Table of Contents

Han Solo (9283, 9288 and 9289) and Ranier (9383, 9388 and 9389)

Note: ALL MODEL 9200s and 9300s are now discontinued

Family Part Numbers

A) 9300s

9383s = 1165- / 1165N-
9389s = 1185- / 1185N-
9388s = 1190- / 1190N-

B) 9200

9283s = 1142-
9289s = 1151-
9288s = 1150-

Links for Han Solo/Ranier

➢ Link to 938x engineering design info ("Ranier"): I:\Company Wide\Project Folders

➢ Link to detailed Engineering information for 9200/9300 series: I:\Engineering\Products\HanSolo (9283)

➢ Link to 9300 manuals (1165-500-0050):\\rocfnp02\idrive\Engineering\Archive\New Released\Manuals\1165-xxxx-xxxx

Associated Part Numbers for 9300s and 9200s

➢ refer to table "dbo_PART" in CustomerService access database.

**Spectracom NetClock Model 9383 on the Internet (outside of firewall)

There is a 9383 at **66.193.84.103**

Login: salesdemo
Password: demo1234

Note: This unit has read-only access. We do not have any NetClock Model 9300s on the Internet with write access.

"End of life"/Discontinuance

Model 9388 discontinuance/obsolescence

➢ Refer to ECO-1404 (in Arena) https://app.bom.com/changes/detail-summary?change_id=2390019112

➢ ECO was completed on 2 Nov 17

➢ Refer also to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\discontinuance- end of life

A) **Models 9383, 9389 and 9388**

Internal Email from Norm West (19 Marc 2014) I have attached the most recent correspondence that I could find regarding our 9300 NetClock discontinuance. Certain options and configurations were discontinued, but we may have left the official discontinuance of the 9300 Series at large incomplete based on the large projects that have been discussed.

9300 Series NetClock Discontinuance Update

We have previously communicated the transition of the NetClock product line from the 9300 to the 9400 Series. We are at another milestone in the transition. We no longer accept orders for configurations that include the base TCXO internal oscillator, SAASM GPS receiver and the display option for 9389. The IRIG input option has previously been discontinued. We can accept orders for 9383 and 9389 with OCXO or Rubidium oscillators with GPS reference and/or the modem option, subject to availability. As previously noted, these configurations are available to support existing programs only. Please continue to propose the equivilent 9400 series or SecureSync model for all other situations. The 9388 Ethernet time server add-on for NetClock continues to be available.

B) **Models 9283, 9289 and 9288**

Email from Jim Allocco (12/12/11) The 9200 series was discontinued on January 2, 2008, so this product has an end of guaranteed service on January 2, 2013. If we can repair the product we obviously will, however, we cannot be certain about the availability of components past next year.

***Repair capabilities for end-of-life NetClocks

Rubidium oscillator replacement (Y100R-0002-RC25)

> ➢ refer to case 203765

Email from Dave Lorah (31 July 2019) "The SRS Rb oscillator P/N Y100R-0002-RC25 is no longer available for individual sale. We can repair these 9283 RB units on a limited basis in house and the cost is $3495.00 plus shipping."

**Specs/hardware

Output accuracy specs (Based on tracking GPS)

System Time (Unit Synced to GPS- Not IRIG, Modem, RS-485, etc)

1PPS output

Accurary (from the Model 9383 user manual): "Positive edge within ± 50 nanoseconds of UTC when locked to GPS."

Jitter: Amount of jitter depends on the installed oscillator. The Option 04: Rubidium oscillator internally generates the 1PPS signal and provides the most stable 1PPS output. The TCXO and OCXO oscillators do not generate 1PPS so we align the 1PPS to the 10 MHz signal. Due to drift of the oscillator, the alignment process can cause jitter of +/- 100ns on the 1PPS output.

Remote and Serial output ports: Output accuracies dependent on which Format is being outputted- Can be +/- 100 usecs or +/- 2 ms.   Refer to Section 1.5 of the manual (Specifications) for details on this.

IRIG output ports Output accuracies dependent on which IRIG Format is being outputted- Can be +/- 20 usecs or +/- 200us.   Refer to Section 1.5 of the manual (Specifications) for details on this.   (see Option 6 note above).

10 MHZ output - Depends on the oscillator installed and also the observation time (short term of 1 to 100 seconds, or long term of days to months)

NTP output – Typically going to be read as 1-10 milliseconds of the accuracy of System Time

Y2k38 (year 2038 rollover issue) ("Unix Millennium Bug")

> ➢ Refer to "**y2k38**" in the Custserviceassist doc I:\Customer Service\1- Cust Assist documents\CustomerServiceAssistance.pdf

MTBF

> ➢ Refer to "MTBF (for all products)" in the Custserviceassist doc I:\Customer Service\1- Cust Assist documents\CustomerServiceAssistance.pdf

Rear panel

A) Model 9300 series

B) Model 9200 series

Model and Serial Number

Email from Dave L (2 Nov 16) If you have a Model 9383 units still installed you can retrieve the serial number through the web browser or through the SNMP Get:

Model Number
.1.3.6.1.4.1.18837.3.1.2.1.20 spectracom.specProducts.specTimeFreqMIB.specTimeFreqObjs.tfSystemObjs.tfSysName

Serial Number
.1.3.6.1.4.1.18837.3.1.2.1.2 spectracom.specProducts.specTimeFreqMIB.specTimeFreqObjs.tfSystemObjs.tfSysSerialNum

Software version
.1.3.6.1.4.1.18837.3.1.2.1.5 spectracom.specProducts.specTimeFreqMIB.specTimeFreqObjs.tfSystemObjs.tfSysAppRev

Power consumption/heat dissipation and Power Supply (power packs)

1. 9300/9200 Faulty power pack in the field

➢ Replacements are no longer available from Spectracom

➢ Customer can locally purchase a replacement 12vdc (or 24vdc for Rb osc) power pack and modify it to have a terminal block connector on the end.

For more info, refer to "**Power packs (for all products)"** in the Custserviceassist doc: I:\Customer Service\1- Cust Assist documents\CustomerServiceAssistance.pdf

Power specs

Online Conversion - Power Conversion

Model 9289 and 9389
12 watts at
1 amp at 12vdc
41 BTU/HOUR

Rubidium unit wants 24V at 2.5A or 60W, we use an external power supply to convert from AC to DC, AC power supply is rated at 70W. 1kVA UPS should last about 12 hours.

9383 current draw:

A) Current draw of 9383 (Option 4: Rb osc not installed)

- 0.5 A at startup, 0.25A after. This is at room temperature.
- BTU rating of a 9289/9389   18W = 61.5 BTU/HR

B) Current draw of 9383 (Option 4: Rb osc is installed)

- 24V at 2.5A or 60W, we use an external power supply to convert from AC to DC, AC power supply is rated at 70W. 1kVA UPS should last about 12 hours.
- Inrush current to the AC power supply is 50A max at 264VAC.
- Worst case power dissipation, 24 V * 2 A = 48 watts = 164 BTU/HR
- Power factor Correction - Complies with EN61000-3-2 and EN61000-3-3.

Operating temperature:

Email from Scott Holmes: Based on the thermal report I wrote, we would want to have a warning when the internal temp = 50°C and a critical condition at 55°C. These conditions will occur when the outside ambient temperature reaches 45°C & 50°C respectively.

938x Input power connector (terminal block connector for the input power)

The connector is a Spectracom part number P900R-0031-011Q (in Arena) https://app.bom.com/items/detail-attach?item_id=1202834979&version_id=10228388708&orb_msg_single_search_p=1&redirect_seqno=8123705349

This is a connector manufactured by ON SHORE TECH and their part number is **EDZ951/3**.
http://www.on-shore.com/products/search?part_number=EDZ951%2FXX

List of On Shore distributors (by State) http://www.on-shore.com/find

The power supply connections for the Model 9389 are looking at the back of the 9389, from left to right on the connector Pin 1 = (+), pin 2 = (-) and pin 3 = GND.

Power monitoring/Power reset of 9300 and 9200 series

Q (From David Brown, Harris) Is there any internal power monitoring or watchdog type circuit or software that could trigger a restart? There are two units on the same power source but only one did this. Would you know how long a power glitch is necessary to trigger a restart? I wonder if there was a very short glitch that was borderline for being long enough to trigger a restart; one unit noticed and one did not. (a rather perverse and low probability situation – but this is Oakland). I have requested our station logs that should indicate if the station noticed the 10 MHz went away – which I assume would happen during a power glitch (unless it was very short). Could the 10 MHz output continue with a low internal voltage that triggers the digital circuits low power reset circuitry?

A **Email from Tom Richardson** (There is a reset circuit that will reset the NetClock if the +5 volts falls below 4.39 volts. This chip only requires a 35 microsecond glitch for reset. The ETX microprocessor module also generates its own reset based on the +5 V in and its own power supplies. I don't have any more information about what the voltage/timing limits are in the ETX. It's possible that a glitch on the power input caused a reset.

PS06-0E1M-DT03 (24 vdc power supply for 9383/9389 with Rb oscillator)

Note: this power pack is **no longer available** from Spectracom

- For more info, refer to "**PS06-0E1M-dt03**" in the custassist doc: ..\CustomerServiceAssistance.pdf

To verify the output of the 24vdc power pack

➢ To measure the 24 VDC, please use a DC voltmeter across the two leads of the terminal block

928x input power connector

- **DC input power:** 9.5 to 30 VDC, 18 watts, through a CE/UL/CSA-approved power adapter (supplied).
- **Connector**: Barrel, 5.5mm O.D., 2.5 mm I. D.
- **Polarity**: Negative shell, positive center.

Reverse polarity of input power

Q. If the input power supply were connected backwards (ground connected to +, +24VDC connected to -), how would this affect this device? What would happen in this case? Would it power up?

A. The 9383 should not be connected to reverse polarity power. This could result in damage to the 9383. There are some electrolytic capacitors on the input that will not take reverse polarity. If these blow the 9383 will be permanently damaged.

The 24V power supply that comes with the 9383 is pre-wired for the correct polarity. If you use your own power, please make sure it is not reverse-connected.

**NetClock Processor (ETX Module) and memory specs/ Sanitizing

NetClock processor: Advantech ETX module AMD Geode™ LX800 ETX CPU Module

- ➢ **Spectracom P/N**: MP20-0003-0006

- ➢ **Advantech P/N**: SOM-4455R-T01A2E

- ➢ **MFG Data Sheet**- Refer to http://www.advantech.com/products/SOM-4455/mod_37BFA971-A650-4458-9588-F569B005CF78.aspx

- ➢ **MFG Manual**: http://support.advantech.com.tw/Support/SearchResult.aspx?keyword=SOM-4455&searchtabs=BIOS,Certificate,Datasheet,Driver,Firmware,Manual,Online%20Training,Specification,Utility,FAQ,Installation,Software%20API,Software%20API%20Manual

- ➢ In Arena: Refer to https://app.bom.com/items/detail-notifications?item_id=1202844915&version_id=10212771508&orb_msg_single_search_p=1&redirect_seqno=5607121138

Specs

Form Factor	ETX 3.0
CPU	AMD LX800
CPU TDP	3.5
Frequency	500MHz
Core Number	1
L2 Cache	128KB
BIOS	Award 4 Mbit
Chipset	AMD CS5536
Technology	DDR 400/333
Max. Capacity	1GB
Socket	1 x 200P SODIMM
Controller	AMD LX800
Graphic Engine	AMD LX800
Graphic Memory	share with system memory

Failure symptoms associated with a bad ETX

- ➢ Can use a keyboard and monitor to look at BIOS settings and power-up
- • Stalls during boot-up sequence
- • Replacing CF card makes no difference in operation.

ETX Network port
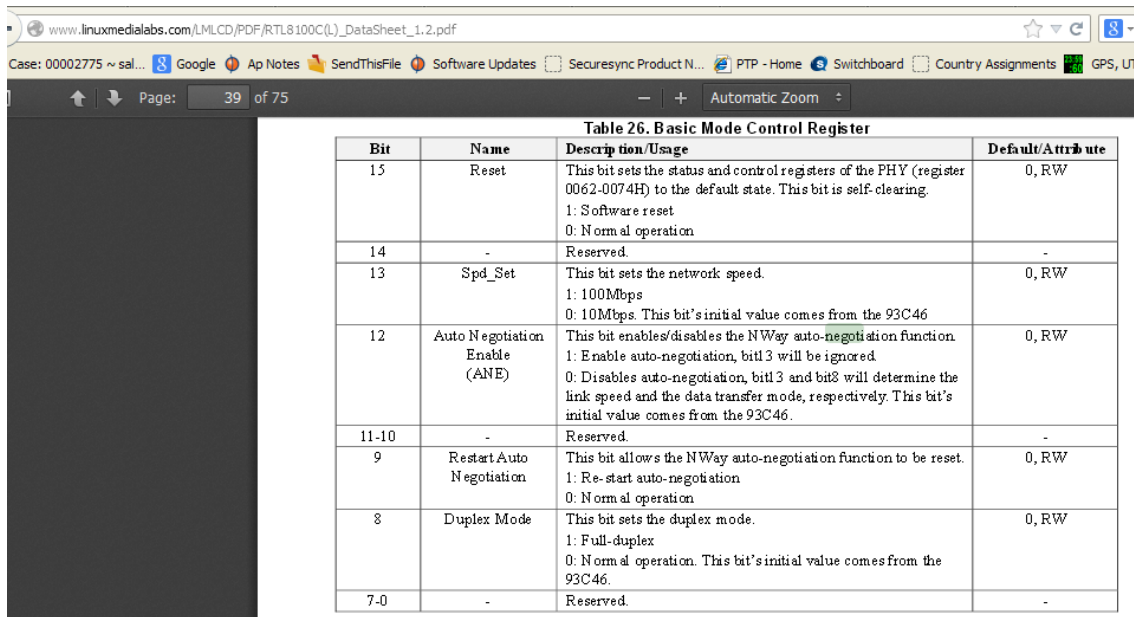
From MFG data sheet Supports up to 4 PCI Master, ISA, 2 IDE, 2 SATA, 4 USB 2.0, **1 10/100 Ethernet**, 2 COM, 1 LPT/FDD, onboard Type II CF socket, Line-in/out, MIC

Chipset:

(Realtek part): http://www.linuxmedialabs.com/LMLCD/PDF/RTL8100C%28L%29_DataSheet_1.2.pdf

10/100Mbps: RTL8100CL-LF Ethernet Controller based on IEEE
802.3u 100Base-T standard

Supports 10Mbps and 100Mbps **NWay auto-negotiation**

Duplex mismatch

➢ Supports both full and half-duplex

➢ Defaults to 10 base-T half duplex if can't duplicate (switch is hard-set to a particular speed).

Main article: *Duplex mismatch* (from Wikipedia)
A duplex mismatch occurs when two connected devices are configured in different duplex modes. This may happen for example if one is configured for auto-negotiation while the other one has a fixed mode of operation that is full duplex (no auto-negotiation). **In such conditions, the auto-negotiation device correctly detects the speed of operation, but is unable to correctly detect the duplex mode. As a result, it sets the correct speed but starts using the half duplex mode.**

Ability to burn new CF card in the field/Replacing the CF card in the field

Q. Is is possible to burn/create a new CF card in the field
A. Email from Dave L (20 Dec 16) **I cannot send the image for 5.4.5 because it does not work to write a card unless the exact memory locations are addressed. It is better to use a card copier to make new CF cards. We use a card copier and a Master CF card when we make CF cards here at Spectracom. This way each card is an exact copy of the master. If the card is not an exact copy it may fail to run the SecureSync properly**

A. An earlier email from Dave L (7 Dec 16) The CF cards cannot be copied easily. You would need a card

copier/duplicator that would copy the data to the exact locations on the new card. If the files are not in the same exact location, it will not work. We have a card duplicator here that works from a pre-programmed master CF card to make exact clones of the CF cards. I can program a CF card to version 3.6.7 and send it to you free of charge. It is not worth returning the old CF card.

_____

NetClock memory/sanitizing (Cost to replace a CF card due to security concerns)

➢ $70.00 each plus shipping fees.

Per Jim Allocco (31 July 2013) If our cost is 20 bucks then I would use $70.00 due to material, overhead, burden, and order entry costs.

Volatile memory- 256MB DDR SDRAM,
 Non-Volatile memory 1Kbit EEPROM,
 Media - 256MB Compact flash card.

Refer to (second page of 9383Memory.doc document): EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Memory and Sanitizing

"Wiping" the CF card
➢ Unlike the SecureSync/9400s, the CF card can't be completely "wiped" in the Model 9300 and 9200 series. Configs can be reset to factory defaults and logs deleted, but this doesn't "wipe" the card.
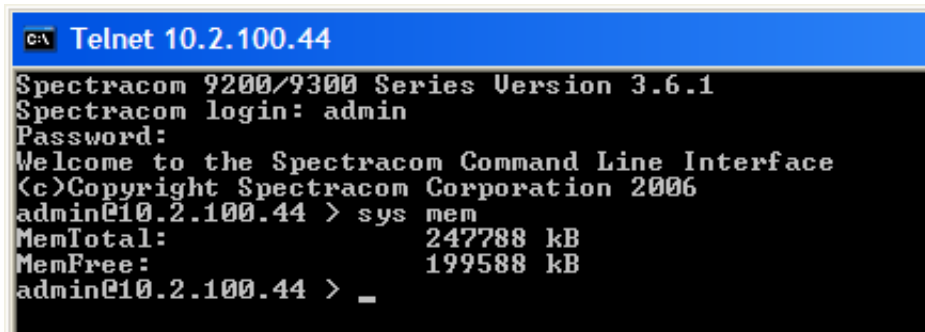
Email Keith sent to a customer When I responded to you earlier about the ability to completely wipe the CF card, I was thinking you were working with our newer SecureSync NTP server, instead of the NetClock Model 9383 (the predecessor to SecureSync).

Unlike with SecureSync, the CF card can't be completed "wiped" in a NetClock Model 9383.   The NetClock Model 9383 can be reset to factory default configurations and the logs can be deleted. But this doesn't completely "wipe" the CF card.

If you would like to replace the CF card in just one Model 9383, I can send you a replacement with the latest version of software (version 3.6.1) pre-burned into the card, at no cost (if you have multiple units that you would like to replace the CF card in, the costs for the NetClock's CF card is the same as the cost for the SecureSync CF cards that I provided you with earlier).

Command to check the CF card memory being used

➢ The command is sys mem <enter>

FIPS compliancy

> Refer to: FIPS compliancy (FIPS 140-2) for all Spectracom NTP servers

**Chassis related

****Rack- Mounting/dimension drawings

> Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\drawings\1165-1000-0775r3 (mtg-outline 9389).pdf

****ETX module heat block

> Heart block is mounted to the bottom of the top cover.

ECN to change the size of the heat block, to possibly help alleviate the problems with the ETX failures: ECN 2834 (ECN bring signed off around 1/25/12).

****Chassis cover really warm above the ETX module

Q. Our demo unit NC9383 has a temperature problem.

When the NC9383 is getting warm, we cannot touch the unit.

If I use my hand to touch the unit to sense the temperature,
   i) on the top, above the CPU area, (near the heat sink area), it hangs.
   ii) on the right side, near the air vent, it hangs.

When hang-up, both front panel displays are blank. Sync LED is off. Only Power LED is on.
We have to remove power, and re-power, to reset it.

That means we cannot touch the unit, when it is getting warm.
The unit is in my office; room temperature is 25-26 Deg. C

A reply from Dave Lorah (22 July 2014) I have seen similar failures like you reported. The area you described as getting hot is here the heat sink transfers the CPU heat to the top cover. It should not be so hot so it burns your hand.

If tapping this area causes the unit to crash, it needs a new computer module. It is damaged. The unit will need to be returned to Spectracom for repair. can you please tell me the serial number of this unit?

FAQ's

- The ground lug on the rear panel is a #6 with a 6/32 thread size.

- **Harmonized code** for the 9300 series: 9106 903 0000

- **IP Rating**: Refer to IP rating/Ingress rating (for all products)

- Shipping info for 9383:

➢ Weight of 9383= 11 lbs

➢ Shipping container dimensions = 25 in x 18 in x 7 in

.

Visio Stencils/shapes

➢ Link to the Model 9300 series Visio Stencils on our website:

http://www.spectracomcorp.com/tabid/456/Default.aspx

http://www.spectracomcorp.com/portals/0/support/visio/spectracom_time_products_9300_Series.zip

Options and Specials

- ➢ Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Options for 928x and 938x

928x Options

Option	Model 9288	Model 9289	Model 9283	Notes
Standard		(1) RS485 output (REM1) (1) RS-232 output (SER1)	Display, IRIG, 10 MHz, 1PPS BNC (2) RS-485 output (REM1, REM2) (2) RS-232 Output (SER1, SER2)	
02	N/A	Adds SER2, REM2 and front panel display	N/A	
03	N/A	Adds Modem	Adds Modem	
04	N/A	N/A	Changes TCXO to Rubidium	
05	N/A	N/A	Changes TCXO to OCXO	
06	N/A	N/A	Removes GPS RX, adds IRIG input	Refer to additional info below
07	N/A	N/A	SAASM Receiver (Trimble Force 22)	Refer to additional info further below

938x Options

- Option 02, Option 03, Option 04, Option 05, Option 06, Option 07, Option 08, Option 09, Option 10, Option 11, SP360

Option	9388	9389	9383
Standard configuration	1 RS-485 input 1 RS-485 output 1 RS-232 output (No 1PPS,10 MHz or IRIG output)	1 RS485 output (REM1), 1 RS-232 output (SER1) (No 1PPS,10 MHz or IRIG output)	Display, IRIG, 10 MHz, 1PPS out, 1PPS In BNC, 2 RS485 output (REM1,REM2) 2 RS-232 Output (SER1, SER2)
2	N/A	Adds Ser2, REM2, 1PPS In (BNC) and front panel display	N/A
3	N/A	Adds Modem	Adds Modem
4	N/A	Changes TCXO to Rb osc	Changes TCXO to Rb osc
5	N/A	Changes TCXO to OCXO osc	changes TCXO to OCXO osc
6	N/A	Removes GPS RX, adds IRIG input	Removes GPS RX, adds IRIG input
7	N/A	SAASM GPS	SAASM GPS
8	N/A	GPS Rx (Standard)	GPS Rx (Standard)
9	TCXO oscillator (standard)	TCXO osc (standard)	TCXO osc (standard)
10 (Globecomm)	N/A	N/A	REM2 is differential IRIG B002 out, 10 MHZ is low phase noise output (at 10DB level)
11 (FAA)	N/A	N/A	Removes the IRIG out and 1PPS IN connectors to provide two IRIG B126 outputs and a Format 09 ASCII serial time code. The standard 9383 NetClock's SERIAL COMM 2 port is replaced by the Option 11 ASCII Time Code Output port. 9600 Baud, 7 Bit, Even parity, 1 stop bit.
9383 SP360 (Harris- ECN 2265)	N/A	N/A	Link to SP360 manual addendum (1165-5000-0052): I:\New Released\Manuals\1165-xxxx-xxxx Link to SP360 Process details: ..\Manufacturing\Manufacturing Shared\Process Details\1165-XXXX-XXXX\1165-XXXX-0600\1165-0135-0600 Simulcast modification for Ed. Changes oscillator to a high temp Rb oscillator (with a 3 year warranty). Other changes also incorporated. Special Request Number SP360 modifies the standard 9383 to output 5 10 MHz sine wave outputs, add an RJ12 connector with 1 1PPS RS-485 output and 2 alarm relay outputs, and extends the upper temperature range to +55 degrees Celsius. This special also replaces the default Spectracom front panel overlay with a Tyco Electronics overlay. SP360 removes IRIG and Remote and Serial Time code outputs and the 1PPS input.

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**Model 9383 SP360

- ➤ Simulcast modification for Ed O'Connor

- ➤ Shortcut to SP360 in Specials folder: \\rocfnp02\idrive\Engineering\Archive\New Released\Archived Documents\Project Specials\SP351 to SP400\SP360 ECN2236

- ➤ Link to SP360 manual addendum (1165-5000-0052) \Engineering\Archive\New Released\Manuals\1165-xxxx-xxxx

- ➤ Link to SP360 Process details (1165-0135-0600): \\rocfnp02\idrive\Engineering\Archive\New Released\Archived Documents\Process Details\1165-xxxx-xxxx-PD

  - o **Note**: these are not in Arena

SP360:

- • Changes the Rb oscillator to an extended temp SRO-100 RB oscillator (with a 3-year warranty).
  - A) **Standard 9383s with Option 04** used SpectraTime SRO-100 Rb oscillator P/N **Y100-0002-RH01** (SRO-100/NO60/10M/24V)
  - B) **9383 SP360** installed extended temp SpectraTime SRO-100 Rb oscillators P/N **Y100-0002-RH02** (SRO-100/10M/24V/NO60/EP)
    - o In Arena: https://app.bom.com/items/detail-spec?item_id=1202848063&version_id=10221203768&orb_msg_single_search_p=1
    - o I believe "high temp RB" was same oscillators used on all 9383s, just "hand-picked" based on each oscilator's individual performance (not yet confirmed).
  - (just for comparison SecureSyncs use Y100R-0002-RC03 (SpectraTime SRO-100/10M/12V/NO60/F/S/E)

- • Modifies the standard 9383 to output 5 10 MHz sine wave outputs,
- • Add an RJ12 connector with (1) 1PPS RS-485 output and 2 alarm relay outputs
- • Extends the upper temperature range to +55 degrees Celsius.
- • This special also replaces the default Spectracom front panel overlay with a Tyco Electronics overlay.
- • Removes IRIG, Remote and Serial Time code outputs and the 1PPS input.
- • Adds **cooling fan** (**P/N: B101R-05R5-000H**) to front panel.

Input power:
- ➤ (DC input only) 9.5 to 30 VDC, 18 watts, through a CE/UL/CSA-approved power adapter (supplied).

  NOTE: Rubidium (Option 04) uses a 24 VDC nominal (+18 – +32 VDC) @ 2.5 amps power supply.

A) **9383 SP360 front panel cooling fan (fan installed with SP360 only)**

Note: 1165 schematic shows the fan for SP360 is apparently temperature controlled – not always on. It's connected via J4 and driven by IC. It's not connected directly to 5vdc.

Note about schematic: it doesn't contain the word "**fan**". So, search the schematic for "**J4**" instead.
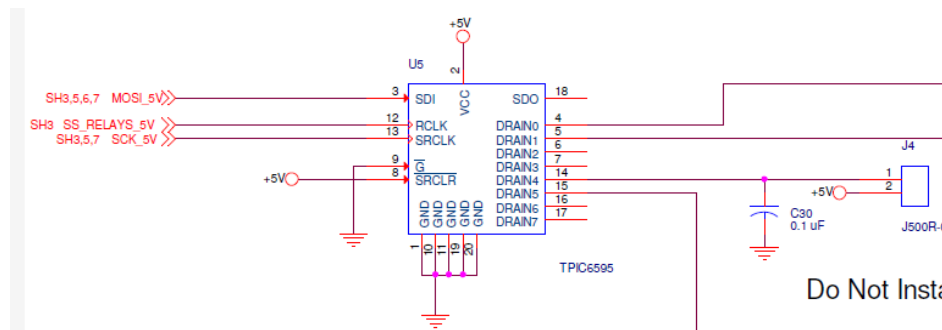
Email from Mark McGregor (18 Mar 16) think that the fan must be J4 of the main board, sheet 2 of the schematic (**above**), connected to U5 pin 14, even though the schematic (**1165-1000-0200 and 1165-1001-0300**) says "Do not populate J4". This implies the fan is under software control. It may be temperature controlled, as I saw a temperature sensor, AD7814, U4 also on sheet 2. Tom Richardson would know for sure, if anyone would.

B) 9383 SP360 Rear panel
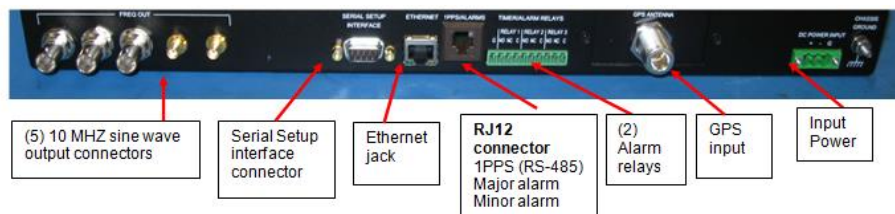
Below info is from page 4 of the Model 9383 SP60 manual (**1165-5000-0052**): I:\New Released\Manuals\1165-xxxx-xxxx

SP360: Model 9383 with 5 - 10 MHz Outputs, RS-485 1PPS, Extended Temperature Range Rubidium (Rb) oscillator

Special Request Number SP360 modifies the standard 9383 to output 5 10 MHz sine wave outputs, adds an RJ12 connector with 1 1PPS RS-485 output and 2 alarm relay outputs, and extend the upper temperature range to +55 degrees Celsius. This special also replaces the default Spectracom front panel overlay with a Harris Electronics overlay.

SP360 removes IRIG and Remote and Serial Time code outputs and the 1PPS input.

Signal: 10 MHz
Connector: 5 outputs, 3 BNC and 2 SMA
Signal Level: +10 dBm +/- 3 dB
Accuracy: GPS locked: $1x10^{-12}$, -30 to +55 deg C
Holdover: < 2 us/day
Harmonics: < -25 dBc
Spurious: < -80 dBc

10 MHz output Phase Noise less than:

- ➢ -80 dBc @ 1Hz
- ➢ -100 dBc @ 10 Hz
- ➢ -125 dBc @ 100 Hz
- ➢ -140 dBc @ 1 kHz
- ➢ −145 dBc @ 10 kHz

Output Isolation: 70dB

RJ12 (RJ-12) connector added to rear panel (for SP360 0nly)

- ➢ Provides 1PPS output, Minor and Major alarm output status
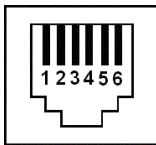
1PPS and Alarm Output Connector

1PPS output
Signal: 1 PPS
Connector: RJ12 pin 3, + and 4, -
Signal Level: meets RS-485 differential signaling levels.
Control: The 1PPS output signal can be delayed in time by up to 50 milliseconds in 0.1 usec steps.
Alarm Relay Outputs

Signal: TTL compatible
Connector: RJ12
   Pin 1 GND
   Pin 2 Major Alarm Relay 3 set to Major alarm on relay configuration
   Pin 5 Minor Alarm Relay 2 set to Minor alarm on relay configuration
   Pin 6 GND
      Voltage: 5V pulled up thru 10k Ohms, GND when alarm
      Current: 0.5A

Default IP address setting. DHCP disabled, static IP address set by factory.
- IP Address: 10.128.5.97
- Subnet Mask: 255.255.255.248 (/29)
- Default Gateway: 10.128.5.102

Harris Electronics Overlay
Extra year warranty on Rubidium Oscillator

9383 SP 360 Rb oscillator

- SP360 Changes Rb oscillator to an extended temp SRO-100 RB oscillator (with a 3-year warranty).

A) **Standard 9383s with Option 04** used SpectraTime SRO-100 Rb oscillator P/N **Y100-0002-RH01** (SRO-100/NO60/10M/24V)

B) **9383 SP360** installed extended temp SpectraTime SRO-100 Rb oscillators P/N **Y100-0002-RH02** (SRO-100/10M/24V/NO60/EP)

   o In Arena: https://app.bom.com/items/detail-spec?item_id=1202848063&version_id=10221203768&orb_msg_single_search_p=1

   o I believe "high temp RB" was same oscillators used on all 9383s, just "hand-picked" based on each oscilator's individual performance (not yet confirmed).

(just for comparison SecureSyncs use **Y100R-0002-RC03** (SpectraTime SRO-100/10M/12V/NO60/F/S/E)

Option 06 (option 06) : IRIG input

Important Note: As of at least June 2012, we are out of the Model 9300 series IRIG option boards. We do not plan on purchasing any more. However, we can still get all of the parts to repair the existing IRIG option boards.

IRIG input accepts the following IRIG Formats

IRIG Code Format Provided	Code Description
B000	IRIG B, TTL, BCD,CF and SBS
B120	IRIG B, AM, 1 kHz , BCD,CF and SBS

IRIG AM and IRIG DCLS input connectors

BNC Connector Pin-out	
Center Pin	IRIG HI
Shield	IRIG LO

DB9 Connector Pin-out	
Pin 1	NC
Pin 2	Ground
Pin 3	Ground
Pin 4	DCLS IRIG IN + (for single ended)
Pin 5	DCLS IRIG IN -
Pin 6	NC
Pin 7	NC
Pin 8	NC
Pin 9	NC

Only web browser configuration for IRIG input

Important note: When using IRIG input, the input year must be set correctly. The year needs to be defined as either "read from the IRIG input" or as a manually entered value. Since the read from the IRIG signal is designed around the IRIG 200-04 spec, and since the Spectracom NetClocks don't meet this spec, do not use this selection with a NetClock. Manually enter the year ONLY.

If the "read year from IRIG" is selected and the NetClock is synced to GPS, the year will always be read as 2010. If the NetClock is not synced to GPS, the year will be read as 2000 (no matter what the present year happens to be)!!!

Option 6: IRIG input synchronization is about 28 microseconds to UTC due to the IRIG AM input being a sine-wave with no clear on-time point to reference (slower rise time than a square wave input).

Q. Choosing "Use specified year" in **System** -> **IRIG Input configuration**, the configuration is automatically changed with a new year event?

A. Yes, the year will automatically rollover at the end of year without any user intervention. However, keep in mind that if the year value is ever manually changed after NTP is enabled, will require NTP to be disabled and restarted in order for

it to use the newly defined year value. NTP does not need to be started or stopped for an end of year rollover. This process is automatic.

Note: Spectracom Basingstoke found that the time offsets between the Input and the Output was based on the modulation ratio of the IRIG signal. Changing the modulation affects the timing offsets.

It was noted that prior to the final test, the test engineer had reduced the modulation index of the IRIG B modulated timecode from the source equipment. This was to ensure that this timecode was in the middle of the range specified for the system (3:1). To ascertain whether this was a factor in the change of time delay, the modulation index was increased to (4:1) and the system was restarted. This resulted in a time delay of 17µS confirming that the delay parameter is a function of the modulation index of the input IRIG B timecode.

Option 07 (Option 7): SAASM Force-22 receiver

- ➢ **Primary document (1165-5000-0051):** U:\Documentation\Released\Manuals\1165-xxxx-xxxx

- ➢ **Secondary info** U:\Engineering\SAASM-FOUO\CustomerService\9300 series NTP servers

- ➢ **For replacement battery info, refer to**: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\SAASM receiver

Battery alarm asserted in NetClock: For alarm error codes, refer to "**GPS Warning1.doc**" document at the link to U drive above for alarm error codes.

Mar 13 17:04:06 Spectracom spectracom: [system] GPS Warning (11): Low memory

Email from Dave Lorah (Aug 2014) This indicates the receiver battery needs to be replaced.
The 9383 equipped with the SASSM GPS Receiver has an internal lithium battery that can be replaced in the field.
I have attached some information on the replacement for you. Please let me know if you have any questions.

Option 10 (SAS17E-IR) Differential IRIG/Low phase noise output for Globecomm

> ➢ - REM2 becomes differential IRIG output (on +Data and –Data leads)

> ➢ - Second internal oscillator provides lower phase noise on 10MHZ output.

> ➢ - Used in conjunction with SAS-17E–IR (Switch and distribution amplifier. -IR is an available option for the SAS-17E that provides a different number and types of outputs).

Refer to: 1165-5000-0054 document located at I:\New Released\Manuals\1165-xxxx-xxxx for documentation on Option 10 and SAS-17-IR (\\rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E SAS17E-IR\SAS17E-IR (Option 10))

FAQs for Option 10

My questions pertain to the configuration setup of the interface.

> ➢ Does the interface setup as shown in Figure 3-37 of the 9383 O&M have any impact on the Option 10 IRIG-B002 output?

Keith's response- There are two IRIG outputs on the back of a Model 9383 with Option 10 (one is a BNC connector and the other is a DB9 connector). The standard Model 9383 has only the BNC connector available. The Interface/RIG output page of the web browser affects the outputs of both the BNC connector and the DB9 connector. Changing settings in this page will affect both ports.

The Option 10 specs indicate the DB9 output is B002 (IRIG B, TTL, BCD toy). Changing the IRIG Format to E, enabling Signature Control, or changing the System Clock selection in this page of the browser affects the IRIG outputs of both connectors.

> ➢ The required signal is RS-485, is the TTL setting for FORMAT B Level defaulted to Rs-485 differential?

Keith's response- The BNC connector can be either AM or TTL modulated. However, the DB9 IRIG output is derived from a differential amplifier, so it will always be a differential RS-485 signal.

> ➢ Does IRIG Signature have any impact?

Keith's response- Enabling Signature Control will cause the modulation of the time code data streams (from both IRIG output ports) to stop, if the NetClock is not in sync with GPS.

The IRIG outputs do not have an indication of the NetClock's sync status (like many of the ASCII Data Formats provide). So Signature Control can be used as the method to prevent a system connected to the IRIG output from using the IRIG reference, if the NetClock is not in sync with GPS.

> ➢ Is the Option 10 IRIG-B002 selectable between GPS and UTC time?

Keith's response- Yes. The System Clock drop-down selection allows both IRIG outputs to be either in UTC time scale or GPS time scale ("B002" specs do not define time scale, so changing this value will not prevent the DB9 output from still being "B002".

> ➢ Is the Option 10 IRIG output configured to be B002, RS-485 by default?

Keith's response- Yes. The factory default configuration is B002 (IRIG B, RS-485 differential output) on the DB9 connector.

In summary of my previous reply, the only change that Option 10 implements to the Model 9383 (as associated with the IRIG output) is it takes the standard IRIG TTL, single-ended BNC output signal and passes this same signal through a differential RS-485 amplifier, in order to output a second IRIG differential output. When this Option was added to the Model 9383 for Globecomm, it was desired for the Model 9383 to have a differential IRIG output, in addition to the standard single-ended TTL BNC connector.

My apologies on the reference to the DB9 connector (RS-232) for the IRIG B002 signal. As this special IRIG output for Option 10 replaces the standard RS-485 Remote port 2 output, I should have mentioned that the Option 10 IRIG output is on a three-position terminal block connector, instead of the DB9 connector.

By the way, thanks for adding that the DB9 connector can also be referred to as a DE9 connector FYI-, the reference to DB9 is not incorrect. The RS-232 connectors on the Model are also called DB9 connectors (with 9 pins). From http://www.cablestogo.com/resources/db.asp

DB9
A DB9 connector has 9 pins arranged in two rows, with one row on top of the other. The top row has 5 pins and the lower row has 4 pins. This interface is commonly used for RS-232 serial applications.
As the Option 10 IRIG output always goes through the RS-485 differential amplifier, this particular IRIG output will always be an RS-485 differential output (by definition, RS-485 is a differential signal), no matter how you configure the Interface/ IRIG output page of the browser. However, this output may not always be B0002, as configuration changes in this page of the web browser can affect the formatting of the IRIG RS-485 output.
TOY does stand for Time of Year. The "2" in B002 indicates the coded expressions is BCD output (HH,MM,SS,DDD).

"B0002" doesn't indicate/imply "RS-485". The first "0" in B002 indicates the signal is an IRIG DCLS output. In order to provide the differential RS-485 output that was desired by Globecomm ("differential" RS-485 is not part of the B002 spec), the standard single-ended IRIG TTL BNC output signal is applied to the input of an RS-485 differential amplifier. The output of this RS-485 amplifier is then passed to the three pin RS-485 Port 2 terminal block connector on the back of the Model 9383. Since the RS-485 IRIG output is derived directly from the IRIG TTL output, any changes that are made to the Interface/IRIG output page of the browser, also inherently apply to the IRIG RS-485 output as well.

So changing settings in the Interface/IRIG output page of the browser, can cause the RS-485 IRIG output to no longer be "B002" output (IRIG B, 1000 Hz, DCLS, BCD out). The only digit that will remain a constant in this IRIG output code is the first "0", which indicates the IRIG output is a DCLS signal. The other values in "B002" can be affected by changes made in the Interface/IRIG output page of the browser. This IRIG output will always be RS-485 (differential) output, no matter how the Model 9383 is configured in its web browser.

Option 11: FAA

Option 11 documentation (1165-5000-0053)

I:\Engineering\Archive\New Released\Manuals\1165-xxxx-xxxx

➢ Option 11 provides two IRIG outputs (one is IRIG B126 and the other is E126) and a Format 09 ASCII serial time code output.

➢ The standard IRIG out and 1PPS are replaced by the IRG B and IRIG E outputs.

➢ Unlike the standard B122/E122 output, the Option 11's IRIG B126 and E126 outputs DO contain the present year (B126 and E126 contain BCD $_{TOY}$, BCD $_{year}$).

Primary POC for NICE Systems (Option 11 time servers):
David Myles
Program Manager, FAA VRRP

david.myles@nice.com
201-549-1841 (office)
304-268-8175 (cell)

11480 Commerce Park Drive - Suite 200
Reston, VA 20191
United States

A) Down-up converter for FAA

The Up converter needs to be externally powered in order for it to pass RF. There is a light on it that will turn on from our 5vdc even if the 12 vdc power pack is not connected! This will result in loss of reception. Make sure up converter is powered by wall transformer.
Refer to:

➢ Down-Up converter installation manual (1201-5001-0050) in Arena: https://app.bom.com/items/detail-attach?item_id=1203165703&version_id=10221246328&orb_msg_single_search_p=1

➢ Option 11 documentation ("1165-5000-0053 Opt 11") (not in Arena)

\\rocfnp01\idrivedata\Engineering\Archive\New Released\Manuals\1165-xxxx-xxxx

Down/Up Antenna impedance measurement- troubleshooting

The BNC connector on the down converter antenna must be capacitively coupled. I couldn't get a stable impedance measurement on the antenna. It started at about 1.6Mohms and quickly ramped up to at least 8Mohms.

If the fault LED is lit on the Up converter, make sure that ~5vdc is present on the coax cable attached to the antenna (as supplied by the Up converter to power the antenna). If 5vdc is not present, a cable issue exists or the Up converter not providing it. Make sure the Up converter power supply is plugged in and has the correct voltage present (12vdc).

Internal battery for ETX / RTC

The Model 9200/9300s contain one internal battery (0.22A-Hr Lithium coin cell battery). The battery is used for backup power to the ETX microprocessor. Changing the battery needs to be performed at the factory to reset the ETX BIOS once the battery has been replaced.

Email from Mark McGregor on 9/2/10 (Regarding NetClock and SecureSync batteries):
The backup battery life is based on the current draw of the ETX module when the SecureSync power is off. Battery life= Battery capacity (A-hr)/battery current (A). The BR3032 capacity is 0.5 A-hr. The ETX draws 12.5 uA when off. This results in 4.57 years of backup time/off time. Battery is not drained when power is on.

For the 93xx (NetClocks), a CR2032 is used, 0.22A-Hr. It uses the same ETX with 12.5uA of current draw when off. This results in 2 years of backup time/off time for the 93xx, so the SecureSync is an improvement over the 93xx. The SecureSync battery is also specified to operate over a wider temperature range of -30C to 80C, whereas the 93xx is a -30C to 60C battery.

928x/938x Operating System/Information on our Linux kernel (I believe this is for brutal- not gentoo)

Email from Paul Myers:
Brutal/Vile Linux is the name of our Spectracom LINUX Distribution. We build the Linux OS from scratch using the "Linux From Scratch" website for support. The Linux Kernel Version is 2.6.15. We tailor the configuration to our needs, in particular to a small footprint for the CompactFlash. I recommend you tell them we run Linux 2.6. If they must know it is Linux 2.6.15.

The Kernel version might change on future Brutal releases for Lafayette/NetClock as BOTH use the same Brutal Distribution at this time. The less the customers know, the better sometimes. I would hope telling the background could be left out. Linux 2.6 or Linux 2.6.15 should suffice.

CLI interface/Serial Setup Interface

> ➢ There are no CLI commands available for the front panel
> ➢ CLI commands are documented in Section 6 of the "1165" user manual.

Available commands (syntax breakdowns are further below)

stc (Models 9388 and 9288 only)

time

reboot

halt

log

option

ltc

net

sys

mdo

ser

rem

irig

frq

B) GNU Bash

- ➢ NetClocks and SecureSyncs have GNU Bash installed
- ➢ The CLI command to obtain the Bash version is: **bash -version** ("dash.dash" before version)

Front panel – no commands available

Log

  log show Shows the contents of a log.
  log get Gets the record #[HANDLE] from a log.

OBJECT

    j   - Journal log
    a   - Alarm log
    g   - GPS qualification Log
    o   - Operational log
    x   - Oscillator log
    d   - Dialout log
    n   - NTP log
    r   - Event relay log
    t   - Authorization log
    u   - Update log

  HANDLE: Record number to access. The first record is 0.

option

provides a means to set, clear and display product configuration options.

USAGE: option COMMAND [OPTION | PRODUCT] [VALUE]
  COMMAND
    display - Displays current option settings.
    enable - Enables options after verifying the hash value.

ltc

used to create up to five Local clocks. Local clocks allow many of the output ports to be able to provide time data as local time instead of just UTC time. This command requires admin level login.

The 'ltc' group of commands are used to manage the local time clocks.

USAGE: ltc COMMAND [INDEX | NAME] [...]
  COMMAND = {disp | create | delete | tz | dst}
    disp - Displays information about the local clock.
    Create   - Creates a new local clock. Multiple consecutive spaces in the name will be reduced to a single space
    delete   - Deletes a local clock at the specified index.
    tz   - Assigns a new time zone offset for the local clock.
    dst   - Assigns a new daylight saving rule to the clock.

Command for new US DST rule (post 2006):

ltc dst1 bwd in 2 sun mar 02:00 01:00 out 1 sun nov 02:00

net (network)

The command, *net*, is used to configure the network interface. The *net* command consists of a set of subcommands that are used to get, set or change each individual network setting. Some of the network settings require admin level security in order to set or change them.

help net

USAGE: net COMMAND [Arguments]
  COMMAND
    config - Configure IP settings.
    show - Displays network configurations.
    Daytime - Enable/disable Daytime.
    time - Enable/disable UNIX time.
    telnet - Enable/disable Telnet.
    ftp   Enable/disable FTP
    http - Enable/disable HTTP.
    https - Enable/disable secure HTTP.
    ssh   - Enable/disable SSH.

Sys (system memory)

help sys

The sys group of commands are used to retrieve information about the system.

USAGE: sys COMMAND [Arguments]
  COMMAND
    sys mem - Display memory information. Use v for verbose mode.

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mdo (modem dialout)

The mdo command is used to configure the dial-out modem option if it is installed. The mdo command consists of a set of subcommands used to control logs and modem configuration.

help mdo

USAGE: mdo COMMAND [Arguments]

COMMAND
    Mode Sets the Serial Setup Interface into a 'console' or 'modem' mode.
        Baud rate can be specified in modem mode.
    Dialnow Dials out immediately.
    Baud Sets baud rate specified by user.

ITU-R protocols use 1200 and ACTS protocols use 9600. NIST ACTS may support either, however 9600 is recommended.
    speaker   - Sets modem speaker on/off.

Ser (Serial RS-232 outputs)

➢ The ser command allows the rear panel Serial ports to be configured from the console. They require admin level login.

Root Command	Function	Type for Serial port 1	Type for Serial port 2
disp	Displays the current serial port settings	**ser disp ser1**	**ser disp ser2**
all	Configures all settings of a serial port.	**ser all ser1**	**ser all ser2**
fmt	Configures the format of the serial port output	**ser fmt ser1 0**	**ser fmt ser2 0**
req	Sets the request character on a serial port	**ser req ser1 none**	**ser req ser2 none**
ltc	Sets the reference clock on the serial output	**ser ltc ser1 1**	**ser ltc ser2 1**
baud	Configures the baud rate of a serial port.	**ser baud ser1 9600**	**ser baud ser1 9600**

rem (Remote RS-485 outputs)

➢ The rem command allows the rear panel Remote RS-485 output(s) to be configured from the console port. This command requires admin level login to modify.

Root Command	Function	Type for Remote port 1	Type for Remote port 2
disp	Displays the current serial port settings	**rem disp rem1**	**rem disp rem2**
all	Configures all settings of a serial port.	**rem all rem1**	**rem all rem2**
fmt	Configures the format of the serial port output	**rem fmt rem1 0**	**rem fmt rem2 0**
req	Sets the request character on a serial port.	**rem req rem1 none**	**rem req rem2 none**
ltc	Sets the reference clock on the serial output	**rem ltc rem1 1**	**rem ltc rem2 1**
baud	Configures the baud rate of a serial port.	**rem baud rem1 9600**	**rem baud ser1 9600**

irig

The 'irig' group of commands are used to control the irig subsystem.

USAGE: irig COMMAND ARG
  COMMAND = {disp | b | brb | e | amp | ltc | sig}
   disp - Display the current IRIG port settings.
   b   - Sets the irig output to format B.
   brb   - Sets the irig output to format B Rubidium (TTL level)
         This option is only available on Rubidium units.
   e   - Sets the irig output to format E.
   amp   - Sets the amplitude level for AM signals.
   ltc   - Sets the reference clock for the IRIG output.
   sig   - Sets the signature control of the IRIG port.

frq (10 MHz output)

The frq group of commands are used manage frequency interfaces.

USAGE: frq COMMAND INDEX [Arguments]
  COMMAND
   frq mode Sets the signature control mode.
   frq status Displays the status of the selected frequency output.

stc (Serial Time Code RS-485 input for Models 9288 and 9388 only)

The stc group of commands are used to setup serial time code input.

COMMAND
    disp   - Displays the current serial time code input settings.
    all   - Configures all settings of serial time code input.
    fmt   - Configures the format of the serial time code input.
    baud   - Configures the baud rate of serial time code input.
    year   - Configures the year used by format 0 serial time code input

stc disp (to display all of the current setting)

Example response
  Serial time code input settings:
     Baud rate: 9600
     Output format: 02
     Year for format 0: 2008

stc all (to configure all of the RS-485 input port settings with a single command)

Configures all settings of serial time code input in one string (see further below for individual commands)
Syntax for this command: *stc all BAUD FORMAT YEAR*

 Example for Format 2 input: **stc all 9600 02 2009**

The serial time code input is not format 0 so the year input is ignored.
Setting up serial time code input successfully
admin@10.2.128.11 > **stc**

The stc group of commands are used to setup serial time code input.
USAGE: stc COMMAND [Arguments]
  COMMAND
    disp   - Displays the current serial time code input settings.
    all   - Configures all settings of serial time code input.
    fmt   - Configures the format of the serial time code input.
    baud   - Configures the baud rate of serial time code input.
    year   - Configures the year used by format 0 serial time code input
     Example for Format 0 input (needs to include year): **stc all 9600 00 2009**

Setting up serial time code input successfully
admin@10.2.128.11 > **stc disp**

Example response
Serial time code input settings:
   Baud rate: 9600
   Output format: 00
   Year for format 0: 2009

Individual/available stc commands

stc fmt 00

➢   Format for serial time code input was successfully set

stc baud 9600

➢   Baud rate for serial time code input was successfully set

stc year 2009

- ➢ Year used for format 0 was successfully set

stc fmt 02

- ➢ Format for serial time code input was successfully set

System Time/System timescale/Leap Seconds

System Time

➢ **System** -> **System Time** page

SNMP Alarm GPS System Time Local System Clocks Set System Mode Update Reboot/Halt Holdover Log Configuration	If the NetClock is currently receiving valid time from a reference source (ie. GPS, IRIG, Serial Time Code, etc.), any date/time information configured using th page will be overwritten. **Note:** Date/time information configured using this page is considered to be UTC. **System Time:** ☐ Set System Time using user-specified UTC time below Date: 3 ▾ Mar ▾ 2016 Time: 21 : 27 : 06 **Leap Seconds:** Number of leap seconds between UTC and GPS time: 17 [Submit] [Reset]

Manually setting the time

➢ ***unlike SecureSync/9400s, manually setting the System Time DOES NOT place the NetClock into Sync and therefore DOES NOT allow NTP to go into sync/Stratum 1 (as confirmed 17 June 2019, by Keith removing the GPS antenna, manually setting the time and observing System Time remaining not in sync and NTP remaining in Sync, Stratum 16),

➢ External input (such as GPS input) overrides any manually set date/time (almost instantly)

  • Must disconnect all inputs in order to manually set the System, date/time

➢ Can manually set the System Time as desired, via the **System** -> **System Time** page of the browser

  1. Select the "**Set System Time using user-specified UTC time below**" checkbox

  2. Set the desired date/time (in UTC timescale) or leave as-is. Then present submit.

System Time:

☑ Set System Time using user-specified UTC time below

Date: 17 ✔ Jun ✔ 2019
Time: 21 : 31 : 03

Important Note: Status and Logs -> **System Status** page will continue to report "Time Sync = not in sync" and NTP in sync (stratum 16) as shown below. GPS input is required for the System to go into sync ahd NTP to go to Stratum 1 (like it does in the newer SecureSyncs and 9400s

Dynamic System Information

Uptime: 0 years, 0 days, 0 hours, 12 minutes, 36 seconds
Current internal temperature: 40.50 C (104.90 F)
Major Alarm is (ON)
Minor Alarm is (ON)
Time Sync Status: Not in Sync
Time Source: None
NTP Service Status : In Sync (Stratum 16)

Static System Information

Product Name is Spectracom Corp. Model 9383
Application Name is hs92XX
Application Rev is 3.6.7
Application Date is 10/24/2014
SSH Rev is OpenSSH_6.6p1
SSL Rev is OpenSSL 1.0.1j 15 Oct 2014
NTP Rev is 4.2.0@1.1161-r
Unit's Serial Number: 2393

Per Salesforce Case Number 197916

Q Spectracom Model 9383: App Rev-3.4.5. Initial setup in lab w/out external time source, device defaults to stratum 15, then becomes 16. Can I set to lower stratum so that I can test in lab environment w/out external time source (satellite, etc)? thank you. need process to manually set stratum to lower value.

A reply from Keith (17 June 2019) Unlike our much more recent SecureSync NTP servers, the earlier (long-discontinued) NetClock Model 9383s (no matter software version installed) did not have the ability to "sync to itself", to thereby allow NTP to become a higher stratum (Stratum 1). The Model 9383's time/date can be manually set if desired, as long as there is no GPS input signal. But there is no way to allow NTP to become a higher stratum than Stratum 16, without an external input (GPS) being applied to the NetClock.

The "System Time" in the Model 9383s (which syncs NTP) can be manually set by a user (by selecting a "user set time" checkbox in the **System** -> **System Time** page of the browser and then pressing Submit) as long as the GPS input signal is not being applied to the NetClock. Having a GPS input connected to the NetClock causes GPS to automatically override the manually set date/time. But removing the GPS antenna and manually setting the date/time does not allow the System to go into sync to itself (System time remains not in sync). And NTP can only go into Sync/Stratum 1 if the System Time is in sync. After a user manually sets the date/time of a Model 9383, the **System Time remains not in sync**, and **NTP remains Stratum 16** (not usable by its NTP clients)

A significant change incorporated in the more recent SecureSyncs (which replaced the NetClock Model 9383s) was the ability for SecureSync to be configured to be able to "sync to itself", if there are no external inputs being applied. When synced to itself, just like when its synced to GNSS/GPS input signals, NTP in the SecureSync goes to Stratum 1, just a couple minutes thereafter. So, the much more recent SecureSync can provide useable NTP Stratum 1 outputs to its clients with no inputs being applied, if desired.

And SecureSync can be configured to sync to itself, until GPS becomes present - at which time it then automatically switches to GPS input, corrects the date/time to its GNSS receiver, all while remaining a useable Stratum 1 time server (SecureSyncs can switch between multiple priority-assigned input references, such as GPS, IRIG, NT etc, via an "Input Reference Priority table", as configured by a user).

For more information on SecureSync, please feel free to contact Mike Messina with our Sales team. He can be reached at 585-321-5850 or via email at michael.messina@orolia.com. I have copied him in on this email for you.

9200/9300 Show mode (for demos)

1. Connect DB9 Serial cable from PC serial port to 9200/9300 setup serial interface.

2. Login as factory

   NOTE: always memorize the password, never write down password or leave it where it can be obtained.

3. Enter factory password (XF0a5t2c2o7r2YX)

   NOTE: Power cycling the unit will turn show mode off. Repeat steps 1-4 if unit has been power cycled.

4. Type show on and verify Sync light turns green

System timescale

- ➢ Unlike SecureSync/9400s, the 9300 and 9200s don't have a configurable System timescale for the entire unit

- ➢ However, NTP by itself can be configured to output GPS timescale instead of UTC timescale

Leap Seconds (UTC offset value)

- ➢ Number of leap seconds are configured/displayed in the **System** -> **System Time** page of the browser

- ➢ In at least versions 3.6.7 and below, unlike SecureSync, there is no way for a user to manually enter a leap second to occur. The leap second flag needs to be set via GPS, NTP or RS-485 input (9388s only).

Note: at least version 3.6.7 has an issue with the Submit button not working on the System Time page when using newer browser versions (such as IE 11. It works with IE 8 for instance).

A) **Models 9388 and 9288 specific (Not Models 9383 or 9389)**

- ➢ For Model 9388 - Refer to draft email from the 2015 Leap Second   ..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\leap second. This email is also below in red.

- ➢ Model 9388 can sync with Formats 0, 2 or 7

- ➢ Leap indicator from NetClock is Format dependent:

- • Format 0 does not provide leap indicator- must manually schedule leap second in 9388/9288

- • Formats 2 and 7 provide leap indicator in the data stream starting 24 hours prior. – do not need to manually schedule leap second in 9388 or 9288 when synced via either of these two data formats. Will automatically schedule

Email from Keith 22 Jun 2015) To begin, as long as the Model 9388s are receiving RS-485 data from a Spectracom NetClock or SecureSync which is synced via GPS, and the RS-485 data is configured to be either Data Formats 2 or 7, the Model 9388s are all set for the Leap Second. This RS0485 data input will be via a twisted-pair connection on the rear panel. However, if the Model 9388s are receiving Data Format 0 from a NetClock or SecureSync, the Model 9388s will need to be manually configured for the end of month leap second, as Format 0 does not provide leap second notification, like Formats 2 and 7 automatically provide (2 hours prior to the leap second being inserted).

To determine if the Model 9388 is synced via RS-485 input (instead of via NTP from another NTP server), verify the Dynamic information table in the Status and Logs - > System Status page indicates NTP is Stratum 1. Then to verify which Format is selected, navigate to the System -> Serial Time Code page of the browser and see which Format is selected. If formats 2 or 7 is selected, the Model 9388 will be flagged by the NetClock or SecureSync 24 hours prior to the leap second.   It will then tell the clients that they need to apply the leap second at the end of that day. If the format selection is set to Format 0, the 9388s will not be automatically informed of the leap second and so a leap second will need to be manually scheduled in order for the Model 9388 to tell the clients they need to apply the leap second that day.   If they aren't informed of the leap second, or if they don't properly handle the leap indicator bits, they will adjust for the one second error once they poll the time server after the leap second has occurred (instead of being adjusted at UTC midnight).

If the Model 9388s are set to Format 0 input, let me know and I will provide you with additional information on how to manually schedule the leap second in the Model 99388s.

If the NTP stratum level is Stratum 2, the Model 9388s are synced via NTP from other NTP servers on the network, instead of via RS-485 data. If they are synced to Spectracom NTP time servers (or other NTP servers that properly process the two leap indicator bits before the Leap second is asserted) via NTP, the other NTP servers will flag the Model 9388s 24 hours prior to the leap second that they need to adjust for the leap second. This will then cause the Model 9388s to change their Leap Indicator bits at that time, to let the clients know the leap second is pending. The clients will see the LI bit change to know they need to apply the leap second at UTC midnight.

NTP input (instead of RS-485) should get the LI bits from its NTP reference. With a Spectracom time server, will

receive the LI bit change 24 hours prior.

Email from Keith to customer with dedicated Stratum 2 9388 (22 Jun 2015) As long as the other various NTP servers have either an external reference that will notify them of the pending leap second, or as long as they have the NTP leap file installed which tells NTP of the leap second pending, their LI bits should change to "2" before the leap second is applied.

This bit change will flag the Model 9388s, resulting in a "Leap Second" message being displayed in the top table of the **Status and Logs**-> **System Status** page of the browser, as shown below:

Dynamic System Information

Uptime: 0 years, 0 days, 0 hours, 7 minutes, 16 seconds
Current internal temperature: 36.75 C (98.15 F)
Major Alarm is (ON)
Minor Alarm is (ON)
Time Sync Status: Not in Sync
Time Source: None
Leap Second: +1 seconds at Month end, UTC midnight
NTP Service Status : Not In Sync

As indicted by this message not being displayed, if by chance none of the various other NTP servers the 9388s are syncing with is not properly handing the leap second by not changing the LI bits as they are supposed to (or if none of the other NTP servers are notified of the pending leap second so they don't know to change the LI bits), the number of leap seconds since GPS went online (the GPS to UTC offset) can be manually incremented by "1" at UTC midnight in the System -> System Time page of the browser. It is currently set to 16. Increment the value to 17 and press Submit. FYI- this manual change to the value will require the use of an earlier version web browser, such as IE 8 for instance, in order to Submit the manual change. This Submit button isn't compatible with newer web browsers such as IE 11 for instance. But with NTP servers properly handling their leap indicator bits, this manual change will not be necessary as the Model 9388 will read and apply the change based on the LI bits its receiving.

Note: at least version 3.6.7 has an issue with the Submit button not working on the System Time page when using newer browser versions (such as IE 11. It works with IE 8 for instance).

A) **Models 9383 and 9389 (not Model 9388)**

➢ Leap second automatically scheduled with GPS input, no less than 30 days prior.

➢ IRIG input (Opt 06) appears it doesn't accept IEEE-1344 so no leap indictor. Must manually increment the leap second value by one at UTC midnight.

Note: at least version 3.6.7 has an issue with the Submit button not working on the System Time page when using newer browser versions (such as IE 11. It works with IE 8 for instance).

Leap second pending notification via the browser

➢ leap second pending is displayed in the **Status and Logs** -> **System Status** page, **Dynamic System Information** table. "Leap Second: +1 seconds at Month end, UTC midnight"

Note: besides a new log entry asserted in the Operational log, this appears to be the only way to know that the NTP LI bits should have changed from 00 to 01. The LI bits are not reported in the **NTP** -> **Status** page (like they are with the newer SecureSyncs and 9400 series time servers). The Status page includes items such as sync, stratum poll internal, reach etc, but doesn't report the LI bits.

- ➢ With GPS input, message is displayed at least 30 days in advance.
- ➢ With input RS-458 Data Formats 2 or 7, message is displayed 24 hours in advance.
- ➢ With NTP input, message is displayed 24 hours in advance (once a Stratum 1 server changes its LI bits).
- ➢ This message automatically clears after leap second has been asserted (1 July).

Dynamic System Information

Uptime: 0 years, 0 days, 0 hours, 7 minutes, 16 seconds
Current internal temperature: 36.75 C (98.15 F)
Major Alarm is (ON)
Minor Alarm is (ON)
Time Sync Status: Not in Sync
Time Source: None
Leap Second: +1 seconds at Month end, UTC midnight
NTP Service Status : Not In Sync

Log entries associated with leap second

- ➢ Entries are asserted when GPS has scheduled the Leap Second to occur:
- ➢ Operational log 24 hours prior to the leap second:

Jun 30 23:59:59 Spectracom spectracom: [system] Leap second inserted at end of month.

Email from a customer- "I think the answer to my previous question has appeared: In checking the Operational Log, I noticed the following entry recently appeared:"
Jan 21 23:21:10 Spectracom spectracom: [system] GPS UTC Offset: Current = 16 Future = 17
Jan 21 23:21:10 Spectracom spectracom: [system] Leap Second Adjustment Date: JUL-01-2015 00:00:00 (+1)

LI Bits (Leap Indicator Bits)

- ➢ Status of LI bits is not reported in browser
- ➢ Read the bits using a program such as Automachron.

Issues with improper leap second propagation via NTP (leap second can happen in this or another unit at the end of a month that it's not supposed to occur in)

A) Issue with NetClock 9300/9200 software (versions 3.4.8 and below).

B) *Note: This fix can be overridden with a bug (2246) in NTP versions 4.2.7 and below (see "B)" further below

- ➢ Fixed in NetClock version 3.4.9 update.
- ➢ Any NTP peer that is running versions 3.4.8 and below can cause a false leap second to propagate via NTP, resulting in a leap second improperly being asserted at the end of a wrong month, in different unit that has been synced to it.   Another unit that is always Stratum 2, or has switched from GPS to NTP input can see this issue happen.
- ➢ Indicated by the following entries being asserted in the Operational log:

- • Leap Seconds between UTC and GPS time changed from 18 to 17 (notice the UTC offset going backwards)

- • Leap second inserted at end of month (entry was asserted at the end of a month that a leap second was not scheduled to occur)

Below excerpt is from the version 3.4.9 update release notes

Leap Second notification improvement for NTP, when a NetClock with version 3.4.8 software currently installed is syncing to other NTP servers Note: This is applicable only to NetClocks operating in a Stratum 2, or lower, configuration (Not applicable to NetClocks syncing via GPS or IRIG input).

- o Resolved an issue that NTP could keep the leap second indicator bits active for 1-2 minutes after the insertion of a Leap Second, causing a Leap Second notification to be asserted for the following month, as well.

C) NTP Bug 2246: NTP leap second flag doesn't clear after a leap second has been inserted (earlier NTP versions 4.2.6 and below. Fixed in NTP v4.2.7)

> **Note**: This applies to at least software versions 3.6.7 and below, as all are running NTPv4.2.0.

➢ Refer to Salesforce cases 20546 (Open Access) and 20358 (ShoreGroup/State Street)

➢ Refer to https://groups.google.com/forum/#!topic/comp.protocols.time.ntp/nHZOEvNTpVo[1-25]

➢ "One is a bug in ntpd 4.2.6 that it can get stuck with the incorrect leap status and only a restart can fix it"

- • Refer to NTP bug 2246 ("**sys_leap is sticky**") http://bugs.ntp.org/show_bug.cgi?id=2246

➢ "Leap seconds. If a leap is pending, decrement the time remaining. If less than one day remains, set the leap bits. When no time remains, clear the leap bits and increment the TAI."

"The line marked A) only resets sys_leap if leapsec decrements from 1 to 0. However, leapsec is set to 0 elsewhere as a result of the voting process:

➢ From a 9383 config file that keeps asserting leap seconds (note the first number is current TAI offset and the second is future TAI offset): leapsecondstatus=16, 17, 7, 1, 2015

Fixes/prevention:

- • **Temporary fix if this occurs**: Stopping/Restarting NTP or rebooting **all** of the time servers on the network (or at least the ones that have a different value for current and future TAI offsets) before the end of the month reportedly should fix it.

- • Temporary prevention of this occurring:
  1. Remove all peering in the NTP Hierarchy (remove peering from S1s, S2s, etc) the month before a leap second is about to be inserted). Any peering remaining when the leap second is asserted will propagate the leap second flag, causing the leap second to occur again.
  2. Stop/restart NTP after the leap second has been inserted, to clear the LI bits from affecting the NTP clients.

- • **Permanent fix**: Replace NetClocks with SecureSyncs to have newer versions of NTP.

NTP flags leap second insertion even with just one upstream NTP server indicating leap second is pending (versions prior to version 4.2.6- this applies to all 9200/9300 series servers)

➢ Refer to https://groups.google.com/forum/#!topic/comp.protocols.time.ntp/nHZOEvNTpVo[1-25]

➢ "The other is in pre-version 4.2.6 versions that they accept the leap at any time when any of its sources is announcing the leap"

- • "The current firmware version, 6.18.004, ships with NTP 4.2.8p3 which doesn't accept a leap second announcement from a single upstream server."

**1PPS input connector

- ➢ Allows an external 1PPS signal to provide better Holdover capability.

- ➢ This input is only used while in holdover mode

- ➢ And since no disciplining of the oscillator occurs while in Holdover mode, the 1PPS is not used to discipline the oscillator. In holdover mode, if the external 1PPS is detected, it is used in place of the oscillator-created 1PPS to maintain accurate time. It has no effect on the 10MHz output.

**GPS Receiver/SAASM/Mobile and Single Sat mode

Commercial GPS receivers

- ➢ 9383, 9389, 9283 and 9289 all use the **Trimble Res-T** receiver

  - • These earlier Model NetClocks are not compatible with the Trimble Res-SMT-GG receivers (with at least software versions 3.6.7 and below)

  - • As the NetClock 9300 and 9200s are now discontinued, I don't expect the Res-SMT-GG GNSS receivers will ever be compatible with these earlier NetClocks.

GPS receiver version information
- ➢ For the Model 9300s and 9200s, the GPS receiver's Serial Number is reported in the **Status and Logs** -> **System Status** page, **Static System Information** table

The GPS receiver firmware version information is reported in the **Status and Logs** -> **Operational Log** page of the browser (entries are asserted at each power-up, as shown below):
Oct 7 13:45:25 Spectracom spectracom: [system] GPS Serial Number: 87788080 06/16/2009
Oct 7 13:45:25 Spectracom spectracom: [system] GPS Appl Version: 1.14 03/02/2006
Oct 7 13:45:25 Spectracom spectracom: [system] GPS Core Version: 1.25 12/15/2005

Standard/Stationary mode (factory default setting)

- ➢ The NetClocks store the GPS UT1 correction offset value. So, they will lock to re-lock to GPS about one minute after tracking 1 satellite.

****Standard Mode Minimum Number of Satellites

Change to the min number of satellites for Standard mode operation in NetClock 9300/9200 (Application software versions 3.6.0 and higher)

- ➢ **System** -> **Set System Mode** page of the browser

Starting in version 3.6.0, the default System Mode switched to requiring at least **4** satellites at all times in order to stay in Sync (not go into Holdover mode) (previous software versions only needed **1** satellite to stay in sync).

- ➢ This change was to help Harris deal with GPS jammers.
- ➢ If a customer upgrades to version 3.6.0 or higher, Standard mode becomes minimum of 4 satellites instead of just 1 satellite (as it was in earlier versions).
- ➢ In Application versions 3.6.0 and higher, the minimum number of satellites for Standard mode is user-configurable (they can change the min number of satellites to 1, if desired). It is configured in the "Standard Mode Minimum Number of Satellites" drop-down field in the System -> Set System Mode page of the web browser (as shown below).
- ➢ The Four satellite setting helps mitigate a potential issue with the receiver 1PPS during the new week rollover on Saturdays at midnight. The one satellite setting makes it more prone to having PPS at UTC midnight on Saturdays.

Standard Mode Minimum Number of Satellites: 4 ▾ ← Default = "**4**" but can be changed to "**1**"

GPS Mobile mode information:

- ➢ Refer to [Mobile mode operation with a Resolution-T receiver (NetClock and SecureSync)](#)

Reboot/Halt page: "Factory Reset GPS receiver" button wipes all position data and navigational/almanac data.

Time it takes for NTP to sync after power-up:

- ➢ Refer to" [Time after initial boot-up for NTP to sync as Stratum 1 (such as in a mobile environment)](#)

Single Satellite Mode /Tracking less than 4 satellites

Han solo units in Position Hold mode ONLY need position hold to be able to obtain an accurate 1PPS output. Position Hold can be obtained via a 3-D fix for 600 samples or by manually setting the location of the unit (If the receiver senses the wrong position or it has been relocated, it will kick out of position hold and do a new survey). Once in position hold, the receiver can drop to just one satellite without having to alarm. Single satellite mode will only be required if they can't get or set position hold.

If the receiver is relocated, the receiver will know that it has been moved once it starts tracking. It will then do a new survey to determine location and then obtain position hold again.   Position hold is retained through a power cycle.

In single satellite mode- If the GPS receiver has no location information (either manually entered by a user or in the System/GPS page of the browser or automatically entered during a GPS survey), the System Time Can go into Sync with very inaccurate/wrong time (one customer had a two-minute System Time error even though the Model 9283 was in Sync to GPS. They were tracking no more than one satellite normally and the GPS location was still all 0s –it had never calculated its position).

GPS Dynamics code doesn't always switch to "Stationary" mode after GPS survey

- ➢ Refer to: Fogbugz case 1849, SalesForce Case 8303 (for Wolfgang Kuhn)

Regarding the automatic switching of the "Dynamics Code" to "Stationary" mode upon successful completion of the GPS survey, we have seen on rare occasions that it may not switch to reporting "Stationary" mode upon completion of the GPS survey. However, this is a very minor reporting issue only and does not affect the operation of the NetClock.

****SAASM Key operation

Links to documents about SAASM:

Primary document (1165-5000-0051): U:\Documentation\Released\Manuals\1165-xxxx-xxxx

- ➢ U:\Engineering\SAASM-FOUO
- ➢ The U:\Engineering\SAASM-FOUO\Docs & Tools\Crypto Key Ordering folder contains a document for ordering crypto
- ➢ The U:\Engineering\SAASM-FOUO\Docs & Tools\Crypto Key Ordering folder also contains a document for the Model 9300 SAASM operation
- ➢ (928x/938x only) The I:\Company Wide\Project Folders\Rainier(938x)\400 Customer Service Plan\Tech Notes Folder contains info on SAASM for the 928x and 938x series.
- ➢ (928x/938x only) The earlier versions of the Model 9300 series manuals used to have a Section for Option 7: SAASM. However, with Rev L, it has now been removed from the manual.

Note: to send SAASM-related documents or other info, use the secure AMDREC website: https://safe.amrdec.army.mil/safe/.   Select "**Non-CAC Users**"

An automatic email will be sent to you to verify the sender. The requested password to use for the verification will be included towards the bottom of this auto-email (example: "The Password is: Q$#2975!99?62J*2*3!J")

General info:

Load a BLACK Update followed by a Black GUV key

Key should correspond to Cryptonets defined below
Primary Cryptonet Code 2
Active Cryptonet Code 40

Sync to GPS first with L1 to verify cabling and antenna operation before loading keys to rule out install issues if there are any issues with the keys.

CONTACT: Rolf Speziale
Zeli Systems
33 Pagosa Ct
El Paso, TX 79904

(915) 751-3222
gps@zeli.com
KLIF account is ZELI001 (ID of the SAASM Facility)

Standard Positioning Service (SPS) mode

This is the unkeyed mode of SAASM receiver operation. To verify operation in SPS mode:

Simply attach the antenna and verify the NetClock is in Sync.

Look at the GPS Signal Status page for L1 Only satellites. (SPS)

See Security SAASM page and verify unkeyed.

Low SAASM battery power indicator

****Cable/ distance between GPS antenna and the Up converter at other end.

➢ The Antenna cable between the down and up converters can be RG-58 cable with allowable lengths of 50ft up to 1500ft long (457 meters)

_____

GPS 1024 week rollover every 20 years (2019, 2038 etc) for 9300s/9200s

➢ General info about GPS week rollover/how to test for it: refer to (on our site):
https://spectracom.com/resources/blog/lisa-perdue/2018/gps-2019-week-rollover-what-you-need-know

➢ 92xx and 93xx all use **Trimble Res-T** receivers.

Refer also to "GPS Week roll-over issue due to number of bits in the message (2019, 2036, etc..)" in
..\CustomerServiceAssistance.pdf

A) Actual rollover observations (once the 2019 week rollover occurred)

1. **Models 9383/9389:** no reports of issues

2. **Models 9383/9389:** a couple reports of year jumping to 2019

B) Forecasted rollover operation (prior to the rollover)

from the GPS week Number Rollover issues document from Dave S
NetClock 928x/938x GPS Time Server / Master Clock
The 928x/938x GPS Time Server / Master Clock was shipped until 2015. Testing on the 928x/938x has shown that the unit will not immediately be affected by the GPS week rollover in April of 2019. However, it will no longer be able to correctly process leap seconds. The announcement of any pending leap second is decided within six months of the leap second occurrence, and after that leap second takes effect, the 928x/938x will no longer provide the correct UTC time. Spectracom recommends replacing all 928x/938x installations with our SecureSync 1200 Time and Frequency Reference System to allow continuous accurate time within your critical systems.
Details: The leap second value (UT1 offset) will no longer be able increment (or decrement) after each leap second thereafter (if any leap seconds are asserted after April, 2019).

Internal note only (28 Apr 18) Dave Sohn's understanding from Paul Myers is the Trimble Res-T receiver does have an issue. But SecureSyncs.9400s contain a "work-around" in their data manipulation which allows it to continue processing leap seconds correctly, The NetClock 9300/9200 do not contain this same work-around.
Sample response from Keith (28 Apr 18) You had asked Tony DiFlorio about the details on the effect this event

will have on leap seconds processing and about the receiver used in these products. FYI- These discontinued, earlier NetClock Models 9383/9389 and 9293/9289 use an installed Trimble Resolution-T ("Res-T") GPS receiver.

Due to a condition associated with this earlier Model GPS receiver, after the week rollover has occurred, the UT1 offset value (the number of leap seconds occurring since GPS first went online), will no longer to be able to increment (or decrement) from the current value of "**18**", if any leap seconds (positive or negative) are added/removed thereafter.

Every second, NetClocks synced via GPS need to convert the received GPS time to UTC time, using this current UTC offset value. If any future leap seconds happen to be applied after the April, 2019 week rollover (starting the moment when the first leap second thereafter is asserted) the UTC tine (which is the "System Time" that the NetClock's time output are derived from) will start to be one second off from UTC time, because this offset value won't be able to change. The time outputs of these above-mentioned NetClocks will then consistently have a one second time error (unless any subsequent leap seconds also happen to be applied thereafter, causing the time error to increment, or decrement, by another "one second" when its applied).

Note that Leap Seconds are normally asserted to add one additional second of UTC offset. However, a leap second can also potentially be used to remove one second of time offset. This would have the opposite effect on the time error of the NetClocks, as they will also no longer be able to decrement the UTC offset from the current value of "18" either, after April 2019 week rollover has occurred.

Dial-out modem (ACTS Client mode and ACTS Server mode)

* **ACTS Server time accuracy-** For a unit configured as ACTS Server to server the correct time, NTP must be enabled. ACTS Modem time is derived from the Linux kernel, which syncs using the NTP daemon. If the daemon is not running, time of the kernel won't be accurate.
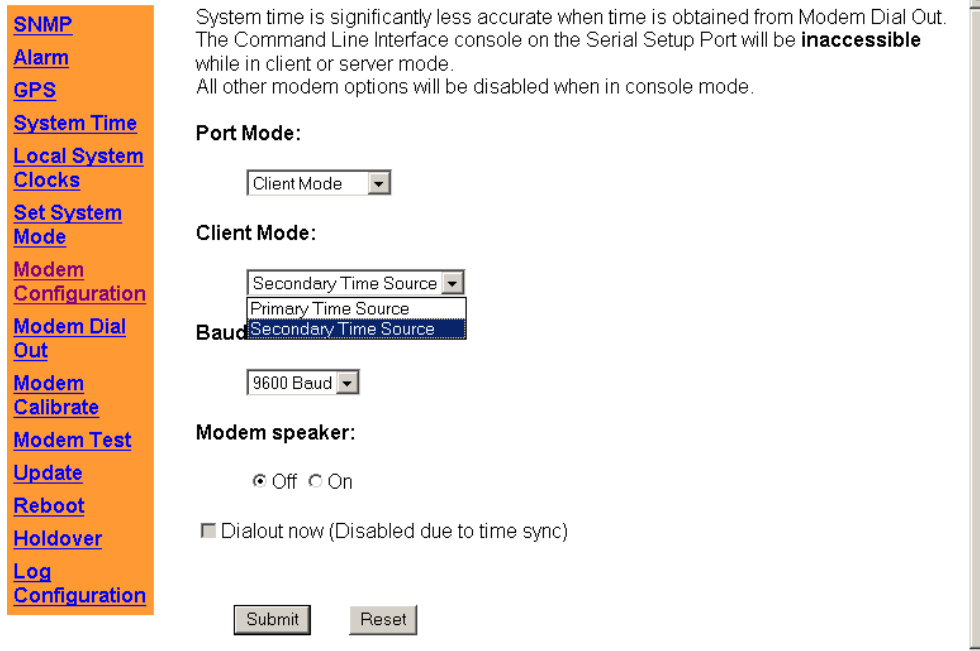
* **NetClock/TS2100 interface-** We can interface with a TS2100 NTP server. We are designed to operate in the modem client mode only.   We DO NOT operate as a modem server to the TS2100.

Modem use- We only recommend and support modems that are Spectracom supported (US Robotics and Best Data). We don't support modems that we don't recommend as compatible.

Modem configuration

Email from Paul Myers (3/26/12) The Modem settings should be Switches 3&8 ON (DOWN) and all others up.

System -> **Modem Configuration** page

System -> **Modem Dialout** page

The dialout settings determine how to call when not in sync with another time source.

DIAL-OUT SETTINGS:

Phone Numbers:

Prefix: 9

⦿ Predefined: NIST-Colorado ▾

○ Specified Number: 1-303-494-4774

Try calling: 2 times

Call Interval:

⦿ Set Interval: Every: 0 Days 1 Hours 0 Minutes

○ Daily: Every 0 Days

At 0 :00 UTC ▾ Click here to edit or create local system clocks.

○ Weekly: Every 0 weeks

On: ☐ MON ☐ TUE ☐ WED
☐ THU ☐ FRI ☐ SAT ☐ SUN

At 0 :00 UTC ▾ Click here to edit or create local system clocks.

SNMP
Alarm
GPS
System Time
Local System Clocks
Set System Mode
Modem Configuration
Modem Dial Out
Modem Calibrate
Modem Test
Update
Reboot
Holdover
Log Configuration

Modem test calls

System -> **Modem Test** page

Note: test calls will not sync the NetClock. They just log whether a call is successful.

The test feature makes a call immediately or on a scheduled interval.
The success or failure of this call is written to the log file.
Test calls are only done while in sync from another time source, for testing at other times use the now or dial interval options.

TEST SETTINGS:

☐ Test Now

☐ Test On Interval

Test Interval:

⦿ Set Interval: Every: 0 Days 1 Hours 0 Minutes

○ Daily: Every 0 Days

At 0 :00 UTC ▾ Click here to edit or create local system clocks.

○ Weekly: Every 0 weeks

On: ☐ MON ☐ TUE ☐ WED
☐ THU ☐ FRI ☐ SAT ☐ SUN

At 0 :00 UTC ▾ Click here to edit or create local system clocks.

○ Monthly: ⦿ Day 0 of every 0 month(s)

○ First ▾ MON ▾ of every 0 month(s)

At 0 :00 UTC ▾ Click here to edit or create local system clocks.

○ Yearly: Every: JAN ▾ 0

At 0 :00 UTC ▾ Click here to edit or create local system clocks.

SNMP
Alarm
GPS
System Time
Local System Clocks
Set System Mode
Modem Configuration
Modem Dial Out
Modem Calibrate
Modem Test
Update
Reboot
Holdover
Log Configuration

Recommended UPS for Modem

* Modem initialization commands-

The following are commands we used in the initialization function and the customer should include them in their configuration file.
 //Reset
   "ATZ",

                        // disable command echo
                        "ATE0",
                        // speaker on
                        "ATM0",
                        // use result code
                        "ATQ0",
                        // result code in verbose
                        "ATV1",
                        // 9600 baud rate
                        "AT&N6",
                        // normal data carrier
                        "AT&C1",
                        // Normal DTR
                        "AT&D2",
                        // Auto answer on first ring
                        "ATS0

Desired pauses when dialing a phone number

  ➢   A comma can be inserted after the dial-out prefix for a desire delay before dialing the configured phone number

Troubleshooting dialout - Known modem issues

➢ **Refer to Modem troubleshooting document**: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9183-9188-9189-TTSxxx\Modem troubleshooting

Dialout logs

Status and Logs -> **Dialout log**

Specific conditions

1) ACTS Server mode in 3.4.6 and below not working

ACTS server mode in version 3.4.6 and below (likely down to version 3.3.0). Need to first configure NetClock for ACTS Client mode, 1200 baud and then switch to ACTS server mode in order for the modem/console port to start responding (when switching from client to Server mode, the baud rate goes to the default value of 9600 baud). A previous patch was applied to ACTS Client mode to have the bad rate cycle automatically. However, this patch was not applied to ACTS server mode. So, the port doesn't respond. This results in "Spectracom actsd: Failed to configure modem, restart the ACTS daemon" log entries being asserted in the ACTS Server log.

➢ Large time corrections periodically occurring due to noisy Analog phone line

➢ Refer to Salesforce case 10862 https://na8.salesforce.com/500?rlid=RelatedCaseList&id=0038000000cLLNu

➢ Review Operational log entries. Large time jumps will be immediately followed by a time jump in the opposite direction (example sets of log entries below)

Sep 10 09:48:59 Itau-CTO-R826 spectracom: [system] Clock adjusted by 2124022298 seconds
Sep 10 15:57:49 Itau-CTO-R826 spectracom: [system] Clock adjusted by -2124022298 seconds

Sep 21 22:09:26 Itau-CTO-R826 spectracom: [system] Clock adjusted by 2123027461 seconds
Sep 22 04:18:58 Itau-CTO-R826 spectracom: [system] Clock adjusted by -2123027461

2) What is the current Application Version? Version 3.4.3 helps prevent a noisy phone line from corrupting data. The fix is to update the software to a newer version.

Accuracy of the dial out modem

Q In the case where the user makes the 9383 synchronize the time NIST provides by dialing to NIST over telephone lines, is it possible to see the time synchronization accuracy in the following User Interface screens:
  - "NTP status" screen
  - "Dial out Log" screen

  If yes, how can the user see the accuracy on the screen(s)?   If not, are there any other ways to check the accuracy?

A. (email sent to Masataka with TOYO in Japan on 11/28/11) To begin, the NetClock is not able to directly report its accuracy to UTC in its logs or other web browser pages. This requires the measurements be performed outside of the NetClock. However, the NetClocks "Dial out log" does report how much correction is made, after each successful Dialout to its reference. Measuring the accuracy of the NetClock's synchronization to UTC time does require this measurement to be performed outside of the NetClock.

Each time a successful modem call is placed, the Modem's "Dialout Log" shows each of the received messages from its time reference. At the end of each dial-out call. At the end of the call, the average difference between the time

reference and System Time Is calculated and the System Time of the NetClock is adjusted to the estimated error. This amount of change that was made to the System Time at the end of the call is also reported in this log.

As the oscillator is not able to be disciplined to the modem input reference, this error value indicates how much adjustment was made to the System Time in order for it to match the dial-out time reference. This shows how closely aligned it is to its reference after each call is made. However, if does not exactly indicate how accurate System Time is aligned with true UTC time. This adjustment at each dial-out value is typically in the low milliseconds range (1-10 milliseconds) but is dependent upon how far apart each dial-out occurs (the dial-out interval). The longer the period between dial-outs, the larger the time correction will be, once each successful dial-out has occurred.

For your information, if a GPS antenna is also attached to the NetClock, the Modem can be calibrated for optimum accuracy of each dial-out call. It will not report the accuracy to UTC when the calculation is performed. But, it allows for latency measurements to be calculated, once the modem has been calibrated once, at that particular location. This results in better synchronization accuracy to its time reference. If no GPS antenna is attached, the modem can't be calibrated for optimum accuracy (the latencies of the phone calls can't be measured, or compensated for, without a calibration being performed),

As mentioned above, the only reported value in the logs is the adjustment made to System Time, after each successful call is made to the time reference. If its desired to measure accuracy to UTC time, this will have to be performed outside of the NetClock and will require another GPS-based time reference co located at the same site as the NetClock. Right after each dial-out, the 1PPS output of the NetClock can be compared to the 1PPS output of another GPS reference such as another NetClock that is connected to GPS) co-located with the NetClock that is using the dial out modem.

Then, using an oscilloscope, measure the difference between the 1PPS from the time reference versus the 1PPS output of the NetClock that is synced via modem. This will give you a good approximation of the System Time error to true UTC. The tolerance of this measurement will be the accuracy of 1PPS output from the GPS-synchronized reference (typically like +/- 15ns, which is way beyond the capabilities of NTP).

Another good email from Dick Fox to TOYO about modem accuracy (121/11)

Spectracom and NIST don't actually specify the overall accuracy because there are many parameters outside of our control that include

> Your Location
> Location on the NIST ACTS server
> Which Server are they calling?
> Have they considered the Hawaii number it may be closer?
> Each call can be routed differently through the telephone network.
> This causes difference in transmission delays.

Spectracom's implementation of the ACTS service takes full advantage of the ACTS On Time Point (OTP)

For more information, please refer to: http://www.nist.gov/pml/div688/grp40/acts.cfm

OTM (on-time marker) is an asterisk (*). The time values sent by the time code refer to the arrival time of the OTM. In other words, if the time code says it is 12:45:45, this means it is 12:45:45 when the OTM arrives.

Incoming calls on modem line

Q. We wanted the POTS line for the dial out modem to be configured for outgoing calls only, but that site support is telling us that they cannot make that happen. So, we want to verify that there is no way that the netclock will pick up or be affected by incoming calls. Can you provide some information on that?

A. (reply from Dave Lorah 8/16/12)
The NetClock will not answer the phone if it gets a call. The incoming call may tie up the line for a minute but that is all that would happen.

9288/9388 Serial Time Code (RS-485 input)

**9288/9388 Serial Time Code configuration via Console port

- **Change the Data Format from 2 to 0** from the Console port is: **STC FMT 00** <enter>

- **Change the baud rate**: **STC BAUD 1200** <enter>

- **Change the year**: **STC YEAR 2007** <enter>

- **Display all settings**: **STC DISP** <enter>

Refer to: \\Exchange\empshare$\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\9388 and 9288\9388 STC commands.TXT

**Issues associated with the add-on time servers (9388s and 9288s)

***(9388 and 9288s receiving fmt 0) Year rollover/Year jump issue after power cycle

➢ Refer to Section 3 of the Model 9388/9288 troubleshooting document: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\9388 and 9288

➢ If the present year is set correctly in the System -> System Time page of the browser, but not set correctly in the System -> Serial Time code page, when the unit reboots anytime during the year, the current year for both the System Time and for NTP will revert to the wrong year value indicated in the Format 0 year field (Serial Time Code page)

 To fix this issue/prevent it

1. Navigate to the System -> Serial Time Code page and correct the year in the Format 0 field

2. If the NetClock/s RS-485 Remote output port only goes to the 9388/9228- change its output to format 2 and also change the 9388/9288 to receive format 2, instead of 0 (format 2 contains the year info each second)

3. Replace the 9288 or 9388 with a newer NetClock/SecureSync with the Model 1204-05 multi-port Gb card installed.

***Known issue with intermittent Holdover alarms being asserted (versions prior to v3.2.0)

Model 9288 only: Versions prior to 3.2.0, when using Data Format 2 as the selected input can intermittently experience holdover alarms that last for a while and then clear. Format 0 is not affected by this condition. The issue is due to the fact that Format 2 has a carriage return at the beginning of the time stamp as well as at the end of the time stamp whereas Format 1 has only one Carriage return. The fix is to update to a newer version of software.

**Desire to sync Ethernet time server (9388/9288) with a Trak receiver

Email to Will Hickey
We spoke some time back, and you mentioned that TRAK was not NEMA compliant and thus couldn't support the TimeView 210/400 Digital Wall Clock modules. I just wanted to confirm with you that a) I recalled the conversation correctly and b) present you the following detail for validation.

The TimeView clock accepts ASCII Format 0 and ASCII Format 1, correct. Below is Format 0:

NetClock ACSII Format 0

CR LF I ^^ DDD ^ HH:MM:SS ^ DTZ=XX CR LF

TRAK provides a Time of Day output in two formats. Here is their Format 2

TRAK ASCII Time Format 2

<CR/LF>spspDDDspHH:MM:SSspDsTZ=xx<CR/LF>

I believe both of the formats are the same. Talking with TRAK, they state the products are compatible, however the TRAK 9100 ToD output is in RS-232 protocol, and needs to be converted to RS-485. Other than that, they should work. My engineers plan to try this later this month, but I want to run this by you again to make sure I wasn't missing anything. Thank you for your support.

Reply from Dave Lorah (5 June 2015) Hi Will, It doesn't look like the two formats match exactly. I don't think they would work. They would have to test it to see if it works to be sure. They will also need a RSR-232 to RS-485 converter.

**Time Sync and Holdover status/ green "sync" LED indication

Sync and Holdover states

You are on the right track. The one "piece of the puzzle" that you are likely missing is the fact that Holdover mode is still treated as if the NetClock is still "in Sync" (as it's still a useable time reference while it's in Holdover mode). While in Holdover, Sync status is always still true. Sync state remains true unless the Holdover mode times out without GPS input being restored, causing Holdover mode to go false and Sync status to also go false at the same time (as this will cause loss of sync to occur).

In order to know the Sync and Holdover states, you just need to poll both of these values. Or, if Holdover is true, it's safe to assume that Sync is also still true, because while Holdover is true, Sync will always be true, as well. Holdover won't ever be true while Sync is not true.   If GPS reception is restored while still in Holdover mode, Sync status remains true and Holdover goes to false.

In case you haven't received this document yet, attached is an SNMP Application Note I've created for the NetClock Model 9300 series NTP servers. You may find this document also helpful, as it goes into a lot more info on SNMP than the NetClock user manual.

Configure the Holdover timeout

  ➢ Factory default is Holdover set to 2 hours.
  ➢ Can be configured as "Set by Time" or as "Set by Error"

System -> Holdover page of the browser

Holdover Length:

Default:	1 Day 0 Hours 0 Minutes
Time bounds:	Min: 15 Minutes
	Max: 5 Years 0 Days 0 Hours 0 Minutes

◉ Set By Time: [0] Years [1] Days [0] Hours [0] Minutes

Error bounds:	Min: 0 Milliseconds 18 Microseconds
	Max: 3153 Milliseconds 600 Microseconds

○ Set By Error: [1] Milliseconds [728] Microseconds

Time in Holdover: Not In Holdover

[Submit] [Reset]

**Oscillators/Calibration-Disciplining
****TCXO/OCXO/Rb specifications

Refer to: ***Oscillator Holdover specs** (in SecureSync section of this document)

****TCXO (and likely OCXO) oscillator calibration

➢ Oscillator calibration occurs after every reboot (cal data is not stored).   This cal data is logged.

Shortly after each time the NTP server powers up, the 10MHz oscillator goes through an auto-calibration procedure. During this time-frame, the oscillator is directed to each of its steerable limits for about 5 seconds each with a couple of seconds of delay so the oscillator can stabilize (The whole oscillator calibration process takes about 20 seconds or so to complete).

This allows the oscillator's Hertz Range and step sizes to be calculate and calibrated. Once the calibration process has been completed, the estimated D/A for a 10MHZ output is set and the oscillator is steered to this value. Thereafter, the frequency counts oscillator disciplining can begin (assuming the external reference- IRIG in this case- is present).

As for the amount of time it will take for the oscillator to settle out after power-up, the type of oscillator will have a significant factor in how long it takes to clear the alarm. The operation of the oscillator monitoring circuit for performing the frequency counts of the oscillator's output varies depending on the type of oscillator. With a TCXO oscillator, the frequency measurements and adjustments of the D/A occur every 1000 seconds (about every 18 minutes). After each frequency count, the D/A is adjusted and the frequency count is logged in the Oscillator log (Status and Logs/Oscillator log page of the web browser). In order for the Frequency alarm to clear, the Fractional Frequency Error (labeled in this log as "Freq Error") has to be better than 1×10^{-7}. Each frequency count should decrease the Freq Error value, bringing it closer to this value. By looking at these measurements in the Oscillator log, you can determine how close it currently is and be able to obtain a pretty good idea of about how long it will take to reach this minimum criteria threshold.

EXAMPLE TCXO OSCILLATOR CAL DATA

Mar 8 19:51:38 Spectracom Spectracom: [system] 2013 067 19:51:38 000 XO1: Saved Cal Value: H/S:+0.0001531242
Mar 8 19:51:38 Spectracom Spectracom: [system] 2013 067 19:51:38 000 XO1: Initial DAC Setting: 0x8066
Mar 8 19:32:23 Spectracom Spectracom: [system] 2013 067 19:32:23 000 XO1: Frequency error recalculated: 00.0000058 (5.807×10^{-13})
Mar 8 19:15:13 Spectracom Spectracom: [system] 2013 067 19:15:13 000 XO1: Frequency error recalculated: 00.0001065 (1.065×10^{-11})

EXAMPLE GREENRAY OCXO OSCILLATOR CAL DATA

Mar 8 19:48:50 Perry911 spectracom: [system] Power-On Reset.
Mar 8 20:06:29 Perry911 spectracom: [system] Auto-Calibration Starting
Mar 8 20:06:40 Perry911 spectracom: [system] Auto-Calibration Complete
Mar 8 20:06:40 Perry911 spectracom: [system] Initial D/A Setting: 7E6D
Mar 8 20:06:40 Perry911 spectracom: [system] DISC_Calibrate: MaxAdj= 8.750000
Mar 8 20:06:40 Perry911 spectracom: [system] DISC_Calibrate: MinAdj= -9.000000
Mar 8 20:06:40 Perry911 spectracom: [system] DISC_Calibrate: **HzRange**= **17.750000**
Mar 8 20:06:40 Perry911 spectracom: [system] DISC_Calibrate: StepSize= 0.000339

Mar 8 20:06:43 Perry911 spectracom: [system] COARSE ADJUST MODE.

EXAMPLE MTRON PTTI (before Greeray) OCXO OSCILLATOR CAL DATA
Mar 8 08:26:55 Spectracom spectracom: [system] Auto-Calibration Complete
Mar 8 08:26:55 Spectracom spectracom: [system] Initial D/A Setting: 8000
Mar 8 08:26:55 Spectracom spectracom: [system] DISC_Calibrate: MaxAdj= 21.500000
Mar 8 08:26:55 Spectracom spectracom: [system] DISC_Calibrate: MinAdj= -34.250000
Mar 8 08:26:55 Spectracom spectracom: [system] DISC_Calibrate: HzRange= 55.750000
Mar 8 08:26:55 Spectracom spectracom: [system] DISC_Calibrate: StepSize= 0.001063

****Oscillator type configuration

The type of oscillator installed is configured at the factory. If the wrong type is selected, remote into the web browser or SSH in, using the factory account user name and password.

With SSH, the CLI command to display the type of oscillator is: **option display**. The CLI command to reconfigure the oscillator type is: **option set oscillator xxxx** (where xxxx is the installed type of oscillator, such as OCXO). Also, make sure "**Disciplining**" is selected/enabled.

****Rubidium Oscillator

PRS10 programming

Email from Dave Lorah to Philip Jackson (7 March 2013) Also, if you are getting 10 MHz on the rear panel, the SRS PRS10 Rb is probably not the source of the problem. It can be replaced but you would need to make a setting change on the replacement PRS10 before installing.

We use lock mode 3 on the PRS10. To set this in the PSR 10 connect with a serial connection and HyperTerminal 9600 N-8-1. You will need a special cable made to communicate with the PRS10.
Type:
 LM3 (changes lock mode to 3)
 LM? (displays lock mode 3)
 LM! (sets the lock mode 3 change)

After a power cycle the PRS10 should reply LM3 if you type LM?

Rubidium Monitor alarms (Rubidium Monitor alarms) / "Track State changed" entries

> For more info. refer also to: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Alarms and logs

  - **Note**: The "System Log" section of the Alarms and Logs document linked above provides all of the valid Track State numbers and much additional info (excerpt of the table pasted below):"

When Option 04: Rubidium oscillator (Rb) is installed in the NetClock (this option is not available with the Models 9388 and 9288), the Rubidium oscillator internally locks itself to the NetClock's 1PPS input reference. Changes in this internal lock state are reported in the System Log. The valid lock states are listed below for your reference.

Reported "Track State" value	Operational State	Rb (Rubidium) Oscillator Lock condition
0	WARMING_UP	The Rb oscillator is now warming up
1	SETUP	Tracking of the 1PPS in the Rb oscillator is now set-up to begin
2	TRACKING	The Rb oscillator is now tracking the 1PPS reference
3	SYNC	The Rb oscillator is now locked to the 1PPS reference
4	TRACK_OFF	The Rb oscillator is now in free run (tracking has been disabled). This entry may occur after unit has been rebooted.
5	REF_UNSTABLE	The Rb oscillator is now in free run (1PPS reference is not stable)
6	NO_1PPS	The Rb oscillator is now in free run (1PPS reference is no longer present)
7 and 8	FACTORY1 and FACTORY2	Reserved
9	FAULT	Rubidium Loses Lock on 1PPS or a Fault condition

- ➢ The "Rubidium Monitor" alarm is classified as a Minor alarm condition.
- ➢ Alarm log containing many "Rubidium Monitor alarms" may indicate a bad RB oscillator.
- ➢ Review System log for "Rb Track State changed from…" entries.
  - Valid values inside the brackets are values [1] through [9].
  - Values such as [129] are not valid.
  - Dave Lorah believes value of "[130]" likely indicates a bad Rb oscillator.

Possible solutions to Rubidium Monitor alarms

Can try updating Software to at least version Application version 3.6.0 (V3.6.0 improved Rb oscillator 1PPS output operation.

Try spreading apart the wires of the cable harness connected to the oscillator (so the wires aren't touching each other).

Return the NetClock for oscillator testing/possible replacement.

Note: Harris NetClock SP360s have a special 3 year warranty (extended temp Rb oscillator).

<mark>Outputs</mark>

**LEDS

****Sync LED flashing or blinking red

> **A flashing Red Sync Led indicates there is an operational problem in the NetClock:**

- If the red flash is quick, about 10% duty cycle, it means there is an antenna connection problem (Antenna Problem alarm).

- If the on/off flashing is 50% duty cycle, it means there is a POST (Power-On Self-Test) failure.

****Boot-up Sync light pattern

Please check to see if the unit is booting up. If the 9389 is booting up properly you should see the front panel SYNC LED change during the boot process. This is how the SYNC LED should look.

After applying power, the Sync LED will be off for one minute. Then it will light yellow for a few seconds and then cycle through a lamp test: Red, Green, Yellow. After that the LED will be yellow for a few seconds and then go off. When this happens you should hear a relay click inside the unit. The unit is now booted up and should operate normally.

If this is not happening, there is probably a hardware fault inside the unit and it will have to be returned for repair. I can arrange the return RMA if we can verify the fault with the 9389.

Local System Clock (creating a local clock to apply to outputs)

1) System -> Local System Clocks page of the browser
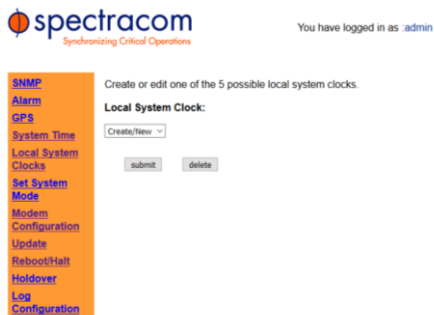
2) With Create/New in drop-down, press submit button

Select "**Manually defined by region**" and in the drop-down, select USA (Post 206)
 (there is no need to fill in the boxes)

****RS-485 Remote outputs /terminal block connectors**

****RS-485 Remote input (9388/9288) and output (9383/9283, 9388/9288, 9389/9289) terminal block connectors

> **3 pin connector for the Remote outputs**:   P900-0031-0H0T

Description: Term Block, Pluggable, 3.81, 3pin, 10A, 125V, Black, Stackable

Mfg: On Shore Technologies
List of On Shore distributors (by State) http://www.on-shore.com/find

MFG P/N
EDZ1550/3BK
OSTTJ0331030

Digikey P/N: ED1961-ND

https://www.digikey.com/en/products/detail/on-shore-technology-inc/EDZ1550-3/250568?s=N4IgTCBcDaIKIBECMBOAbEgtAOQSAugL5A

Pin-outs of Remote RS-485 ports

- 9300 series pin-out: <mark>G - +</mark>
- 9200 series pin-out: <mark>+ - G</mark>

**IRIG output (Models 9383 and 9283 only)

➢ Provides one IRIG AM or IRIG DCLS output

The IRIG output is a digitized output, so it is a "stepped" output signal at all times, causing "quite long breaks" in the signal. It is not an analog sine wave as viewed on an oscilloscope.
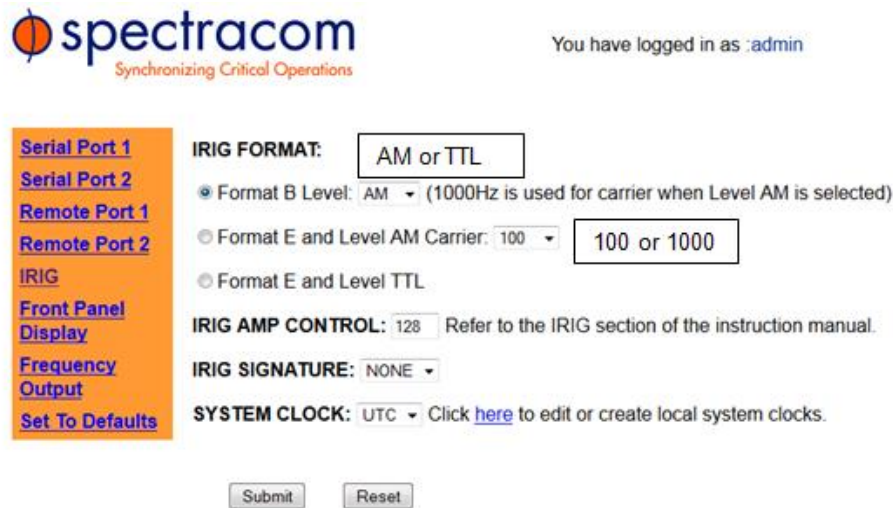
- Also refer to: IRIG for all products for IRIG output

- Also refer to: Option 6: IRIG input for IRIG input (Option 06)

Standard unit has one IRIG output on BNC connector that supports either AM or DCLS (TTL)

Standard IRIG output (not applicable to Option 11)

Interface -> **IRIG** page of the browser

Standard IRIG output (not applicable to Option 11)
The NetClock's IRIG output connector can provide the following IRIG Formats

IRIG Code Format	Description of code
B000	IRIG B, TTL, BCD, CF and SBS
B120	IRIG B, AM, 1 kHz, BCD, CF and SBS
E000	IRIG E TTL, BCD, CF and SBS
E110	IRIG E AM, 100 Hz, BCD, CF and SBS
E120	IRIG E AM, 1 kHz, BCD, CF and SBS

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Option 11 (modified IRIG outputs)

Option 11 provides two IRIG outputs and a Format 09 ASCII serial time code. These outputs and the Format 09 time code are fixed. The IRIG OUT and 1PPS IN ports on the rear of the standard 9383 NetClock are replaced by the Option 11 IRIG-B and IRIG-E outputs specified herein. The standard 9383 NetClock's SERIAL COMM 2 port is replaced by the Option 11 ASCII Time Code Output port.

A) IRIG-B Output Specifications

- AM Output
- B126 Format
- Fixed amplitude of 5Vpp into no load
- BNC Connector
- UTC Time

B) IRIG-E Output Specifications

- AM Output
- E126 Format
- Fixed amplitude of 5Vpp into no load
- BNC Connector

Year information

Partial email from Tom Richardson (11 July 2014) "CF: IRIG formats reserve a set of elements known as Control Functions (CF) for the encoding of various control, identification, or other special purpose functions. IRIG B has 27 Control Functions located between elements 50 and 78. The NETCLOCK/GPS uses the Control Functions to encode year information and time sync status."

Time sync status

➢ Sync status is apparently reported in the "Spectracom Format"

Partial email from Tom Richardson (11 July 2014)   Element 55 is the time sync status bit. Element 55 is a Binary 1 when the front panel time sync lamp is green, and a Binary 0 when the lamp is red.

Supported IRIG output configurations / 200-04

Q. From Wade Sober- What is IRIG rev 200-04? What IRIG formats does the 9383 support?
A. reply from Tom Richardson (11 July 2014)   All the IRIG outputs included time information.
IRIG version 200-04 was an update to the IRIG standard to add year information.

This goes back a ways, but referring to the 8183 manual, which the 9383 uses the same IRIG generator, we supported IRIG B and E version 200-98(1998) with Spectracom additions to the control codes for Time Sync Status at position P55 and Year information at P60 to P70. Because the year information was not included in version 200-98 this was a vendor specific implementation of the year information. The control codes could be used for anything.

When the year information was included in the IRIG standard at version 200-04(2004) the year information was included at positions P50 to P58 making the Spectracom format not comply with IRIG standard 200-04 because that's where we put the Time Sync status.

8183 Code word structure:
BCD: Word seconds digits begin at index count 1. Binary coded elements occur between position identifier elements P0

and P5 (7 for seconds, 7 for minutes, 6 for hours, and 10 for days) until the code word is complete. An index marker occurs between decimal digits in each group to provide separation for visual resolution. Least significant digit occurs first.

CF: IRIG formats reserve a set of elements known as Control Functions (CF) for the encoding of various control, identification, or other special purpose functions. IRIG B has 27 Control Functions located between elements 50 and 78. The NETCLOCK/GPS uses the Control Functions to encode year information and time sync status.

Element 55 is the time sync status bit. Element 55 is a Binary 1 when the front panel time sync lamp is green, and a Binary 0 when the lamp is red.

Year information consists of the last two digits of the current year (i.e. 97, 98, 99 etc.). Elements 60 through 63 contain the binary equivalent of year units. Elements 65 through 68 contain the binary equivalent of tens of years. In keeping with IRIG formats, the least significant bit occurs first. All unused Control Functions are filled with a space (Binary 0).

SBS: Word begins at index count 80. Seventeen Straight Binary Coded elements occur with a position identifier between the 9th and 10th binary coded elements. Least significant digit occurs first.

The fix for all this occurred with the SecureSync and its myriad of IRIG codes.

****10 MHZ output (Freq out)**
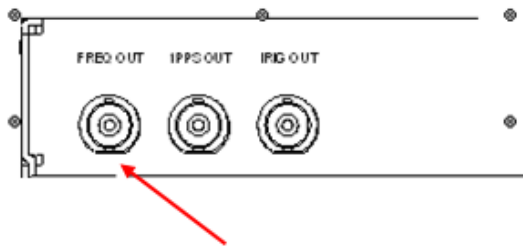
Interface -> **Frequency Output** page of the browser
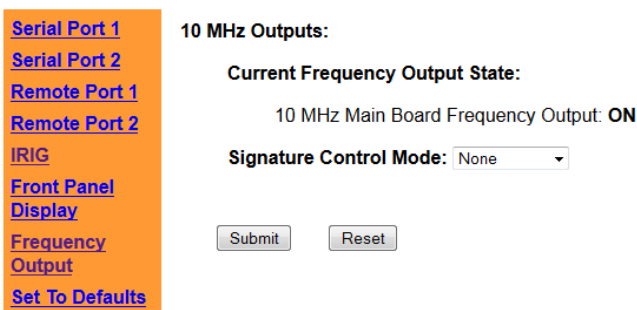
Signal Level: 700 mVrms into 50 ohms. (2vp-p, 10 dBm)

****10 MHz Phase Noise

Refer to: (Product Phase noise.xls) I:\Engineering\Products and
I:\Company Wide\Product Technical Specs\Phase Noise

****Frequency Stability/ 10 MHz Allan Variance

Refer to: I:\Company Wide\Product Technical Specs\Allan Variance

****1PPS BNC output (and to other outputs for sync)**
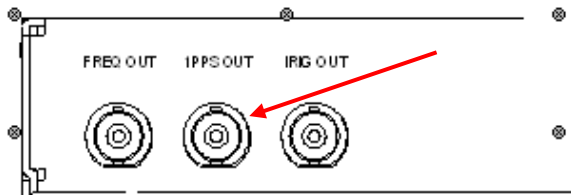
- ➢ FPGA selects from more than one 1PPS input.
- ➢ 1PPS output is not configurable (no config pages in the browser)

1PPS Pulse width

- ➢ Not user-configurable.
- ➢ Output pulse width should always be 200 milliseconds, no matter which 1PPS input is selected (FPGA stretches the selected pulse width),
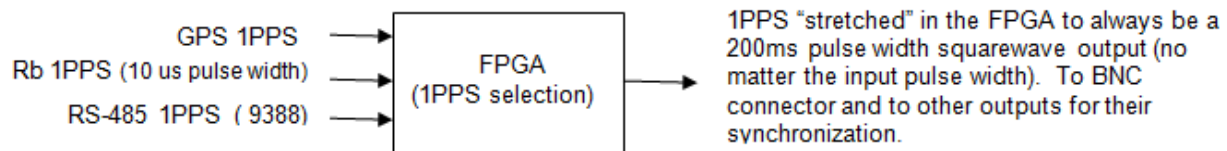
****Relays (Major/Minor/Event)**

- ➢ Refer to Section 3.4.17 of the 9300 manual for relay configuration via the browser.
- ➢ Refer to Section 4.1 of the 9300 manual for relay pin-out and operation.
- ➢ The relays are drawn in the manual schematics as de-energized (Shelf-state).
- ➢ The rear panel is screened for the relays when they are activated /energized (either on for a Minor alarm being asserted, Major alarm not active or when the Event is scheduled to be turned on). (For example, C to NC will be a short and C-NO will be an open).
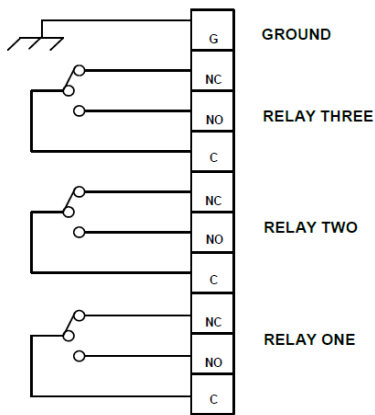
NOTE: Relays are shown in the de-energized state (event "off").

Figure 4-1: Event and Alarm Relay Contacts

Major alarm- With power on and no alarms, C-NO is a short and C-NC is an open.   However, if power is lost or if a Major alarm condition exists, the relay will de-energize/switch to C-NC being a short   and   C- NO will be an open.

Minor alarm- With power on and no Minor alarm asserted, C–NO being a short   and   C- NC being an open However, if power is lost or if a Minor alarm condition exists, the relay will energize/ switch to   C-NO being an open and C-NC being a short.

Event Relay - Both before and after a scheduled event: C -NO is a short   and   C-NC is an open.   When the event is scheduled to occur, the relay will energize and switch to C–NC being a short   and   C- NO will be an open.

Alarm/Event relay terminal block connectors

➢ **10 Pin connector for the Alarm output connector:**   P900-0101-0H0T

Mfg: On Shore Technologies
http://www.on-shore.com/products/terminal-blocks/pluggable/plug

List of On Shore distributors (by State) http://www.on-shore.com/find

Mfg P/N: EDCZ1550/10BK

Known issues with relay functionality

➢ Test Relays function no longer works with all web browsers.
➢ (25 Feb 2013 KW) Refer to FogBugz Case 1850, Salesforce case 8304

In version 3.6.1, Test Relays doesn't work with all web browsers. It works with IE, but no longer works with Mozilla:

Network Settings (net show/net config commands)

Viewing the network settings via CLI interface

➢ The CLI command to view the network settings is: **net show** <enter>

Configuring IP Address via CLI interface

The CLI command to change the network setting (via a walk-thru menu) is: **net config** <enter>

➢ The net config command will take the user into a setup menu which will walk them though the network settings/

➢ To disable DHCP (in order to configure a static address) type no to the question "do you wish to enable DHCP".

DNS Hostname

➢ Hostname must start with a letter and contain only letters, numbers, "-" or "_" afterwards.

HTTP, HTTPS (OpenSSH) and SSL (OpenSSL) certificates/ potential vulnerabilities

** Network settings/ static routes

Q How do you add static routes to the Models 9388, 9383 or 9389?

A. Reply from Keith (23 May 13) For your information and to answer your question, unlike our newer SecureSyncs and Model 9400 series NTP servers which support static routes, the Model 9388 does not support internal static routes. Static routes can only be added to these two newer Models of NTP servers.

Because the Model 9388 does not support static routes (with no intentions at this time to add them to this product), any special network routing will need to be handled outside of the NTP server.

Also for your information, in case you weren't already aware: The Spectracom SecureSync and Model 9400 series NTP servers have an available option that can be installed, which adds three additional 10/100/1000 base-T Gigabit network interfaces to the standard 10/100 base-T network interface included with all units. This capability provides the NTP server with a total of four network ports that can be connected to up to four isolated subnets. This capability alleviates the need to use Model 9388s in conjunction with the NetClock if it's desired to sync more than one network.

Attached you should find a copy of the SecureSync data sheet, which shows the capabilities of this NTP server. For more information on the SecureSync or Model 9400 series NTP servers, please contact Will Hickey in our Sales department at (585) 321-5832 or via email at willh@spectracom.orolia.com.

**OpenSSH, OpenSSL and Apache web browser/Potential vulnerabilities

Refer to:("**93xx Software Release dates.xlsx**"): PSB, PSP software updates\928x and 938x\928x and 938x software updates

Troubleshooting web browser issues

Web browser error codes

A) **Error code 01** is displayed while trying access NTP server

"**ERROR:** Web service could not get the desired information from the system. Please contact us for help. To speed up the trouble shooting process, please tell our technical support the error code [01]."

- This code is displayed when trying to access the web browser while its booting-up/rebooting.

- It may also occur if it can't find the time server on the network.

Diagnosing (if NetClock not just recently rebooted)

Check input power pack voltage

See if data displayed in the front panel LCD windows or if they are both black.,

Try connecting directly to a PC with a cross-over. Verify PC has an IP address on the same subnet.

---

*tcpforwarding (TCP forwarding)

➢ tcpforwarding is disabled in all software versions

Email from Paul Myers (15 Jan 2014) primarily regarding SecureSync
The SSHD Configuration files have "AllowTcpForwarding no" by default. I think this has been this configuration for some time. It is either the default or I turned it off since the NetClock 93xx. NetClock 93xx has it turned off as well.

802.1x authentication (Encapsulation of EAP – also called EAPOL)

➢ As of at least software versions 3.6.6 and below, NetClock 9300/9200 series does not support 802.1x

From Wikipedia (http://en.wikipedia.org/wiki/IEEE_802.1X)
IEEE 802.1X is an IEEE Standard for port-based Network Access Control (PNAC). It is part of the IEEE 802.1 group of networking protocols. It provides an authentication mechanism to devices wishing to attach to a LAN or WLAN.

Requires both Radius and EAP (http://en.wikipedia.org/wiki/Extensible_Authentication_Protocol)

IEEE 802.1X defines the encapsulation of the Extensible Authentication Protocol (EAP) over IEEE 802[1][2] which is known as "EAP over LAN" or EAPOL

With 802.1X port-based authentication, the supplicant provides credentials, such as user name/password or digital certificate, to the authenticator, and the authenticator forwards the credentials to the authentication server for verification. If the authentication server determines the credentials are valid, the supplicant (client device) is allowed to access resources located on the protected side of the network

Q. Do we support 802.1x authentication?
A. Email from Mike Sander (2/2/12) (regarding SecureSync)
We don't support 802.1x authentication. It can be added to RADIUS, but we don't currently support it. It looks like a significant effort, adding packages to Linux, and supporting a new kind of certificate.

**(HTTPS) Certificates (SSL certificates)

Creating and installing HTTPS (SSL) certificates

Refer to:

- ➢ The NetClock user manual: I:\New Released\Manuals\1165-xxxx-xxxx
- ➢ HTTPS Tech Note: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\HTTPS certificate

Formatting of the SSL certificate:

The SSL certificates can be either PEM or P7 format. If PEM, the user can paste the generated certificate into the field in the WebUI. If it is a P7 certificate, it cannot be pasted into the WebUI (because P7 certificate is a binary file instead of ASCII data like with PEM cert), When using a P7 certificate, the user has to transfer the file using SCP or SFTP into the "**/** " directory (no sub-directory is used- it goes right to**: /**). Then, in the WebUI, select the file extension of the certificate file from the drop-down and select the box to use a transferred file.

Email from Paul Myers If the certificate is not in the PEM format we cannot load it unless it is one of the types below.

PEM certificates are loaded through the WEB UI.

FTP the certificate file to the default location for the scp user.

GO to the web UI and check the update box and pull down the Certificate type loaded and press submit.

The following types are supported if renamed as shown below:
1. cert.pem - x509 PEM
2. cert.der -x509 DER
3. certpem.p7c - PKCS7 PEM
4. certder.p7c - PKCS7 DER

We load #2, #3, #4 as files with the indicated name and convert them to PEM format.

I have not tested or used this in a LONG, LONG time other than to reload PEM certificates.

There is a good chance the conversion might not work if he has some odd/new/unheard of certificate type.

If he is not loading PEM, I don't hold much hope.

Not able to enter a key size above 1024 bits (such as 2048)

- ➢ Refer to Fogbugz (not Mantis) 1604 http://fogbugz/default.asp?pg=pgEditBug&command=view&ixBug=1604
- ➢ Apparently, key sizes 1024 to 4096 was always intended, but versions 3.4.2 and below wouldn't allow 2048 or higher to be selected.
- ➢ It appears this was addressed in version 3.4.5???

Version 3.6.0 won't allow x509 DER certificate to be FTP in (can accept PEM certs)

- ➢ Refer to Salesforce case 6821 for more info
- ➢ Can downgrade to 3.5.0, install cert and then upgrade back to 3.6.0 (special downgrade instructions apply- refer to notes with the upgrade files).

Can you think of any reason the FTP would give an "disconnected from server" message when trying to FTP a Certificate file to a 9389 v 3.6.0?

Update to this issue (22 Jan 2013): This issue is applicable to Application software version 3.6.0 only. It was fixed in version 3.6.1.

Email sent by Dave Lorah (12/7/12) based on feedback from Paul Myers
After some discussion and investigation, we have concluded the problem you are experiencing is not caused by the FTP session but with the permissions to write to the root directory location where the certificate must be placed. There is a bug that had changed the permissions for this directory, so the certificate cannot be written there.

Unfortunately this is the only location where the certificate can be sourced from inside the 9389, so at this time it is not possible to upload a x509 Certificate.

It is only possible to use a PEM certificate which can be copied into the web UI.
Spectracom is looking into a fix. At this time new firmware update has not been scheduled. We will need to see what needs to be done and when this can be scheduled.
_____

Corrupt HTTPS certificate or expired HTTPS certificate (can't connect via HTTPS)

- ➢ If the SSL certificate is expired or corrupt, unlike the SecureSync which has a CLI command available to delete the certificate (**defcert**), the Model 9300 and 9200 series do not have a CLI command to just delete the certificate.

- ➢ Must disable HTTPS and enable HTTP to login to the browser with HTTP connection to reset the certificate.

If the SSL certificate is corrupted for any reason (Some examples include: the wrong PEM file is pasted into the browser, missing parts of the certificate file, etc), HTTPS will immediately stop working. If you try to login with HTTP, it will try to redirect the user to HTTPS and still not let you in.

You must go in through the console port and first disable HTTPS with NET HTTPS NO.
 Then, enable HTTP with NET HTTP YES.
 Using the browser with an HTTP connection, delete the old HTTPS certificate and create/install a new certificate.
In the Security -> HTTPS page of the browser, select "Create Certificate Request and Self Signed Certificate".

If HTTP connection isn't working either:

- • **If version is 3.6.0 or above**, perform a clean ("sys reset" command) as discussed in the email below
- • **If version is prior to v3.6.0**, replace the CF card to clean the unit.

Email Keith sent to customer of Roots, 29 July 2014)
Hi Wan Quan,
Good day to you and thanks for your email.

What is the version of software currently installed in the NetClock? Is it still at version 3.5.0? Or have you since upgraded it to version 3.6.6?
Since you are no longer able to access the web browser using either HTTP or HTTPS, the only other suggestion I have for you is to clean the unit (reset the configs) back to the factory default values), which with software versions 3.6.0 and above software installed, can be performed with a serial cable. Once the unit has been restored to the factory default state using the "**sys reset**" serial command, the NetClock can be reconfigured as desired.

To restore the configurations, connect a standard DB9F to DB9M serial cable (pinned as a straight thru cable) to a PC with a DB9 port (or to a USB to serial adapter) and the other end of the cable to the "Serial Setup Interface" connector on the back of the Model 9389.   On the PC, run HyperTerminal, Procomm or any other terminal emulation software. Attached you should find a document that discusses this serial connection and provides the port settings to use.

Once connected to this rear panel Serial Setup Interface port, hit <enter> and login to this port using the username of **defaults** and the password of **M0g2i2r1f6a7T** (the second value is a number "zero"). Then at the command prompt, type **sys reset** <enter>.   Note that if the login password is typed incorrectly, it will automatically perform a sys reset and

restore the unit to factory default settings.

With the NetClock now restored to the factory default settings, login as **admin** with the default password of **admin123** and then type **net config** <enter> to reconfigure the network settings as desired. It should now allow you to login to the web browser using the Spectracom default HTTPS certificate.

If the software version is still at version 3.5.0, a CF card inside of the unit will need to be swapped out to reset it to the factory default settings. Replacing the CF card does not void the warranty and there is no additional cost for this card. To send it out to you, we just need a shipping account number (such as UPS or Fedex) and let us know to whom it should be made attention to, the address to send it to and a phone number for someone at this address. Once the socketed card has been swapped out, the NetClock's network settings can be reconfigured as discussed above.

Apache web browser version information/ PHP

➢ Version 3.4.5 uses Brutal Linux version 2.5. This correlates to Apache version 2.2.6 being installed in versions 3.4.5 (and 3.4.6)

Note: If a customer happens to ask about our PHP version, we do not install PHP in our NetClocks or SecureSync. (PHP is a type of scripting language, like Pearl, for creating web browser pages).

For version information on the packages we use, refer to: **\\eng-server\projects\Brutal-2.5\sources

Determining current version of Apache installed

➢ Unlike SecureSync/9400s, the earlier NetClock CLI doesn't have a "version" command and the Apache version isn't reported in the web browser (at least versions 3.6.7 and below

➢ Find out Application software version and look up applicable Apache version in the Excel spreadsheet: PSB, PSP software updates\928x and 938x\928x and 938x software updates

SCP/ Factory/User/Admin accounts

scp account

➢ scp account has greater rights than admin account
➢ Uses the same password as the admin account to login.

Factory account

Factory account/factory password (internal use only)!!
Earlier factory password: XF0a5t2c2o7r2XY
It was later changed to: Uno1Dos1Tres3

User accounts / admin account

➢ Up to 16 different user accounts can be created (each with their own password).

Username/Password requirements for admin and user accounts / Enhanced password complexity

A) **Username requirements/limitations**

- Username must be between 3 and 32 characters

- The user account name does not like capital letters or non-alphanumeric characters (except an underscore or hyphen, which it will accept).

- The user name can contain an underscore symbol or a hyphen, but other symbols and capital letters are not allowed. (We tried it here and were successful). However, the user name cannot start with a number or a symbol. It must start off with a lower-case letter. Then it can be followed by numbers, other lower-case letters or an underscore/hyphen symbol only.

B) Password requirements/limitations

- Password must be between 8 and 32 characters.

- They do not have any requirements for special characters, etc.

Failed to set access value for group 3 error message

Creating User Accounts gives **Failed to create new account   Failed to set access value for group 3** error message. This can be caused by having incorrect user account name (user name) parameters. The user account name does not like capital letters or non-alphanumeric characters (except an underscore or hyphen, which it will accept). User account name is min 3 to max 32 characters.   Password is 8 to 32 characters).
11/12/10 KW- Apparently, the user name can contain an underscore symbol or a hyphen, but other symbols and capital letters are not allowed. (We tried it here and were successful). However, the user name cannot start with a number or a symbol. It must start off with a lower-case letter. Then it can be followed by numbers, other lower-case letters or an underscore/hyphen symbol only. Everything else will result in **Failed to create new account   Failed to set access value for group 3** being displayed.

On version 3.4.5 this is the message returned from the web browser: Hostname must start with a letter and contain only letters, numbers, "-" or "_" afterwards

Note-We saw a case today where the account was created in the Linux password file but not the Spec password file (don't know why). The account name could be "created" again (because it's in the Linux file) but it couldn't be deleted from the Spec file because it wasn't being displayed in the Security/User account page account drop-down list. A customer was apparently seeing this same issue. Recommended they reset all configs back to factory (system/Reboot page). Then the account should be able to be created.

Enhanced password complexity

➢ Unlike SecureSync and NetClock 9400s, the Model 9200 and 9300 series time servers do not have any password complexity requirements (such as password expiration, special characters, variable password lengths, etc).

Email from Keith (12 Dec 14 KW) Unlike our newer NetClock Models 9483 and 9489 (which have now replaced the earlier Model 9389s), the Model 9300 series time servers do not have any ability to enable/enforce enhanced password complexity. For example, the Model 94389s account passwords do not expire and do not require any special characters. The Model 9389's only password requirements are that the password must be between 8 and 32 characters.

For your reference, below is a screenshot from the NetClock Model 9400 series web browser showing the enhanced password complexity capabilities for its user accounts:
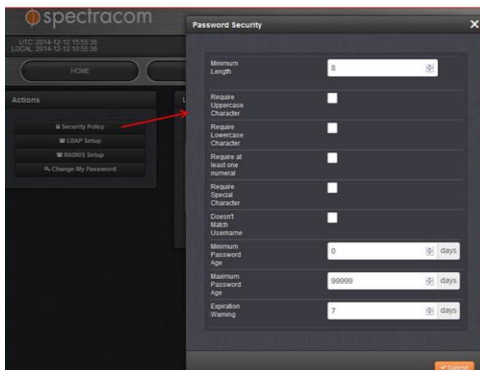
To create new user accounts/change the admin or user account password (when password is known)
Security -> User Accounts page of the browser
Select either "admin" or "user" in the drop-down and Submit.

Note Password must be between 8 and 32 characters

User Name:	admin
Password (Required):	
Type Password Again (Required):	

Email Keith sent to a customer (6/19/12): The NetClock's admin account password can be changed, as desired. To change the admin account password, login to the web browser and navigate to the **Security** / **User Account** page of the browser. In the "User Account" drop-down, select "admin" and press the submit button. Then, enter the desired password to change it to and type it again to confirm the password. Hit the Submit button to accept the new password. The admin account password has **now been changed.**

Admin password reset (if current password is not known)

➢ Refer to knowledge base article on our website: http://support.spectracomcorp.com/articles/How_To/Reset-the-admin-password-for-NetClock-9200-and-9300?q=reset&

Summary:

- Version 3.6.0 or above installed – can reset password in the field

- Versions 3.5.0 or below installed –need to replace CF card and reconfigure settings, or return CF card to the factory for the password reset which allows the configs to be retained.

Details:

Starting in version 3.6.0 (released/starting shipping November 2012) units that have been already been updated to at least this version can then perform a clean if the Admin password is not known (alleviating the need to send new CF card).

Important Note: If you type anything wrong in the following commands, or type anything else, a full clean/reboot is performed. One option is to email the following command and have them paste it, to ensure its typed correctly.

To perform the clean, they login to the rear panel "**Serial Setup Interface**" connector. The user name is: **defaults** (all lower-case) and the password is **M0g2i2r1f6a7T** (the second value is a number 0).   Note that the password is "**M g l r f a t**" alternating with "**0 2 2 1 6 7**".

Then, at the command prompt, type the following command: **Sys reset password** (Admin account and User passwords are reset).

To perform a clean, type **sys reset** type. It will take about 2 minutes to reboot and then about three additional minutes to generate the keys.

————————————————

Web browser troubleshooting (error messages displayed/abnormal web browser operation)

A) Error code: ssl_error_no_cypher_overlap displayed when trying to connect.

➢ Verify the browser (IE, Firefox, Chrome) is up to date.

➢ Note the info below was observed with a SecureSync, but also likely applies to the earlier NetClocks, also

Email from Harris (3 March 15): Brian, I loaded the 5.2.0 software and now my Firefox browser won't connect to the webpage. My firefox version is 13.0.1. the page message is:
Secure Connection Failed
An error occurred during a connection to 10.128.13.97.
Cannot communicate securely with peer: **no common encryption algorithm(s)**.
(Error code: ssl_error_no_cypher_overlap)
The page you are trying to view cannot be shown because the authenticity of the received data could not be verified.
Please contact the website owners to inform them of this problem. Alternatively, use the command found in the help menu to report this broken site.
Keith's finding: Firefox 13 was release in 2013. I recommended updating Firefox to a much newer version.

B) Issue with Radius/User accounts after updating to version 3.6.1

➢ Refer to Fogbugz Case 1853 (http://fogbugz/fogbugz/default.asp?pre=preSubmitBug)

➢ User accounts apparently need to be editied after updating.

Partial email from Cedrick Smith with USAF: I've installed 3.6.1 on my 9383 Time Servers and now My user rights are not working. I logged in as admin and checked my user rights. I still had "Write" permissions, but I was denied access to the "Status & Logs" page. Have you heard of this happening anywhere else with this upgrade?

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Authorization Log (Auth Log)

A) Auth log records the following:

• Successful and unsuccessful SSH logins

• Successful and unsuccessful FTP/SCP logins

• UNSUCCESSFUL HTTP/HTTPS logins ONLY (It does not record SUCCESFUL HTTP/HTTPS logins)

• Creating new user accounts

• Changing passwords

3) **Syslog: Auth log/log entries are not able to be sent to Syslog servers. As the Auth log is the only log for HTTP/HTTPS and SSH logins, therefore, login log entries are not able to be Syslog.**

Example Auth log entries for SSH

Valid username and valid password
Oct 31 16:10:21 Spectracom sshd[1400]: Accepted keyboard-interactive/pam for admin from 10.2.100.29 port 3939 ssh2

Valid username and invalid password
Oct 31 16:15:26 Spectracom sshd(pam_unix)[1419]: authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=pm-wing2.int.orolia.com user=admin

Oct 31 16:15:28 Spectracom sshd[1417]: error: PAM: Authentication failure for admin from pm-wing2.int.orolia.com

Invalid username (admin) / arbitrary password
Oct 31 16:12:44 Spectracom sshd[1411]: Invalid user admin11111 from 10.2.100.29
Oct 31 16:12:44 Spectracom sshd[1411]: Failed none for invalid user admin11111 from 10.2.100.29 port 3963 ssh2

———————————————————

Example Auth log entries for HTTP/HTTPS

Valid username and valid password

Note: No log entries are asserted for valid web browser logins

Valid username (admin) / invalid password

Below is an example log entry asserted in the Authorization log when I tried logging into the admin account via HTTPS, using an invalid password:
Oct 31 16:16:07 Spectracom httpd(pam_unix)[1371]: check pass; user unknown

Oct 31 16:16:07 Spectracom httpd(pam_unix)[1371]: authentication failure; logname= uid=1001 euid=1001 tty= ruser= rhost=

Oct 31 16:16:26 Spectracom httpd(pam_unix)[1303]: authentication failure; logname= uid=1001 euid=1001 tty= ruser= rhost= user=admin

invalid username (kwing) /arbitrary password

Below is an example log entry asserted in the Authorization log when I tried logging into the admin account via HTTPS using an invalid user account name and an arbitrary password:
Oct 31 16:18:16 Spectracom sshd(pam_unix)[1426]: check pass; user unknown

Oct 31 16:18:16 Spectracom sshd(pam_unix)[1426]: authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=pm-wing2.int.orolia.com

Oct 31 16:18:18 Spectracom sshd[1424]: error: PAM: Authentication failure for illegal user kwing from pm-wing2.int.orolia.com

Oct 31 16:18:18 Spectracom sshd[1424]: Failed keyboard-interactive/pam for invalid user kwing from 10.2.100.29 port 4009 ssh2

———————————————————

Example Auth log entries for FTP

Valid username and valid password
Oct 31 16:27:17 Spectracom xinetd[578]: START: ftp pid=1593 from=::ffff:10.2.100.29
Oct 31 16:27:17 Spectracom pure-ftpd(pam_unix)[1593]: session opened for user admin by (uid=0)
Oct 31 16:27:17 Spectracom pure-ftpd(pam_unix)[1593]: session closed for user admin
Valid username and invalid password

Oct 31 16:29:58 Spectracom xinetd[578]: EXIT: ftp pid=1595 duration=17(sec)

Oct 31 16:29:58 Spectracom xinetd[578]: START: ftp pid=1597 from=::ffff:10.2.100.29

Oct 31 16:29:58 Spectracom pure-ftpd(pam_unix)[1597]: authentication failure; logname= uid=0 euid=0 tty=pure-ftpd ruser= rhost= user=admin

Oct 31 16:30:00 Spectracom pure-ftpd (IDLE)[1597]: (?@pm-wing2.int.orolia.com) [WARNING] Authentication failed for user [admin]

Oct 31 16:30:04 Spectracom pure-ftpd (IDLE)[1597]: (?@pm-wing2.int.orolia.com) [INFO] Logout.
Oct 31 16:30:04 Spectracom xinetd[578]: EXIT: ftp pid=1597 duration=6(sec)

Example Auth log entries for account management

Creating a new user account

Oct 31 16:21:09 Spectracom useradd[1443]: new user: name=kwing, UID=1009, GID=104, home=/opt/./, shell=/usr/bin/cli
Oct 31 16:21:09 Spectracom passwd(pam_unix)[754]: password changed for kwing

Changing an existing account password

4. Oct 31 16:23:24 Spectracom passwd(pam_unix)[754]: password changed for kwing

Enable SSH/ SSH sessions / troubleshooting issues associated with SSH

1. Enable/disable SSH

➢ Enable box at the bottom of the Security -> Network page of the browser (under "Services")

Services:

☐ Enable Daytime Protocol

☐ Enable Time Protocol

☑ Enable Telnet

☑ Enable FTP

☑ Enable SSH

☑ Enable HTTP

☑ Enable HTTPS

2. Configure SSH/SSH password

Security -> **SSH** page of the browser

```
SSH Configuration:
    Host Keys:
        Delete Keys:
            ☐ Delete Host RSA/RSA1 Key File
            ☐ Delete Host DSA/ECDSA Key File
        ☐ Create Host Key Files
            Private Key Bit Lengths:
                RSA Key Length: 2048
                DSA Key Length: 1024
    SSH Authentication:
        ● Allow either Public Key with Passphrase or Password Authentication
        ○ Allow only Password Authentication
        ○ Allow only Public Key with Passphrase Authentication
    Public Keys File:
```

SSH keys supported (the following info was pasted from the SecureSync cust assist doc)

➢ 9300s support RSA/RSA1 and DSA/ECDSA key types

➢ (SecureSync/9400s) Update version 5.4.5 added support for openSSH use of ED25519 keys. I don't believe this key type is supported in any software version of the 9300s/9200s.

"Could not load host key" log entries

Report from customer "There are these messages in the auth.log"

Jan 27 00:16:57 nt01pdmi107 sshd[7256]: error: Could not load host key: /etc/ssh/ssh_host_ed25519_key
Jan 27 00:16:57 nt01pdmi107 sshd[7256]: Did not receive identification string from 144.14.193.108
Jan 27 00:16:57 nt01pdmi107 xinetd[2927]: EXIT: ssh pid=7256 duration=41(sec)

Email from Dave L (15 Feb 27) regarding a Mode 9400/SecureSync What we believe is happening is you are using an older or NEWER SSH version and there is key negotiation issues where it tries key different types and it is timing out before getting a connection.

We updated OpenSSH in nearly every past version and there was usually an issue with the supported key types.

I would recommend you evaluate which version of SSH you and the SecureSync are using and pick a compatible key type on each side that works. Updating the firmware to current version 5.5.1 should also resolve the problem.

<mark>NTP related</mark>

**NTP Version

Note: We will not automatically incorporate version changes to NTP. We will review and assess the requirements of the change to decide if the change is warranted.

> NTP Version is reported in the **Status and Logs** -> **System Status** page of the browser

> NTP is version **4.2.0** in at least Application versions 3.6.7 and below (not expected to ever be updated)

```
NTP Rev is 4.2.0@1.1161-r
Unit's Serial Number: 435
GPS Receiver Serial Number: 82577157 06/09/2005
```

(7/30/12 KW) the version of NTP in the 9300 and 9200 series NTP servers has a potential vulnerability, if NTPQ/NTPDC is enabled (this is disabled by factory default).   At this time, per Jim Allocco and David Sohn, there is no intention to update NTP in this series to a newer version. The customer can either keep NTPQ/NTPDC disabled, or upgrade to a SecureSync/9400 (we are planning to update NTP in these newer systems later 2013).

**NTP Configuration

A) NTP -> General page

NTP Service:
○ Enabled ● Disabled

NTP is Primary:
● Enabled ○ Disabled

NTP Time Scale:
● UTC ○ GPS

NTP Broadcasting:
☐ NTP Broadcast every 4 (16s) ▾
Use MD5 authentication with trusted key ID: None ▾

NTP Access:
☑ Service all IPv4 requests by default.
☐ Require Authentication for IPv4 requests.
☐ Allow queries from NTPDC or NTPQ over IPv4.
☑ Service all IPv6 requests by default.
☐ Require Authentication for IPv6 requests.
☐ Allow queries from NTPDC or NTPQ over IPv6.

Type	IPv4/IPv6	IP Address/Hostname	IP Mask	Auth Only	Enable Query
Allow ▾	IPv6 ▾	mask	255.255.255.255	☐	☐
Empty ▾	IPv4 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐

NOTE: NTP Access can only be configured while the NTP Service is disabled.

[Submit] [Reset]

Sidebar menu: General, References, Symmetrical Keys, Autokey, Statistics FTP, Status

**NTP timescale

> NTP can be configured to output in either UTC (default) or GPS timescale.

> Configured in the NTP -> General page of the browser

NTP Time Scale:
● UTC ○ GPS

***NTP Access Control List (ACL) / enable NTP/NTPDC functionality external to the time server

- ➤ The MAX number of entries in the NTP Access table that can be listed in the GUI= Max of 20

- ➤ The access table is a dynamic table that can grow to add more entries. Once 5 entries have been entered, hitting Submit will add another row for another entry. A total of 20 entries can be added to this particular table.

- ➤ NTP Unicast (default) or NTP Broadcast supported. Can be both simultaneously.

***NTP Client list

- ➤ Unlike the earlier Model 9100 series, the Model 9300 and 9200 series time servers have no available NTP client list. There are no lists of NTP clients accessing these Model NetClocks available via either the browser or the CLI interface.

Regarding a list of NTP clients in the discontinued Model 9300 series NetClocks

For your information, and unlike the newer SecureSyncs, the earlier Model 9300 series NetClock had no NTP clients list available via either its web browser or its CLI interface. There are no available CLI commands which allow a list of serviced NTP clients to be reported (NTP cannot be accessed via the CLI in the 9300s in order to obtain a list of clients).

However, the NTP clients that are accessing the earlier Model NetClocks can instead be captured external to the NetClock by performing a Wireshark packet capture on a mirrored port. Filter this packet capture by the destination address being the address of the NetClock and either:

- ➤ By port number (NTP port 123)
- ➤ By protocol (NTP)

****"NTP is primary

- ➤ Used to disable the Antenna Problem alarm when the GPS antenna isn't connected.
- ➤ Can be Enabled or Disabled as desired (Disabled by default- so the Antenna Alarm is active).
- ➤ Controlled in the NTP -> General page of the browser (Just below the NTP Enable/Disable switch)

NTP Service:
  ⦿ Enabled ○ Disabled

NTP is Primary:
  ○ Enabled ⦿ Disabled

NTP Time Scale:
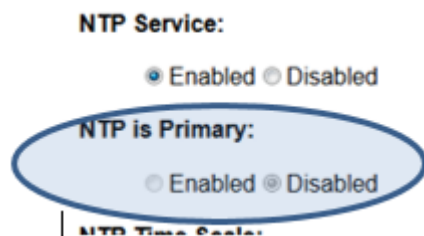
Q. Regarding 9389, there is this "NTP is primary" enable / disable selection. My user wants to know why default is disabled. A search on the manual points it at something to do with modem option 03 or peering or sending alarms.

A Email Keith sent to danny Loke (24 Sept 14) This function isn't as complex as it sounds. Normally, the Model 9389 will have a GPS antenna connected to it, in order for it to track and sync to the satellites. However, with NTP input, it can operate without a GPS Reference by just syncing it to other time servers. In this application, it's likely that the GPS antenna won't even be attached to the time server. Without an antenna connected to the NetClock, its internal GPS receiver is going to report a constant open is occurring in the GPS "cable", which will cause the Antenna Problem alarm to be asserted. When this alarm is asserted because either there is a cable issue or no antenna even antenna, the Sync LED flashes red to report this.   So "NTP is primary" being enabled stops the front panel Sync LED from flashing red, because the antenna isn't attached ☺!!

NTP -> References page

➢ Trusted- Allows it to be used as a reference. If it is not Trusted, it cannot be used as a time source.

➢ The MAX number of Peers or Servers that can be listed as references in the GUI= Max of 12 (this table is dynamic so that it can grow when Submit is pressed

***NTP iBurst mode

For more info on iBurst in 9200 and 9300 series, refer to: **EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\NTP\NTP peering**

- ➢ NTP iBurst was added as an optional configuration via the browser in the NetClock 9200/9300s starting with version 3.6.1 (Jan, 2013 time-frame).

- ➢ When enabled, iBurst ends an initial 8 packets to the listed NTP servers (instead of just one packet) when NTP first starts up.

- ➢ iBurst is only available when configuring NTP Servers in the "NTP Servers" table. It is not available when listing other NTP Peers in the "NTP Peers" table.

- ➢ Disabled by default.

- ➢ To enable iBurst mode, select the "**IBurst**" checkbox for each desired listed server in the "NTP Servers" table.

NTP Peers:

NTP Peers may be specified in the following table to form a peer server group. Servers in a peer group should each specify the oth group loses sync with its primary reference, it will choose another member of the peer group as backup, dropping to one above the

Peer IPv4/IPv6/Hostname	Min Poll	Max Poll	Trusted Sym Key ID	Autokey	Clear
	4 (16s)	10 (17m 4s)	None	☐	☐
	4 (16s)	10 (17m 4s)	None	☐	☐
	4 (16s)	10 (17m 4s)	None	☐	☐
	4 (16s)	10 (17m 4s)	None	☐	☐
	4 (16s)	10 (17m 4s)	None	☐	☐

NTP Servers:

NTP Servers specified in the following table are used only as potential time references. If a server is chosen by the NetClock as th drop to one above the stratum level of the chosen server.

☑ Enable Stratum-0 Reference (ie. GPS, Modem, Serial Time Code)

NOTE: When enabled, the Stratum-0 reference is ALWAYS preferred.

Server IPv4/IPv6/Hostname	Preferred	Min Poll	Max Poll	Trusted Sym Key ID	Autokey	Iburst	Clear
	☐	4 (16s)	10 (17m 4s)	None	☐	☐	☐
	☐	4 (16s)	10 (17m 4s)	None	☐	☐	☐
	☐	4 (16s)	10 (17m 4s)	None	☐	☐	☐
	☐	4 (16s)	10 (17m 4s)	None	☐	☐	☐
	☐	4 (16s)	10 (17m 4s)	None	☐	☐	☐

Modified excerpt from: http://www.eecis.udel.edu/~mills/ntp/html/ntpd.html:
With this option (iBurst) a volley of 8 NTP packets is exchanged between the NTP Server and each configured NTP Server (listed in the "NTP Servers") table to groom the data and set the NTP clock in about ten seconds. If nothing is heard after a few minutes, the daemon times out and exits without setting the clock.

Email from Paul Myers (7/25/12) FYI - Morgan Stanley wanted to try Burst (8 packets requested every poll) and IBURST (8 packets requested at NTP startup)
I ran a test over the weekend and the results look very good.

The Application Note can mention users can use IBurst to set the Linux kernel time (and thus the KTS time) as indicated in my earlier emails.

The Burst seems to allow faster convergence and according to NTP documentation better performance in the presence of Jitter.

Please add to the application note burst and iBurst may be of benefit. IBurst to set the Linux and KTS time on startup. Burst to overcome jitter and network congestion.

B) NTP -> Symmetrical Keys page (Symmetric Key authentication)

➢ The MAX number of Symmetrical keys that can be listed in the GUI = **Max of 15**.

➢ This table is not dynamic (can't grow)

C) NTP Status page

NTP -> **Status** page of the browser

NTP Status table shows the Linux kernel time
syncing via our NTP Reference Clock driver

NTP Status:

Status	In Sync
Stratum	1
Selected Reference	.GPS.
Delay	0.000 mS
Offset	-0.001 mS
Jitter	0.002 mS

Offset Graph:

01/28/2013
Refresh Graph
⊙ Time Offset
○ Frequency Offset
○ RMS Jitter

NTP Reference Status:

Sync	Host	Ref ID	Stratum	Mode	Type	Auth Status	Last (Sec)	Poll Interval (Sec)	Reach	Delay (mS)	Offset (mS)	Jitter (mS)
*	Spectracom	.GPS.	0	Client	local	none	2	16	377	0.000	0.068	0.002

Our Reference Clock
driver (allows NTP to
get time from System
Time)

Offset field: this value is the typical, inherent processing delay of our serial
clock driver allowing NTP to grab the System Time.

Note this processing delay is much better/less in SecureSync/9400s than in
the 9300/9200 series.

NTP Status reference line color schemes:

RED:

REJECT   - The peer is discarded as unreachable.

YELLOW

OUTLYER   - The peer is discarded by the clustering algorithm as an outlyer.

GREEN

CANDIDATE - The peer is a survivor and a candidate for the combining

SYSPEER   - The peer has been declared the system peer and lends its
        variables to the system variables.

PPSPEER   - The peer has been declared the system peer and lends its variables to the system variables.

NTP Ref ID change (".PPS" to ".GPS")

Due to many questions about the Ref ID indicating ".PPS" instead of "GPS", Mark Goodlein hid the "**.PPS**" reference clock driver in the browser so that only "GPS" was displayed in the NTP / Status page. With some help from Paul Myers, this Ref ID change appears to have been added to the v3.2.1 software update.

Email KW sent to a customer (6/18/12) Question for you- What is the Application software version installed in both units (as indicated in the Static System Information table on the Status and Logs/System Status page of both units)?

FYI- Once NTP has synced to GPS, we enable another NTP input reference that uses the 1PPS generated by the GPS signal. This "PPS" reference helps stabilize/optimize the NTP functionality.   When this occurs, we used to display "PPS" to indicate the PPS clock driver had been enabled. There was a software change quite some time ago that removed the reference to "PPS" because of customer questions/concerns of it showing "PPS" instead of "GPS", since it's a GPS synchronized NTP time server. The later operation of NTP is exactly the same as the earlier operation, but the "PPS" display was changed to "GPS" instead.

This change was incorporated in a very early version of the software (version 3.2.1 back in 2006, I believe). If the current version is version 3.4.1 and below, we HIGHLY recommend it be updated to the current version of version 3.5.0. Below and attached is information regarding updating to the latest version of software:

**NTP Status graphs

> ➢ Refer to: **NTP Status graphs

FTP of Statistics will result in a text file full or the NTP info. See http://www.eecis.udel.edu/~mills/ntp/html/monopt.html#types of a description of this data.

**NTP Functionality

****NTP as only input to sync System Time (corrects Front panel time and improves operation)

> Refer to NTP Peering document for the limitations of NTP peering the 9200 and 9300 series: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\NTP\NTP peering

> Version 3.4.7 update allows System Time to sync to NTP (the front panel time will match NTP. The Sync LED will turn green and it will be treated like if it was synced to GPS.

For your information: unlike the NTP servers that have now replaced the Model 9389s (called SecureSyncs and Model 9489s), the Model 9389s were not designed/ intended to be synchronized by NTP input from other NTP servers. They were designed to be synced by GPS input, and then they can provide NTP output to clients. NTP can be used and as input to sync NTP. But with earlier versions of software, NTP could not sync anything in the NetClock (including the front panel time display) other than NTP itself. So, in earlier versions of software, the NTP time going out to the network will be different than the front panel time display, which is just based on a free-running oscillator in the NetClock.

In later versions of software, this operation was partially changed so that the system (including the front panel time display) can be periodically synced to NTP (which is synced to other NTP servers, without a GPS input).

Below and attached is additional information about this

Attached is a document that goes into much more detail regarding NTP peering of the Model 9389 and the limitations to this functionality. In summary (and in addition to this document) syncing one NTP server to another is known as NTP peering. Unlike SecureSync and Model 9489, NTP is NOT considered a primary input reference to the Model 9389 (GPS and modem dial-out with option 03 installed are the only possible primary inputs to the Model 9389).

When the Model 9389 is only synced to a Stratum 1 NTP server (so it's a Stratum 2 server to the network) and not synced to one of the above mentioned primary inputs, the Model 9389 will not be able to go into initial Time Sync and therefore it will never be able to go into the Holdover mode. The internal oscillator for Holdover mode is only used upon the loss of the primary input reference(s) (where the Modem can be used in addition to either IRIG or GPS input).   Upon loss of the primary input, the Model 9389 then goes into Holdover mode, and NTP is not affected unless Holdover mode expires before the primary input has been restored. Specific to your questions, the oscillator is not used while only peering the NTP server with another NTP server.

With the Model 9389 only synced to an NTP server, without first going into sync with one of the primary inputs, holdover mode is not available. NTP will only remain at Stratum 2 as long as the Stratum 1 server remains continuously available for the Model 9389 to obtain time from it. While in this mode, the front panel Sync LED will not indicate Sync status, the front panel time display and the System/System Time page of the browser will not show the same time as NTP is outputting to the network (these display a free-running and un-synced time), and there will be no indication on the front panel that NTP is in this mode. As I mentioned earlier, the attached document covers these limitations in more detail.

With the Model 9389, NTP peering is meant to be a temporary backup (for network synchronization only) in case the primary input is lost for a period of time. It was not designed specifically to be the only input ever provided to this product. It will work as a peered server, but with the limitations that are specified in this email and the attached document.

It is HIGHLY recommended that the Model 9389 be continuously synced to GPS or IRIG (or that its synced via modem-dial-out), so that it's in constant sync. However, this is not always possible. The only work-around to the limitations of NTP peering of the Model 9389 with no continuous input reference, and I've heard of a couple of other customers doing this, is to temporarily sync the Model 9389 outdoors of the location that the unit will be installed in. Then, after its synced to GPS, move the equipment back indoors without any interruptions to power (if power is ever removed, even for one second, it will not power back up in either Sync or Holdover modes and therefore has to be reconnected to GPS again). Then, it will operate n Holdover mode, until either Holdover expires, or if the unit is power cycled. When either of these occurs, GPS has to be temporarily reconnected again!! The allowable holdover mode length of time is user-configurable for a value up to 5 years. So, at the absolute minimum, the Model 9389 has to be reconnected to GPS every 5 years, but even more often if the unit is either power cycled for any reason (or if a Leap second occurs during the Holdover period).   Besides temporarily moving the Model 9389 and GPS antenna equipment in and out of the building after ever power cycle/Holdover mode expiration, the alternate method, if its allowed, is to keep the equipment in place and

temporarily connect it to an outdoor GPS antenna via a coax cable that is temporarily reconnected to the back of the Model 9389.

Unlike the Model 9389, NTP input IS considered a primary input to SecureSync. SecureSync can fully sync to NTP input and will go into Holdover mode with the oscillator being used to maintain NTP time, if NTP input become available.   As you can see from the above description and the attached document, SecureSync is a much better solution if NTP peering is the only input that is available to the Spectracom NTP time server. Richard Fox can provide you with additional information on SecureSync!

Per page 7 of the attached Release Notes (excerpted below), version 3.4.7 enhanced the NetClock Model 9389 to work better when NTP is the only input".

**9383/9389/9388 in Stratum 2 configuration

> (In at least versions 3.5.0 and below) The Frequency (and associated Major alarm) will remain asserted because the oscillator can't discipline to NTP input (refer to case for "Open Access" and their customer- Malaysia rail)

Syncing a TimeView to a Spectracom NTP server in a Stratum 2 only configuratiuon

Email from Paul Myers (to Will Hickey) regarding a 9388 (which syncing to a Track NTP server) and desire to sync a TV400W to the 9388. Please tell your customer who is using a Track NTP Server as a primary GPS Stratum 1 reference and a 9388 as a Stratum 2 server with TV400 Wired Display clocks to perform the following setup.

Track NTP Source

1. Configure as a Stratum 1 NTP Server using GPS – MUST BE IN SYNC!
2. Use a PC NTP Client to verify operation LI bits should be zero and Stratum 1

9388/TV400

1. Power up with network connection installed
2. Connect TV400 to RS-485 Remote OUTPUT port 1 using the TV400 INPUT not output.
3. Configure on Interface Remote Port 1 Serial port to 9600 Baud using Data Format 0 or 1
4. The clocks can display UTC or a user created Local Clock
5. Create a Local Clock then select it on the Interface Remote Port Serial 1 page if needed.
6. Verify TV400 shows the correct time, but seconds will blink until time sync achieved.

NetClock Configuration:

1. Disable **NTP** (in **NTP General** Tab)

in the NTP References Tab

2. Enter the NTP Server addresses (Quantity 1 to 5)

3. Configure the NTP Min Poll rate to 6 and Max Poll rate to 10.

4. Disable the checkbox for "Enable Stratum-0 References" (This can make sync slower if enabled).

5. Enable NTP on the General Tab

6. Wait for NetClock 9388 to enter holdover and the sync light blinks green.

7. Observe TV400 for correct second's value which now does not blink.

Troubleshooting:

I recommend you shorten these to bullet points or drop this and let Keith/Dave deal with them.
Note if you compare the time of the displays to the front panel display of a Track or Spectracom time server note the time shown on the displays maybe in UTC.

If you 9388 is off 1 second check to see if the correct number of leap seconds is configured. Check the System-> System Time Leap Second field and adjust to 16 if needed.

If the seconds jump or skip, initially this is OK. If your NTP servers are remote or are inaccurate, you can improve your 9388 clock stability by adjusting your NTP Min Poll and Max Poll rate. The recommend values are Min=6 and Max=10. Slower poll rates will improve stability if the NTP servers are distant or inaccurate.

For faster time sync Min Poll can be lowered to 4, but the high poll rates during initial sync can result in time jumps of the seconds. After a while NTP increases the poll rate.

Leaving the "Enable Stratum-0 Reference" enabled makes sync'ing take longer, but might improve stability, at the risk of introducing a slight offset.

Enhanced NTP Stratum 2 operation (syncing to other NTP servers on the network)

- When only syncing the NTP time server to other NTP servers on the network (not syncing it to a primary input, such as GPS, IRIG, or in the case of the Models 9388 and 9288, RS- 485 ASCII data), NTP input will now sync the "System Time".

- With "System Time" now synced to NTP input, the front panel Sync LED will now turn green while NTP data is being received from other NTP servers, the front panel's displayed time (not applicable to all Models) will display the same time as NTP and the **System** -> **System Time** page of the web browser will now also show the same time as NTP.

**NTP Requests per second/NTP stress testing

➢ Shortcut to NTP stress test results for earlier Model NetClocks: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\NTP\Testing of Number of NTP requests

➢ Refer to "NTP Stress Test Tool" in the SecureSync cust assist document for info on the test tool itself.

MD5 SETUP ON A CICSO switch

This is the Cisco configuration that worked with your 9388:

```
ntp authentication-key 1 md5 [key]
ntp authenticate
ntp trusted-key 1
ntp access-group peer 20
ntp update-calendar
ntp server [IP address of 9388] key 1
```

NTPQ/NTPDC/ NTP Access / Mode 7 packets

NTPQ/NTPDC capabilities (Application version 3.4.3 and above)

➢ For a list of available NTPQ/NTPDC commands (such as peerstats and loopstats), refer to: http://www.ece.udel.edu/~mills/ntp/html/ntpdc.html

***Mode 7 packets (NTPQ/NTPDC) NTP Queries

Q What are mode 7 packets *(except below from http://www.tutorialspoint.com/unix_commands/ntpdc.htm)*

Answer: ntpdc uses NTP mode 7 packets to communicate with the NTP server, and hence can be used to query any compatible server on the network which permits it. Note that since NTP is a UDP protocol this communication will be somewhat unreliable, especially over large distances in terms of network topology. **ntpdc** makes no attempt to retransmit requests, and will time request out if the remote host is not heard from within a suitable timeout time.

> *Except below is from the Model 9300 user manual*
> NTPDC and NTPQ are utilities for controlling NTP servers and gathering performance data from NTP servers. NetClock firmware 3.4.3 has facilities to allow these tools to gather performance data. Modification or control of a NetClock's NTP service through NTPDC or NTPQ is not supported.
>
> **If you would like to allow any NTPDC or NTPQ client access over IPv4, enable "Allow Queries from NTPDC or NTPQ over IPv4." If you would like this for IPv6 NTPDC or NTPQ, enable "Allow queries from NTPDC or NTPQ."**
>
> Authentication is the use of some cryptographic technology to ensure that messages sent between computers are unaltered and emanate from a legitimate source.
>
> **NTP can use MD5 hashes along with trusted symmetric keys to ensure that messages come from authenticated sources. This does not encrypt NTP messages.**
>
> **To require all requests for NTPDC or NTPQ to be authenticated over IPv4 or IPv6, enable "Allow Queries from NTPDC or NTPQ over IPv4" or "Allow queries from NTPDC or NTPQ over IPv6."**
> **The NTP Access grid on the NTP General screen allows the user to enable or disable all IPv4 and IPv6 requests, as well as to allow or deny users or network segments. Clicking the "Auth Only" box on each line where a user or network segment is defined will prompt the NetClock to accept only authenticated requests (MD5 or Autokey) from this user or network segment.**
>
> You may also specify options on a per client basis. Instead of providing blanket access, you may specify which IP Addresses or hostnames have access, or restrict access for certain IP addresses or hostnames. To allow access, change the "Type" drop-down to "Allow," for restriction, to "Deny." Enter the appropriate hostname and IP Mask. If you wish for the additional security of authorized access, enable "Auth Only." To allow for queries, enable "Enable Query."
>
> *NOTE:* Changes to the NTP configuration may only occur while the NTP service is disabled.

NTP -> General page of the browser

spectracom
Synchronizing Critical Operations

You have logged in as :admin

NTP Service:

○ Enabled ◉ Disabled

NTP is Primary:

○ Enabled ◉ Disabled

NTP Time Scale:

◉ UTC ○ GPS

NTP Broadcasting:

☐ NTP Broadcast every [4 (16s) ▾]

Use MD5 authentication with trusted key ID: [None ▾]

NTP Access:

☑ Service all IPv4 requests by default.
☐ Require Authentication for IPv4 requests.
☐ Allow queries from NTPDC or NTPQ over IPv4.
☑ Service all IPv6 requests by default.
☐ Require Authentication for IPv6 requests.
☐ Allow queries from NTPDC or NTPQ over IPv6.

Type	IPv4/IPv6	IP Address/Hostname	IP Mask	Auth Only	Enable Query
Empty ▾	IPv6 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐
Empty ▾	IPv4 ▾			☐	☐

NOTE: NTP Access can only be configured while the NTP Service is disabled.

[Submit]   [Reset]

Contact us

➢ Mode 7 packets are blocked/suppressed by factory default configuration

➢ NTPQ/NTPDC Queries can be enabled, if tis desired to perform commands such as ntpq -p from outside the NetClock

- These queries do not need to be enabled to perform ntpq/ntpdc commands via its own CLI interface (only need to be enabled if its desired to perform from outside the tine server altogether)

To verify Mode 7 packets are suppressed/blocked (they are disabled by factory default) make sure the two "**Allow queries from. NTPDC or NTPQ…**" checkboxes are not selected (as shown below):

Note: if either/both are currently selected, first disable the NTP Service (at the top of the same page of the browser) the boxes rare greyed-out while NTP is enabled. Re-enable NTP after unselecting the box(es) and pressing the Submit button.

NTP Access:

☑ Service all IPv4 requests by default.
☐ Require Authentication for IPv4 requests.
☐ Allow queries from NTPDC or NTPQ over IPv4.
☑ Service all IPv6 requests by default.
☐ Require Authentication for IPv6 requests.
☐ Allow queries from NTPDC or NTPQ over IPv6.

Type	IPv4/IPv6	IP Address/Hostname	IP Mask	Auth Only	Enable Query
Empty ⌄	IPv6 ⌄			☐	☐
Empty ⌄	IPv4 ⌄			☐	☐
Empty ⌄	IPv4 ⌄			☐	☐
Empty ⌄	IPv4 ⌄			☐	☐
Empty ⌄	IPv4 ⌄			☐	☐

NOTE: NTP Access can only be configured while the NTP Service is disabled.

127.127.1.0 (Atom clock driver), 127.127.22.0 (PPS driver) AND 127.127.45.0 (Clock driver)

➢ **Refer also to** 127.127.1.0 (Atom clock driver), 127.127.22.0 (PPS driver) AND 127.127.45.0 (Clock driver) I:\Customer Service\1- Cust Assist documents\CustomerServiceAssistance.pdf

When using NTPQ/NTPDC, a reference to three distinct values may be displayed. These values are as follows:

127.127.1.0 is the **NTP Local Clock Driver** (for NTP to be able to go to Stratum 16).

127.127.22.0 is the **NTP 1PPS driver (Atom clock driver/Atomic clock driver**). This driver allows for better stability of NTP by providing it with a 1PPS input reference (See additional information below).

127.127.45.0 is the **Spectracom Reference Clock driver** which allows NTP to obtain time from System Time.

Q. How can we configure them to answer remote ntpq querys, as in "ntpq -c pe IP_Adress"?
A. This particular capability is disabled by the system software. However, much of this information is available via the web browser. Refer to the NTP configuration pages in the web browser.

**NTP Statistics (NTP ClockStats, NTP loopstats and NTP Peerstats)

- ➢ Refer to: http://www.eecis.udel.edu/~mills/ntp/html/monopt.html
- ➢ Refer to: NTP (for all products)

**Auto FTP export NTP Statistics to FTP server

- ➢ **Enabled/configured in the NTP** -> **Statistics FTP** page of the browser
- ➢ The three files automatically transferred are **clockstats**, **peerstats** and **loopstats** (as three separate files).
- ➢ Remote file names are appended with the UTC date stamp (YYYMMDD).
- ➢ Files are sent out using FTP (FTP port 21).

The NTP Statistics files are only FTP transferred (not Syslog transferred) every hour, on the half hours (Such as 1:30, 2:30, 3:30, etc). They are not transferred every 30 minutes (Such as 1:00, 1:30, 2:00, 2:30, etc). As the Statistics files are transferred using FTP and not Syslog, the server they are being transferred to needs to support FTP functionality (it has to have a FTP daemon running on that PC). The Statistics files will not just automatically transfer to a Syslog server. The only way a Syslog server can be used to store the files is if the Syslog server is FTP capable.

The three files automatically transferred are clockstats, peerstats and loopstats (all three are transferred as separate files). The three types of NTP log files are explained in the NTP.org website address (http://www.eecis.udel.edu/~mills/ntp/html/monopt.html).

Specific to the Clockstats log, the log contains a log message section. The log message is the time stamp that the NTP daemon received from the System Time of the NTP server.

Troubleshooting FTP export

Verify the NTP -> FTP Statistics page is correctly configured

Automatic FTP of NTP Statistics:

⊙ Enabled ○ Disabled ← Verify Automatic FTP is enabled

User Name: spadmin
Password: ••••••••
FTP Server: 10.2.100.29
Remote Path:

Remote File Names:

NTP Clock Statistics:
NTP Loop Statistics: loop
NTP Peer Statistics:
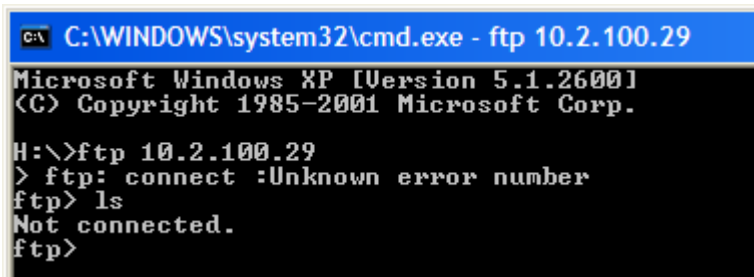
NOTE 1: Files are sent to the remote server 30 minutes into every hour.
NOTE 2: Remote file names will be appended with a UTC date stamp (YYYYMMDD).

[Submit] [Reset]

Verify PC has FTP capability
To verify the desired PC to send the files to has FTP capability, go to a Windows PC on the network and open the command Prompt window. At the command prompt, try to establish an FTP connection to the server they wish to FTP the files to (such as **FTP xxx.xxx.xxx.xxx** <enter> (Where the xxx.xxx.xxx.xxx is the IP address of the PC/server). It should prompt for login information. If they are able to establish an FTP session, next try to transfer an arbitrary file from the PC into the FTP server using FTP.

- If they can establish an FTP session from a Windows PC and can successfully FTP transfer a file into the desired server, the NTP server is able to automatically transfer the NTP Statistics files to their Syslog server.
- If they cannot establish an FTP session with the Syslog server (as we suspect may be the case and as shown

below), the files cannot be automatically transferred and stored in that PC. They will then need to use another PC that has FTP capability (an FTP daemon running on it) or provide that PC with FTP capability.

To verify the NetClock is sending the file out

Email Keith sent to Chris Oliver on more than one occasion I have some information for you to help determine if this is a NetClock configuration issue or if it's associated with the FTP server that the logs are being sent to.

First, to verify the desired server has FTP capability, go to a Windows PC on the network and open the command Prompt window. At the command prompt, try to establish an FTP connection to the server they wish to FTP the files to (such as FTP xxx.xxx.xxx.xxx <enter> (Where the xxx.xxx.xxx.xxx is the IP address of the Syslog server). It should prompt for login information.   If they are able to establish an FTP session, next try to transfer an arbitrary file from the PC into that server using FTP.

If they can establish an FTP session from a Windows PC and can successfully FTP transfer a file into the server, the NTP server is able to automatically transfer the NTP Statistics files to their server. If they cannot establish an FTP session with the server (as we suspect will likely be the case), the files cannot be automatically transferred and stored in that server. They will then need to use another PC/ server that has FTP capability (an FTP daemon running on it) or provide that PC with FTP capability.

To verify the NetClock is successfully sending out the files once each hour, perform a wireshark packet capture running on a PC that is on the same subnet as the NetClock. Hourly, at xx:30 (30 minutes into each hour, such as at 12:30, 1:30, 2:30), the packet capture should indicate files being sent to the specified IP address from the IP address of the NetClock.

Please let me know if they can connect to the other server via FTP and whether the packet capture shows packets being sent from the SecureSync each hour. Then we can go from there

**NTP Autokey

> Refer to: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\NTP\MD5 -Cryptograhic authentication Ap Note

> Known limitations/issues with NTP Autokey in Model 9300 and 9200 series (as of at least v3.6.1 anyways)

  • Supports **Group key** generation but not **Client key** generation.

Troubleshooting Issues specifically related to NTP in 9200/9300s

A) NTP is stratum 16 (even though the front panel Sync LED is green)

Likely reason is the **Enable Stratum 0** checkbox is not selected

Details

Versions 3.4.1 and below (logs can become too full/enable stratum 0 checkbox can become unselected)

- ➢ Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\known software issues -logs too full\v3.4.1 and below

- ➢ logs can become too full, which can cause the "enable stratum 0" checkbox to become unselected (resulting in NTP going to Stratum 16, even though the front panel Sync LED is green

- ➢ Fix is to update to v3.4.2 or above, AND also re-enable the "Enable Stratum 0" checkbox (NTP -> References page of the browser, between the "Servers" and "Peers" tables)

    - Note "NTP Service" needs to first be disabled (top of the NTP -> General page) before the "**Enable Stratum 0**" button can be selected).

B) Report of NTP Service disabling itself (no indication it was disabled by a user) in post 3.4.1 software

- ➢ Refer to Salesforce case 18440

- ➢ Reported that this has occurred in two of their three NetClocks.

- ➢ Paul Myers and I reviewed the logs. Looks like it may be associated with "bad 1PPS" from the Res-T receiver during the new week rollover on Midnight Saturdays.   Hold over alarms (as well as 1PPS Sync state and Coast state System Log entries) were asserted on a few Saturdays around 23:59:xx.

- ➢ Recommendation is to set the "**Standard Mode Minimum Number of Satellites**" field (**System** -> **Set System Mode** page of the browser) to "4" (instead of "1"). If GPS reception is marginal, this change will result in more Holdover alarms but will help the receiver ride through the New Week rollovers on Saturdays.

C) "NTP Sanity check error"

NTP Sanity check error in the NTP log "time correction of -2663 seconds exceeds sanity limit (1000); set clock manually to the correct UTC time"

Once NTP has been started, it will no longer accept a time input that is greater than 1000 seconds from its time. If a large time correction in System Time has occurred (while NTP is running) NTP will need to be stopped and then restarted in order for it to adjust to the new time values. It will not slew unless the error is less than 1000 seconds.

D) "NTP configuration successfully validated. Error: Unable to ensure NTP will start after reboot"

NTP error shown in web browser ("NTP configuration successfully validated. Error: Unable to ensure NTP will start after reboot") as shown below:

SPECTRACOM
Synchronizing Critical Operations™

You have logged in as :admin

General
References
Symmetrical Keys
Autokey
Statistics FTP
Status

NTP configuration successfully validated.
Error : Unable to ensure NTP will start after reboot.

This issue is caused by large time jumps occurring in System Time. The customer that reported this screen being displayed had the NetClock in standard mode, receiver was never able to complete the GPS survey, and had manually entered bad Lat and long values. This caused System Time to be jumping around (giving NTP a poor reference).

NTP will stop running (and will need to be manually stopped/restarted) if its input is providing erratic timing. The fix is to perform a new GPS survey or provide a more accurate Lat and Long.

Software related

*CLI interface / Serial commands

```
admin@10.2.100.93 > help
Command line interface (CLI) help.
Type 'help cmd' for a detailed help on the 'cmd' command.
The following are the available commands.
        time    - time
        reboot  - reboot
        halt    - halt
        log     - log COMMAND OBJECT [ HANDLE ]
        option  - option COMMAND [OPTION | PRODUCT] [VALUE]
        ltc     - ltc COMMAND [INDEX | NAME] [...]
        net     - net COMMAND [Arguments]
        sys     - sys COMMAND [Arguments]
        ser     - ser COMMAND SERIAL [Arguments]
        rem     - rem COMMAND REMOTE [Arguments]
        irig    - irig COMMAND ARG
        frq     - frq COMMAND INDEX [Arguments]
admin@10.2.100.93 > time
```

stc COMMAND [Arguments] (9388s only)

9388 specific commands (not applicable to 9383 or 9389)

admin@10.2.128.11 > stc

The stc group of commands are used to setup serial time code input.

USAGE: stc COMMAND [Arguments]

   COMMAND

      disp   - Displays the current serial time code input settings.

      all   - Configures all settings of serial time code input.

      fmt   - Configures the format of the serial time code input.

      baud   - Configures the baud rate of serial time code input.

      year   - Configures the year used by format 0 serial time code input

admin@10.2.128.11 > stc disp

Serial time code input settings:

   Baud rate   : 9600

   Output format   : 02

   Year for format 0: 2008

admin@10.2.128.11 > stc all

Configures all settings of serial time code input.

USAGE: stc all BAUD FORMAT YEAR

   BAUD = {1200 | 2400 | 4800 | 9600}

   FORMAT = {00 | 02 | 07 | 08}

   YEAR = 20XX

admin@10.2.128.11 > stc all 9600 02 2009

The serial time code input is not format 0 so the year input is ignored.

Setting up serial time code input successfully

admin@10.2.128.11 > stc

The stc group of commands are used to setup serial time code input.

USAGE: stc COMMAND [Arguments]

COMMAND

    disp   - Displays the current serial time code input settings.

    all   - Configures all settings of serial time code input.

    fmt   - Configures the format of the serial time code input.

    baud   - Configures the baud rate of serial time code input.

    year   - Configures the year used by format 0 serial time code input

admin@10.2.128.11 > stc all 9600 00 2009

Setting up serial time code input successfully

admin@10.2.128.11 > stc disp

Serial time code input settings:

    Baud rate   : 9600

    Output format   : 00

    Year for format 0: 2009

admin@10.2.128.11 > stc fmt 00

Format for serial time code input was successfully set

admin@10.2.128.11 > stc baud 9600

Baud rate for serial time code input was successfully set

admin@10.2.128.11 > stc year 2009

Year used for format 0 was successfully set

admin@10.2.128.11 > stc fmt 02

Format for serial time code input was successfully set

Software version information

Vial CLI/Serial port- Version info doesn't appear to be available through CLI interface

Refer to: I:\Customer Service\PSB, PSP software updates\928x and 938x\928x and 938x software updates

A) Issues downloading Specup bundle from our website

➢ Pop-up blocker may block the request form

➢ Page that bypasses the download request form:
http://www.spectracomcorp.com/Support/HowCanWeHelpYou/Software/93009200NetClockSoftware/tabid/901/sbmt/1/fmmid/2540/fdid/29073/Default.aspx

Downgrading from version 3.6.0 (or higher)

Important Note:

Special requirements exist when downloading from a unit already at version 3.6.0 (or higher). Refer to the version 3.6.0 update instructions for the section that discusses these special requirements.

1. We don't recommend downgrading from 3.6.0. But if they wish to downgrade after updating to v3.6.0, we recommend you never go back to an earlier version than 3.4.5. If you do happen to downgrade, make sure to perform a clean after the update process
2. Don't add noted to release notes about password reset.   But add note to customserviceassistance.
3. Order of preferred customer support: 3.6.0 and 3.4.5 for those that are locked in at this version.

Second email from Paul Myers (31 Oct 2012) Downgrade from 3.6.0 □ Lower version requires either use of from_ file shown on last page OR a downgrade using the to_ file will require the user to "clean" the unit after downgrade.

This is because the scp user path varies between 3.5.0 and 3.6.0. THE only loss of function is failure to upgrade back up to 3.6.0 and higher. A factory clean fixes that IF they don't use the from_360 file in the downgrade.

The use case that fails is 3.6.0 □ 3.5.0 (or any other lower version like 3.4.5) □ 3.6.0

TO RESOVLVE DO A FACTORY CLEAN if the user did not copy the from_360 files from the 3.6.0 release to the 3.5.0 release to use!!!

Known software issues

1) Version 3.4.4 release (from Paul Myers)

I finally fixed the 2 bugs where the NetClock could fail to change modes correctly on startup and the Calibration issue.   I tested for recovery from invalid GPS Receiver configuration as compared to the NetClock CF's configuration files. I force the RES-T configuration to match the CF's when different on startup.

Keith has verified Mobile Mode by driving around a NetClock 9383. I verified by testing on multiple NetClocks 9283 TCXO, 9383 TCXO and 9383 OCXO and 9383 Rb.

The Modem workaround has been applied and seems to work reliably dialing out every hour for 3 days. It recovers from Halts, Reboots and Power Loss dialing ACTS (US) and ITUR (Germany) National Time Service phone numbers.

The system level changes are:
1. Mobile Mode is available on all Trimble RES-T GPS products with Air, Land Sea, and Stationary Dynamic setting.
2. Dynamics can only be selected when in Mobile Mode
3. Modem Work around applied.
4. Stationary and Single Satellite Survey time is now 2000 sec. (Trimble originally used 2000 sec when Selective Availability was on, then briefly changed to 600 sec, and at the complaints of customers returned to 2000 sec.) The longer overcomes the error introduced by Selective Availability. Telecom applications wanted to ensure they function reliably if SA is turned back on. (Trimble has customers using surveys as short as 1 minute but that short a time is discouraged as position errors can lead to time errors.) The initial survey takes ~35 minutes now with startup overhead. This is a one-time event however.
5. To allow for 1PPS stabilization and Oscillator warm-up, a 180 second qualification period (delay with a rule) is added to the sync rule. On all startups in all modes the NetClock waits 3 minutes before declaring 1PPS valid to allow for stabilization. It was found helpful in Mobile mode, and after applying changes a short delay was found needed in the other modes because Auto-Calibration failed sometimes. I felt it was better to be consistent. If this is an issue, we can try to shorten the delay or make the rule smarter. Under the new rules it seems PPS Valid sync was starting Auto-Cal too early, necessitating the delay.

If the initial survey startup time is too long for Stationary mode, we can shorten the survey time. I chose to make it the Trimble Default. If the 3 minute stabilization time is undesired I can look to change the start-up rules to shorten that time.

2) Versions 3.4.1 and below (logs can become too full/enable stratum 0 checkbox can become unselected)

➢ Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\known software issues -logs too full\v3.4.1 and below

➢ logs can become too full (cron not looking at log size to see when they needed to be rotated), which could cause the "**enable stratum 0"** checkbox to become unselected (resulting in NTP going to Stratum 16, even though the front panel Sync LED is green

➢ Fix is to update to v3.4.2 or above, AND also re-enable the Enable Stratum 0 checkbox (NTP -> References page of the browser, between the two tables)

- Note "**NTP Service**" needs to first be disabled (top of the NTP -> General page) before the "**Enable Stratum 0**" button can be selected).

From the announcement we sent out to customers
Application software version 3.4.2 is a patch that facilitates processing of the unit's logs and configuration files. If this patch is not applied, the unit's Compact Flash (CF) card may become full, which may impact long-term system performance. Symptoms of this issue include potential loss of NTP operation (NTP configurations may not be retained), potential loss of connectivity to the NTP time server, and potential loss of the front panel display data (applicable only to those models that have a front panel LCD display).

Software updates

Unzipping the software bundle downloaded from our website

➢ Doesn't like the native Windows zip utility and doesn't work with WinRAR

➢ Can use third-party programs such as WinZip or 7-Zip (http://www.7-zip.org/)

Specup update notes/error conditions

Info on Specup:

➢ files are transferred on *port 22.*

➢ The "Enable SSH" checkbox needs to be selected in the list of Services (towards the bottom of the Security -> Network page of the browser)

➢ All configuration settings (including SSH keys, LDAP/Radius, modem, etc) are internally stored in RAM and then restored during the update process. Do not power cycle the unit after it is rebooted to begin the update, until the update is complete!!!

➢ Application software versions prior to version 3.4.3 will not back-up (transfer to a PC) and restore all of the configuration files. To backup all the configs to a PC, first update the Application software to at least version 3.4.3. Then perform a Save backup with the Specup utility.

Example screenshot from a successful version 3.6.6 update (shows Status messages)

Log messages associated with updates

➢ Two logs generated with each update and stored in same update bundle as Specup is running front: Err.log and updatelog.log

A) Updatelog.log

Example updatelog.log (from a successful update)

B) Error logs/errlog.txt

Note: References below to "**Error log**" are referring to the file called **errlog.txt.** The **updatelog.log** and **errlog.txt** files are stored in the same location that all the files were unzipped to (such as C:/temp for example). Sending these to us for review may help determine why the utility isn't working.
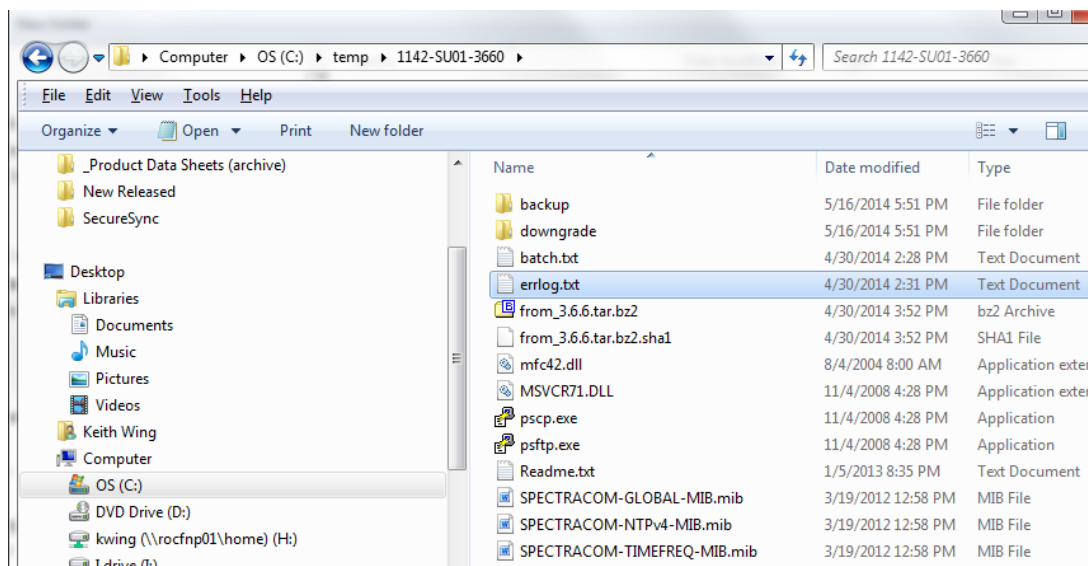
Example error log (from a successful update)

pscp -unsafe -scp -l scp -pw admin123 10.2.100.139:/upgrade/SPECUPD_ALIVE SPECUPD_ALIVE
Success
pscp -scp -l scp -pw admin123 upkernel 10.2.100.139:/upgrade/temp/**upkernel**
File was sent successfully!
pscp -scp -l scp -pw admin123 upkernel.sha1 10.2.100.139:/upgrade/temp/**upkernel.sha1**
File was sent successfully!
pscp -scp -l scp -pw admin123 uprd.img.gz 10.2.100.139:/upgrade/temp/**uprd.img.gz**
File was sent successfully!
pscp -scp -l scp -pw admin123 uprd.img.gz.sha1 10.2.100.139:/upgrade/temp/**uprd.img.gz.sha1**
File was sent successfully!
pscp -scp -l scp -pw admin123 win2lin.txt 10.2.100.139:/upgrade/comm/win2lin.txt
File was sent successfully!

pscp -scp -l scp -pw admin123 C:\temp\1142-SU01-3660\from_3.6.6.tar.bz2
10.2.100.139:/upgrade/temp/**from_3.6.6.tar.bz2**
File was sent successfully!

pscp -unsafe -scp -l scp -pw admin123 10.2.100.139:/upgrade/comm/lin2win.txt lin2win.txt
Success
pscp -unsafe -scp -l scp -pw admin123 10.2.100.139:/upgrade/backup/bundle/backup-3.4.9.tar.bz2
C:\temp\backup-3.4.9.tar.bz2
Success
pscp -scp -l scp -pw admin123 win2lin.txt 10.2.100.139:/upgrade/comm/win2lin.txt
File was sent successfully!
pscp -unsafe -scp -l scp -pw admin123 10.2.100.139:/upgrade/comm/lin2win.txt lin2win.txt
Success
pscp -scp -l scp -pw admin123 win2lin.txt 10.2.100.139:/upgrade/comm/win2lin.txt
File was sent successfully!

Example updatelog.log (from a successful update)

06/16/14 12:22:44: Deleting log files on 10.2.100.139... Finished.
06/16/14 12:23:11: Beginning firmware update on 10.2.100.139...Successful

failed update

Errlog showing no files transferred

psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
psftp -b batch.txt -2 -l scp -pw admin123 10.2.100.139
pscp -unsafe -scp -l scp -pw admin123 10.2.100.139:/upgrade/SPECUPD_ALIVE SPECUPD_ALIVE

Correlating entries from the Updatelog.log (as displayed in Specup)
Waiting for target machine to move files...Success!
Receiving files from target machine...Success!
Logs saved successfully!
Log Save Started
Software Upgrade Started
Deleting log files to free space. Please wait...Finished!
Beginning communication with target...Unknown error, make sure pscp.exe is present

Potential fix for this particular issue: perform a **sys reset** command (clean) if it's at version 3.6.0 or higher.

Hardware issues

Identifying FPGA load issues (exit code 90/ exit code -90)

➢ Refer to Salesforce case 6867

Two emails from same customer, indicating a likely FPGA/Hardware issue

I found the following in fpgaerr.log:

Tue Dec 11 14:50:56 UTC 2012

SERIAL# = 0C40113BD07419

PROGRAMMING ARRAY
PERCENT_DONE = 1%
PERCENT_DONE = 3%
PERCENT_DONE = 4%
PERCENT_DONE = 6%
PERCENT_DONE = 7%
PERCENT_DONE = 9%
PERCENT_DONE = 10%
PERCENT_DONE = 12%
PERCENT_DONE = 13%
PERCENT_DONE = 15%
PERCENT_DONE = 16%
PERCENT_DONE = 18%
PERCENT_DONE = 20%
PERCENT_DONE = 21%
PERCENT_DONE = 23%
PERCENT_DONE = 24%
Exit code = -90... Unknown exit code
Elapsed time = 00:00:21

I drove in to my DC to get on the terminal to see if there is anything I could glean from the CLI, but the CLI is only rendering the following, every 30 seconds:

6: eth0: <BROADCAST,MULTICAST,UP> mtu 1500 qdisc pfifo_fast qlen 1000
   link/ether 00:d0:c9:c9:58:fa brd ff:ff:ff:ff:ff:ff
   inet 172.25.4.21/24 brd 172.25.4.255 scope global eth0
   inet6 fe80::2d0:c9ff:fec9:58fa/64 scope link
     valid_lft forever preferred_lft forever

Troubleshooting any SSH/SCP reported issues:

1. Update file won't unzip after downloading from our website

➢ Try a different Zip utility

Q. I was going to try to install this today (**v3.6.7**) at our customer's site, but I can't unzip it successfully...any ideas...has anyone else had issues?
A (response from same customer above) I figured out the problem...must not be compatible with Windows XP anymore? I successfully used a different Zip utility.

As an FYI- To verify the SFTP (SSH) connection for the file transfer to take place, you can try manually creating an SSH session with the NetClock. There are SSH programs available on the Internet, if you don't already have one installed on your PC. One of the popular ones is a program called "putty". I believe this is still a freeware program, if I'm not
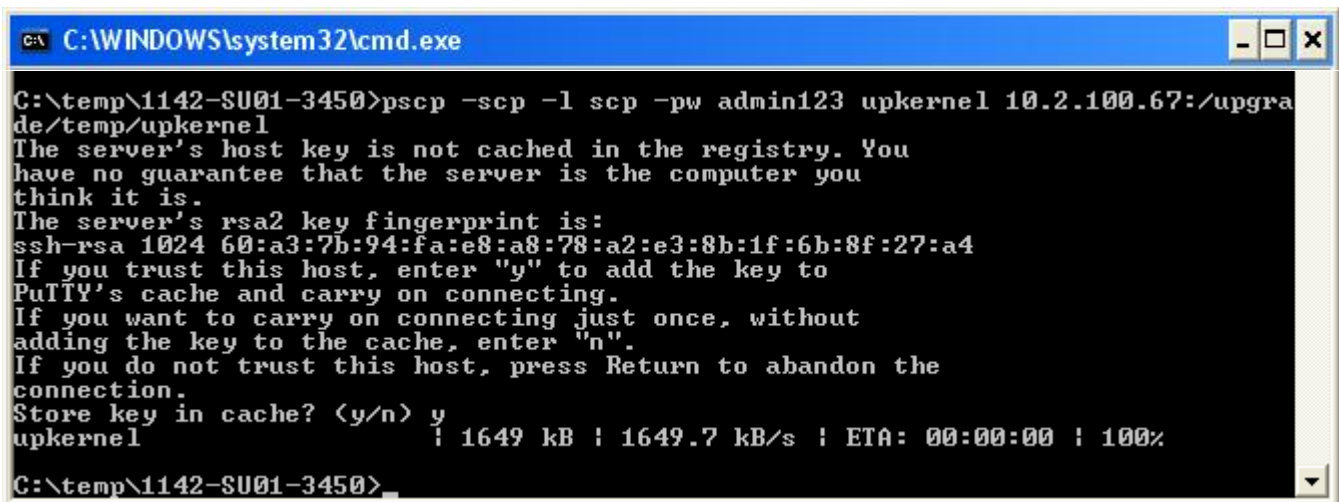
mistaken. With this Windows utility installed on a networked PC, you can manually SSH into the appliance. This is another way to confirm port 22 is open.

C) **To troubleshoot file transfer/pscp error messages, you can manually perform pscp commands in a Windows command window (this is outside of the Specup utility, altogether):**

➢ Open a command prompt window (Start/Run and type: cmd <enter>).

➢ Change to the directory that all of the upgrade files were unzipped to (such as C:/temp).

➢ Then, type the following command: pscp –scp –l scp –pw [admin123] upkernel xxx.xxx.xxx.xxx:/upgrade/temp/upkernel <enter> (where [admin123] is the admin password and xxx.xxx.xxx.xxx is the IP address of the NTP server).

Example: pscp –scp –l scp –pw [admin123] upkernel 10.2.100.58:/upgrade/temp/upkernel
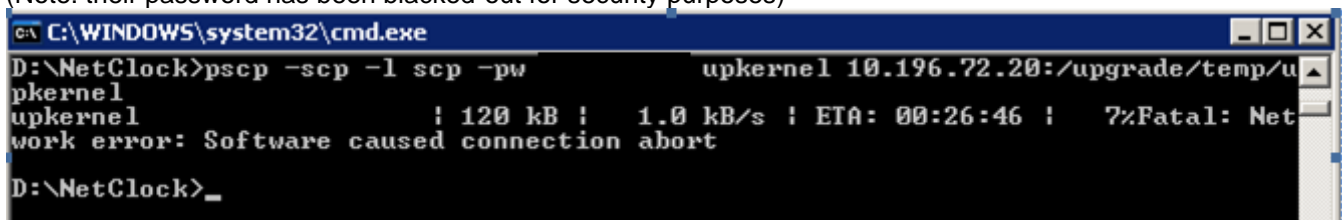
After hitting enter, there should be a brief pause, followed by a question about cache. Type a "Y" as soon as you see this prompt. A manual file transfer should then occur, and a message should be displayed moments later. The message should indicate that 100% of the file was transferred. Refer to the screenshot below which shows a successful (100%) file transfer:

If there are any problems with pscp running on your computer, it should provide an indication of why it couldn't successfully open a connection to the NetClock or couldn't transfer the first update file.

Here's an example of a pscp failure. The file was taking way too long to transfer, so it was timing out.
(Note: their password has been blacked-out for security purposes)

Verify successful file transfers using SCP account (before rebooting or saying "Yes" to the reboot prompt)

Note: The "**lin2win.txt**" file doesn't exist in the group of files included in the file downloaded from our site. It's generated when Specup and the time server start communicating.

1. Login to SSH using scp account (instead of admin account)

2. Navigate to the **opt/upgrade/temp/** directory

   - Directory should contain the following files: upkernel upkernel.sha1 uprd.img.gz uprd.img.gz.sha1 and to_3.6.6.tar.bz2

```
[scp@Spectracom comm]$
[scp@Spectracom comm]$ cd
[scp@Spectracom /]$ cd upgrade/temp
[scp@Spectracom temp]$ ls
filelist.txt          runbefore.sh    tarlist.txt    upkernel.sha1    uprd.img.gz.sha1
from_3.6.6.tar.bz2    success         upkernel       uprd.img.gz
[scp@Spectracom temp]$
```

3. Navigate to the **/upgrade/comm** directory

4. While Specup is operational, **lin2qin** Directory should

```
[scp@Spectracom /]$ cd upgrade/comm
[scp@Spectracom comm]$ ls
lin2win.txt
[scp@Spectracom comm]$
```

5. After reboot or power cycle and update has been performed, these files no longer exist in the two locations:

```
[scp@Spectracom temp]$ ls
[scp@Spectracom temp]$
```

```
scp@Spectracom /]$ cd opt/upgrade/comm
scp@Spectracom comm]$ ls
scp@Spectracom comm]$
```

Specup FAQs

Q. What protocol is used to push the new code & communicate with the appliance? FTP, SFTP, TFTP? (the reason I ask is because firewalls are between the Specup application and appliance)
A. Specup uses the SCP and SFTP (Secure FTP- also called SSH) protocols to transfer the files from the Windows PC into the NTP servers. Port 22 needs to be open on any firewalls located between the computer and the NTP time server being updated.

Q Will the configuration/current settings be retained after the code upgrade is completed?
A All of the configuration settings are internally stored and restored during the update process. Using the Specup utility, NTP servers with Application software versions of 3.4.3 and higher also have the ability to store most of the configurations on a PC for archival and restore capability, as desired. For security reasons, the Specup's "Save Backup" capability does not back-up SSH keys, login passwords, etc. And due to cloning reasons (the ability to transfer configurations from one-time server to another), the network settings are not backed-up to a PC either.

Q. Any issues moving from 3.4.1 directly to 3.4.5?
A Software Version 3.4.1 (and all other earlier versions) can be updated directly right to version 3.4.5 with no need to apply any other updates in between. FYI- Due to a potential software issue that can occur in Application software versions prior to version 3.4.2 (where the internal CF card can become quite full of log data), a reboot of the time server may be required if the files aren't transferred the first time through the update process. The files should be transferred into the time server within about 5-7 minutes after beginning the update. Once the files have been transferred into the time server, a prompt asking if you wish to reboot now will be displayed. This indicates the files have been transferred into the time server and saying yes to this reboot prompt begins the actual update process. If you don't see the prompt within 10 minutes or so after starting the update, reboot the time server and run the update process again. It should then sequence through to the reboot prompt.

Problem with no error message (possible corrupt file in the update bundle)

> Note: Also refer to **Problem 7: "Failed to send upgrade kernel**"

Customer reported the update process was stopping shortly after deleting log files. But no error messages were being displayed.

Referred him to the info for Problem 7 below (Failed to send upgrade kernel) and it wasn't transferring any of the file when he tried to manually pscp transfer the upgrade kernel file.

I recommended he re-download the bundle. He called back saying the update was a success. Looks like the upgrade kernel file was corrupted (even though his file size reported in Properties was the same as my file).

Problem 1: "incorrect admin password".

- I am trying to use the specup.exe application to save the configs before I try the upgrade, and from both of our appliances it returns the message "incorrect admin password". I verified that the admin password that I have entered is correct and I can ssh to the timeclocks with username admin and this password.
Do you have any idea what may be the problem?

Fix: Under **Security** -> **LDAP General,** once I unbound LDAP from SSH/SFTP/SCP then I was able to use the admin account.

Problem 2: "ERR_OPTYPE"

Software Upgrade Started
Beginning communication with target...Success!
Uploading upgrade bundle to target...Success!
Waiting for target to create backup...Error: ERR_OPTYPE

Fix: This error message appears to occur because the card is too full to be able to be updated. Must replace card or completely reprogram card from scratch (can't use Updater utility to reprogram).

Problem 3: "ERR_Incorrect Host address"

Occurs after beginning communication with target – caused by the Specup program unable to communicate with the time server.

Can be duplicated by using an incorrect IP address. Also, can be duplicated by using leading zeroes in IP address. Also??
Can also be caused by SSH being disabled in the **Network** -> **Security** page of the browser.

   Fixes:

1. Remove leading zeroes, use correct IP address.

2. Also make sure SSH is enabled in the Network -> Security page of the browser

---

Problem 4: "Unknown error, make sure the pscp.exe is present"

3. Wrong IP address in Specup utility.

4. Delete DNS server addresses if not valid addresses (Security -> Network page of browser)

Below is an email I sent to a customer with this issue:
The error message you are seeing regarding PSCP can be caused by a couple of different reasons. First, make sure that you extracted all of the files to a folder on your hard drive, such as c:\temp. Go into this directory and try clicking on the PSCP.exe file. A black box should be displayed for just a moment and then should go away. If the box isn't displayed, turn off your anti-virus software and click it again.

If the files were extracted to a file on the PC and the box is displayed when the PSCP.exe file is clicked, this error message can also be caused by required services for the update being disabled in the time server (Services are at the bottom of the **Security -> Network** page).

Make sure you can log into the web browser from the PC being used to update the time server, using the same IP address that was entered into the Specup utility (if you can't open the browser from this PC using the same address entered in the Specup utility, you won't be able to run the update process). Then, in the web browser, navigate to the **Security -> Network** page and scroll down to the bottom of this page, where the Services are listed. Make sure that all Services (with the exception of the Daytime and Time protocols) are selected. If not, select the box(es) that aren't selected and hit the Submit button. Close out of the web browser and try the update process again.

Let me know if the error message still occurs.

Possible Fix:
Delete primary and secondary DNS servers from the **Security** -> **Network** page of the browser and reboot.

Problem 5: "No hash file found"

➢ Occurs if there are any spaces in the folder name (such as "Documents and Settings") where the Specup files are located. See Note below.

Note: Apparently, this can occur if there is a space in the path of where the folder/files are located (such as in "documents and settings: instead of C:/Temp, for example). If the folder/files are not in a directory with no spaces, create a new folder in the C:/drive that has no spaces in the name (such as C:/temp or C:/spectracom).

➢ Occurs if SSH connection has already been established, before starting the update.

➢ Occurs at the very beginning of the update, even before deleting logs.   Caused by the "Update" file selected as the one with sha1 at the end such as C:\temp\to_3.4.2.tar.bz2.sha1.

Fix-
Move the files to a directory that has no spaces in its name.
Make sure there are no ssh sessions already open.
Remove the sha1 value from the "Update file" file name.

Problem 6: "Failure to create backup"

➢ Can be caused by the CF card not having enough memory space to create the back-up file.

Fix: The logs are deleted by the SpecUp program at the start, therefore creating more memory space. But the NetClock only reads available memory space on reboot. So, reboot the NetClock and try again. This time it should work.

➢ This can also occur if there is a problem with the Directory to Save Backup.

Fix: If this happens, let the SpecUp create the folder location to store the backup file. This may help.

Problem 7: "Failed to send upgrade kernel. Aborting…"

From the error log:
pscp -scp -l scp -pw M4cGruB3r upkernel 10.196.72.20:/upgrade/temp/upkernel
Fatal error!

Based on the code, we determined this error is likely related to a failure of PSCP running on the PC not being able to transfer the "upkernel file" from your PC into the NTP server. This file is one of the ones that was included in the zipped file downloaded from our website.

First question for you- Since it appears you are updating appliances on different subnets, have you been able to successfully use the same PC that you are attempting to update this particular unit to update any other NTP server? Or, is this particular PC only being used to update this particular NTP server? If you have been using this same PC and were able to update other NTP servers with it, then the unzipped files must all be OK. However, if this PC is only being used to update this one-time server, the error message indicates there may be a missing or corrupt file on the hard drive (D:\NetClock).

Below is a list of all the files that should be in this location. If any files are missing, especially the "upkernel" and "upkernel.sha1" files, either copy/paste the file from another PC, or unzip the original downloaded file from the website.

Name ▲	Size	Type	Date Modified
batch	1 KB	Text Document	2/18/2010 4:39 PM
errlog	13 KB	Text Document	2/18/2010 4:40 PM
mfc42.dll	1,004 KB	Application Extension	8/4/2004 7:00 AM
MSVCR71.DLL	340 KB	Application Extension	11/4/2008 4:28 PM
pscp	288 KB	Application	11/4/2008 4:28 PM
psftp	300 KB	Application	11/4/2008 4:28 PM
Readme	2 KB	Text Document	1/18/2010 2:03 PM
SPECTRACOM-GLOBAL-MIB	6 KB	MIB File	11/19/2009 2:24 PM
SPECTRACOM-NTPv4-MIB	12 KB	MIB File	11/19/2009 2:24 PM
SPECTRACOM-TIMEFREQ-MIB	59 KB	MIB File	11/19/2009 2:24 PM
SpecUp	464 KB	Application	6/27/2009 3:15 PM
SpecUp.exe.md5	1 KB	MD5 File	6/29/2009 4:03 PM
to_3.4.5.tar.bz2	1 KB	BZ2 File	6/5/2009 9:55 AM
to_3.4.5.tar.bz2.sha1	1 KB	SHA1 File	6/5/2009 9:59 AM
updatelog	2 KB	Text Document	2/18/2010 4:43 PM
upkernel	1,650 KB	File	11/19/2009 5:57 PM
upkernel.sha1	1 KB	SHA1 File	11/19/2009 5:57 PM
uprd.img	16,580 KB	GZ File	1/18/2010 9:04 AM
uprd.img.gz.sha1	1 KB	SHA1 File	1/18/2010 9:05 AM
v3.4.5 Update Instructions	94 KB	Microsoft Office Wo…	1/18/2010 3:37 PM

If this PC has all of the files listed, but this PC has not been able to successfully update any other NTP server, one of the files may be corrupted, we recommend next deleting these files from the temporary location and then try unzipping them again to the same location. Then make sure all files are present.

Lastly, the specific error of "fatal error" indicates the PSCP running on the PC is reporting that it is having a fatal error being able to transfer the upkernel file, which is telling the Specup update program to abort the update process. The PSCP program on the PC may be indicating why it's failing, but this information is not transferred into the error log. Manually performing this step on the PC itself may provide a specific reason why the file isn't able to be transferred.

To manually try performing the PSCP file transfer, go into the Windows command prompt (start/Run and type "cmd"). Then type the following line from the error file:
pscp -scp -l scp -pw M4cGruB3r upkernel 10.196.72.20:/upgrade/temp/upkernel
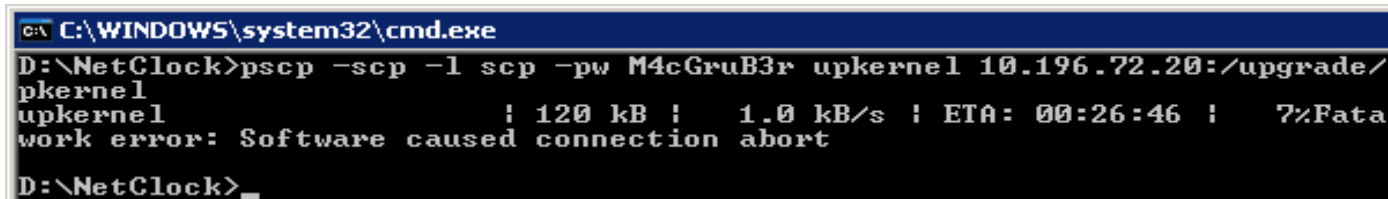
Then see if the PSCP program reports anything besides just "fatal error". If it does, let us know what it says and then we can see if we can figure out the specific reason that it's failing to run on this particular PC. It could be related to a file issue on the NTP server, but it's not as likely.

In summary, verifying all of the files are present on the PC (especially the two upkernel files) should be very simple. Secondly, reinstalling the unzipped files on this PC in case one is corrupt should be fairly easy to perform, as well. The third step if the previous two don't resolve it is optional to perform. It may or may not help. If you prefer, if the first two recommendations don't resolve the issue, just let me know and we can send you a new Compact Flash card to install in the NTP server. The new card will have version 3.4.5 installed, so it won't need to be upgraded.

Response from the customer showed:

> Yes, I used this same PC to update all the NTP servers, so I believe all the files are okay. I also confirmed that I have SSH access from the PC to the failing NTP device.

Problem 8: "failed to send upgrade ram disk hash"

➢ Reported by Ed Lasota with Fibertech Networks
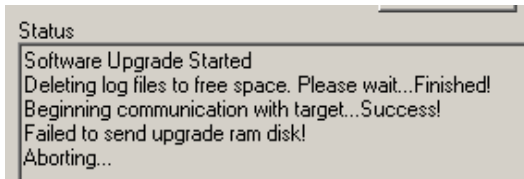
Reply from Dave Lorah (12 Sept 2014) The "Failed to send update ram disk" message may be a clue. I think the SpecUp program may not be finding the update file or the file cannot get to the NetClock.

Please make sure all the files are extracted in the C:\Spectracom folder and there are no firewalls blocking port 21 (FTP) closed between the NetClock and the computer. Also make sure all services except the Time and Daytime protocols are enabled in the NetClock.

If all else fails, we could send you a compact flash memory card to physically install in the NetClock. This can be done by opening the cover and swapping out cards in a cardholder on the board. This will however set the configurations back to factory defaults.

Problem 9: "Error: Child process not started"

- Make sure the SSH service is enabled.
- If using LDAP, may need to disable SSH from the list of services that use LDAP.
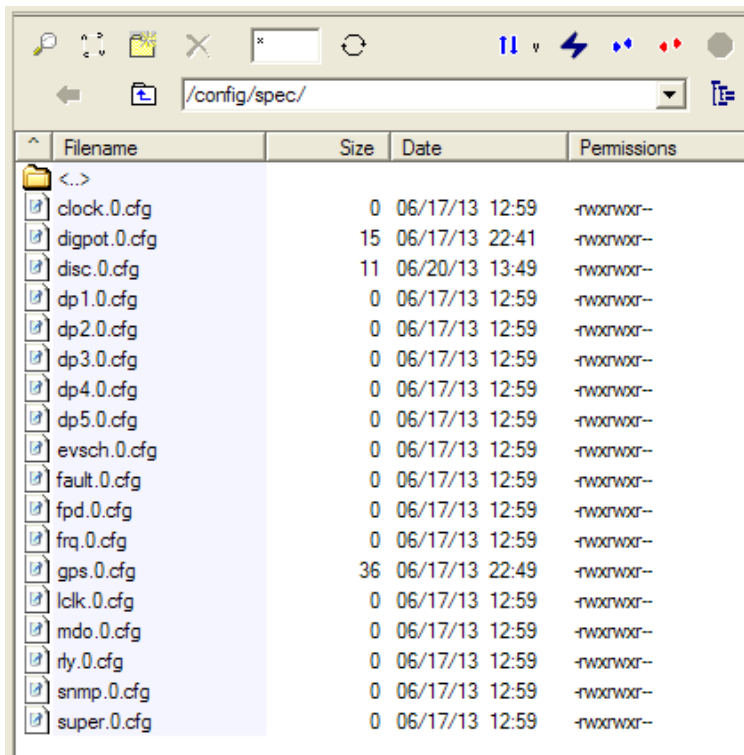
Backup Configurations (Save configs/ Restore configs, cloning)

➢ Refer to: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Specup config store-restore

➢ Requires Application software versions 3.4.3 or higher be installed

Application software versions prior to version 3.4.3 will not back-up (transfer to a PC) and restore all of the configuration files. To backup all of the configs to a PC, first update the Application software to at least version 3.4.3. Then perform a Save backup with the Specup utility.

Alternate ways to backup configs without using Specup

➢ There is no way to perform backup using the command line interface.

➢ However, can FTP out the Config files (/config/spec folder, as shown in screenshot below)

Notes:

As shown above, the only files that can be accessed/transferred out are the Spectracom-specific configs (such as local clocks that have been created, front panel configuration, ASCII port settings, etc.). Configs such as NTP and the network settings are not accessible to a user, so they can't be backed-up.

The Config files only indicate what configs have been changed from the factory default settings Factory default settings are not stored in the config files

Known bugs/Issues

1. Model 9288 only – Versions prior to 3.2.0, when using Data Format 2 as the selected input can intermittently experience holdover alarms that last for a while and then clear.

2. Format 0 is not affected by this condition. The issue is due to the fact that Format 2 has a carriage return at the beginning of the time stamp as well as at the end of the time stamp whereas Format 1 has only one Carriage return. The fix is to update to a newer version of software.

3. If you add a space to every field on the LDAP general configuration page and then hit Submit, the page won't open and an Error message will be generated. Can't recover without running an updater to reset the config file. Refer to I:\Engineering\Engineering Shared\UpdateLdapCD_322.If unit gets power cycled in ver 3.3.0 or before SNMP will look like it is working but will need to be toggled off and on again to restore proper operation. One of the MIBs stops working if this is not done. Should be fixed in 3.4.0.

4. Sandisk CF cards with an internal Firmware version of HDX 4.03 won't allow Reboot button to work. Version HDX 2.33 allows Reboot button to work. Because Reboot doesn't work with HDX 4.03, the Specup program requires the unit to be manually power cycled in order to be updated.

5. All versions prior to 3.3.0- Potential issues arise if network settings are displayed on the front panel of 9283 or 9289.

6. All versions prior to 3.3.0- Serial port(s) will revert from "Multicast" mode to Unicast mode when power cycled.

7. All versions prior to 3.4.0- No Halt button in software, so flash card could be become corrupt upon a power down if button not used first.

8. All versions prior to 3.4.1 (Found in version 3.2.2) – GPS Qualification Log can, on a rare occasion, stop logging entries. Paul says it could be related to an unstable 1PPS. A reboot temporarily fixes it, but it could happen again. Not a CF issue.   Update to version 3.4.1 to resolve it.

9. Version 3.4.1 broke the front panel GPS display on the front panel (non-SAASM units only) while implementing it for SAASM units. Should be fixed in version 4.0.0.

10. Versions 3.4.3 and below (though at least 3.3.0) have an issue with the Option 3: modem dialout that if the 9283, 9289, 9383 or 9389 is power cycled (Halted or not) the modem will likely stop working unless you cycle between ACTS Server mode and back to ACTS Client mode, or if you change the modem baud rate to 1200 baud and then back to 9600 baud. Both of these actions restore modem operation after power-cycle.

11. Heat Sink placing too much pressure on the ETX module-Per ECN 2277, "The heat sink over the CPU on the ETX module is placing too much pressure on the ETX module after the cover is secured because the spacers required are an odd length not easily obtained. To correct this until new parts can be procured is add spacers between the cover and the ETX module spacers."   Cut in SN is 01162 (sold 10/6/08). Affected range was from a few months prior to this date.

12. Approximately Jan 21st, 2010- GPS Wing of the Air Force changed the GPS signal, affecting Trimble Resolution T and Force22E SAASM receivers. Commercial receivers drop to 0 sats for about one second, about 5 times per hour. SAASM receivers OK if not keyed, but when keyed, they lose reception for periods of time. IKEY was a temporary workaround. Force22E Version 12 software fixes this issue. Version 12 started shipping in Force22E receivers purchased after 5/11/2010.

13. Format 90 doesn't work while in mobile mode: As of 9/29/10 anyways, Software versions of 3.4.5 and below, while the GPS receiver is configured for mobile mode, the Format 90 output data stream will not have any time data in the output message. There are blanks where the time data should be inserted.

    Email from Paul Myers-It looks like there is a bug in the GPS code introduced with the introduction to mobile mode that fails to determine 3D fix state for Mobile Mode.   The code works only for Stationary operation because more GPS tracking states are now supported and are not considered in a function that tests for a 3D fix condition for Format 90. This function is used other places so I will search for its impact and write a fogbugz later this week.

Format 90 only outputs time in every third output message.

- ➢ Refer to Salesforce case 4990 and software release notes for more details.
- ➢ Fixed in version 3.5.0.

Will not connect Ethernet port to some switches (direct connect with cross-over cable and connection to other switches works just fine)

- ➢ Refer to ECN 2179
- ➢ No good link LED:
- ➢ Affects certain later Model 928x and early 938x units. This can happen on certain later 928x units and earlier 938x units that have a new style ETX module and capacitors C54, C60 and C180 (all three capacitors are surface mounts caps located near the Ethernet connector) have not been removed (Update. 14 Aug 2015 KW-Don found that cap C84 being installed can also cause this issue to occur).

INFO on this condition

ECN 2179 was to cut-in the new ETX module that was initially used on the older 928x PCB board. This ECN was released on 3/27/08. The new ETX modules continued to ship on the 928x PCB with the caps installed on the PCB until ECN 2212 was released to remove the three caps. This ECN was released on 5/06/08. So the approximate range of affected 928x and 938 units should be units shipped between about 3/27/08 through 5/6/08. We didn't capture exact cut-in S/Ns but based on these dates:

- ➢ The approximate affected range of 928x units appears to be ABOUT Serial Number 2122 through 2270.
- ➢ The approximate affected range of 938x units appears to be ABOUT Serial Number 571 through 639.

A) **Old ETX module, with caps installed (units not affected by this issue)**
- ➢ Mac address is 00:30:64
- ➢ The top cover will have four screws in a "square" with just ONE set of diagonal screws for a single heat sink (6 screws total)

B) **New ETX module, with caps installed (units can be affected by this issue)**
- ➢ Mac address is 00:d0:c9
- ➢ The top cover will have four screws in a "square" with TWO sets of diagonal screws for a single heat sink (8 screws total)

Halt function

This is a very good question, and I have some information for you that I hope will help alleviate any concerns that you may have about this:

Like any other computer, it is always best to stop the programs that are currently running before just pulling the power cord out of the computer. Otherwise, there is always that small chance that you could corrupt a program this was running at power down. So, computers usually internally stop all processes before they power-down, just to be safe (i.e. Windows Shut-down function) The HALT command is the method used to stop all processes in the NetClock before powering power.

The Halt Command is provided to promote file system stability. It does take time to preserve data in the file system. Using halt to shut-down the NetClock rather than just removing power ensures log data, and configuration information being written to the file system is successfully stored. Also, it avoids any issues of file system corruption.   The file system can recover from corruption and errors. However, to avoid file system corruption the use of Halt is recommended. Also, if a file error was to occur, the file system will try to fix it the next time the unit is booted up. This process could cause the power-on to take longer than normal.

Minor and Major alarms / Logs and log entries

List of Minor alarms and Major alarms and what they indicate

➢ Refer to the "NTP server Status and Log entries" document: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Alarms and logs

Log directories (where logs are stored)

➢ All of the logs are stored in the /opt/log directory (including the "Spectracom" and other logs

➢ "Spectracom" logs (such as the alarm and Qual log) are stored in the /opt/log/spectracom directory.

Capturing logs (to send them to us or to archive)

To send us the logs, a customer can:

1. Copy/paste the log entries to a file.

2. FTP/SCP transfer them out using the scp account (instead of admin) (See "A" below)

3. Use the Specup utility: (Refer to "B" below for additional info on this)

A) Capture logs using CoreFTP and the scp account

To capture all of the logs, login to the FTP/SCP client with the username of "**scp**" and use your standard admin account password.   Once logged in, navigate to the following directory: /opt/log. In the /opt/log directory, just pull all of the files (including the ones in the "spectracom" folder), zip or tar them together and send the file over to us. I will then forward the logs over to our Engineers for their review.
Another email from Paul Myers (

Another email from Paul Myers (4 Apr 2014)
Log cd /opt/log/sys.log
Can be retrieved using scp user name shown below.
winSCP
scp username and admin123
SEE BELOW.

Hi Dave,
There is a manual way to retrieve the logs.
Specupdate uses a username "scp" user to retrieve files.
The "scp" user's password is maintained as the SAME as the admin user's password.
For example, the scp user can be used to retrieve logs from the NetClock 9383 SP360.
FTP or the SSH protocols SCP or SFTP can be used to retrieve the logs:
If FTP is used, the user must ensure FTP is enabled, and then do the following:

ftp –i <your unit's IP address>
Name: scp
Password: admin123 (or your admin password)
>bin (use binary transfer to be safe)
> cd /opt/log
> mget *.**log**
> cd spectracom
> mget *.**log**

Using FTP you will find all logs and statistics files in /opt/log, /opt/log/ntpstats and /opt/log/Spectracom.
You can also use the SSH utilities SCP and SFTP. However, the path differs because the SSH tool places you into the /opt path.
Your directories you will find logs in are now the current directory '.', ./ntpstats and ./Spectracom
scp scp@yourIPaddress:/*.log* .

scp scp@yourIPaddress:/spectracom/*.log* .

The "Spectracom logs" are stored in the directory of Log/Spectracom. The user has access to these files so they can manually FTP/SCP/SFTP the logs off, or they can write a script that automates the logs being transferred off of the box.   Login as FTP/SCP or SFTP using admin password, navigate to this directory and then transfer the log files.

B) Capture logs using the Specup utility

For more detailed info, refer to: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Alarms and logs

The "Spectracom logs" are stored in the directory of **Log/Spectracom**. The user has access to these files so they can manually FTP/SCP/SFTP the logs off, or they can write a script that automates the logs being transferred off of the box.   Login as FTP/SCP or SFTP using admin password, navigate to this directory and then transfer the log files.

To capture the logs using the Specup utility, download the NetClock version 3.6.7 update bundle (if you don't still have it) from http://spectracom.com/Support/HowCanWeHelpYou/Software/tabid/61/Default.aspx#NetClock (under "**NetClock 9300/9200 series**", click on "**an update to version 3.6.7 is available**"). Then run the Specup.exe program (it doesn't need to be installed).

In the upper-right corner of the Specup utility. select Save and Logs. Also enter your Admin password, the IP address of the NetClock and the file on your PC to place the files (as shown below). Then press Start.
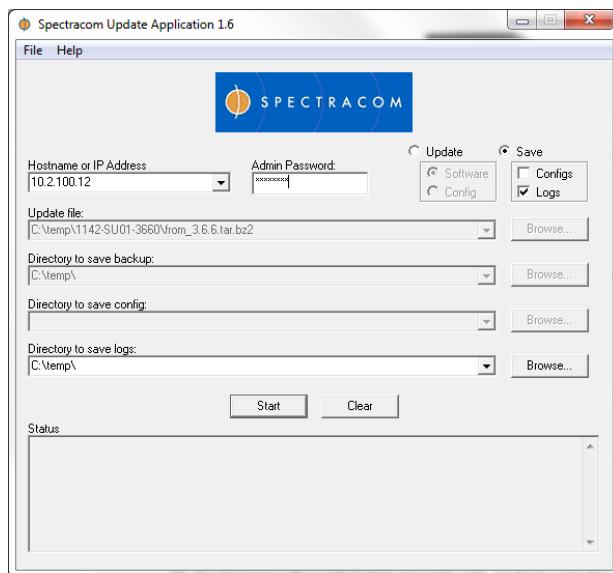
Desire to delete the logs

Regarding desire to delete the NetClock logs…

Unlike the newer SecureSyncs and 9400 series NetClocks, there is no way to delete just the logs.

However, there is a way to restore the NetClock 9300 series back to the factory default configuration.   This will restore the configs and also delete the logs. Once this process has been performed, they can either restore the units configs. This can be done manually via the browser, or they can backup/restore most of the configs using the Specup utility. Refer to the attached document.

To delete the logs and restore the unit to default configuration, navigate to the **System** -> **Reboot/Halt** page of the browser. The select "**Restore Factory Defaults**" at the top of the page and then press "**Reboot Now**" (as shown below):

SNMP **Alarm** **GPS** **System Time** **Local System Clocks** **Set System Mode** **Update** **Reboot/Halt** **Holdover** **Log Configuration**	**Caution:** If you restore factory defaults ALL user configurations will lost and the IP will be assigned by DHCP. Record your user settings before selecting reboot or halt. ☑ Restore Factory Defaults ☐ Factory Reset GPS Receiver **Caution:** If you installed any updates, reboots may take longer than expected. [Reboot Now] **Warning:** Do not remove power for at least 30 seconds after requesting halt. [Halt Now]

Log rotation

Email from Paul Myers (16 Jan 2014)
Fcron is used
1 main log and 4 old .# logs of size about 75Kbytes each.
Log Rotation is every 10 minutes so if you burst logs the size could exceed 75K.
Log sizes generally are a little larger than 75k usually ~76-78K.
Duration of days covered is dependent on user.

Email from Keith to a customer (16 Jan 2014)
For your information, the number of log entries that are retained in the NetClock is based on the size of each log file. The more logs being asserted into any particular log file; the sooner the oldest log entries are deleted (log entries are not stored indefinitely in the NTP server. They are periodically deleted to keep them from taking up too much flash memory).

Each log type (such as the modem dial-out log) is checked every 10 minutes to determine the size of that log. If it has reached or exceed about 75kBytes at that time, the log file is rotated to a new file name and newer entries start being stored in the original file name. Once the newest entries have reached about 75kBytes, the log rotates again using the same method. The original log entries get another new name (at this point they are still stored in the NetClock and all of the log entries are seamlessly viewable in the web browser (all entries are displayed in the browser as one long log, even though they are being pulled from separate file names). This process of rotating blocks of log entries continues until there is one main log and four older log files. The next log rotate will delete the original block of log entries from the unit.

If its desired to retain log entries longer than they are being retained in the unit, the log entries can also be sent to a Syslog server (if they aren't already) for remote log storage.

Log Configuration (syslog Facility/Severity settings)

The **Facility** and **Severity** selections on the **System -> Log Configuration** page maps where the log entries are sent to. Changing these values in mixed logs (System logs mixed into the GPS Qualification log, for example).

Default log configuration:

Syslog Configuration:

Log Name	Enable Local Log	Facility	Severity	Local File Name
system	☑	local7 ▾	emerg ▾	/log/spectracom/system.log
events	☑	local7 ▾	alert ▾	/log/spectracom/events.log
alarms	☑	local7 ▾	crit ▾	/log/spectracom/alarms.log
tracking	☑	local7 ▾	err ▾	/log/spectracom/tracking.log
operational	☑	local7 ▾	warn ▾	/log/spectracom/operational.log
oscillator	☑	local7 ▾	notice ▾	/log/spectracom/oscillator.log
dialout	☑	local7 ▾	info ▾	/log/spectracom/dialout.log
journal	☑	local7 ▾	debug ▾	/log/spectracom/journal.log
update	☑	local6 ▾	emerg ▾	/log/spectracom/update.log

Auth" (Authentication) and "NTP" logs are no longer in the list of configurable logs
For the Product release, both **"Auth"** (Authentication) and "**NTP**" were initially listed at the very bottom (for product release) of the **Log Configuration** page. However, a very early software version update (version 3.2.2, I believe) intentionally removed both of these logs from this page of the browser. Below explains why they were removed from the list of configurable

I have just confirmed with our Engineering team that the Authorization (Auth) log as well (as the NTP log) was initially included in the list of configurable logs (when the product was first released). However, in a very early version of software, both of these logs were intentionally removed from this list, but the corresponding System -> Log Configuration screenshot in the manual wasn't updated to reflect this change.

The logs that are currently listed on this page of the browser are all of the "Spectracom Application" logs. The Authorization and NTP logs are unique in that they are not Spectracom-created logs. These log entries are accepted directly from their associated software modules. Only the Spectracom-derived log entries from the NetClock's Application software (such as the Alarms log, oscillator log, etc) have configurable Syslog Facility and Severity codes. So, the Auth Log is not included in the list.

Viewing logs with a CLI connection to the Serial Setup Interface" connector port OR remotely using a telnet

Important note: (10/28/11 KW) In at least software versions 3.4.6 and below, logs are not available via SSH. There is an engineering issue in the NTP time servers that prevents the logs from getting though SSH. Refer to FogBugz case number 1532.

The logs can be viewed either with a direct connection to the rear panel "Serial Setup Interface" connector or remotely using telnet (see note above regarding logs not being available via SSH). Refer to the Alarms and Logs document at the following for more information: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Alarms and logs

In summary of this document, after logging into the CLI:
- Type: **log show** <enter> to list all of the available logs that can be viewed via the CLI interface

```
OBJECT
     j          - Journal log
     a          - Alarm log
     g          - GPS qualification Log
     o          - Operational log
     x          - Oscillator log
     d          - Dialout log
     n          - NTP log
     r          - Event relay log
     t          - Authorization log
     u          - Update log
```

3) **Type log show x <enter> (where x is the letter for the corresponding log type.**

Examples:
- Typing: **log show o** <enter> will display the Operational log.
- Typing: **log show d** <enter> will display the Modem Dial-out log.

Syslog logging

➢ Syslog entries are sent to port 514.

➢ Logs for Syslog mapping are configured in the System/ Log Configuration web browser page,

➢ The only two logs not configurable for Syslog are the NTP and Auth logs. They are not listed in the System/Log configuration page.

➢ The Auth (Authorization) log entries are the only log entries not sent to Syslog.

➢ See the note below and also refer to SalesForce case 6165 for Roots for more info.

Refer to Fogbugz 1841

(8/29/12 KW) based on testing I performed using Wireshark and a NetClock with v3.5.0 software, apparently all log entries, with the exception of the **Auth log** (Authorization log) are being sent to configured Syslog servers. Auth log entries are not being sent. Refer to SalesForce case 6165 for Roots for more info.

I configured my PC's IP address in the NetClock as the dedicated Syslog server. With Wireshark, I was able to capture "Syslog" packets being sent from the NTP log (I stopped and restarted NTP). However, when I intentionally failed to connect via web browser or SSH by entering invalid credentials, or when I successfully connected via web browser and SSH, no Syslog packets were captured, though entries were added to the Syslog log.

Specific logs and log Entries

➢ For additional info, refer to the "NTP server Status and Log entries" document: EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\Alarms and logs

Log Type	Types of entries	Refer to (below)
Alarm log	All alarms asserted	Alarm log
Journal log	user configuration changes	Journal log
Modem log	Modem ops	MODEM DIAL-OUT log
NTP log	Entries directly from NTP	NTP Log
Operational log	Reboots	OPERATIONAL Log
Oscillator log	Frequency Error measurements	OSCILLATOR Log
System log	Rubidium oscillator state changes	SYSTEM log
Sys log	Appwatch for system restarts	Sys.log (sys log)

A) Alarm log:

Holdover alarm: Asserted 5 seconds after loss of primary input reference (such as GPS). The 5 second delay was added due to the change to the GPS signal.

Holdover alarm asserted

Alarm log entry
Jun 4 15:41:49 Spectracom spectracom: [system] Hold Over

Associated System log entries
Jun 4 15:41:49 Spectracom spectracom: [system] Rb PLL Disabled) (Holdover mode started)
Jun 4 15:41:50 Spectracom spectracom: [system] Rb PLL Enabled (Holdover mode ended 1 second later)

Holdover alarm asserted for two seconds with v3.6.1 installed (starting at 02:59:21)
Jun 1 02:59:21 Spectracom spectracom: [system] Rb Hold State [RefSel=010 (Rb), Out=10 (Rb)] (1PPS Select)
Jun 1 02:59:21 Spectracom spectracom: [system] Rb PLL Disabled
Jun 1 02:59:22 Spectracom spectracom: [system] Rb Track State changed from [3] to [4] after 60104 seconds.
Jun 1 02:59:23 Spectracom spectracom: [system] Rb PLL Enabled
Jun 1 02:59:30 Spectracom spectracom: [system] Rb Track State changed from [4] to [2] after 2 seconds.
Jun 1 02:59:31 Spectracom spectracom: [system] Rb Track State changed from [2] to [3] after 1 seconds.
Jun 1 02:59:31 Spectracom spectracom: [system] Rb Lock State [RefSel=010 (Rb), Out=10 (Rb)] (1PPS Select)

Second example of Holdover (not sure version/oscillator installed)

[system] Coast State [RefSel=111 (Cond), Out=11 (Cond)] (1PPS Select) NetClock went into Holdover mode.
[system] CoastToSync State [RefSel=111 (Cond), Out=11 (Cond)] (1PPS Select) NetClock went from Holdover mode back into sync.

Frequency Error alarm: Asserted due to either loss of input reference (such as GPS, IRIG or Serial Time Code) or a problem with the oscillator

Frequency Error alarm assertion due to loss of GPS

Q. How soon after GPS reception is lost (or IRIG/Serial Time code input is lost) is the Frequency alarm asserted?
A. With GPS input, the Frequency alarm is asserted at the end of a 100 second frequency monitoring window, if GPS reception is not qualified at that particular moment. Note the window size is not dependent on the type of oscillator that is installed. It varies based on what the input reference is.

The Holdover alarm (due to loss of GPS reception) can occur at any point in the 100 second oscillator monitoring window, with the Frequency Alarm being asserted at the end of the 100 second window.   So the Frequency Alarm can be asserted up to a total of 100 seconds after a Holdover alarm occurs, but can occur much sooner than 100 seconds. If GPS reception is restored before the end of the 100 second window, the Frequency alarm is not asserted even though the Holdover alarm was asserted (the Holdover alarm is asserted as soon as GPS is not qualified). But if GPS reception has not been restored by the end of the 100 second window, the Frequency error alarm is asserted.

With either IRIG input (Option 06) or with Serial Time Code input (Model 9388 only), the oscillator monitoring window size changes to 1000 seconds, instead of 100 seconds. Other than the size of the window, the Frequency alarm assertion is the same for these references as it is with GPS input. Instead of up to 100 seconds after loss of input, in these inputs, the Frequency alarm can be asserted up to 1000 seconds after the Holdover alarm is asserted.

C) Journal log

Journal log entry for a reboot commanded by a user

The Journal log will indicate if someone has purposely rebooted the unit with this message:
Spectracom spectracom: [admin] [WEB] Reboot Now

D) MODEM DIAL-OUT log

Example logs associated with the modem option

Modem dial out to 9 1-303-494-4774. The modem has dialed the configured phone number to obtain time and date information.

Message 01: OTM = "*" revd 0.001030 adv 0.0450 through
Message 40: OTM = "*" revd 0.001030 adv 0.0450

The ACTS time stamp consists of 40 messages, with one message received each second. The messages are numbered as Message 01 though Message 40. Having these entries in the log indicate time/date information is being received during a particular modem dial-out.

Modem dial out failed: Busy Signal – The modem dialed the configured phone number, but a busy signal was detected. It will try again as configured in the Dial-out configuration.

Modem dial out failed: No Sync Message.

Modem dial out successful.   All required messages were received and useable.

Modem Time Sync Success: Subsecond counter adjusted by +243.112 ms.   Indicates how much of a correction that the modem has made to the System Time as a result of the dialout call (in this example, it increased the current System Time by 243.112 milliseconds as this was the amount that System Time was behind UTC time at the time of the modem call).

No leap second detected this month. Leap seconds are occasionally added to the UTC time. If one is scheduled to occur, it will be indicated in the ACTS time message and will flag the NTP server to adjust the time by one second accordingly at the last second of the current month. This particular entry indicates that a leap second is not scheduled to occur this month so the UTC time does not need to be adjusted.

E) NTP Log:

18 Aug 12:47:10 ntpd[1545]: refclock_atom: time_pps_kcbind failed: Operation not supported
In version3.1.1 or below, when a clean is performed at the factory, an older NTP.conf file is used which causes an issue with the NTPD. Issue causes NTP to not be able to declare sync, even if the unit itself is Time Synced. To fix, just disable and then re-enable NTP in the NTP page.

22 Aug 19:22:23 ntpd[4814]: synchronized to SPEC_92XX_APP(0), stratum=0 **(Good message)**
This entry indicates that the NTPD has successfully synced to the Spectracom Application software.
                                    OR
22 Aug 19:45:27 ntpd[1317]: clock SPEC_92XX_APP(0) event 'clk_fault' (0x03) **- (Error message)**
- In all versions, when the unit is power cycled, the NTPD may try to get the time from the Application before the Application is ready to provide the time, so NTPD can't get the time- the error message is generated. This alarm entry should only be present shortly after power –up. Any other time, it indicates a problem in the unit.

23 Aug 14:34:55 ntpd[4310]: ntpd exiting on signal 15
Indicates NTP has been disabled from the NTP page enable/disable button.

F) OPERATIONAL Log:

"Clock adjusted by x seconds:
Per Paul Myers, System Time corrections of 2 seconds or greater are logged. Time corrections less than 2 seconds are not logged (we "step" the time at 2 seconds- less than 2 second errors are slewed in).

Power cycle

Spectracom spectracom: [system] Power-On Reset.
 ➤ The oscillator log will log this message if a power cycle has occurred:

Leap second log entries

 ➤ Entries asserted when GPS has scheduled the Leap Second to occur:

I think the answer to my previous question has appeared:
In checking the Operational Log, I noticed the following entry recently appeared:

Jan 21 23:21:10 Spectracom spectracom: [system] GPS UTC Offset: Current = 16 Future = 17
Jan 21 23:21:10 Spectracom spectracom: [system] Leap Second Adjustment Date: JUL-01-2015 00:00:00 (+1)

G) OSCILLATOR Log:

Aug 22 21:49:26 Spectracom spectracom: [system] Rubidium PLL Inactive.
Displayed right after power cycle.
                                    OR
Aug 22 21:58:01 Spectracom spectracom: [system] Rubidium PLL Active.
Displayed shortly after power cycle o indicate the Rb oscillator has internally locked to its reference.

Nov 12 11:05:30 prdcg4nett00 spectracom: [system] Missed Reference 1PPS (System Clock Service) -

From Paul Myers- This log entry is posted when a 1PPS arrives later than it should. The FPGA can detect missed 1PPS and bubbles this state up to the firmware. If memory serves me the 1PPS can be 20 usec late before a 1PPS is generated by the FPGA automatically to ensure a 1PPS is output NEAR the correct time.

We are warned about this condition via a return value from a driver. This is what prints if a 1PPS was TOO late from the GPS or other reference and is outside the window of acceptability.

If this happens once in a while there is no concern for alarm.
I noticed this when I was fixing bugs for 3.4.1. If this is a one-time event, he is OK. The 1PPS was late for some reason. Way late.

H) Sys.log (sys log)

Appwatch entry: indicates appwatch has restarted the whole system. Other than this log entry being asserted in the sys log, this condition otherwise looks like a standard power cycle/reboot.

Note: Both Harris and Howard Boettcher have reported this condition occurring in the NetClocks. We have confirmed this entry present in the Harris logs, but not yet in Howards's logs.

Apr 1 09:23:58 Johnson_GPS_1 /usr/bin/appwatch: Application terminated [139] (/usr/bin/specapp). Will attempt to restart.
Apr 1 09:24:02 Johnson_GPS_1 syslogd 1.4.1: restart.

SYSTEM log entries (Rubidium oscillator state, etc)

Rb PLL state while in sync/holdover/not in sync

➢ RB PLL Enabled while in sync with GPS

➢ RB PLL Disabled while in Holdover mode and when not in sync

Rb Track State changed from [x] to [y] entries (applicable only to Option 04: Rubidium Oscillator)

When Option 04: Rubidium oscillator (Rb) is installed in the NetClock (this option is not available with the Model 9388 and 9288), the Rubidium oscillator internally locks itself to the NetClock's 1PPS reference. Changes in this internal lock state are reported in the System Log. The valid lock states are listed below for your reference.

Reported "Track State" value	Rb Lock condition
0	The Rb oscillator is now warming up
1	Tracking of the 1PPS in the Rb oscillator is now set-up to begin
2	The Rb oscillator is now tracking the 1PPS reference
3	The Rb oscillator is now locked to the 1PPS reference
4	The Rb oscillator is now in free run (tracking has been disabled)
5	The Rb oscillator is now in free run (1PPS reference is not stable)
6	The Rb oscillator is now in free run (1PPS reference is no longer present)
7	The Rb oscillator is now in free run (Tracking has been disabled)

Notes:

These log entries indicate both the previous Rubidium Oscillator's Lock State as well as the new Rubidium Lock State.

"Track States values of 0 through 3 are normal to see after the NTP server has been powered-up or rebooted.

Track State value of 3 indicates the Rubidium oscillator is now fully locked and disciplining to the system's 1PPS reference.

Track State values of 4 through 7 may indicate an issue with either the system 1PPS or with the Rubidium oscillator. Contact Tech Support for additional assistance.

Valid Track State changes are reported values of 0 through 7.   Reported values that are greater than 7 (such as "[129]", for example), can periodically be logged due to glitches that can intermittently occur in the communications interface between the NetClock and its Rb oscillator. These invalid Track State values (values greater than 7) are simply a reporting error only and do not reflect an invalid status/operation of the Rb oscillator. These values can just be ignored.

Port Assignments and RFC's

Refer to: "**Port assignments and RFCs for all products**" in the Customerserviceassist document.

**Admin password reset if current password is not known

Starting in version 3.6.0 (released/starting shipping November 2012) units that have been already been updated to at least this version can then perform a clean if the Admin password is not known (alleviating the need to send new CF card).

Important Note: If you type anything wrong in the following commands, or type anything else, a full clean/reboot is performed. One option is to email the following command and have them paste it, to ensure its typed correctly.

To perform the clean, they login to the rear panel "**Serial Setup Interface**" connector. The user name is: **defaults** (all lower-case) and the password is **M0g2i2r1f6a7T** (the second value is a number 0).
Note that the password is "**M g l r f a t**" alternating with "**0 2 2 1 6 7**".

Then, at the command prompt, type the following command: **Sys reset password** (Admin account and User passwords are reset).

To perform a clean, type **sys reset** type. It will take about 2 minutes to reboot and then about three additional minutes to generate the keys.

****CLEAN configuration capability (sys reset command)**

Clean Configs capability

- ➢ Prior to version 3.6.0, must swap out CF card to reset configs/passwords.
- ➢ Clean capability available with versions 3.6.0 and above. See info below about the sys reset command

Starting in version 3.6.0 (released/starting shipping November 2012) units that have been already been updated to at least this version can then perform a clean if the Admin password is not known (alleviating the need to send new CF card).

Important Note: If you type anything wrong in the following commands, or type anything else, a full clean/reboot is performed. One option is to email the following command and have them paste it, to ensure its typed correctly.

To perform the clean, they login to the rear panel "**Serial Setup Interface**" connector. The user name is: **defaults** (all lower-case) and the password is **M0g2i2r1f6a7T** (the second value is a number 0).   Note that the password is "**M g l r f a t**" alternating with "**0 2 2 1 6 7**".

Then, at the command prompt, type the following command: **Sys reset password** (Admin account and User passwords are reset).

To perform a clean, type **sys reset** type. It will take about 2 minutes to reboot and then about three additional minutes to generate the keys.

SNMP for 928x and 938x series

C) Support for Net-SNMP OIDs

- ➢ Apparently need to also download from Internet / install the SNMP-FRAMEWORK-MIB.mib file.   This file is not included within the NetClocks.
- ➢ This file can be downloaded from:
  http://tools.cisco.com/Support/SNMP/do/BrowseMIB.do?local=en&step=2&mibName=SNMP-FRAMEWORK-MIB

D) SNMP OID numbers

- • "**18837.**" Is for the Spectracom-specific OIDs
- • "**8072.**" is for Net-SNMP's OIDs

Model and Serial Number via SNMP

Email from Dave L (2 Nov 16) If you have a Model 9383 units still installed you can retrieve the serial number through the web browser or through the SNMP Get:

Model Number:
1.3.6.1.4.1.18837.3.1.2.1.20 spectracom.specProducts.specTimeFreqMIB.specTimeFreqObjs.tfSystemObjs.tfSysName

Serial Number:
.1.3.6.1.4.1.18837.3.1.2.1.2 spectracom.specProducts.specTimeFreqMIB.specTimeFreqObjs.tfSystemObjs.tfSysSerialNum

Software version:
.1.3.6.1.4.1.18837.3.1.2.1.5 spectracom.specProducts.specTimeFreqMIB.specTimeFreqObjs.tfSystemObjs.tfSysAppRev

Reboot trap ("reboot" versus normal power-up)

- ➢ The Reboot trap is only asserted on a "reboot" command, before shutdown is complete. Ten it's sent again while booting back up.
- ➢ The Reboot trap is NOT SENT upon a normal power-up (with power reconnected – the unit wasn't commanded to reboot)
- ➢ Net-SNMP in the NetClock also sends a "notifyshutdown" trap (partial Net-SNMPs OID "8072.4.0.2")

Email Keith sent to Dave Brown with Harris (24 Aug 2015)

- ➢ SNMP OIDs of "8072" are for Net-SNMP software (the program that provides the SNMP functionality for all the NetClocks- and for SecureSyncs. This software and associated OIDs are not specific to Spectracom).
- ➢ SNMP OIDs of "18837" are for Spectracom-specific NetClock OIDs

Based on my verification testing:

A) If the NetClock 9383 is commanded to reboot (not just power cycled)"

1. At shutdown

- • The Spectracom software sends the **Reboot** trap (OID …18837.3.1.3.0.10)
- • The Net-SNMP agent then sends a **notifyshutdown** trap OID …8072.4.0.2)

2. As its powering back-up

- • The Net-SNMP agent sends a **notifyshutdown** trap OID …8072.4.0.2)

B) If the unit is just power cycled (not commanded to reboot)

➢ No traps are sent at power-down or power-up

Auth Error trap (Authentication Error trap)

➢ The Auth Error trap is sent when there is an SNMP authentication error on an SNMP query.

➢ To test, enable SNMP, authentication traps, and a trap receiver. Attempt an SNMP Get to the unit with incorrect community or user to see the trap.

SNMP command to restart SNMP

➢ Update version 3.6.6 added a new CLI command to allow a user to restart SNMP if this Specapp fault does happen to occur; Default SNMP does not restart. This new CLI command can be issued one-time to have SNMP restart: sys snmp [restarton | restartoff].

FAQs

Q. We could not configure the SNMP (snmp security -> ipv4 network access): we tried to configure at ipv4 network access field the network: 200.160.1.0/24...We tried one IP: 200.160.1.56; tried network 200.160.1.0/24; and 200.160.1.0/255.255.255.0... No option works... The last doesn´t even fit in the field... Could you explain this configuration and give us an example? This field appears to accept 255.255.255.0 without an IP address, but it doesn´t make sense for us...

A In order for the entries to be accepted, the desired Protocol, Permission and Community Name must all be selected or entered for that row. We used your example of 200.160.1.0/24 with a value selected in each of the previous fields and it was accepted as a valid entry. Each entry must use the format of the desired IP followed by a slash "/" and then followed by the number of bits. The entered value of 255.255.255.0 likely looked like an IP address to the browser instead of a subnet mask, so it accepted it as valid.

SNMP stops responding when walking the MIBS

➢ Error message asserted: "WARNING!!! Unsuccessful enabling SNMP agent upon next reboot!!!" asserted while walking the MIBS"

➢ Refer to Salesforce cases such as 16433 (Noah Robin with AOL)

Email from Paul Myers (3 Dec 14)
We did fix the segfault issue which crashed specapp and impacted SNMP in 3.6.6 I believe.
This problem was first reproduced when I walked the MIB finding we could cause the issue.

Q. (from Noah Robin) We began polling our 9389's every minute about a day ago; after a few hours, the SNMP daemon stopped responding. I also note that two of the three devices rebooted with in the past 72 hours; in the config area, the SNMP agent was disabled. I re-enabled it and was able to query for SNMP stats, however all three devices report:

SNMP agent configuration validated successfully.
SNMP configuration successful saved.
SNMP Agent successfully enabled
WARNING!!! Unsuccessful enabling SNMP agent upon next reboot!!!

Questions:
=========
1) Did the snmp polling cause the devices to reboot?
2) Why is re-enabling SNMP failing?

Cloning two units or backing up configurations

There is capability to "clone" certain configurations from one Model 928x to another 928x unit. The configurations that can be copied directly to another unit are the configurations of items such as the Remote and Serial output ports (Baud rates, Data Format, request characters, etc), GPS antenna cable delay, alarm/event relay configuration, and other basic unit setup parameters.

These items can be copied and placed in another unit for cloning units. This can be done by either using the Spectracom's Windows software update utility or by transferring files out of the original unit and into the new unit using an FTP or SFTP session. Certain configurations are not available for cloning to other units. These include NTP configuration, user accounts/passwords and the logs. These configurations will need to be manually configured in a cloned unit as there isn't a way to copy these configurations from unit to unit.

IPSec (IP Security)

For general/troubleshooting info on IPSec, refer to: IPSec / IP Security (for all products)

Refer to the following links (design info from Yingchao): EQUIPMENT\SPECTRACOM EQUIPMENT\9283-9288-9289-9383-9389-9388\IPSec

Refer to Section 3.4.23 (IPSec) of the 9300 manual for additional info.
  ➢ Model 9300s supports IPSec.

  ➢ Encryption occurs in a different layer. All devices on the network have to support IPSec to use it.

Internet Protocol Security (IPSec) is a suite of IP protocols that authenticates and encrypts network communications. IPSec supports IPv6 and IPv4 as of this writing.

IPSec defines a Security Association (SA), consisting of secured communications between two network devices. Configuring IPSec requires us to define SA Policy (SAP) and SA Descriptors (SAD). SAP determines what network traffic can or must be secured through IPSec. SAD describes actively secured conversations. All network traffic for an SA contains an identical Security Parameter Index (SPI).

IPsec is configured in the **Network/IPsec** page of the web browser.

"IPSec IKE SA Configuration" versus "IPSec Manual SA configuration"

Via the **Security**-> **IPSec General** page of the browser, user can either:
Automatically configure IPSec (Using the IPSec IKE SA Configuration page of the browser)
Manually configure IPSec (Using the "IPSec Manual SA configuration" page of the browser)
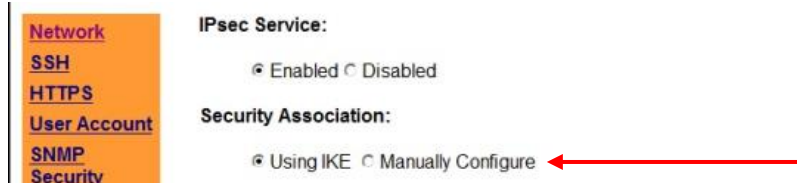
LDAP / Radius authentication

E) Group login / Group authentication / Group permissions

➢ Group login (admin or user permissions) is a limited to either LDAP or local account login (account on the box).

➢ Radius authentication does not support group login. It doesn't differentiate between admin or user rights- it just determines whether or not a user is allowed to access the browser. Any user who logs in via Radius automatically has admin rights.

➢ Radius can be used with LDAP if desired, or LDAP can be used on its own.

Q. I am using Radius and would need to assign certain users to Admin group and certain users to User group. Adding user accounts with the same name as the one in Radius would work, but is it possible to disable local password login on those accounts?

A. **Keith's response:** In general (not specific to just the SecureSync) and unlike LDAP, Radius does not support Group authentication. Radius just provides permissions to login, but doesn't define what permissions that user will have once they are logged in. If your customer wants to provide group authentication without using local login, we recommend they consider using LDAP, either instead of or in conjunction with, Radius authentication. Otherwise, if they prefer not to use LDAP, they can create local accounts in the SecureSync. Each local account can be assigned either user or admin privileges.

Attached is a LDAP/Radius Tech note for SecureSync. Your customer may find this document helpful.

LDAP supports LDAP versions 2 and 3. LDAP version 2 can only communicate with version 2. LDAP version 3 can communicate with LDAP version 2 or 3.

LDAP is only used if the login name/password are not located on the 92xx unit (i.e. if the login name is "admin", LDAP isn't required because the account is on the unit).

We only support **PAM** LDAP (Pluggable Authentication module) so an account MUST be created in the 92xx/93xx to be used in conjunction with the LDAP Server (We only support authentication of the password for a user-name, not authentication of both user name and password).

Note: PAM LDAP limitations in design prevent "group login" (a list of many user names and passwords in the LDAP Server only and no accounts on the unit). Each account name will have its own password but each account can have different rights assigned.
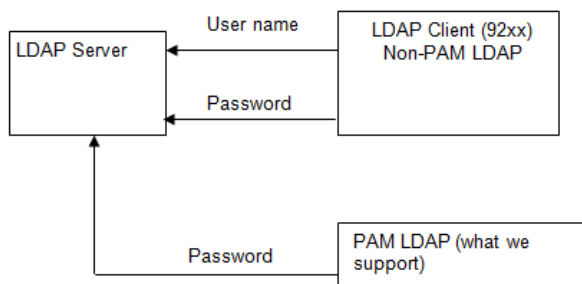
With PAM LDAP, the LDAP Server strictly authenticates the entered password (we internally validate that the account name entered is available in the list of accounts on the unit)

RADIUS:

We support **PAM** (Pluggable Authentication module) and **PAP** (Password Authentication Protocol) but we don't currently support **CHAP** (Challenge Handshake Authentication Protocol).

Radius client login events are logged in the **Auth log**; user activity is logged in the **Journal log**.

Type/Version of Radius

(Email from Yingchao):
I did more research based on information provided by Mark and Paul. I finally remembered the history with radius client.

We use pam_radius initially, but there are some issues with it. So we found out a better module called pam_radius_auth, which is provided by the freeradius project. In general. when people mention freeradius, they mean server. But the freeradius project not only provide server, but also provide pam_radius_auth module.
So we could tell customer we are using pam-radius_auth module from freeradius project to support radius client feature.

RSA Authentication with Radius: KW- As of 2/15/10   RSA authentication (SecurID) is a capability that can be used in conjunction with a Radius server that requires the login passwords to be different with each login. An RSA Authentication module needs to be incorporated with the PAM Radius to support this capability. Native PAM does not support this capability. Refer to Fogbugz case 1649 or CustService ID 13802 (Jacob Uecker from NNSA) for more details.

Email from Mike Sander: Keith,
Jeet looked into this a bit further. He was able to duplicate the problem by using Radius with a NetClock and changing the password during a session. Then he tried it again with a SecureSync and some web page test code. We know that our test web software is not asking for a password, so it is the web server (Apache) and the authorization module (PAM) that are asking for the passwords. It is possible that Apache or PAM can be configured to correct this problem, but we would have to investigate.
http://httpd.apache.org/docs/2.2/howto/auth.html

"Because of the way that Basic authentication is specified, your username and password must be verified every time you request a document from the server."
The RSA website has software that can be downloaded to support their products with PAM. So there might be a few ways to support this, if that's something we want to work on.

Configuration of LDAP and Radius in the webUI.

➢   For LDAP only- Must chose the LDAP Server type (from LDAP General page of webUI):

- For Windows, chose: Active Directory for Windows 2000/2003

- For Linux/Unix chose: OpenLDAP on Linux /Unix.

➢   For both LDAP and Radius, the user must specify which services will use LDAP or Radius Server for authentication (Console/Telnet, FTP, SSH/SFTP/SCP and HTTP/HTTPS). These are check boxes located on the LDAP General or Radius General page of the webUI.

   Important Note: Until proper LDAP login operation has been confirmed, it is highly recommended not to enable all services to use LDAP. It is recommended that only one service is enabled and then make sure you can login through the Radius Server. Enabling all services prior to verifying the ability to login with the Radius server can result in being totally locked out of the unit if LDAP is not configured correctly.

➢   Need to configure specific LDAP or Radius Server info in the "LDAP Client Configuration" or the "Radius Client Configuration" pages of the webUI.

   Note: We can support from 1 to 5 LDAP or Radius Servers.

➢ For LDAP only: Check the "Enable SSL for simple authentication to encrypt password. Unchecked will send passwords in the clear.

> **Important Note:** Radius does not have encryption capability at this time. Passwords will always be sent in the clear.

➢ For LDAP only: LDAP supports group-based authentication. Check the box if active group login is desired.

Distinguished name of the search base: (known as DN) This is the base name to use in the search. Typically the top-level of the directory structure.

Distinguished Name to bind server with: The DN to use to bind to (optional field if the database allows anonymous login- not likely. Must fill in this value. Able to use any same level of the tree and everything below.
Credential to bind server with: The necessary password to bind with the LDAP Server.

Login attribute used for search: A string of data that provides additional filter (UID) information.

Search base for password: Helps the LDAP Server determine the starting point in the directory tree to start searching for the password.

➢ For Radius only: "Secret Key" appears to be a shared MD5 string for authentication with the Radius Server.

Below are specific notes for the LDAP and Radius Client Configuration pages.

LDAP

Enable SSL for simple authentication (Security/ LDAP Client Configuration page)
Enable SSL drop-downs:

Never- The client will not request or check any server certificate.

Allow- The server certificate is requested. If no certificate is provided, the session proceeds normally. If a bad certificate is provided, it will be ignored and the session proceeds normally.

Try- The server certificate is requested. If no certificate is provided, the session proceeds normally. If a bad certificate is provided, the session is immediately terminated.

The customer needs to have LDAP server's certificate on the NetClock so that it can use it to verify if the certificate sent by the LDAP server is valid. They need to upload the LDAP certificate to the NetClock and let LDAP client knows where to find it (the path is entered into the field next to the drop-down). The LDAP server should have ability to generate this certificate.   In summary- upload the LDAP certificate to the time server (into a folder), enter the path to this folder in the blank field and choose one of the three drop-downs described above.

LDAP Active Directory:

Below is the sample configuration for Active Directory that Yingchao used when designing LDAP into the unit
The sample configuration for Active Directory (this is also in LDAP section of the instruction manual)

> DN for search base   dc=test,dc=spectracomcorp,dc=com

> Bind DN   cn=administrator,cn=users,dc=test,dc=spectracomcorp,dc=com

> Bind password   test

> Search filter   objectclass=User

> Login attribute   sAMAccountName

> DN for password   ou=users,dc=test,dc=spectracomcorp,dc=com?one

> Group DN   cn=engineer,cn=users,dc=test,dc=spectracomcorp,dc=com

> Group member attribute   member

The directory tree for the above example is shown below.
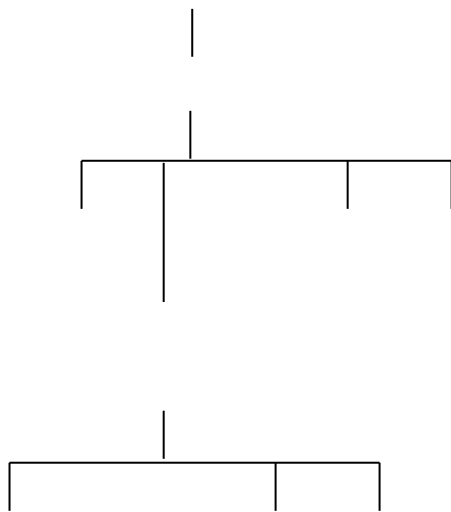
Binding determines at which level a user has rights to. They will have rights for everything at that particular level and below but don't have rights above that value. In the above diagram, if a user is binded to Engineers, they can login to Engineers or user 2-4 but not Users 1 and 2.

The sample configuration for OpenLDAP server
> DN for search base   dc=spectracomcorp,dc=com

> Bind DN   cn=manager,dc=spectracomcorp,dc=com

> Bind password   test

> Search filter   objectclass=posixaccount

> Login attribute   uid

> DN for password   ou=people,dc=spectracomcorp,dc=com?one

> Group DN   cn=engineer,ou=group,dc=spectracomcorp,dc=com

> Group member attribute   member

F) Issue with Radius/User accounts after updating to version 3.6.1

- ➢ Refer to Fogbugz Case 1853 (http://fogbugz/fogbugz/default.asp?pre=preSubmitBug)
- ➢ User accounts apparently need to be edited after updating.

Partial email from Cedrick Smith with USAF: I've installed 3.6.1 on my 9383 Time Servers and now My user rights are not working. I logged in as admin and checked my user rights. I still had "Write" permissions but I was denied access to the "Status & Logs" page. Have you heard of this happening anywhere else with this upgrade?

<mark>Troubleshooting</mark> NetClock 9300s and 9200s

1) "Updating Firmware" continuously being displayed

SpectraTime

Points of contact for SpectraTime (in Les Ulis)

Walter Rojas

Per Wade Sober "Spectratime Clock related inquiries, please reach out to Walter Rojas – walter.rojas@orolia.com 585-321-5832

- All other inquires please email sales@orolia.com"

Florise Breiner florise@spectratime.com

Email from Eric Girard (Oct 2020) I will forward this to Florise who also work for Spectratime

Spectratime RMAs

➢ The ***Spectratime RMA form*** is on the **Support** site and found here:
https://www.orolia.com/sites/default/files/document-files/QF%2004%20011%20%20Product%20return.pdf

SpectraTime Products

SpectraTime GRClok-1500

➢ Refer to: https://www.orolia.com/products/atomic-clocks-oscillators/grclok-1500-gps-gnss-rubidium-clock

SpectraTime iReference+ GNSSSource-2500 series/RBSource-1500 series

GNSSource-2500 | Overview | Features | Applications | Documents | Software

Low Noise GPS/GNSS Rb Source (GNSSource-2500)

The GNSSource™ is a low-cost, high-performance primary GPS/GNSS rubidium reference standard in a compact 1U package. It integrates a low noise OCXO, a smart rubidium clock, and a GPS/GNSS receiver. It also uses the patented GPS/GNSS SmarTiming+® technology, disciplining the Rb clock with an auto-adaptive loop time constant of 1,000 to 100,000 seconds, depending on the GPS/GNSS signal quality, at cutting-edge 1ns resolution.

RBSource-1500 | Overview | Features | Applications | Documents | Software

Rb Source Disciplinable to an External GPS/GNSS Standard (RBSource-1500)

The RBSource™ is a low-cost, high-performance rubidium reference disciplinable to an external GPS/GNSS standard, all in a compact 19" 1U package. It uses an auto-adaptive SmarTiming+® technology, disciplining the GPS/GNSS reference up to 100,000 seconds at 1ns resolution, depending on the GPS/GNSS 1PPS reference noise and signal-impairment level.

General info for both GNSSource-2500 and RBSource-1500

Links

> Datasheets and product manuals (refer to SpectraTime website):

- **GNSSource-2500**: https://www.spectratime.com/products/ireference/low-noise-gps-gnss-rb/GNSSource-2500/

- **RBSource-1500**: https://www.spectratime.com/products/ireference/

> SpectraTime Product Brochure:
https://www.spectratime.com/uploads/documents/all/Spectratime_Product_Brochure_(4-24-14).pdf
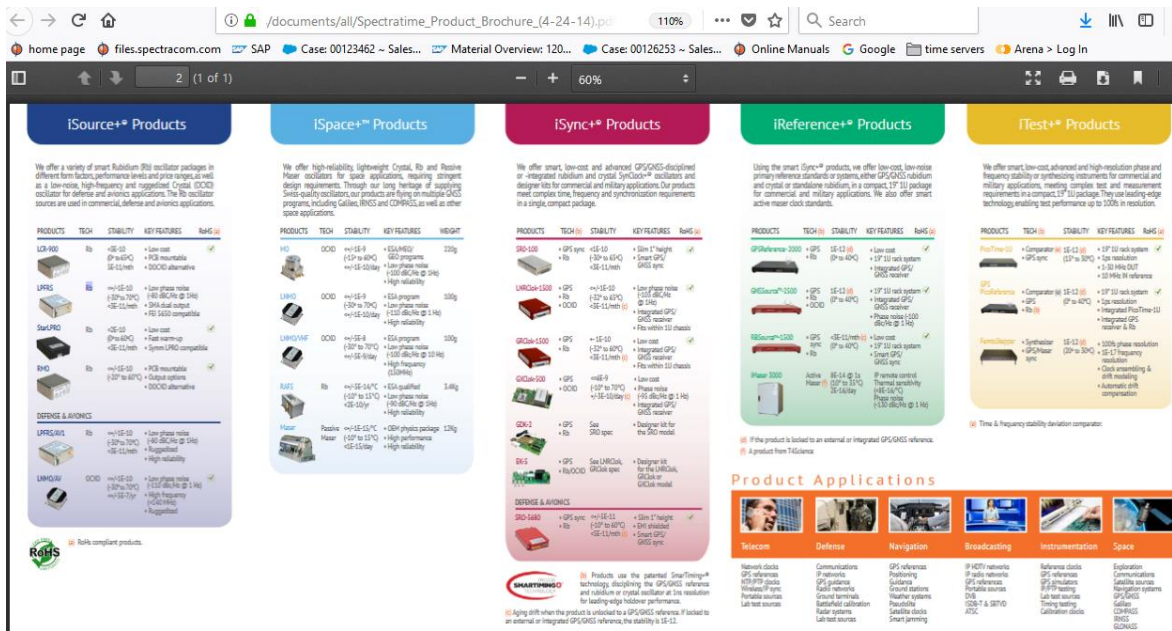
Datasheets/manuals

Q Datasheets/Manuals- I looked in Sharepoint data sheets and didn't see any available for the GNSSource. Are they available yet, and if so where are they located? What about manuals?

A (per Dave S 14 Feb 18) Datasheets and manuals are still the responsibility of SpectraTime and are available through the website

Tech Support of the SpectraTime Frequency References

Q will these initially be supported by SpectraTime directly or will be be supporting out of Roc and Les Ulis?

A (per Dave S 14 Feb 18) Mike Sutton is going to be doing some support from the applications engineering side, but tech support remains the responsibility of SpectraTime.

Front panel/back panel connectors

A) Front panel
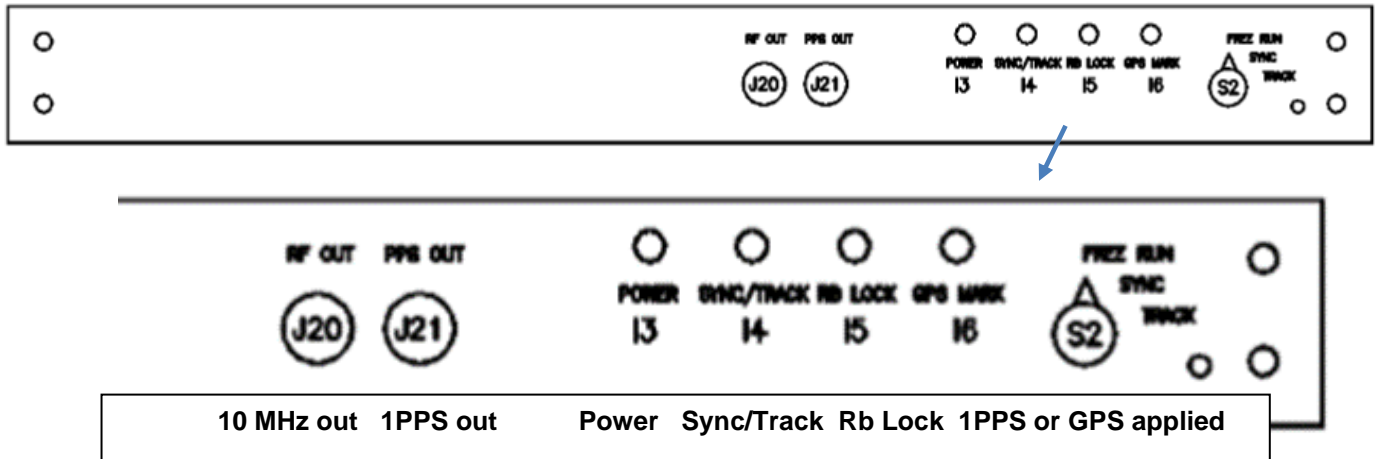
N°	Type	Definition	I/O
J20	BNC	10MHz sine reference output	O
J21	BNC	1PPS output	O
I3	Green LED	Power indicator	-
I4	Green LED	Sync or Track mode enabled	-
I5	Red LED	Rubidium clock locked alarm	-
I6	Green LED	1PPS GPS applied	-
S2	SWITCH	Free run, Sync or track selection switch	-

Back panel
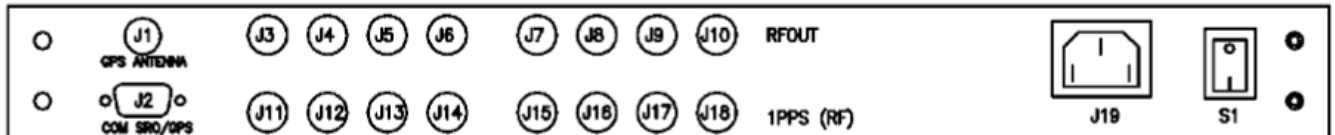
N°	Type	Definition	I/O
J1	SMA	GPS antenna connection for GNSSource-2500 (1PPS in for RBSource-1500)	I
J2	SUB-D9-F	Serial communication RS232	I/O
J3-J10	SMA	8x 10MHz sine reference outputs	O
J11-J18	SMA	8x 1PPS outputs (8x 10 MHz sine reference outputs with option code 8RF)	O
J19	IEC PLUG	Power connection	I
S1	SWITCH	On/Off switch	-

A) GNSSsource-2500 variants

1. GNSSource-2500/RA/E/US

➢ In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRPx?srPos=0&srKp=01t

Reference: ECO-ITEM-1324**: https://app.bom.com/changes/detail-summary?change_id=2389294774

Description: GPS Disciplined Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Roof-Top Antenna Kit, Rack Mounting Kit, and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena):

---

2. GNSSource-2500/16RF/RA/E/US

➢ In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRQ2?srPos=1&srKp=01t

Reference: ECO-ITEM-1324**: https://app.bom.com/changes/detail-summary?change_id=2389294774

Description: GNSSource-2500 GPS Disciplined Rubidium Frequency Standard, 16+1 10MHz and 1 1PPS outputs with Roof-Top Antenna Kit, Rack Mounting Kit, and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena):

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3. GNSSource-2500/LN/S/RA/E/US

➢ In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRQ7?srPos=2&srKp=01t

Reference: ECO-ITEM-1324**: https://app.bom.com/changes/detail-summary?change_id=2389294774

Description: GNSSource-2500 GPS Disciplined Low Noise Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Roof-Top Antenna Kit, Rack Mounting Kit, and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena)

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4. GNSSource-2500/LN/S/16RF/RA/E/US

➢ In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRQC?srPos=3&srKp=01t
➢

Reference: ECO-ITEM-1324**: https://app.bom.com/changes/detail-summary?change_id=2389294774

Description: GNSSource-2500 GPS Disciplined Low Noise Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Roof-Top Antenna Kit, Rack Mounting Kit, and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena)

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5. GNSSOURCE-2500/RA/CA/US/BRA

➢ In Salesforce: Not currently in Salesforce (not yet reselling it?)

Reference: ECO-ITEM-1324**:** https://app.bom.com/changes/detail-summary?change_id=2389294774

Description: GPS Disciplined Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Roof-Top Antenna Kit, Rack Mounting Kit, and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R-0002-0002 (in Arena): https://app.bom.com/items/detail-spec?item_id=1230587305&version_id=10696873458

Links
 Datasheet:

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6. GNSSource-2500/US/RA/CA/E

➢ In Salesforce: Not currently in Salesforce (not yet reselling it?)

Reference: ECO-ITEM-1324**:** https://app.bom.com/changes/detail-summary?change_id=2389294774

Description: GPS Disciplined Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Roof-Top Antenna Kit, Rack Mounting Kit, and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R-0002-0003 (in Arena): https://app.bom.com/items/detail-spec?item_id=1237509859&version_id=10819482918

B) RBSource-1500 Variants

1. RBSource-1500/E/US

➢ In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRD1?srPos=0&srKp=01t

Description: Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Rack Mounting Kit and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena)

Links
  Datasheet:

2. RBSource-1500/LN/S/A/E/US

➢   In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRPn?srPos=1&srKp=01t

Description: Low Noise Rubidium Frequency Standard, 8+1 10MHz and 8+1 1PPS outputs with Rack Mounting Kit and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena)

3. RBSource-1500/16RF/E/US

➢   In Salesforce: **https://orolia.my.salesforce.com/01t0h000004XRPd?srPos=2&srKp=01t**

Reference: ECO-ITEM-1324**:**

Description: Rubidium Frequency Standard, 16+1 10MHz and 1 1PPS outputs with Rack Mounting Kit and North American Power Cord

Mfg: SpectraTime

Our P/N: MP34R- (in Arena)

4) RBSource-1500/LN/S/A/16RF/E/US

➢   In Salesforce: https://orolia.my.salesforce.com/01t0h000004XRPs?srPos=3&srKp=01t

Description: Low Noise Rubidium Frequency Standard, 16+1 10MHz and 1 1PPS outputs with Rack Mounting Kit and North American Power Cord

Our P/N: MP34R- (in Arena)

SpectraTime iReference+ GPSReference-2000)

GPSReference-2000/RA/CA/US/BRA/E

➢   Refer to: https://www.spectratime.com/products/ireference/gps-gnss-rb-clock-standard/
➢   Reference: ECO-ITEM-000828
➢   Refer to (in Arena) https://app.bom.com/items/detail-attach?item_id=1220801540&version_id=10518450958

Note: This is a SpectraTime device (added to our documentation in case we happen to ever start cross-selling it)

Model 7535-001 IRIG distribution amplifier (discontinued)

Note: this product is no longer available.

Model 7535 discontinuance/obsolescence

➢ Refer to ECO-1370 (in Arena) https://app.bom.com/dashboard/list-main?stay_here_p=1
➢ ECO was completed on 2 Nov 17

Links/shortcuts

link to Model 7535 manual:

- I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\7535-001

    OR

- I:\Engineering\Archive\Released\Old Manuals from Jen 120805\8134

➢ **link to Model 7535 data sheet**: link to datasheets in SharePoint

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This was a product manufactured from another company in the US. (We just used to resell it)

Email from Norm West on 10/25/11
This is a product that we purchased from the former GE Fanuc. I'm not sure who the vendor is now.
Tom or Russ – Do you have more info on who we should contact for additional info on our 7535-001 IRIG-B Buffer Amplifier?

➢ Four channels (four inputs). One output from tone channel can be connected externally via coax to the input of the next channel to increase the number of outputs by an additional four (for each channel).
➢ Each signal channel (inputs) accepts single-ended or differential input signals.
➢ Each output is single-ended and buffered.
➢ Each output is at 1 to 6 vp-p at 1kHz.
➢ If IRIG AM in, IRIG AM out
➢ IF IRIG TTL in, IRIG TTL out

FYI: The SAS17E-IR will feed a 7535 because it can accept differential or single ended signal inputs.

UL rating

(6/4/12KW) Not currently UL rated and there are no plans to have it tested.

Per Jim Allocco: We are not planning on doing anything with the product."

Environmental specs

Input power / current

- ➢ Single AC input (115 Vac 60 Hz)

- ➢ 16 watts max

Inputs

BNC input connectors - Accepts either differential or single-ended IRIG signals (When connecting a differential IRIG signal to the input of the Model 7535, one side of the IRIG signal is connected to the center pin and the other side is connected to ground, because the Model 7535 does not have a differential input connector).

Outputs

BNC output connectors - Outputs single-ended IRIG signal (does not output differential IRIG signals)

Outputs are short-circuit protected.

Model 8194B/8195B/8197B/8195A/8197/8195

Manual

➢ **Shortcut to combined 8194B/8195B/8197B manual (1132-5000-0050):** I:\Engineering\Archive\New Released\Manuals\1132-xxxx-xxxx

➢ Shortcut to Detailed Engineering info on the Models 8195B and 8197B: I:\Engineering\Products\8195B-97B-94B

➢ Shortcut to Detailed Engineering info on the Models 8195a and 8197: I:\Engineering\Products\8195a

International shipping (ECCN and HTS codes)

*Excerpt below is from an email sent by our Compliance team to Marlea (4 Dec 16_*

8195A
HTS: 8543.20.0000
ECCN: EAR99

Input Power requirements

8197: AC Input: 90 to 264 VAC, 50/60 Hz, 60 Watts for Rubidium unit.
Option 02, Internal Battery Backup, requires an additional 20 Watts
Option 03, Built-in Distribution Amplifier, requires an additional 25 Watts

Standby DC power (AC powered units only):
Replaces the internal Option 02 battery with external 24vdc input. Range is 24vdc +/- 5% (22.8- 25.vdc). Note this input does not power the entire unit. It just keeps the oscillator warm and the GPS receiver tracking in order to decrease re-acquisition time of the receiver.

DC Power Options Isolated Input Power

Option 52, $\pm$ 12 VDC

Option 53, $\pm$ 24 VDC

Option 54, $\pm$ 48 VDC
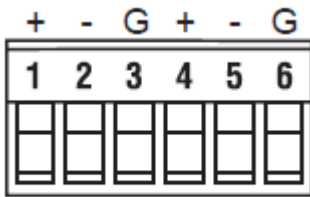
Figure 3-16 DC Power Connector

Terminal block connectors (DC power and alarm output)

DC power input (1 connector)
P13006 (6 pin terminal block connector)

These connectors are available from: Digikey P/N 1705-ND (Mfg is On Shore Technologies, P/N ED950/6).

List of On Shore distributors (by State) http://www.on-shore.com/find

Refer to: http://www.digikey.com/product-detail/en/ED950%2F6/ED1705-ND/123774?WT.z_cid=ref_octopart_dkc_buynow&cur=USD

Alarm outputs (1 connector)
P13007 (7 pin terminal block connector)

These connectors were available from: Digikey P/N 1705-ND (Mfg is On Shore Technologies, P/N ED950/7BK).

List of On Shore distributors (by State) http://www.on-shore.com/find

Refer to: http://www.digikey.com/product-detail/en/ED950%2F6/ED1705-ND/123774?WT.z_cid=ref_octopart_dkc_buynow&cur=USD

Note (10-26-12): The 6 pin terminal block is still listed on the Digikey site, but the 7 position connector is not listed. Not sure if it's still available from Digikey.

RS-232 Setup port not responding

Can occur when the unit sends data at the same time that you are typing to the unit.   Have the customer hit the "shift" key and the "7" key at the same time. A buffer table should be displayed and normal communications resumed. To prevent this from happening. Turn on set mode or test mode, and then type EO off <enter> (turns the Event Output off).

Rear panel connectors

**RS-458 data comm port (interface for Harris)

➢ Refer to the "8195B Contract Book" and "RS-485 Commands.xls":

**Rear panel DIP switches:

1-5 set the desired address, 6 selects either 9600 or 19200 baud for the RS-485 comm port and 10 is for termination

3.3.5.4 Termination

Switch 10 terminates the RS-485 Receive line with 120 ohms. Place Switch 10 in the ON position when the unit is installed at the end of the RS-485 bus. Place this switch in the OFF position when the unit is not the last device on the bus.

3.3.6 RS-485 COM

The RS-485 communication port permits remote configuration control and monitoring of performance and status. The RS-485 Com port uses a protocol and command set described in Section 4.2 of this manual. The Com connector pin numbering is shown in Figure 3-10. Table 3-7 lists the Com pin assignments.
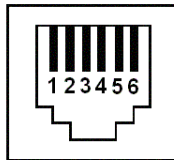
Figure 3-10 RS458 COM Connector

PIN	SIGNAL	NOTES
1	- Transmit	RS-485 A terminal
2	+ Transmit	RS-485 B terminal
3	- Receive	RS-485 A terminal
4	+ Receive	RS-485 B terminal
5	Ground	Cable Shield
6	Ground	Cable Shield

Table 3-7 RS-485 COM Pin Assignments

The rear panel DIP-switch selects the RS-485 address and termination as described in previous paragraphs. Transmitted characters are in ASCII form with a bit structure of 1 start, 8 data, 1 stop and no parity, data rate is 9600 baud.

RS-485 is a balanced differential transmission requiring twisted pair cable. The RS-485 standard defines the A terminal (-) to be negative with respect to the B terminal (+) for a Binary 1 (MARK or OFF) state. The A terminal (-) is positive to the B terminal (+) for a Binary 0 (SPACE or ON) state. Figure 3-11 illustrates the relationship between the A and B terminals for the Transmit and Receive connections.

Data Clock connector

This connector provides RS-485 clock signals of one pulse per second (1PPS), 9.6 kHz, 18 kHz and Major Alarm relay contacts. The connector is a 9-pin series D numbered as shown in Figure 3-8. Data Clock pin assignments are listed in Table 3-5.
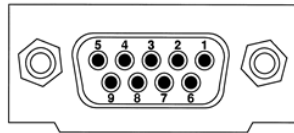
Figure 3-8 Data Clock Connector

PIN	SIGNAL	NOTES
1	+ 9.6 KHZ	RS-485 B TERMINAL
2	+18 KHZ	RS-485 B TERMINAL
3	+ 1 PPS	RS-485 B TERMINAL
4	MAJOR ALARM	GROUND = NORMAL
5	GROUND	CABLE SHIELD
6	- 9.6 KHZ	RS-485 A TERMINAL
7	-18 KHZ	RS-485 A TERMINAL
8	- 1 PPS	RS-485 A TERMINAL
9	GROUND	CABLE SHIELD

Table 3-5 Data Clock Pin Assignments

Data sync connector

This connector provides RS-485 clock signals of 17 $2/3$ Hz, 33 $1/3$ Hz / 26$2/3$, 18 kHz, 64 kHz, and Major Alarm relay contacts. The connector is a 15-Pin series D female numbered as shown in Figure 3-12. Data Sync pin assignments are listed in Table 3-8.
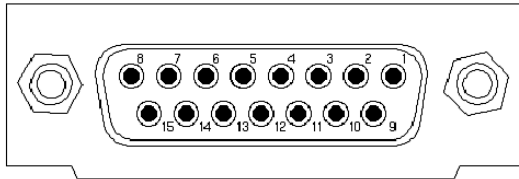
Figure 3-12 Data Sync Connector

PIN	SIGNAL	DESCRIPTION
1	+ 64 kHz	RS-485 B Terminal
2	-64 kHz	RS-485 A Terminal
3	+18 kHz	RS-485 B Terminal
4	-18 kHz	RS-485 A Terminal
5	+ 17 $2/3$ Hz	RS-485 B Terminal
6	-17 $2/3$ Hz	RS-485 A Terminal
7	+33 $1/3$ / 26$2/3$ Hz	RS-485 B Terminal
8	-33 $1/3$ / 26$2/3$ Hz	RS-485 A Terminal
9	Ground	Cable Shield
10	Major - C	Common Contact
11	Major - NO	Normally Open
12	Major - NC	Normally Closed
13	Ground	Cable Shield
14	Ground	Cable Shield
15	Ground	Cable Shield

Table 3-8 Data Sync Pin Assignments

Version information

Version 2.13 (main PROM)
Fixed issue where 1PO and ACD were lost upon loss of input power (Settings retained in Option 2 units until the battery voltage fails).

GPS VP receiver twice a year reset: Added in ver 2.05

GPS Receiver in 8195x/8197x

GPS 1024 week rollover every 20 years (April 2019, 2038 etc)

➢ General info about GPS week rollover/how to test for it: refer to (on our site):
https://spectracom.com/resources/blog/lisa-perdue/2018/gps-2019-week-rollover-what-you-need-know

➢ Refer to "GPS Week roll-over issue due to number of bits in the message (2019, 2036, etc..)" in
..\CustomerServiceAssistance.pdf

Engineering tested Rollover and found no problems

Q from Dave L to Tom Richardson/Dave S (7 Feb 2019) I was wondering if we ever did test the 8195 series products for the April 2019 Rollover? I have customers asking about this now.
A from Dave Sohn (7 Feb 2019) We did and did not find issues around the week rollover

Signal Strength requirements for Qualification

- VP Receiver- 50 or greater
- UT Receiver- 40 or greater

GPS Qualifying Algorithm (GQA)

Refer to 8195B manual for details Section A2 for info and A3 GQA command)

- **GQA1**- four qualified satellites required at all times (Default mode)
- **GQA2** – Only one satellite required. No 3-D fix required.
- **GQA3** – Only one satellite after 3-D fix for one minute.

Older units needed PHO turned off prior to changing the GQA to higher number (Two-step process).

GQA 3 with a Current level of 1 (then 2)

There are three GQA levels.   GQA 1, 2 and 3. GQA 1 indicates that you have to always track at least four qualified satellites (factory default) while GQA 2 says that you only need to ever track just one qualified satellite.   GQA 3 is a combination of both 1 and 2. GQA 3 indicates that you have to initially have four qualified satellites for a period of time,

Page | 159

but then it can drop to just one satellite. GQA 2 is not a recommended setting to use as it is recommended to have at least four satellites to obtain a 3-d fix first before dropping to just one satellite.

When in GQA 3, the Current Level starts at GQA 1 while it is requiring four satellites to obtain a 3-D fix. Once the GPS receiver has achieved a 3-D fix for 60 seconds, the Current Level with then switch to 2, indicating that it has met the minimum requirements of a 3-D fix for 60 seconds and so it now only needs one qualified satellite to maintain lock. It won't ever progress to a level of 3 because GQA 3 is not an individual level with its own defined rules–it's just a combination of GQA 1 and 2. If the GQA response shows level 2, all of the minimum GPS requirements have been met.

GQA Command

The GQA selection command is a Test Mode command. Place the unit in Test Mode by sending the following command:
Type: **TM ON <ent>**

The unit will respond with an acknowledgement that Test Mode is enabled. To read the current GQA selection, issue the command as shown below:
Type: **GQA <ent>**
Response: GPS Qualifying Algorithm= 1

To change the GQA algorithm, issue the GQA command as follows:
Type: **GQA1 <ent>**
or
GQA2 <ent>

The unit will respond with the selected algorithm.

Turn Test Mode operation off as shown below:
  Type: **TM OFF <ent>**
        The unit shall respond with another Change in Status message

Allow the receiver two to three hours to frequency lock the oscillator to GPS. When the oscillator is disciplined to GPS, the front panel OSC LOCK lamp turns on and the frequency and major alarms clear. The unit may now be placed in service.

GPS receiver accuracy (UT receivers)

Accuracy of GPS receivers (Motorola VP and GT plus receivers)

Refer to: Motorola VP/GT/UT receivers

Options

**Option 02 (battery backup of GPS receiver and oscillator warming circuit)

Battery replacement

➢ Refer also to Section 6.2 of the Model 8195B manual for details of replacing battery I:\Engineering\Archive\New Released\Manuals\1132-xxxx-xxxx

Acceptable replacement batteries can be purchased locally
Replacement batteries can be ordered from Spectracom Sales Department at 585-321-5800. Specify Part Number B00004. Batteries can also be obtained locally.
Select a 12 Volt, 7.0 Amp/Hour sealed lead acid *battery.*

Acceptable replacement batteries

- Power Sonic P/N: **PS-1270**

- Panasonic P/N: **LC-R127R2P**

- Power Patrol P/N: **SLA1075**

Batteries may also be purchased from DigiKey, a large mail order electronics distributor. Call 1-800 DIGIKEY, specify their part number **P078-ND.**

Commands to clear "**Replace Battery**" LED after changing out battery.

A) **8195**

Type: **TM ON** <enter> and then **TB ON** <enter>. A four-minute load test will be performed. If it passes, the light will clear. It will then go to "Charging" for a period of time before going "Ready".

B) **8195A/8195B**

Type: **SM ON** <enter> and then **CA BAT** <enter>. A four-minute load test will be performed. If it passes, the light will clear. It will then go to "Charging" for a period of time before going "Ready".

Battery date code

POWER SONIC   MMDDYX
    MM= Month
    DD=Day
    Y=Year
    X= Manufacture Plant

PANASONIC   YYMMDDX
    YY=Year
    MM= Month
    DD=Day
    X= Manufacture Plant

PANASONIC   YWWDD
    Y=Year
    WW= week number
    D=Day of week

Email from Dave Lorah (9/14/12) I do know that the battery has about a three to four year lifespan. After that it will start to trigger Replace Battery Alarms. I also know that the battery will self-discharge if stored for long periods of time. The batteries should be kept on a trickle charge to maintain their health in storage. We do that here in our stock room.

If a unit is to be stored for 13 months or so it would be better to leave it powered on to keep the battery charged. Either

that or keep the battery separate and on a trickle charger. It is usually best to install a fresh battery at the time a swap is made of the equipment.

The battery circuit does have a state it can get into with no battery attached. It will sit at about 3.5 volts unless a good battery is installed. If a bad battery is installed it will never charge up enough to satisfy the charging circuit so the LED changes to READY. A bad battery can have an internal voltage leakage and reduced capacity.
If a lead acid battery like these is stored in a decreased charge state, it will develop sulfation on the plates which greatly reduces capacity. If this is the case the battery will never charge fully and the READY LED will not come on.

If you power up a unit with a good battery the voltage will climb to about 14 V for a few minutes and then settle down to about 13.5 V when it gets charged and the READY LED comes on. This should be normal operation.

REVERSE POLARITY BATTERY

If a replacement battery is connected backwards, it can:

- Damage the trace between the front panel battery connector to the ground plane.

- Damage the following components (all on the front panel PCB): U1, U6, U9, Q2 and Q3.

To remove battery Option 02 in the field:

1. Remove R43 from the front panel (Prevents battery test from occurring)
2. Remove R2 from front panel. (Prevents Ready light from being turned on)
3. Remove the battery from the chassis
4. If desired =Apply new front panel overlay (Spectracom P/N 064027)

**Option 06: 12.8MHz outputs

- ➤ Hardware modification of the output frequency of the 2048kHz PLL circuit to generate 12.8MHz
- ➤ Changes the (4) rear panel BNC Frequency outputs and the front panel 10 MHz to 12.8 MHz out/
- ➤ Changes the rear panel 2048 kHz output to 1600 kHz
- ➤ Also changes the 64kHz output on the rear panel DB15 Data Sync connector to 50 kHz

   Associated alarms for 12.8MHz- there are no alarms associated with this output

**Option 07: 5MHz outputs

- ➤ Hardware modification of the output frequency of the 2048kHz PLL circuit to generate 5MHz
- ➤ Changes the (4) rear panel BNC Frequency outputs and the front panel 10 MHz to 5 MHz out.

**Option 14 (CTCSS outputs 1 and 2) and Option 17 (CTCSS outputs 3 and 3)

Installation

➢ Refer to: [..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS](..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS)

Note: "Option 17" was initially "**SP317**"

P/N of the Option 14/17 PROM: 8195-0001-6003

- **Opt 14:** U27 (left of the three PROMs – as looking at the front of the unit)
- **Opt 17/SP317:** U30 (Middle of the three PROMs)

Interface with the Model 1118 CTCSS board

➢ Refer to: [..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS\CTCSS install-troubleshooting](..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS\CTCSS install-troubleshooting)

8195 (no letter) oscillator calibration process

Perform the oscillator calibration after at least 24 hours of oscillator warm-up time (The GPS antenna does not need to be connected during this warm-up).

Note that it's recommended to disconnect the GPS antenna from the back of the Master Oscillator before performing this procedure. If the GPS antenna remains connected and the GPS receiver continues to track satellite, an oscillator D/A correction may be applied while performing the alignment. This will adversely affect the oscillator calibration.
Connect a Frequency counter to the front panel 10 MHZ output BNC. Apply an external 10MHz signal from a good 10 MHz source to the frequency counter's 10MHz input for external lock (this allows more precision on the frequency counts).
Connect a PC running terminal emulation software (such as HyperTerminal) to the front panel RS-232 port. The settings for the Com port are 9600, 8 N, 1.

After removing the top cover of the Master Oscillator, remove the small set screw on the end of the oscillator (opposite the front panel PCB). After typing the first command mentioned below in Step 1, use a very small (preferably somewhat flexible) "calibrator" to turn a very small potentiometer that is accessible via this small hole at the end of the oscillator. Turn the pot in either direction until the frequency readout on the counter is about 2.5 Hz to 2.6 Hz above 10 MHz (note the exact frequency that it's sent to isn't critical).

Note that Step 2 below does not require any mechanical adjustment of the oscillator (the oscillator is only mechanically adjusted in step 1). Just read the output frequency on the counter after typing the command. The set screw can be reinstalled back onto to the end of the oscillator at this point.

1. Type SHI <enter> This sets High DAC [A666]. Set the 10MHz out to 2.5Hz high   _____

2. Type SLO <enter> This sets low DAC [4CCD]. Read the 10MHz frequency   _____

3. Subtract the difference in the frequency measurements taken in steps 1 and 2. Type HR xx.xxx<enter>

   (where xx.xxx is the frequency difference between the SHI and SLO frequencies). This command sets the Hertz Range of the 10 MHZ oscillator.   Typical Hertz Range values are around 11 to 12 Hz (they are oscillator dependent).

4. Reconnect the GPS antenna and allow the Master Oscillator to GPS and Frequency lock. On the front panel, the three green Status LEDs should all illuminate and the two red Alarm LED (Minor and Major) should extinguish within a couple of hours.

End-of-line 50 ohm terminators for 10MHz

A) Red-capped DC-isolated (004490s) 50 ohm terminator (AC riding on a DC voltage):

- ➢ Link to Process Detail (8140-0000-1000): I:\Engineering\Archive\New Released\Process Details\8140-xxxx-xxxx Process Details\8140-0000-1000

The part number for the 12VDC Red Cap 50 ohm terminator is 8140-0000-1000 (used to be P/N 004490)

Note: these components are no longer available (in stock or in anc kits) and can't be produced again!

Components used to build this terminator

- **Resistor** (our P/N R02510): RES, 51 OHMS 1/2W 5% Carbon Film
- **Capacitor** (our P/N C23223): CAP, .1 UF 50V CERAMIC TUBE (Mallory P/N P10U104M5)

Resistor lead: solder to center pin of BNC connector. **Cap lead**- bend back and solder to shell of the BNC.

B) Silver-capped 50 ohm terminator (AC only):

- ➢ Part Number for the 12VDC silver Cap 50 ohm terminator: 004492

Interface from Master Oscillator to Radio systems

Radio system Timing jump occurs when the primary Master Oscillator achieves lock

When the front panel "Osc Lock" LED becomes lit, the Frequency and Major alarms clear. If this is the primary Master Oscillator, when the alarm clears the radio will switch to using the newly locked unit as the selected reference.

If the 1PPS outputs of both the Primary and Backup Master Oscillator's aren't coincident with each other when the switch-back occurs, the radio's timing will go "haywire" requiring the Master Oscillator to be manually brought back in.

If a radio system timing jump is noticed when the Osc Lock LED illuminates, verify the 1PO value on both units are set to the same value. If not, reconfigure the value as needed (if one is set to 0 and it was recently back for repair, it may have been inadvertently not set back to the original starting value. Or the GPS receiver may have been damaged by lightning, so the 1PO offset value couldn't be obtained here, before sending it back once the RMA was completed).

Ed's website: http://www.simulcastsolutions.com/
http://www.simulcastsolutions.com/case-studies.htm (Case Studies of past installs)
http://www.simulcastsolutions.com/phpbb/index.php (Post questions about specific products)

Interface to either MTR-2000 or Quantar radio system

Make sure modulation is exactly the same at all xmitters
If using PL (Private Line), the tone is generated but not locked if Opt14 not used.
Audio delay has to be accounted for between the xmitters.
Radio normally ships with ability to use either Carrier squelch or Private Line.
Radio factory default is 5 MHZ. Change to 10 MHz if not Option 7.
Note: Quantar radios require the purchase of a "Wild Card" option called x157. This is an interface module for the input of a PL Tone.

Email from Ed regarding connection to an MTR-2000
Use the 4 wire wireline for Tx and Rx audio. Cable 10 MHz into the external frequency input. Configure MTR for 10MHz external input.

Using the RS232 port on the front of the master oscillator, set your desired CTCSS tone in CTCSS1.

Make a straight through DB15 to DB15 cable to connect the master oscillator to the CTCSS filter board.

Into the aux i/o board (option) wire:
      B+ (J4 pin3) to 1118 from A18
      Gnd (J4 pin2) to 1118 to/from A19
      CTCSS (J4 pin6) input to MTR into A17

Turn on external CTCSS input in the MTR.

For squelch tail elimination, you should take the keying from the mux, to the CTCSS interface board, then the CTCSS interface board PTT output to the MTR.

Interface to Mastr III Radio system

- ➢ They call CTCSS as CG (Channel Guard)
- ➢ Factory default is 10 MHz input.
- ➢ Make sure modulation is exactly the same at all xmitters
- ➢ Audio delay has to be accounted for between the xmitters

Pin-outs for Model 1118 to Mastr III (info on Pin-outs for older 93000 to Mastr III further down)

Tone Control stations

Spectracom 1118 CTCSS board	Mastr III Back plane	Function
J4 Pin 3 (or J6 Pin 4)	P2 Pin 1	A +
J4 Pin 1 (or J6 Pin 2)	P3 Pin 10	GRD
J4 Pin 5 (or J6 Pin 5)	P3 Pin 2	PTT In
J4 Pin 6 (or J6 Pin 1)	P3 Pin 14	EXT LSD/CTCSS Audio

TX Voice audio on TB 101 terminals 2 and 5

Must use Special editor software for station to open EXT LSD gate on tone sequence

E&M Keying

Spectracom 1118 CTCSS board	Mastr III Back plane	Function
J4 Pin 3 (or J6 Pin 4)	P2 Pin 1	A +
J4 Pin 1 (or J6 Pin 2)	P3 Pin 10	GRD
J4 Pin 9 (or J6 Pin 6)	P2 Pin13	PTT to the station
J4 Pin 5 (or J6 Pin 5)		E-Lead closes to Ref Grd
J4 Pin 6 (or J6 Pin 1)	P3 Pin 14	EXT LSD/CTCSS Audio

TX Voice audio on TB 101 terminals 2 and 5

Must use Special editor software for station to open EXT LSD on Repeat PTT
Set 1118 CTCSS board for desired PTT Delay

Note: For E&M Keying, J4 Pin 5 (or J6 Pin 5) is the KEYING input from the Multiplexor. This is not a connection to the Mastr III.

For 93000 to Mastr III

➢ Ped Ed: "M3 interface info is on my web site - go to "Case Studies /App Notes" tab in bar at top, down to "Case Studies / Forum" line, scroll down to Forum VI, Monmouth and Lackawanna projects" (links below).

http://www.simulcastsolutions.com/ppt/Monmouth2003.PDF

http://www.simulcastsolutions.com/ppt/Lackawanna2003.PDF

For 1118 to Mastr III

http://www.simulcastsolutions.com/PDF/T1orIPInterconnectMar08.PDF

http://www.simulcastsolutions.com/PDF/RFLinkInterconnectMar08.PDF

Interface to a Tait transmitter

➢ They use 12.8 MHz (Option 06) directly into the transmitter. End is terminated into 50 ohms.

➢ 12.8 MHz is used for both the reference oscillator and the micro clock.

➢ For CTCSS- they use either our CTCSS card or their card.   If they use Tait CTCSS card, they use 50 kHz as the reference (Not 18kHz like CTCSS card uses).

➢ HAVE THEM CALL ED O'CONNOR

Tait radio system problem related to internal jumper settings:
"It appears that the system when it was installed was/is using an incorrect setting in the CTCSS logic module as it relates to the Spectracom clock. Where currently we are using 'C' settings with the older boards the new board was correct configured with the 'B' settings.

This was not very apparent due to the limited documentation of the older REV 0 boards.
We confirmed the problem and fix by changing a separate network (in this case Fire 5 that is not associated with the St. Peters Hospital site) with the new board and changing the settings between B and C. When all the boards are matched up with the incorrect settings the system is OK. When the one board has the B settings and the rest have the C settings the whole system goes bad. Apparently, the settings must cause a phase shifting.

Anyway; With our other experiments where we found the system to be much better without the CTCSS on the carrier; we are going to change all the CTCSS logic boards to be correct with the 'B' settings. Tait NZ indicated that there could be no guarantee of the stability of the settings if jumpered outside of its engineered operating parameters, and that this may cause some phase variations between units. Tait NZ opinion was that 'it sure couldn't hurt anything, might even make it better'. So that is our course of action and our fix.

Desire to convert a Model 8197B to a Model 8195A (convert Rb osc to OCXO)

Q. Would Spectracom be able to convert this 8197B to OCXO GPS disciplined operation only?
A. **Reply from Dave L (26 Jan 17)** The model 8197B is discontinued and the parts needed to convert it are no longer stocked at Spectracom. The OCXO oscillator itself is now a special order part and has an 18 week lead time to order. It is also *very* expensive.
We have not provided such a conversion in the past so at this time I can only provide a rough estimate of $2600 with

Exit Phase Process (not applicable to 8195/original 8197s)

- AT1 alarm (Less than 4 qual'd sats >1 min) will cause unit to exit Phase process but Osc Lock lamp stays lit. Minor alarm for AT1. No Frequency alarm generated.

- AT2 alarm (Less than 4 qual'd sats >2.5 hours) causes Osc Lock light to clear, Frequency alarm and Minor/Major alarm activated.

- Tracking 0 Sats even for 1 second will cause exit of Phase process, Osc light stays lit, no minor or major alarms. No Frequency alarm generated.

10 MHZ offset/ TV offset

➢ Unit will not go into phase lock when any 10MHz offset has been entered.

➢ When 10MHz offset (ie SC2 +1) has been entered-oscillator is cal'd the same way as norm (2.5 Hz high)

➢ I believe TV offset SHI value is 3.5Hz vice 2.5Hz high.

➢ Won't go into free-Run with it entered. Remove and re-enter offset afterwards.

➢ Use 10 MHz offset on logic board to cal-not front panel.

Fractional Frequency Error

FFE = Change in Frequency/desired Frequency (10 MHz)

To calculate change in Frequency: FFE * 10 Mhz (10E +6) = change in Frequency

Sample from DFM command: Drift = 0024 ns =2.7E-13 2000-03-22

3.5×10^{-14} * (Times)10E+6 (10 MHz) = Change in Frequency**.**

DS1 Framing

Line Coding= AMI Framed all ones
Line Framing= D4 or ESF
SSM- Sync Status Messaging. We do not support (Indicates health).

GPS Position Hold Command (PHO)

(TM ON) holds GPS location when set to ON. Should be set to AUTO/DISABLED for normal operation. If it is set to ON and holds the GPS location, then moved to another location it will experience poor satellite tracking (normal 7 or 8, to 3 or 4 satellites). To solve the problem, the PHO must be set to AUTO and the receiver restarted by power cycle or **RGPS** to re-acquire satellites. If it shows ENABLED, it is holding position.

_____

C) Requirement for Phase Noise Modification

Apparently, there is a letter going around stating that all 8195A's with **S/N 1390 and below** need ECN 511 added.   The real information is **8195A-1280** and below need the Phase Noise Mod. **S/N 1281 and above are all set**. Also, it is only necessary if the customer is having a problem with the unit.

_____

8195 Free-Run Test

- CAM installed in 8150 determines which time scale on chart paper to use.
   20 mm (installed) uses right hand time scale.
At 48 hours after free run test was enabled, count the number of microseconds that has changed in the ONE hour period. If 100 was selected, it is one microsecond per division. (For 8195 10MHz divide the 100us by 10 to equal 10us full-scale on the paper).

In the following example the N = 100 button was depressed. The full scale deflection may be determined from the formula:

Full Scale = $\underline{N}$ = $\underline{100}$ = 10 microseconds
                  F 10×10^6 Hz

Formula for calculation is FFE= Number of microseconds that changed divided by 3600 (seconds in one hour)

This determines if the oscillator passes. Make sure there are no frequency jumps.

  Example: ERROR CALCULATION FROM A CHART RECORDING

The error calculation is made by dividing the phase movement expressed in seconds by the time in seconds during which the movement occurred.

Frequency error = Phase Change (seconds) =   t   _____ _____
          Time Interval (seconds)   T

From the example in, over a 2 hour period a 5.6 microsecond phase change occurred. The resultant fractional frequency error is:

Frequency error = 5.6×10^{-6} seconds   = 7.8×10^{-10} _____
           2 hours x 3600 $\underline{seconds}$
                    hour

In this example the local input is higher in frequency than the reference input by 7.8×10^{-10}.

The error calculation chart shown in Figure 2-3 may be used to find the frequency error as a function of phase change and time.

_____

Cooling Fan operation/replacement

Fan turns on at 50 degrees C and off at 40 degrees C. Not normally ever on with AC power, almost always on with DC units.

Testing the fan

There are a couple of ways to test the fan, as listed below (keep in mind the first two methods may adversely affect the radio system, if it's an installed/operational Master Oscillator).

Power cycle the Master Oscillator (The fan should turn on for a few moments during the first 12 seconds of power-up).

Turn on Test Mode (TM ON) and Lamp Test on (LT ON).

Even better, install a metal jumper across the two wires at the power connector on the board.

Cooling Fan Replacement

➢ Our P/N for the fan is fan001.

➢ Mfg: Sunon MFG P/N: KFO410B5H-012-243

➢ Our cost was $4.55 each.

➢ Appears to be an obsolete component- can't even get them from digikey any longer.

➢ We may have inventory that can be sent to the customer.

I have looked into the P/N to purchase one locally (such as through DigiKey), but it appears this part has been obsolete for a couple of years now. Based on the information below, if you find the cooling fan is not temporarily turning on at power-up, or during the Lamp Test, let me know and I will just send you one from our stock. In order to send it to you, I need to know the address to send it to, and to whom I should make it attention to (if not yourself).

Radio growling issues

Refer to 1118 CTCSS tone card below. Model 1118 CTCSS CARD

Neat command to find out how long unit has been powered up for:

Timelog TL <enter> (Responds with number of seconds since power up)

Troubleshooting Model 8195As and 8195s

A) Green "Osc Lock" Status LED on the front panel is not lit

Potential causes:
  A) **GPS reception issue**
  B) **Recent power cycle (within the last few hours)**
  C) **Bad oscillator (Rb in 8197 or OCXO in 8195s)**

Steps to take to diagnose this condition

Verify if the green GPS tracking Status LED on left side of the front panel is lit.-

- **GPS tracking LED is not lit** - if it hasn't recently power cycled, troubleshoot the reception issue.

- **GPS Tracking LED is lit** – If it hasn't been power cycled within the last several hours, get all of the unit's logs. Likely has a bad oscillator.

Diagnose the logs

STAT command
Example response
STAT
TIME= 20:37:04 DATE= 2015-05-06

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OSCILLATOR STATUS= NOT LOCKED   RUBIDIUM STATUS= NOT LOCKED
GPS SIGNAL= QUALIFIED
INTERNAL TEMP= +41.0 DEGREES C COOLING FAN= OFF
ALARM RELAYS: MAJOR= ON   MINOR= OFF
ACTIVE ALARMS: MAJOR
FREQUENCY

A) **If a Model 8197, verify "Rubidium Status" reports "Locked"**

   RUBIDIUM STATUS= NOT LOCKED indicates likely bad Rubidium oscillator and RMA needs to be assigned

B) **At the very bottom of this response, see what alarms are asserted**

   "**Frequency**" is asserted when the Osc Lock LED is not lit.

   DOL command (Display Oscillator Log)
   Example response
   DOL
   SPECTRACOM CORPORATION GPS DISCIPLINED OSCILLATOR
   SOFTWARE VERSION 3.03 DATE: MARCH 22, 2005 08:56:39
   UNIT STARTED 18:52:25 2015-05-06
   BAUD GENERATOR 1 = VERSION 7.02
   BAUD GENERATOR 2 = VERSION 2.02
   BAUD GENERATOR 3 = VERSION 2.02
   GPS RECEIVER = 12 CHANNEL M12 VERSION 1
     TIME= 14:21:43 DATE= 2015-05-06 D/A= DA88(85%) FREQ ERROR= -2.30E-09
   LONG GATE 10MHZ OFFSET= NONE   INTERNAL TEMP= +39.5
   FREQ CNT= 9,999,999,977

A) **If the Freq CNT values in the logs in a Model 8197 are more than 1 Hz about or below 10,000,000,000, the Rubidium oscillator is likely faulty. RMA is required.**

   The example above from a Model 8197 shows the oscillator frequency is 23 Hz low. This means the oscillator is definitely bad and will likely need to be replaced.

B) **Green "GPS Tracking" Status LED on the front panel is not lit**

Refer to GPS reception Tech note: GPS\GPS reception Ap Notes\8194 8195 8197

Diagnose the logs

     DAL command (Display Alarm Log)

DAL
INVALID COMMAND STRUCTURE, ? FOR HELP
 TIME= 06:05:03 DATE= 2015-05-05 STATUS CHANGE <TEMP= +41.0>
COOLING FAN= OFF
ALARM RELAYS: MAJOR= ON MINOR= ON
ACTIVE ALARMS: MAJOR
FREQUENCY
TRACKING ALARM 1
LOW GPS QUALITY
 TIME= 08:23:44 DATE= 2015-05-05 STATUS CHANGE <TEMP= +41.5>
COOLING FAN= OFF
ALARM RELAYS: MAJOR= ON MINOR= ON
ACTIVE ALARMS: MAJOR
FREQUENCY
LOW GPS QUALITY
TIME= 08:27:30 DATE= 2015-05-05 STATUS CHANGE <TEMP= +41.5>
COOLING FAN= OFF
ALARM RELAYS: MAJOR= ON MINOR= ON
ACTIVE ALARMS: MAJOR
FREQUENCY
TRACKING ALARM 1

LOW GPS QUALITY
  TIME= 09:47:49 DATE= 2015-05-05 STATUS CHANGE <TEMP= +41.0>
COOLING FAN= OFF
ALARM RELAYS: MAJOR= ON MINOR= ON
ACTIVE ALARMS: MAJOR
FREQUENCY
LOW GPS QUALITY

Specials

**SP294/SP295

For SP294B, B8ZS is defaulted to OFF. However, a hardware modification to the internal Verdsat DS1 output board can be made to enable it, if desired.

Email sent to a customer on 10/27/09:
By default, B8ZS is not an available configuration for the Model 8195b SP294. However, with a hardware modification to an internal PC board, you should be able to reconfigure the output as B8ZS. Since SP294 is not a standard configuration of the Model 8195B, we don't have any units currently available to verify this configuration change. But, the following change should provide you with this desired output.

Inside the Model 8195B is a smaller daughterboard that is used to output the two DS1 signals. This board will have a Part Number of 034020 screened onto it. On this daughterboard will be a 0 ohm jumper located on HDR1. Connecting this jumper to different pins of HDR1 should cause the output to become B8Zs instead. To make this change will require the 0 ohm jumper to be unsoldered from its current location, placed into different holes and then resoldered. Currently, this resistor is located in pins 7 and 8 of HDR1. Changing it to pins 8 and 9 of HDR1 instead should reconfigure the output as desired.

B8ZS

➢   For SP294B, B8ZS is defaulted to OFF. However, a hardware modification can be made to enable it, if desired.

Email sent to a customer on 10/27/09 :
By default, B8ZS is not an available configuration for the Model 8195b SP294. However, with a hardware modification to an internal PC board, you should be able to reconfigure the output as B8ZS. Since SP294 is not a standard configuration of the Model 8195B, we don't have any units currently available to verify this configuration change. But, the following change should provide you with this desired output.

Inside the Model 8195B is a smaller daughterboard that is used to output the two DS1 signals. This board will have a Part Number of 034020 screened onto it. On this daughterboard will be a 0 ohm jumper located on HDR1. Connecting this jumper to different pins of HDR1 should cause the output to become B8Zs instead. To make this change will require the 0 ohm jumper to be unsoldered from its current location, placed into different holes and then resoldered. Currently, this resistor is located in pins 7 and 8 of HDR1. Changing it to pins 8 and 9 of HDR1 instead should reconfigure the output as desired.

CR2032 coin-cell battery

Function**:**

Email Keith sent to a customer (Feb 2011) The only purpose of this coin-cell battery is to allow storage of the GPS Ephemeris and Almanac data for the GPS receiver, when primary input power is not present. This allows the GPS receiver to track satellites a little faster after input power has been restored. Faster recovery of the GPS receiver being able to track satellites speeds up the time that it takes for its 1PPS output to stabilize.

Coin-cell battery replacement
Email from Mark McGregor (2/09/1*1*)
I don't know anything about the 8195B battery other than what you described below. I looked at the 8195B main board schematic just now, and it is true that the CR2032 is connected only to the GPS Receiver battery input, in this case the Motorola M12.

The 8195B is not UL or CE safety certified. In fact, it does not have any agency approvals as far as I know.

I believe your statements below about the battery replacement are correct. Remove AC power cord for safety, and observe ESD precautions to change the battery. Do not re-apply AC power until unit is re-assembled after battery replacement. After the battery is changed, the GPS will take longer to "lock" due to no data backed up in the GPS receiver.

The battery will only affect how quickly the GPS receiver can get a fix for position hold to get best timing, 1PPS output. Even if the battery is dead or not present, the unit will continue to function normally, other than it will take 12 minutes to 40 minutes for the GPS to get a fix after a power loss, if the battery is not present or is dead.

The M12 is specified to have 5 uA of battery power draw, so the 220mA-Hr of the CR2032 should yield at least 5 years of "off" time. If the customer has the product powered at least 50% of the time, the battery should last 10 years.

My response to the customer:
I have received feedback from our Engineering team regarding the replacement of the CR2032 battery in the Model 8195B.   As I had mentioned to you yesterday, the only purpose of this coin-cell battery is to allow storage of the GPS Ephemeris and Almanac data for the GPS receiver, when primary input power is not present. This allows the GPS receiver to track satellites a little faster after input power has been restored. Faster recovery of the GPS receiver being able to track satellites speeds up the time that it takes for its 1PPS output to stabilize.

Based on our calculation of the battery power draw, the coin cell battery should yield as least 5 years of "off" time.   Even if the unit is powered down for 50% of the time, the battery should be good for at least 10 years.

As I had also mentioned earlier, the procedure to replace the battery is very straight forward. For safety reasons, remove the input power from the back of the Master Oscillator. With power removed, the top cover can also be removed to gain access to the socketed battery. While following standard ESD processes (to minimize the risk of damaging any internal components due to static discharge), carefully remove the currently installed coin-cell battery.   Note: there is a lip on one side of the battery socket and the other side is held in place with metal fingers. To prevent the chance of inadvertently pulling the battery socket off of the PCB, we recommend you don't just pry up on the battery. Instead, gently slide the battery towards the metal fingers and lift up on the side of the battery that was under the lip of the socket. The battery will then be able to be lifted completely out of the socket. Install the new battery using the same orientation as the originally installed battery.

With the new battery installed, the top cover can be placed back on the unit and input power can be reconnected. As the battery does not store any configuration data, no re-configuration steps are necessary. The only effect on the operation of the equipment when the battery is replaced is the GPS receiver may take a little longer to track satellites and achieve lock to GPS (as indicated by the front panel GPS Tracking LED turning green), the first time its powered back up after the battery has been replaced. Allow about 15 minutes or so for this LED to turn green. Note that the front panel "Osc lock" (Oscillator Lock) LED will not illuminate for a minimum of about 3-4 hours after the GPS Tracking LED has lit. The time it takes for this LED to turn green after a power cycle is oscillator dependant and will vary from unit to unit and from reboot to reboot. Typically, it will turn green within 3-6 hours.

Once all three of the green front panel status lights have turned green, the red "Major" alarm LED should extinguish. Having all three green LEDs lit and neither of the Alarm LEDs lit indicates the Master Oscillator has returned to normal operation.

Note: Dave Lorah tested what happens when the battery is replaced. His findings:
I finally got a chance to test an 8195B to see what happens when you remove the coin cell battery. It loses the Lat and Long parameters and **also loses the TZO**.   **1PO setting remains intact.**

Option 02 battery

 ➢ Refer to "Option 02 (Battery)" in the following Model 8195A section: Option 02 (battery)

Frequency Lock Recovery (8195B with Opt 02 battery)

The battery backup powers only the 10 MHz OCXO and GPS receiver board during AC power failures. Outputs are not provided under backup operation. A Frequency Alarm is asserted when AC power is restored. Battery backup shortens the recovery period to 2 hours when AC power returns by eliminating oscillator warm up and GPS reacquisition delay. Without backup power, a 3 to 4 hour recovery period is required.

The Battery Backup option permits even faster recovery when the following conditions are met:

• The unit achieved Oscillator Lock before losing AC power.

• The power outage was less than 2 hours.

• The internal ambient temperature did not change by more than 10° C.

When AC power is restored the Frequency and AT (Alarm Time-out) alarms are turned off after one minute. If the unit does not have any 10MHz frequency offsets entered, it will begin the phase locking process. The Oscillator Lock lamp will turn on in approximately one hour.

If the unit is configured with 10 MHz frequency offsets it does not require phase locking. Therefore, the Oscillator Lock lamp is turned on immediately.

Difference between coin cell battery and Option 02 battery for recovery after loss of AC

Q. If we change the coin batteries in the Spectracom GPS units we have with the rechargeable option 2 battery installed, will the GPS maintain tracking information and lock up faster than without option 2?

Are there are other settings or configurations that might be lost. (According to your write up below it would seem not to be the case but I thought I'd check)

A. Email Keith sent to a customer (1 Apr 2013) To answer your question, both the coin-cell battery and the Option 02 battery "work together" to allow the GPS receiver to recover from the loss of primary AC input power (in the case of the coin cell battery only, it also helps if the unit is configured for primary DC input instead of AC input, and the DC input is lost). They both perform different functions for the GPS receiver.

The coin cell battery helps expedite recovery from loss of AC input by allowing the receiver to remember its location and by storing data that is transmitted by the satellites (ephemeris and almanac data). This data is necessary for the receiver to be able to calculate a 3D fix and to provide the receiver with necessary information. without the battery, this information would be lost upon loss of AC power and the receiver would have to obtain it again, once power is restored. For ephemeris data, it takes 12.5 minutes for the receiver to download this info, so the coin cell battery alleviates this delay upon power-ups.

However, the coin cell battery does not keep the GPS receiver powered-up and operational if AC power is lost. When AC power is lost, the GPS receiver stops tracking any satellites, unless Option 02 battery backup is installed and the battery is good. If this other battery is not installed or its bad, the receiver takes like a minute or two after AC power is restored to re-acquire at least four satellites, as needed for a 3D fix and a stable 1PPS. So the Option 02 battery keeps the GPS receiver tracking satellites even when AC power has been lost. When AC power is restored, the GPS receiver is already tracking satellites and doesn't need to wait for re-acquisition of satellites before being able to provide a stable 1PPS to the Master Oscillator. The 1PPS output from the Master Oscillator is stable much faster, once AC power has been restored.

On average, the coin cell battery is good for at least 10 years from the date of purchase.

Troubleshooting Model 8195Bs and 8197

A) Green "Osc Lock" Status LED on the front panel is not lit

Potential causes

- GPS reception issue
- Recent power cycle (within the last few hours)
- Bad oscillator (Rb in 8197 or OCXO in 8195s)

Steps to take to diagnose this condition

1) Verify if the green GPS tracking Status LED on left side of the front panel is lit

- GPS tracking LED is not lit - if it hasn't recently power cycled, troubleshoot the reception issue.
- GPS Tracking LED is lit – If it hasn't been power cycled within the last several hours, get all of the unit's logs. Likely has a bad oscillator.

2) Diagnose the logs

STAT command
Example response
STAT
TIME= 20:37:04 DATE= 2015-05-06
OSCILLATOR STATUS= NOT LOCKED   RUBIDIUM STATUS= NOT LOCKED
GPS SIGNAL= QUALIFIED
INTERNAL TEMP= +41.0 DEGREES C COOLING FAN= OFF
ALARM RELAYS: MAJOR= ON   MINOR= OFF
ACTIVE ALARMS: MAJOR
FREQUENCY

B) If a Model 8197, verify "Rubidium Status" reports "Locked"

RUBIDIUM STATUS= **NOT LOCKED** indicates likely bad Rubidium oscillator and RMA needs to be assigned

➢ At the very bottom of this response, see what alarms are asserted

"**Frequency**" is asserted when the Osc Lock LED is not lit.

DOL command (Display Oscillator Log)

Example response
DOL
SPECTRACOM CORPORATION GPS DISCIPLINED OSCILLATOR
SOFTWARE VERSION 3.03 DATE: MARCH 22, 2005 08:56:39
UNIT STARTED 18:52:25 2015-05-06
BAUD GENERATOR 1 = VERSION 7.02
BAUD GENERATOR 2 = VERSION 2.02
BAUD GENERATOR 3 = VERSION 2.02
GPS RECEIVER = 12 CHANNEL M12 VERSION 1
TIME= 14:21:43 DATE= 2015-05-06 D/A= DA88(85%) FREQ ERROR= -2.30E-09
LONG GATE 10MHZ OFFSET= NONE   INTERNAL TEMP= +39.5
FREQ CNT= 9,999,999,977

C) If the Freq CNT values in the logs in a Model 8197 are more than 1 Hz about or below 10,000,000,000, the Rubidium oscillator is likely faulty. RMA is required.

The example above from a Model 8197 shows the oscillator frequency is 23 Hz low. This means the oscillator is definitely bad and will likely need to be replaced.

D) Green "GPS Tracking" Status LED on the front panel is not lit

   ➢   Refer to GPS reception Tech note: GPS\GPS reception Ap Notes\8194 8195 8197

Models 1118 and 93000 CTCSS TONE CARDS

Physical connection of the Model 1118 boards to the Master Oscillator

J1: Model 1204-14 1PPS and Alarm output connector (RJ12)- Major and Minor alarm contacts as well as CTC tones 3 and 4 are provided on the 1PPS/Alarm output connector (J1) on the Model 1204-14 Option Card.

PIN	NOTES	SIGNAL	819x mapping	938x SP360 Mapping
1	CABLE SHIELD	GROUND	GROUND	GROUND
2	5V = NORMAL GROUND = ALARM	MAJOR ALARM RELAY	MAJOR ALARM RELAY	MAJOR ALARM RELAY 3
3	RS-485 + TERMINAL	OUTPUT 3+	+ 1PPS	+ 1PPS
4	RS-485 - TERMINAL	OUTPUT 3-	- 1PPS	- 1PPS
5	5V = NORMAL GROUND = ALARM	MINOR ALARM RELAY	MINOR ALARM RELAY	MINOR ALARM RELAY 2
6	CABLE SHIELD	GROUND	GROUND	GROUND
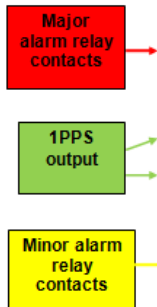
PIN	NOTES	SIGNAL	819x Mapping	819x Option 17 Mapping
1	RS-485 + TERMINAL	OUTPUT 0+	+ 9.6 KHZ	+ CTCSS #1
2	RS-485 + TERMINAL	OUTPUT 1 +	+18 KHZ	+18 KHZ
3	RS-485 + TERMINAL	OUTPUT 2 +	+ 1 PPS	+ CTCSS #2
4	GROUND = NORMAL OPEN = ALARM	MAJOR ALARM	MAJOR ALARM	MAJOR ALARM
5	CABLE SHIELD	GROUND	GROUND	GROUND
6	RS-485 - TERMINAL	OUTPUT 0 -	- 9.6 KHZ	- CTCSS #1
7	RS-485 - TERMINAL	OUTPUT 1 -	-18 KHZ	-18 KHZ
8	RS-485 - TERMINAL	OUTPUT 2 -	- 1 PPS	- CTCSS #2
9	CABLE SHIELD	GROUND	GROUND	GROUND

Major alarm relay contacts → (Pin 2)

1PPS output → (Pins 3, 4)

Minor alarm relay contacts → (Pin 5)

A) Model 93000 (preceded 1118 modules)

Manual for the earlier Model 93000 CTCSS boards:

- \\rocfnp02\idrive\Engineering\Archive\Released\093000 - CTCSS

- I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS\93000

B) Model 1118

Links for Model 1118 (1118-1,1118-2 and 1118-2-24)

- **1118 Manual P/N:** 1118-5000-0050 (not yet in Arena): \\rocfnp01\idrivedata\Engineering\Archive\New Released\Manuals\1118-xxxx-xxxx

- **Link to manual CD that we ship with the 1118s (1217-5003-0001)** in Arena: https://app.bom.com/files/list-main (includes manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS Model 1118 and SecureSync)

- **Tech notes for information on the 1118 boards**: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\CTSSS 8195 8195a 8195B 8197\CTCSS\CTCSS install-troubleshooting

- **Link to 1118 schematic (1118-1001-0200)** in Arena: https://app.bom.com/items/detail-spec?item_id=1202838922&version_id=10221298568

- **Link to BOM in Arena**: https://app.bom.com/items/detail-spec?item_id=1202838922&version_id=10221298568

> **Note**: Rev E 1118 manual has wiring errors in the "Osc 1204-13 DB-9 Output" column of Table 1-2. Rev F of the manual fixed this error.

1118-1
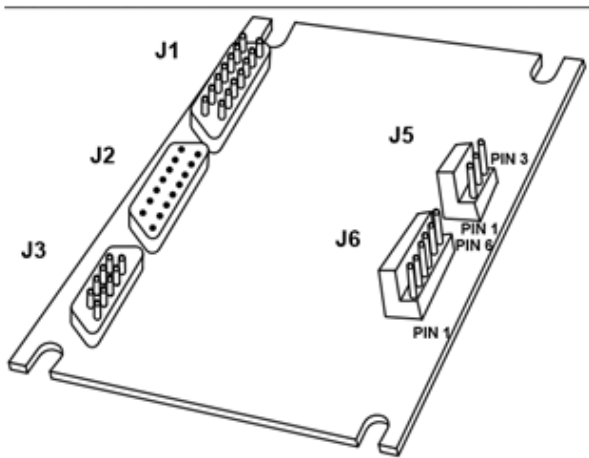
FIGURE 2-2: J5, J6 Pin Numbering, 1118-1
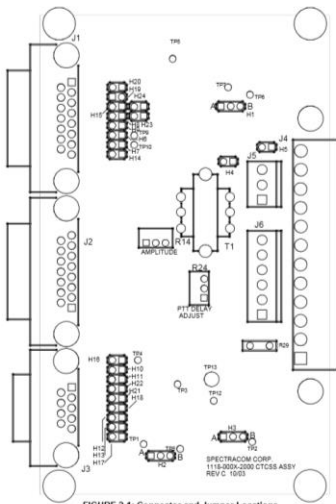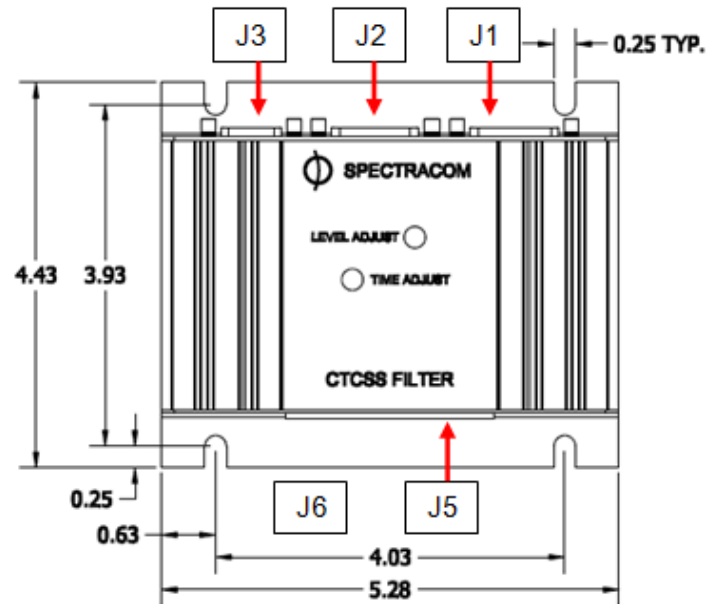
1118-2

FIGURE 2-1: Connector and Jumper Locations

Model 1118-2 vs Model 1118-2-24

➢ Model **1118-2** operates on *12vdc*

➢ Model **1118-2-24** operates on *24vdc*

Ancillary kits contents

Your Spectracom CTCSS 1118 unit is provided with an ancillary kit containing the following accessories:

- Male DB9 Connector
- Female DB9 Connector
- DB9 Shields (2)
- Male DB15 Connector
- Female DB15 Connector
- DB15 Shields (2)
- 3-Pin Plug
- 6-Pin Plug

Typical install
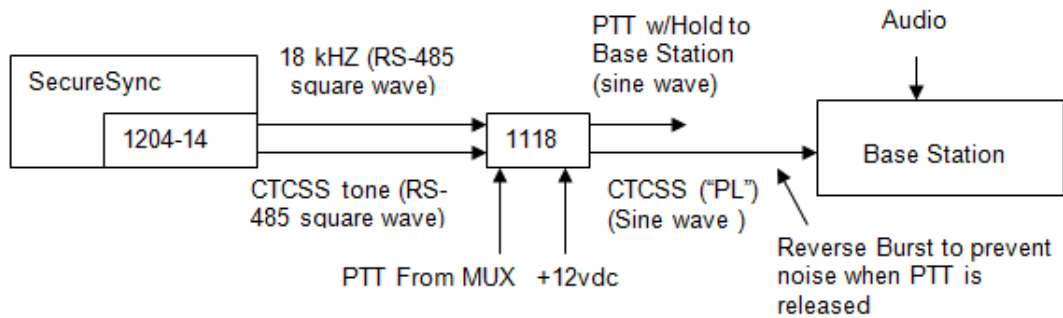
Motorola/ NYC Transit install
(CTSS is "Always on" AND using Model 1118-2-24 for 24vdc input power)
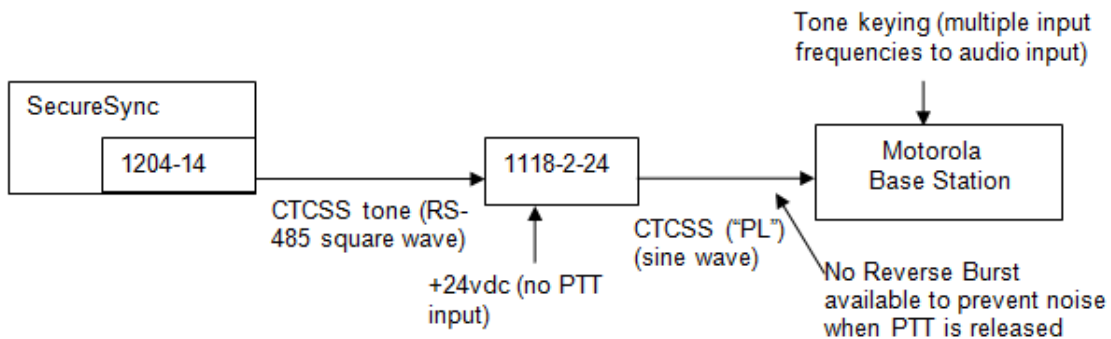
Pin-outs on the 1118

1118-1
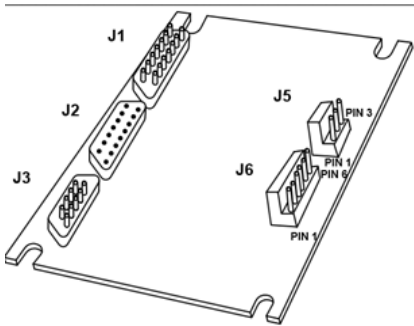
FIGURE 2-2: J5, J6 Pin Numbering, 1118-1

1118-2
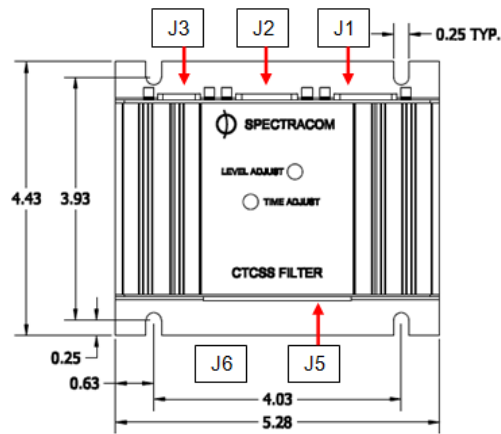
12 pin terminal block

2.3.1 Data Sync Port J1 and J2 (DB-15M and F) on 1118

Connector: DB15

Pinout: Refer to Table 1-2

1118 PIN	SIGNAL	DESCRIPTION	OSC 1204-14 DB-9 OUTPUT	
1	Reserved	Reserved		
2	Reserved	Reserved		
3	+18 kHz	RS-485 B Terminal	2	
4	-18 kHz	RS-485 A Terminal	7	
5	+CTCSS Signal #2	RS-485 B Terminal	3	
6	- CTCSS Signal #2	RS-485 A Terminal	8	
7	+CTCSS Signal #1	RS-485 B Terminal	1	
8	- CTCSS Signal #1	RS-485 A Terminal	6	
9	Ground	Cable Shield	9	
10	Reserved	Reserved		
11	Reserved	Reserved		
12	Reserved	Reserved		
13	Ground	Ground		
14	Ground	Ground		
15	Ground	Ground		

TABLE 1-2: DB-15 Input Pin Assignments

2.3.2 Note Regarding J3

Data Sync J3 DB-9 on 1118 is used only with 8195 GPS Master Oscillators, not with SecureSync.

2.3.3 I/O Connector J4

Connector: 12 pin connectable terminal block
Pinout: Refer to Table 1-6

PIN	SIGNAL	DESCRIPTION
1	Ground	Ground
2	Ground	Ground
3	+7 to 20 Volts (+24 to 32 VDC for option 24)	Positive power supply voltage
4	Unused	Unused
5	PTT IN	PTT input
6	CTCSS Out +	CTCSS output high
7	CTCSS Out -	CTCSS output low
8	Unused	Unused
9	Delayed PTT Out	Delayed PTT output positive
10	Delayed PTT Out	Delayed PTT output low side
11	Inhibit in	Inhibit input
12	Unused	Unused

TABLE 1-6: I/O Connector Pin Assignments

2.3.4 Transceiver Interface Port A J6

Connector: 6 Pin Header (0.156 spacing)
Pinout: Refer to Table 1-4

PIN	SIGNAL	DESCRIPTION
1	CTCSS Output	CTCSS Output high
2	GND	GND
3	GND	GND
4	+ 7 to 20 Volts (+24 to 32 VDC for option 24)	Positive Power Supply Voltage
5	PTT In	PTT Input
6	Delayed PTT Out +	Delayed PTT Output positive

TABLE 1-4: Transceiver Interface Port A Pin Assignments

Reverse burst in Model 1118:

➢ Advances the CTCSS PL tone forward 180 degrees for 150 milliseconds (during delayed PTT – when the mic is un-keyed).

➢ Prevents a "squawk noise" from happening when mic is un-keyed.

Note: NYC transit is using Continuous CTCSS output. So, they do not have a reverse burst occurring.

Reverse Burst is configured with Header H20

H20 enables either the legacy mode of operation or reverse burst. When this jumper is on, the 180 degree inverted tone output during the delayed portion of the PTT output is disabled. The default position is off.

Reverse burst in 93000:

93000 does not support "true" reverse burst. It's method of squelch tail elimination was to cut the CTCSS immediately upon input transition to de-key state while keeping the PTT to the transmitter up for another 0.2 sec or so. 1118 has a jumper so one can select true reverse burst (180 deg for 120 msec, not 135 degree) or CTCSS cut.

Inputs (from a SecureSync 1204-14 card or a Model 8195 series Master Oscillator)

Input signals to the Model 1118 CTCSS board

INPUT	RECEIVED FROM	FUNCTION
18 kHz	Master Oscillator	Clock Reference frequency
CTC1 and CTC2	Master Oscillator	1st and 2nd available tones (opt 14)
CTC3 and CTC4	Master Oscillator	3rd and 4th available tones (Opt 17)
PTT Input (Push To Talk)	Transmitter	Used to activate the Delayed PTT output (gates the CTCSS tone).
Inhibit input	Transmitter	De-activates the CTCSS output tone.
Power (7 to 20vdc)	Transmitter	Powers the CTCSS board

1. 12vdc (or 24vdc with 1118-24 configuration)

2. 18 kHz (square wave at RS-485 levels)

3. CTCSS tone (square wave at RS-485 levels)

4. Typically, a PTT signal from the MUX

5. Inhibit

Outputs (to the base station)

Outputs from the Model 1118

OUTPUT	SENT TO	FUNCTION
CTCSS out	Transmitter	Selected CTCSS tone (Can be tones CTC1, CTC2, CTC3 or CTC4)
Delayed PTT output (Push To Talk)	Transmitter	Keys the transmitter.

1. CTCSS tone (Aka "PL" for Public Line)

2. Delayed PTT for reverse burst

3. Adjustable level using potentiometer R14 which adjusts both the CTCSS tone and reverse bust level, since reverse burst doesn't have its own level control).

*Troubleshooting CTCSS

A) BLOCK **D**IAGRAMS

Note: Rev E 1118 manual has wiring errors in the "" column of Table 1-2. Rev F of the manual fixed this error.

A) BLOCK DIAGRAM OF **S**IGNALS
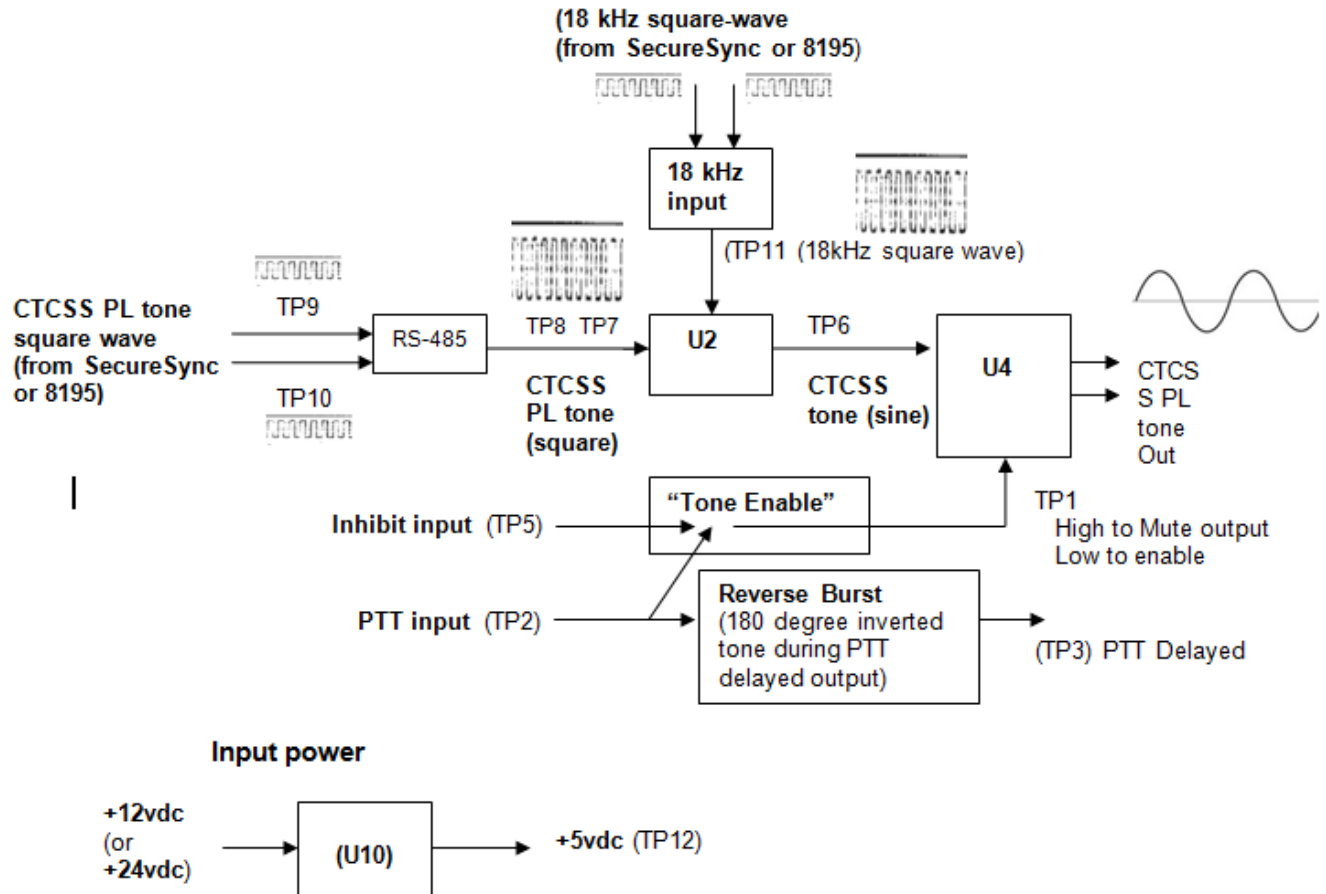
B) Block diagram of Headers

H21, H22, H23 H24

18 kHz input

TP8 TP7   U2   TP6

CTCSS PL tone (square)

CTCSS tone (sine)

U4

CTCSS PL tone Out

"Tone Enable"

(H2)

TP1
High to Mute output
Low to enable

PTT input (H3)

Reverse Burst
(180 degree inverted tone during PTT delayed output)

PTT Delayed
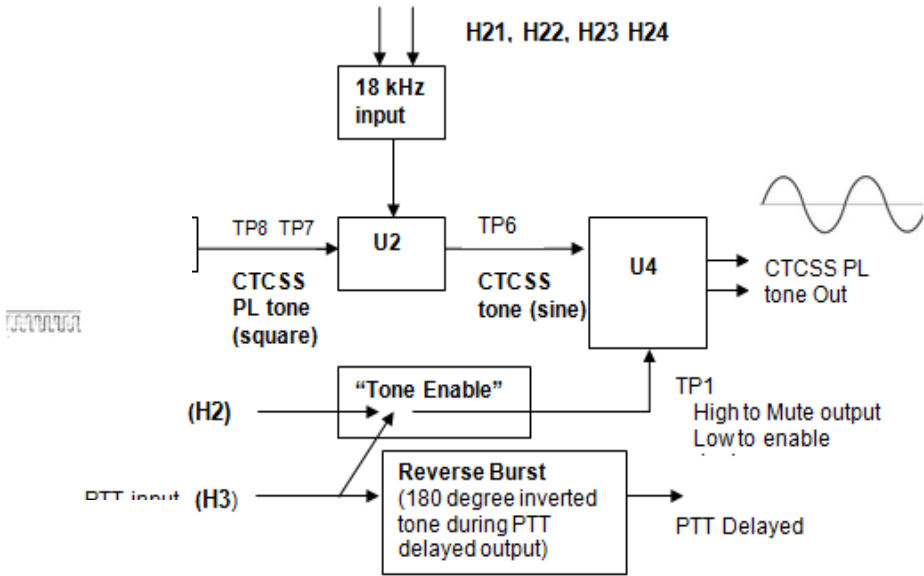
B) General troubleshooting steps for CTCSS

➢ Refer to either the SecureSync/CTCC or 8195x/CTCSS tech note (as applicable): I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS\CTCSS install-troubleshooting

- Verify header positions on the 1118 CTCSS card

- Verify the "master oscillator (8195 or SecureSync) is synced to GPS and appears to be operating normally.

C) Specific Model 1118 input/output checks

Model 1118 Outputs

➢ Verify CTCSS (PL) sine wave outputs at J4 pins 6 and 7 (or J5-1 and J6-1)

Model 1118 Inputs

Verify input power at TP12 ~12vdc (or 24vdc with 1118-24), 1 watt

Verify RS-485 level CTCSS (PL) input at TP9, TP10 and down-line at TP8, TP7 and TP6

Verify RS-485 level 18 kHz input at TP11

If using PTT input from radio (typical), make sure TP2, TP4 and TP3 changes states when radio is keyed

Make sure Tone Enable (TP1) is low when CTCSS should be present (generated by Inhibit). Goes High to mute the output

D) Specific scenarios

1) No CTCSS (PL) sine wave outputs on J4 pins 6 and 7 (or J5-1 and J6-1)

Verify input power at TP12 ~12vdc (or 24vdc with 1118-24)

Verify RS-485 level CTCSS (PL) input at TP9, TP10 and down-line at TP8, TP7 and TP6

➢ If CTCSS tone is present at TP8 and TP7, but not present at TP6, verify RS-485 level 18 kHz input at TP11.

➢ If CTCSS tone is present at TP8, TP7 and TP6 also, continue on.

2) Inhibit/PTT - Make sure that Tone Enable (TP1) is LOW when CTCSS output should be present (generated by Inhibit and PTT, such as when keying the radio).

➢ This signal goes High when PTT is not active or Inhibit is active to mute the output.

➢ This signal should always be low if its desired to have a continuous CTCSS output (such as is being used with NYC Transit).

3) Reported Growling from the Radio install.

➢ Refer to either the SecureSync/CTCC or 8195x/CTCSS tech note (as applicable): I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\CTCSS 8195 8195a 8195B 8197\CTCSS\CTCSS install-troubleshooting

4) Suggestions

➢ Have customer run system in carrier squelch mode ("in the clear" with no CTCSS tones transmitted) to see if problem clears.

• If it does clear the issue, it probally is an issue associated with CTCSS configuration/1118 board.

• If it doesn't remove the growl, there are many other conditions such as an issue with either the transmitter or the 10 MHz reference input not valid, selected or connected. (Not a CTCSS issue). Verify if the Master oscillator is tracking GPS and its oscillator is locked to GPS.

• (8195s should have all three green status LEDs lit and neither of the red Alarm LEDs should be lit),.

If the site is experiencing a growling noise at the site with CTCSS enabled:

• Verify H1 is set the correct position based on the frequency of the tone they are using (the setting to use depends on whether the configured tone is above or below 150Hz)

• Also verify RS-485 CTC tone is wired correctly (Not reversed).   Customers/installers make their own cables-we provide only the connectors.

Note: The Rev A of the manual is backwards in the chart. Rev B is correct. 150 Hz and below should be set to B. Above 150 Hz should be set to A.

_____

5) CTCSS software issue in Model 8195As (affecting three CTCSS tones)

Note: Refer to the document in the link above for more details

Spectracom has released new software to correct a condition that can occur when using one of three CTCSS frequencies available with option 14 on the Models 8195A and 8197. These frequencies can experience excessive drift upon loss of the GPS signal. The three CTCSS frequencies affected are **127.33Hz (3A), 173.66 (6A)** and **203.66 (M1).** In normal operation, the CTCSS tone outputs are locked to a stable 1PPS from the GPS receiver. If the GPS signal is lost, the CTCSS tones are locked to an internally generated 1PPS. This upgrade resolves the issue of excessive drift upon loss of GPS tracking

Newer seriesTimeView display clocks TV210 (Model 9175) TV400 (Model 9177) and TV312

Note: Earlier Models 8175 and 8177 display clocks have their own separate section in this document. This section is only for the newer "W", "U" or "V" displays.

Model TV400W = Model 9177

Model TV210W = Model 9175 (discontinued)

Links

➢ Link to TV210W/TV400W data sheet: link to datasheets in SharePoint

➢ Link to TV312 manual (1123-5000-0050): I:\Engineering\Archive\New Released\Manuals\1123-5000-0050

➢ Link to TV210W/TV400W manual (1144-5000-0050) (not in Arena): I:\Engineering\Archive\Released\1144 - TV210\Manual\Current Release

- (Note: manual is in Released drive- not in the New Released drive)

➢ Link to TV210W/TV400W in Customer Service: \\rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Spectracom Display clocks

➢ Link to Detailed Engineering info on the Model 9177: I:\Engineering\Products\TimeView_Display_Clocks and I:\Engineering\Products\9177 Wireless TV400

➢ Link to manual CD that we ship (1217-5003-0001): I:\Engineering\Archive\New Released\Media\ (includes http://www.spectracomcorp.com/manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS and SecureSync)

Time view Ancillary Kits

- **TV400W anc kit**: P/N 1122-0000-0701 (in Arena): https://app.bom.com/items/detail-spec?item_id=1202838929&version_id=10221298638

	#	Item Number	Item Name	Category	Phase	Wkg Mods	Where Used				Files	Rqmts	Qty	BOM No
	1	CA06R-1513-0001 rev 2	AC CORD,5-15P to C13,18AWG,10A,125V,105C	Cable Assembly	In Prod						4		1 EA	
	2	H100-1000-0016 rev 1	SCREW,SHEET METAL,#10 X 1,ZINC PLATE	Fasteners/Spacers, Unified	In Prod								2 EA	
	3	HD00001 rev 1	PLASTIC ANCHOR	Miscellaneous Mechanical	In Prod								2 EA	0003 00
	4	P13006 rev 1	TERM BLOCK, 6 POS	Terminal Block	In Prod								1 EA	0002
	5	PS06-0E0J-DTA0 rev A	PS,SW,100-250VAC,12VDC,1.5A	Power Supply	In Prod						?		1 EA	
	6	R02121 rev 1	RES, 120 OHMS 1/2W 5% C.FILM	Resistor	In Prod								1 EA	

- **TV210W anc kit**: P/N 1001-0000-0701 (in Arena): https://app.bom.com/items/detail-bom?item_id=1202838910&version_id=10221298498&orb_msg_single_search_p=1&redirect_seqno=72979804 23

	#	Item Number	Item Name	Category	Phase	Wkg Mods	Where Used				Files	Rqmts	Qty	
	1	H100-1000-0016 rev 1	SCREW,SHEET METAL,#10 X 1,ZINC PLATE	Fasteners/Spacers, Unified	In Prod								2 EA	
	2	HD00001 rev 1	PLASTIC ANCHOR	Miscellaneous Mechanical	In Prod								2 EA	
	3	P13006 rev 1	TERM BLOCK, 6 POS	Terminal Block	In Prod								1 EA	
	4	PS03-0T0J-WM01 rev 1	PS,SW,120/240VAC,12VDC,0.8A	Power Supply	In Prod								1 EA	
	5	R02121 rev 1	RES, 120 OHMS 1/2W 5% C.FILM	Resistor	In Prod								1 EA	

120 ohm terminating resistor shipped in anc kit

➢ **In Arena**: https://app.bom.com/items/detail-sourcing?item_id=1202846014&version_id=10221256468

➢ **Our P/N**: R02121

➢ **Specs**: RES, 120 OHMS 1/2W 5% C.FILM

➢ **MFG and P/N**: YAGEO CFR-50JB-120R

➢ I found a close P/N at DigiKey (CFR-50JB-52-120R) Not sure what the 52 indicates, but it appears to be similar specs.

RS-485 terminal block connector (RS-485 Input/ Output connector)

For 8175, 8177, TV210W and TV400W

➢ 6 pin terminal block connector. Our P/N: P13006

(1) six pin terminal block connector (Spectracom P/N P13006) is shipped in the TV210W ancillary kit (1001-0000-0701) and TV400W ancillary kit (1122-0000-0701)

These connectors are available from: Digikey P/N 1705-ND (MFG is On Shore Technologies, P/N ED950/6).
Refer to: http://www.digikey.com/product-detail/en/ED950%2F6/ED1705-ND/123774?WT.z_cid=ref_octopart_dkc_buynow&cur=USD

List of On Shore distributors (by State) http://www.on-shore.com/find

As of May 2017 the 1122-0000-0701 Anc Kit is discontinued.
The new direct replacement Power Supply is this:

https://www.digikey.com/product-detail/en/sl-power-electronics-manufacture-of-condor-ault-brands/TE20A1203F01/271-2910-ND/5400188

SL Power Electronics Manufacture of Condor/Ault Brands

Part number **TE20A1203F01**

$16.29

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TS1Win and TimeSet software for TimeView display clocks (discontinued)

- **link to an archived copy of TS1/Win software:** I:\Customer Service\Software\TS1 for Windows
- **link to an archived copy of TimeSet software** I:\Customer Service\Software\TS1_From Floppy

*** **discontinued**- no longer available on the price list.

- Verified XP and 2000 compliant by KW on 10/22/04
- The program outputs a Format 1 data stream at a minimum interval of once-per-minute. It cannot broadcast Data format 1 at a once-per-second rate and cannot send Data Format 0 so it cannot be a replacement to NetClock.

Note: The day of the month HAS a leading zero, (01, 02, 03…09, 10 etc) so it is not the same as the NetClock Data Format 1 output.   NetClock outputs a space before each Day 1 through 9.

Email from Keith (3 Dec 14) To begin, we used to offer a software program called TimeSet software that was used to synchronize Spectracom TimeView 230 (and TimeView 400) digital display clocks to a PC, when there wasn't a Spectracom NetClock at the facility. However, this TimeSet software has been discontinued for several years now and is no longer available. The TimeView 230 display clocks can now only be synced with a co-located NetClock or each one can be manually set in absence of a NetClock.

FYI- Spectracom still offers NetClocks such as the Models 9483 and 9489 that can sync these display clocks. We now also offer an IP-based digital and analog clocks that can sync to a Spectracom NTP time server via a LAN connection, instead of via a twisted-pair cable like the TV230 clocks used to use (these clocks have also been discontinued for several years as well,

Local time (TZO) /DST configuration

- ➢ No configuration (Modes) available in the display clock for setting Time Zone Offset/DST
- ➢ Must be configured in the Remote RS-485 output of the NetClock/SecureSync (even if a TimeBurst is used)

MODE	SET	RANGE	MODE	SET	RANGE
1	Display	12 or 24	9	100s Group	0 or 1
2	Brightness	0..3	10	10s Group	0..9
3	10s Hours	0,1 or 2	11	1s Group	0..9
4	1s Hours	0..9	12	100s Sub-Group	0..2
5	10s Minutes	0..5	13	10s Sub-Group	0..9
6	1s Minutes	0..9	14	1s Sub-Group	0..9
7	10s Seconds	0..5	15	Buzzer	0..3
8	1s Seconds	0..9	16	Exit Setup	-

12/24 hour selection:

- ➢ Configured in Display clock itself.
- ➢ It's the first mode of configuration (Mode 1: Display)

MODE	SET	RANGE		MODE	SET	RANGE
1	Display	12 or 24		9	100s Group	0 or 1
2	Brightness	0..3		10	10s Group	0..9
3	10s Hours	0,1 or 2		11	1s Group	0..9
4	1s Hours	0..9		12	100s Sub-Group	0..2
5	10s Minutes	0..5		13	10s Sub-Group	0..9
6	1s Minutes	0..9		14	1s Sub-Group	0..9
7	10s Seconds	0..5		15	Buzzer	0..3
8	1s Seconds	0..9		16	Exit Setup	-

Seth Thomas Clock: 1-800-556-7354

Use of an RS-232 to RS-485 adapter

Use a Black Box IC1655A or "B and B Electronics" Model 422LP9TB
Can be used on any NetClock Serial port. However, they need to jumper on the NetClock serial port side of the adapter, pins 6 (DSR) and 7 (RTS) (Pins 7 and 8 are internally shorted in the NetClock).

Wall Wart/ Power pack/ power connector/ power specs

TV312 and TV400W power packs

Email from Tom Richardson (5/27)
TV400 has IEC 320 C14 connector
TV312 has IEC 320 C8 connector

Email from Dave Sohn (5/31/11)
The TV400W uses a desktop adapter with an IEC 320 C14 connector (3 prongs). There is enough space in the TV400W to rest the desktop adapter such that only the line cord comes out from behind the unit. The anc kit supplied with the TV400W has the desktop adapter and a US line cord. We don't have an international version.

The TV312W uses a desktop adapter with an IEC 320 C8 connector (2 prong). The adapter is stuffed in the housing already with our US (2 prong) line cord coming out. We don't have an international version.

Input power connector for both the TV210W and TV400W

Barrel-type power connector; 5.5 mm OD, 2.5 mm ID, female,
center positive.

Input power specs for TV400W

  ➢ From the TV210/TV400W manual:

POWER:
100-250 VAC, 47-63 Hz to **12 VDC @ 18 watts max**. from external
CE/UL/CSA approved power supply.

Input power specs for TV210W

> ➤ From the TV210/TV400W manual:

POWER:
100-250 VAC, 47-63 Hz to 12 VDC @ 9.6 watts max. from external
UL/CSA approved power supply.

As of May 2017 the 1122-0000-0701 Anc Kit is discontinued.

The new direct replacement Power Supply is this:

https://www.digikey.com/product-detail/en/sl-power-electronics-manufacture-of-condor-ault-brands/TE20A1203F01/271-2910-ND/5400188

SL Power Electronics Manufacture of Condor/Ault Brands

Part number **TE20A1203F01**

$16.29

TV312 –specific information

TV312 Time Sync lamp operation:

Clock first powered up- light will flash continuously while the hands advance to the internal time reference.
After hands have adjusted- the light remains solid until it receives a sync message or is manually set.
After receiving reference input, the hands adjust and the light turns off.
Wireless clocks-light flashes once each time a wireless burst occurs.
Wired and wireless versions blink once at the top of the minute and twice at the top of the hour

 Light flashing early or late indicates the clock needs to be calibrated.*
After a loss of power, the light blinks continuously (once-per-second) as the hands are adjusting back.
After 8.5 hours without a reference, loses time sync. The light remains constantly lit.

TV312 hand calibration/alignment

Hand movement for correction

 - Less than 51 minutes faster than the internal time, hands stay still until time catches up.
 - Greater than 51 minutes from the correct time, the hands move fast forward until time is correct.

Hands misaligned because pin inadvertently not pulled before power-up

Email from Dave Lorah to customer (11/13/12) This clock may not be permanently damaged. You can reset the clock motor synchronization. The clock motor has to be reset by holding the small test button on the clock motor for 10

seconds. The clock hands should then move to the 12:00 position. Then power cycle the clock and the hands will move to the correct time after the clock synchronizes

Jumper on rear panel

> ➢ Used to enable or disable the Buzzer

Cobbs Hill/Spectracom frequencies

Frequency of Cobbs Hill 154.310 MHz (Fire 5?)
Spectracom's assigned Frequency (for shows): 469.50 MHz

Frequency bands

- **VHF:** 150-174 MHz

- **UHF:** 440-470 MHz

- **Government:** 406-420 MHz

Software version information

Version 3.1.3 of TV210, TV312, TV400, 9175, 9177

Fixes wired unit TS1 compatibility, removes TV312 serial message output when adjusting analog hands, restores wired unit Auto Baud for 9600-1200 baud.

Version 3.1.2

> ➢ Auto-Baud feature does not work. Clock will sync to 9600 baud only. If Master clock has to be a different baud rate, the display will have to come back for software update

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Digital clocks have flashing seconds:

> ➢ Seconds flash upon loss of RS-485 or if Master Clock loses sync.

TV312 -Message Error being displayed on a PC

> 1) **Verify the Header/jumper on the rear panel is set closest to the DB9 connector.**

- If it is set to the left two pins, the clock will send RS-485 to the RS-232 connector which causes the computer to output "Message error" continuously.

TV210 Outdoor Enclosure Specifications

NEMA 3R – The modified enclosure we provide will meet a NEMA 3R rating. Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to

provide a degree of protection against falling dirt, rain, sleet, and snow, and that will be undamaged by the external formation of ice on the enclosure.

- ➢ The ambient operating temperature for the TV210 outdoor enclosure assembly as provided, mounted in a shaded area, is -20C to 50C (-4⁰F - 122⁰F).

- ➢ The assembly will include.

- ➢ Weatherized TV210W with power supply.

- ➢ A 11" x 15" x 5.1" (HxWxD) modified polycarbonate enclosure rated for NEMA 3R

- ➢ A plate and hardware to mount the TV210 to the enclosure.

- ➢ Hardware for mounting the enclosure to a wall.

- ➢ A strain relief grommet for the RS-485 wire.

- ➢ UL rated 25 foot outdoor extension cord.

- ➢ The customer will supply the wiring for the RS-485 interface to the TV210.

- ➢ Placing a heater inside the assembly is discouraged and unnecessary. Use of a heater inside the assembly will absolve Spectracom from any liabilities or warranties after or as a result of this application

- ➢ Questions / Concerns:

- ➢ What happens to the clock if the ambient operating temperature drops below -4˚F? The clock will continue to operate and read time. We cannot guarantee that the clock will be accurate until it rises above -4˚F and receives a time sync signal.

- ➢ What is the purpose of the 25' outdoor Extension cord? This a UL outdoor rated extension cord and is used to provide power from the customers' 120VAC outlet to the outdoor enclosure in order to keep the 12VDC power supply out of the weather.

- ➢ Where does the 12Vdc converter reside in this proposed design or are you running these 210W as a 120Vac device? The 12VDC power supply resides inside the outdoor enclosure and is plugged into the outdoor extension cord. The TV210W is designed to operate on 12VDC power only.

- ➢ 13 x 2.5 x 5" actual display what is the purpose of the 11" H enclosure? The larger 11"x 15"x 5.1" enclosure is required so there is room for the extension cord to plug in to the 12VDC power supply inside the enclosure. This will enable us to keep the UL approval for this product assembly. The enclosures you have now are too small and would be returned to Spectracom.

- ➢ Is the heat produced by the clock while running used as a factor in specifying the lowest ambient temperature? Yes, there is some heat generated by the clock and power supply and this was factored into our temperature specification.

- ➢ If the clock loses power due to PM at the site, is the lowest temp rating changed? Yes. Our specification for the clock when not powered is -40˚F

- ➢ Frequently the outdoor temperature falls below -4F at several sites during winter- sometimes for extended periods of time. Is the clock not to be used if ambient temperatures fall below -4 degrees F? The clock can be used below this temperature and has been tested in our environmental chamber to -50˚F, however both time accuracy and receiver sensitivity suffer. We cannot guarantee that it will keep accurate time or will receive a sync signal until it reaches -4˚F. If the temperature does fall below -4F, what happens to the clock? The time accuracy will suffer between sync signals and could fall out of our 250 millisecond specification. The receiver sensitivity will suffer as well and the clock may not sync. Is it damaged? No permanent damage will result from low temperature use. Will it resume working when temperatures rise above -4F? Yes, after receiving a time sync signal, the clock will return to normal operation once the ambient outdoor temperature is above -4˚F.

Channel Separation/Deviation:

5 kHz deviation for 25 kHz spaced channels

2.5 kHz deviation for 12.5 kHz spaced channels

_____

Configuration storage/battery/ Real Time Clock (RTC)

RTC-Real Time Clock ("U7")

➢ Maintains time while display clock is powered down, so it doesn't power back up showing all 0;s and count up from here, until it syncs to the RS-485 data

➢ Spectracom P/N: U090-1226-000K

Battery ("B1")

➢ Coin cell battery: "B1"

➢ Only battery installed in the clock,

➢ Just used to backup time data when Clock is powered-down (backs up Real-time Clock IC -Our P/N U090-1226-000K).

➢ Our P/N for the battery: BT30-0221-0COM

➢ MFG P/N: Panasonic CR2032 (Lithium, 3v 220ma)

Email Keith sent to a customer (17 Feb 2014)
There is only one battery in the Spectracom TimeView display clocks. It is a coin-cell battery that is used to back-up the Realtime clock.   The Realtime clock maintains the approximate time while the TimeView display clock is powered-down. This allows the clock to display the approximate time upon each power-up, instead of just counting-up from all 0's. After the clock has powered-up, and as long as the RS-485 input is present, the backed-up time is corrected by the NetClock. Besides "maintaining the time" during power-down, the battery doesn't perform any other functions (it isn't used to save any configurations). If the battery voltage drops too low, the clock will just display the time and 00:00:00 and then count-up each second, after each power-up.

The battery has an average 10 year lifespan (cumulative time that the display clock is powered-down). But it can be replaced, if you wish. This coin-cell battery is a standard Panasonic "CR2032" battery and is annotated on the PCB as "B1". Below is a picture of where this battery is located (below the units of minutes' digit).

Excerpt from 1122-0013-2000
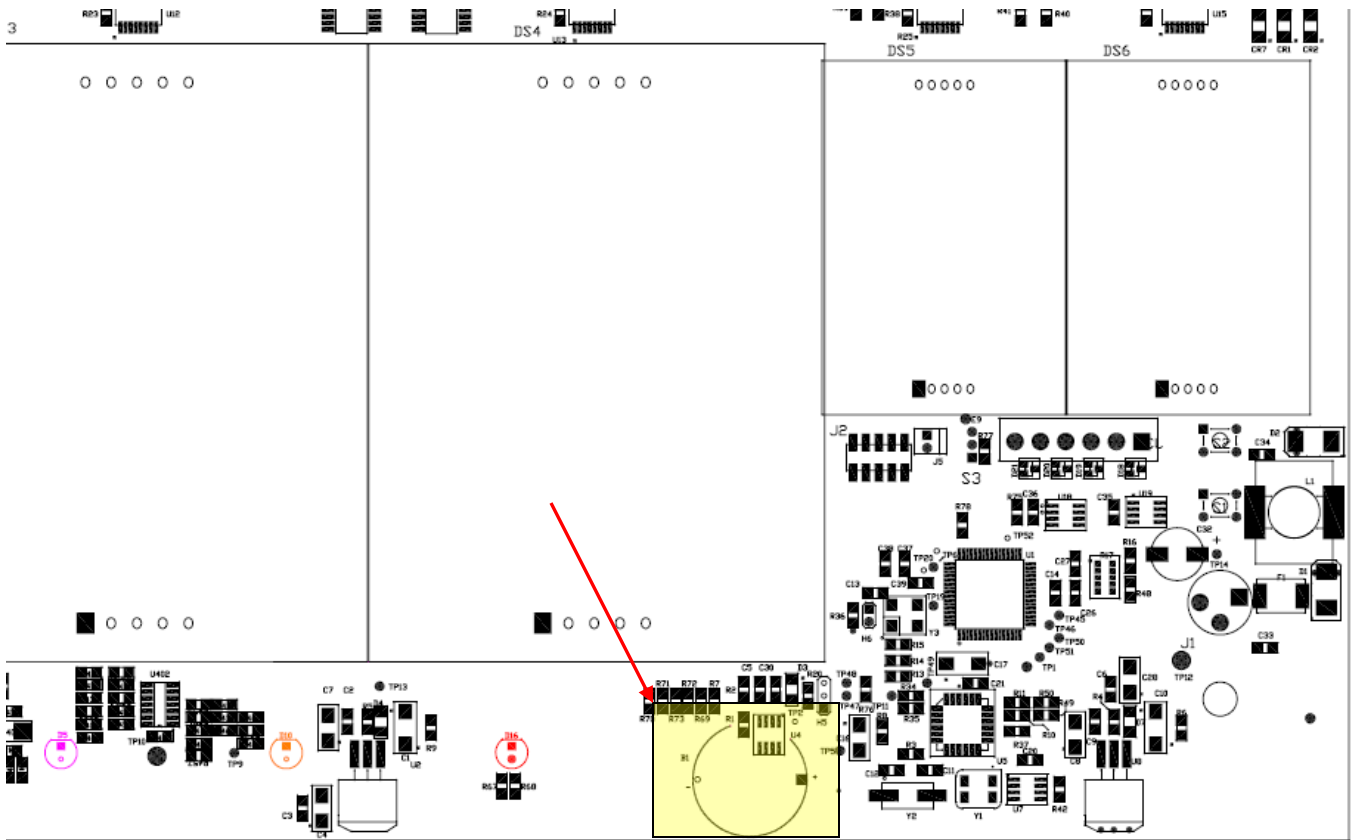
Email and table from Dick Fox (after talking to Mark McGregor 1/27/12)
1 The configuration information is maintained in non-volatile memory, so the battery life doesn't impact recovering the configuration information

2 The battery allows the internal clock module in the 312 and 400 to continue to run if power is lost. In theory this can continue for up to 10 years.

But the internal frequency of each clock will drift relative to the master and the other clocks so over time they could drift apart. During the time period when the power is off.

However, once they get their first sync signal they will all get synced.

WE say after a power cycle they could be off by up to 2 second because when the second digit changes.

Item	Battery type	Battery life time	What kind of configuration information can be maintained by this battery?	When after the clock is locked to master clock (SecureSync), the clock lost the input signal and if power off the clock for a while and power on again without input time source, can the clock follow the right time by remembering it by the battery? If so, how long does it can maintain the time during power off?
TV312W	Lithium	10 years	The configuration information isn't saved by the battery it I saved in non-volatile memory. So the clocks will continue to have the correct configuration even if battery dies Here is what is saved: Group Address 001 Sub-Group Address 000 Buzzer Volume Level 1 (lowest) "In the event of a power failure, configuration selections are saved in non-volatile memory." From manual	Time is maintained by a battery-backup-equipped, real-time clock. "From manual' So essentially the time is maintained and the display clocks real time clock continues to run so internally the time continues to be updated. However, the frequency of the local display clock oscillator may be drifting relative to the reference so it could be off by a couple of second it the power is off for a long time. It can be maintained up to 10 years. After a sync and then a power cycle the display could be off by up to 2 second until it gets a new sync signal which identifies when the seconds should be updated. (1 PPS)
TV400W	Lithium	10 years	The configuration information isn't saved by the battery it I saved in non-volatile memory. So the clocks will continue to have the correct configuration even if battery dies Here is what is saved: Group Address 001 Sub-Group Address 000 Buzzer Volume Level 1 (lowest)	"Time is maintained by a battery-backup-equipped, real-time clock. "From manual' So essentially the time is maintained and the display clocks real time clock continues to run so internally the time continues to be updated. However, the frequency of the local display clock oscillator may be drifting relative to the reference so it could be off by a couple of second it the power is off for a long time. It can be maintained up to 10 years. After sync and then a power cycle the display could be off by up to 2 second until it gets a new sync signal which identifies when the seconds should be updated. (1 PPS)

GSG GPS SIMULATORS

➢ **Link to GSG information in SharePoint** https://oroliagroupemeamicrosoftonlinecom-1.sharepoint.emea.microsoftonline.com/Spectracom/customer_service/GSG%20Signal%20Generators/Forms/GSG%20Docs%20Default.aspx

➢ **For all information on GSGs, refer to: ..\GSG Customer Service.pdf**

Pendulum Equipment

PathAlign-R (Path Alignr) (discontinued/no longer supported)

(Path AlignR, Path Align-R)

- ➢ Link to Data Sheets: link to datasheets in SharePoint
- ➢ Link to White paper on aligning microwave antennas: http://www.pendulum-instruments.com/pdf/products/24-2200_article.pdf
- ➢ Link to all KB articles: http://support.spectracomcorp.com/search?q=path+align
- ➢ Link to FAQs EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\PathAlign-R\PathAlignR FAQs.doc
- ➢ Link to Model 2240 manual (PEN9-9990-2240): I:\Engineering\Archive\New Released\Manuals\PEN9-xxxx-xxxx
- ➢ Link to detailed Engineering information for Pendulum devices: I:\Engineering\Products\Pendulum

Path AlignR Discontinuance/obsolescence/no longer supported

Refer to ECO-2121 (7 Aug 2019) In Arena at: https://app.bom.com/changes/detail-summary?change_id=2396712361&

DISCONTINUANCE NOTICE

➢ Refer to document at: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\PathAlign-R\Discontinuance (contents pasted below)

SPECTRACOM PRODUCT DISCONTINUANCE NOTICE
Product: PathAlign-R, All Models – 2200, 2200A, 2240, 2240A, 2241, 2241A
Effectivity Date: March 16, 2018
Replacement Product: None
The PathAlign-R series of products, which was first introduced by XL Microwave, is now end of life and no longer available, effective immediately. No replacement product is available.
Full Standard Support will be available for one year after which limited support will be available for a minimum of 1 year until the product can no longer be supported.

> *Customers requiring calibration services for PathAlign-R should prepare to transition to a third-party calibration service over the next two years. Procedures and references for calibration are available upon request.*

No longer supported/accepted back for cal/repair notice (officially announced 13 August 2020)

Path Align-R Final Product Notice
The Global Leader in Resilient PNT
13-Aug-20

For over 20 years Orolia has been happy to provide you with support for your Path Align-R devices. Due to parts obsolescence and availability we discontinued Path Align-R production in March 2018. At that time we committed to supporting the product line for another year following its discontinuance. We have exceeded our support options at this time and extended this time frame as long as we could. Effective immediately, Orolia will no long be able to offer support for the Path Align-R product.

This notice impacts all support functions including hardware repair, upgrades and calibration. You may contact your local calibration house for assistance with calibration if needed.

We apologize for any inconvenience this may cause. Please contact us at TechSupport@Orolia.com if you have any questions about this notification.

Thank you,

Joseph Hutt

Warranty period
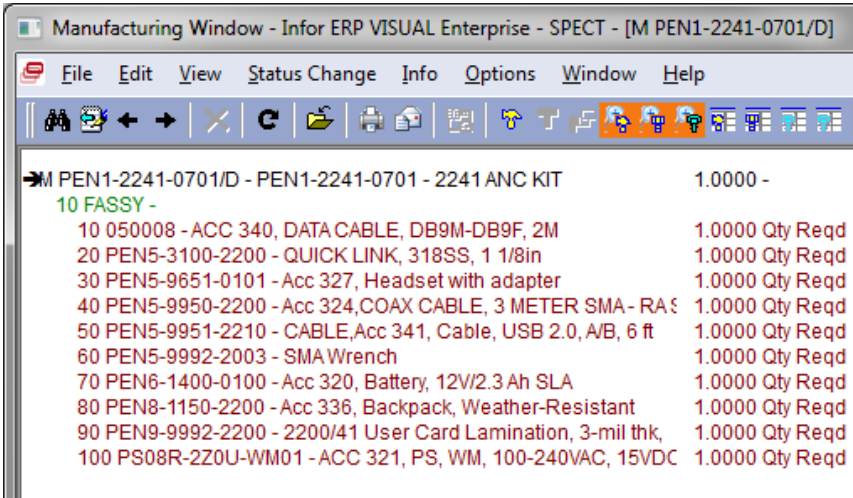
Serial Numbers- Consist of 9 digit date code:

- 1st digit= (currently a 3) indicates made in Poland.
- 2nd digit= (currently a 9) Single digit year value (first i will become a four next year).
- 3rd and 4th digits= Month
- 5th and 6th digits= Model
- 7th, 8th and 9th digits= Sequential Serial Number (Usually sold as sets with sequential numbers).

Ancillary kits

Standard ancillary kit

Model 2241CR Climb Ready package and CR ancillary kit ("Climb Ready Ancillary kit")

Climb Ready package (CR)

➢ Climb Ready Data sheet: refer to (ClimbReady): link to datasheets in SharePoint

Example order for Climb Ready package (T-39125)

From Sadie (8 Jan 2013) Here is what we have in MPL for the 2241 Climb Ready:

2241 CR Path Align-R*	944612241335 (2qty) **Note**: This is the P/N for the two Model 2241s (Path Align-R's)	PEN1-2241-0702 (2qty) **Note**: this is the "CR Ancillary kit"	PEN9-9990-2240 (1qty) **Note**: this is the ACC335 Path-Align-R manual

From the Climb Ready Data sheet: refer to (ClimbReady): link to datasheets in SharePoint
➢ The Climb Ready Package, model 2241CR, includes a Path Align-R set with Record-R for GPS data logging, all 4 extended frequency bands, and its standard accessories.

Additional accessories include 2 each: case, extra spare battery, and SMA to N connector; and 2 each of 4 different waveguides to coax adaptors.

Model 2241CR includes: **Spectracom P/N**
Model 2241 Path Align-R set (Climb Ready)   (944612241335)

Two (2) each of:
• **Acc 326 Case**: Watertight, airtight, corrosion proof   (**PEN8-1150-0400**)
• **Acc 320** Spare Battery: 12V/2.3 Ah rechargeable sealed lead/acid   (**PEN6-1400-0100**)
• **Acc 325** Connector: SMA (f) to N type (m)   (**PEN5-9350-0015)**

Two (2) each of these waveguide to coax adaptors:
• **Acc 330:** N type (f) WR137, 5.85-8.20 GHz (CPR137 Flange, 8 hole) (**PEN5-9350-2137**)
• **Acc 331**: N type (f) WR90, 8.20-12.40 GHz (UBR100 Flange, 4 hole) (**PEN5-9350-2290**)
• **Acc 332:** N type, WR112, 7.05-10.0 GHz (CPRF Flange, 8 hole)   (**PEN5-9350-2112**)
• **Acc 333:** SMA (f) WR42, 18.00-26.5 GHz (UBR220 Flange, 4 hole)   (**PEN5-9350-2242**)

One "CR Ancillary kit" (Spectracom P/N PEN1-2241-0702)

    This ancillary kit consists of the following items

M PEN1-2241-0702/D - PEN1-2241-0702 - 2241 CR ANC KIT	1.0000 -	
10 FASSY -		
10 050008 - ACC 340, DATA CABLE, DB9M-DB9F, 2M	1.0000	Qty Reqd
20 PEN5-3100-2200 - QUICK LINK, 318SS, 1 1/8in	1.0000	Qty Reqd
30 PEN5-9350-0015 - Acc 325, Adapter, SMA/F, N/M, SS	1.0000	Qty Reqd
40 PEN5-9350-2112 - Acc 332, Adapter, WR112 to N, 7-10 GHz	1.0000	Qty Reqd
➔ 50 PEN5-9350-2137 - Acc 330, Adaptor, WR137 to N, 6-8 GHz	1.0000	Qty Reqd
60 PEN5-9350-2242 - Acc 333,Adaptor, WR42 to SMA, 18-26 GHz	1.0000	Qty Reqd
70 PEN5-9350-2290 - Acc 331, Adaptor, WR90 to N, 8-12 GHz	1.0000	Qty Reqd
80 PEN5-9651-0101 - Acc 327, Headset with adapter	1.0000	Qty Reqd
90 PEN5-9950-2200 - Acc 324,COAX CABLE, 3 METER SMA - RA S	1.0000	Qty Reqd
100 PEN5-9950-2260 - Acc 323, In Vehicle Battery Charger	1.0000	Qty Reqd
110 PEN5-9951-2210 - CABLE,Acc 341, Cable, USB 2.0, A/B, 6 ft	1.0000	Qty Reqd
120 PEN5-9992-2003 - SMA Wrench	1.0000	Qty Reqd
130 PEN6-1400-0100 - Acc 320, Battery, 12V/2.3 Ah SLA	2.0000	Qty Reqd
140 PEN8-1150-0400 - Acc 326, Case, Water-tight, holds 1 inst	1.0000	Qty Reqd
150 PEN8-1150-2200 - Acc 336, Backpack, Weather-Resistant	1.0000	Qty Reqd
160 PEN9-9992-2200 - 2200/41 User Card Lamination, 3-mil thk,	1.0000	Qty Reqd
170 PS08R-2Z0U-WM01 - ACC 321, PS, WM, 100-240VAC, 15VDC	1.0000	Qty Reqd

One "ACC 335 Path Align-R manual" (Spectracom P/N PEN9-9990-2240)

MODELS

- **Model 2200** Microwave Antenna Path Alignment Test Set with four bands.

- **Model 2240** Microwave Antenna Path Alignment Test Set which extends the ranges of the four bands (refer to the "Band options" section below)

- **Model 2241** Microwave Antenna Path Alignment Test Set with extended bands (refer to the "Band options" section below), GPS and Data Logger/Recorder -stores date, time, location and path loss in NVRAM for later retrieval).

Note: Models ending in "A" (such as Model 2241A for instance): Models that are custom-configured for at least one or more frequency band options.

Front panel , Switches and LCD display

2241/2241A display (With Record-R function)
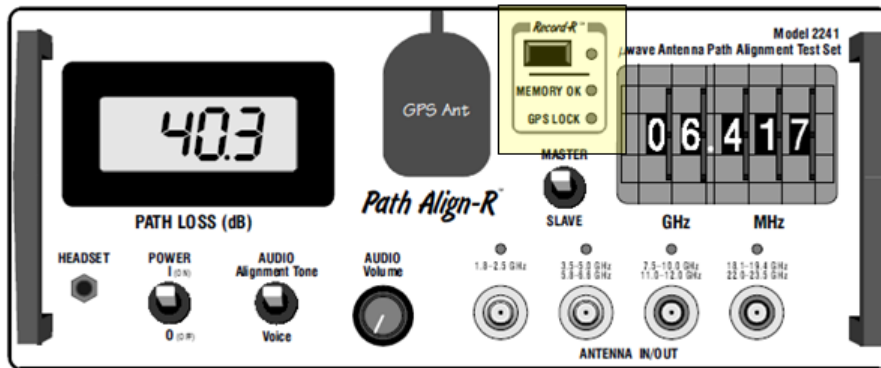
Display for other Models (not 2241)

Band 1	Band 2	Band 3	Band 4
(1.5 to 2.5 GHZ)	3.5-5.0 GHz	7.5 -10	15 GHz
	5.8-6.6 GHz	GHz 11-12	18.1 -19.4 GHz
			22 - 23.5 GHz

Power: On/Off

Master/Slave toggle switch.

Select whether an individual unit:

- ➤ Allows for full duplex voice communication via a combined 39 MHz offset over the link
- ➤ Transmits 20 MHz above the selected frequency (Master)
- ➤ or 19 MHz below the selected frequency (Slave).
- ➤ Doesn't matter which one is set to Master and which one is set to Slave. Just set one as Master and the other as Slave.

Audio: Toggle between internal variable Alignment Tone or transmitted voice from the headset or speaker

Audio Volume: controls volume of both headset and built-in speaker.

LED above each Band Connector Illuminates when that particular Band is active (thumbwheel switch has selected a frequency that is within the Band's range).

LCD (Path Loss display) The PathAlign-R has a 4-digit, 0.5 inch high numerical in-line backlit LCD display with decimal point. The display shows 4 digits of received Path Loss measurement information. Path Loss is displayed in dB with 0.1 dB of resolution. The high contrast LCD provides good readability in bright ambient light and the back-lit LCD panel provides good contrast in low light. All dB indications are negative (loss).

Battery Charge indication (Icon in LCD Display). The front panel LCD meter has a low battery annunciator in its upper left hand corner. This battery annunciator will be displayed when the battery has approximately 15 minutes of its charge left. Additionally, when the battery charge becomes insufficient to properly operate the unit.

Audio Jack and HEADSET / Built-in Speaker (Acc 327)

- ➤ Built-in speaker (located just behind the circular graphic)
- ➤ Can also use a talk/listen headset
- ➤ Replacement Headset P/N Acc 327
- ➤ Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint

Audio Jack /Headset

3.5 mm (bigger than a cell phone headset which is 2.5mm). Can purchase headsets from us (our OP/N ACC 327) or purchase an adapter as necessary.

1.5.5 Headset Information

Earpiece:	Dynamic, 8 Ohms (ring connector)
Microphone:	Electret, noise cancelling (tip connector)
Cord:	Quick release adapter with right-angle 3.5mm (1/8 in.) plug

~~Modulation Choices:~~	~~Voice / Alignment tone, switch selectable on front panel~~
Modulation Input / Output:	Headset w/10-foot cable, terminated in a 3.5 mm Plug (Mic & Earpiece)
Headset Microphone Input:	3.5 mm front panel jack (tip connector) w/5 VDC thru a 2.2k resistor

Bands/ Band Connectors

Output power

- ➢ (From Section 3 or the 2240/2241 manual) The output of all four band ranges is fixed at 0 dBm (1 mW) which provides for a known signal level for the second (receiving) PathAlign-R to measure against. The PathAlign-R's very stable low level signal greatly reduces the possibility that the path alignment process will interfere with nearby active sites.

Replacing the "female Super SMA sparkplug connector" for each band

- ➢ They can order the parts from SouthWest Microwave in Tempe, AZ. They may be able to also source them elsewhere but they can refer to SouthWest Micro for the specs.

- ➢ Home page: http://mpd.southwestmicrowave.com/products/product.php?need=connectors&item=43

- • **Female Sparkplug connector** – SMA – SouthWest P/N = 220-502SF

- ➢ http://mpd.southwestmicrowave.com/products/product.php?need=connectors&item=43

- • **SparkPlug installation/removal tool** – SouthWest P/N = T-1020-1

- ➢ http://mpd.southwestmicrowave.com/products/product.php?need=installTools&item=68

- • It is also important to use a threadlocker fluid when installing. A low strength threadlocking fluid is best in case the connector gets damaged and needs to be replaced.

ESD/STATIC DISCHARGE/DAMAGE TO BANDS

NEVER connect Aligner directly to the transmitter and ALWAYS touch the cable to ground before connecting it to the Aligner, to prevent the chance of ESD damage to the output circuitry.

Q. We were installing a new microwave hop when we attached the path alignment unit to the dish and we turn it on we pick up a 63dB level of interference threw the unit. Will this cause damage to the unit?
A (Reply from Dave L): The PathAlignR can take up to 0db input without damage. He will need to eliminate the interference to do a proper alignment. As it is now the PathAlignR will not work.

Standard Bands/ Band options

- ➢ Connect to the sparkplug connector (50 ohm input impedance).
- ➢ Only one band is active at a time.

With the exception of the Model 2200, there are four available frequency output connectors for four different bands. Use the one that correlates to the selected/dialed-in frequency for the antenna (connect this output to the antenna.

Model 2200
Standard Bands for Models 2200 (includes all four bands)

- **Band 1:** 1.15 - 2.5 GHz band

- **Band 2:** 5.5 - 6.6 GHz band

- **Band 3:** 11.0 -12.0 GHz band

- **Band 4:** 18.1 -19.4 GHz band

Model 2200A
Band options for Models 2200A (specified bands installed)

- **Band 1:** 1.15 - 2.5 GHz band

- **Band 2:** 5.5 - 6.6 GHz band

- **Band 3:** 11.0 -12.0 GHz band

- **Band 4:** 18.1 -19.4 GHz band

Models 2240 and 2241
Standard Bands for Models 2240 & 2241 (includes all four bands)

- **Band 1**: 1.5-2.5 GHz band

- **Band 2:** 3.5- 5.0 GHz & 5.8-6.6 GHz band

- **Band 3:** 7.5-10.0 GHz & 11.0-12.0 GHz band

- **Band 4:** 18.1-19.4 GHz & 22.0-23.5 GHz band

Models 2240A and 2241A

> **Note:** With the Models 2240A and 2241A, you specify which of the four bands you want installed, so it will have less bands than a 2240 or 2241. For instance, you can specify to have band 1 installed and Bands 2, 3 and 4 not installed)

Band Options for Models 2240A & 2241A (specified bands installed)

- **Band 1**: 1.5-2.5 GHz band

- **Band 2:** 3.5- 5.0 GHz & 5.8-6.6 GHz band

- **Band 3:** 7.5-10.0 GHz & 11.0-12.0 GHz band

- **Band 4:** 18.1-19.4 GHz & 22.0-23.5 GHz band

900 MHz

Q. We own two 2241 units that I am eager to try out – however the comparison I am interested in making is between 5.8 GHz, 2.4 GHz, and 900 MHz. I notice 900 MHz is not in the eligible band list for any of your units, is there an approximation that can be made using the bands that are available?

(Reply from Dave Lorah 30 apr 13) The Path AlignR can align antennas using frequencies between the available bands on the Path AlignR. I have a attached the manual for reference, see page 3-27 for a chart on in-between band applications.

I do not believe it will work for the 900 MHz however. The low end only goes down to about 1.5 GHz. You could try it and see what happens. I am not personally aware of anyone trying it at 900 MHz before. If you do try and find it does or does not work I would like to know the results.

Output signal/ Polarization

FM modulation

> Outputs a 0dbm signal through the dish antenna.

> Can be tuned to 0.1 dB.

> Four Super SMA female Sparkplug connectors on front panel (one for each band)

POLARIZATION

Make sure both antennas are selected to the same type of polarization (vertical or horizontal). Either type can be used, but they must both be set to the same value.

Rear panel

Figure 3-2 depicts the PathAlign-R rear panel connectors and battery access door.
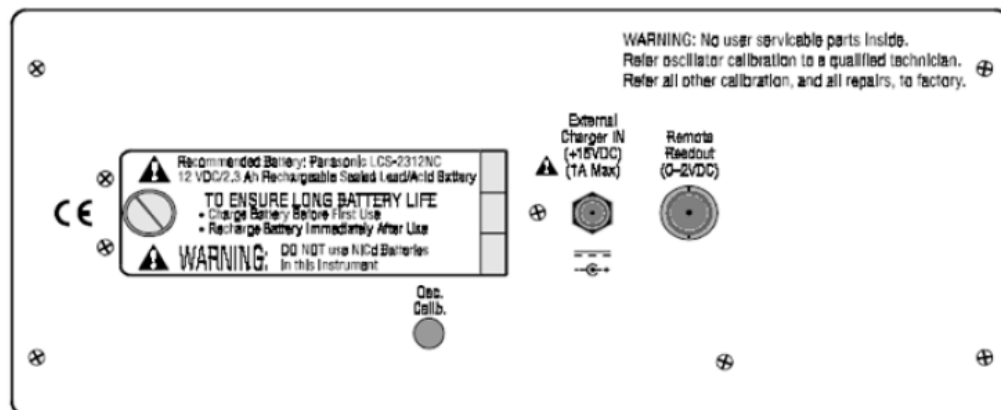
Figure 3-2. Model 2240 Rear Panel

Name	Function
Battery Access Door	Hinged battery access door provides for removal/replacement of internal battery. Door latches via a thumbscrew.
Osc. Calib.	Access hole allowing the use of a trim pot adjusting tool to fine-tune the internal oscillator during yearly calibration. ***Note: Refer oscillator calibration to a qualified technician!***
External Charger IN	Type 5.5 mm x 2.1 mm, two-terminal battery power connector connects the external 15VDC/ 1A Battery Charger to the PathAlign-R (center pin is positive, maximum charge current: 1 amp).
Remote Readout	BNC type connector. Provides a 0-2 VDC output that tracks the front panel LCD Path Loss Meter (1 mV = 0.1 dB). Allows for external readout of path loss using a handheld DVM.

ALIGNING LINKS OUTSIDE THE PATH-ALIGN-R'S BAND RANGE

➢ Refer to KB article on our website: http://support.spectracomcorp.com/articles/FAQ/Path-Align-R-Waveguide-Comparison?&category=PathAlign_R_2200_2240_2241&

Desire to use only one Path-AlignR with an existing transmitter

Q. can I use the path box on one end of the path and align using the existing signal from the other end? Or do we need to stick to the technique described in the user info card?

A. Reply from Lisa Perdue (25 Aug 2014) It will not work. The PathAlign-Rs transmit and receive on offset frequencies so they work together in a set.

Email from Keith (25 Aug 2014) The Path-AlignRs do need to be used as a set (one at each site). They can't be used individually with an existing transmitter, because the frequencies of the two Path Aligners are offset by 20MHz (one high by 20Mhz and one low by 20MHz) to allow two-way communications between the technicians at the site (full duplex).

PathAlign-R BATTERY (ACC 320)/Battery Charger/Vehicle adapter

- Battery drain occurs even if Path-Aligner is off. Remove battery if powered down for more than 30 days.

- Batteries are sealed lead acid and have a shelf life, especially if stored uncharged.

- Typically, can run 3-5 hours on a full charge, but this is based on age of battery and outdoor temperature: The colder it is outside, the shorter the battery life. Can be down to 15-20 minutes in extremely cold weather.

- Refer to "Path AlignR Accessories" Data Sheet:

1.5.6 Battery Characteristics

Operating Time (approx):	4 to 5 hours continuous @ 25°C (77°F). Low Battery indicator, within LCD display, ON when approx. 15 min. operating time remains.
Charge Time (approx):	3 hours
Manufacture:	Panasonic
Manuf. Part No.:	LCS-2312NC, Rechargeable Sealed Lead Acid Battery
Nominal Voltage:	12 VDC
Nominal Capacity:	2.3 Ah
Capacity affected by Temperature:	40°C(104°F) 102% 25°C(77°F) 100% 0°C(32°F) 85% -15°C(5°F) 65%
Self-Discharge @ 25°C:	Capacity after 3 month storage: 90% Capacity after 3 month storage: 80% Capacity after 3 month storage: 60%

Spare battery/replacement battery (ACC 320)

- **ACC 320** (in Arena): https://app.bom.com/items/detail-sourcing?item_id=1202836861&version_id=10221283528

- **MFG. P/N:** PowerSonic PS-1223 (refer to link above for a copy of the MFG. datasheet)

- Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint

- Available for purchase from us: (In Salesforce), refer to: https://na28.salesforce.com/01t80000001Xvsn?srPos=0&srKp=01t

Email from Lisa Perdue (20 March 18) regarding PathAlignr discontinuance: We should also freely shared the information about the batteries so customers can purchase them from another source. We will not restock them.

Data sheet for battery is in here:

I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\PathAlign-R\PathAlignR Test, Calibration, Repair\Accessories

We will be transferring any inventory that may be useful for repairs to the service department.

Portable Battery Charger (Acc 321)

- ➤ Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint

- ➤ ACC 321 in Arena at: https://app.bom.com/items/detail-attach?item_id=1202836860&version_id=10221283518&orb_msg_single_search_p=1&redirect_seqno=7880251379

- ➤ Available for purchase from us: (In Salesforce), refer to: https://na28.salesforce.com/01t80000001Xvso?srPos=0&srKp=01t

Battery Charger In:	5.5 mm x 2.1 mm rear panel Power jasck (15 VDC/ 1A, center positive)
ACS MAINS Input:	90 to 264 VAC / 47 to 63 Hz
AC MAINS Connector:	IEC-320, 3-conductor. Conforms to IEC 320-3:1987/EN 60 320

DC Output:	15 VDC / 1A
DC Connector:	5.5 mm x 2.1 mm Barrel Power connector, 5 foot cord

Vehicle adapter (ACC 323)

- ➤ In-vehicle battery charger with battery clip for charging spare battery (outside instrument)

- ➤ **Spectracom P/N** Acc 323

- ➤ Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint

- ➤ Available for purchase from us: (In Salesforce), refer to: https://na28.salesforce.com/01t80000001Xvsq?srPos=0&srKp=01t

Battery appears to be depleted

➢ Check battery voltage with a multimeter.
➢ Replacement battery is the Spectracom P/N ACC 320 (see additional details further below)

Q. Both devices are not working without the AC power

A. Email Dave Lorah sent (3 Nov 2014) You may have depleted batteries. These are sealed lead acid types and they do have a shelf life, especially if they have been stored uncharged. If you check the batteries with a voltmeter do they show a good charge?

How old are these batteries?
There is also a possibility the Path AlignR internal battery connectors are damaged and no longer making good contact. If the batteries are inserted the wrong way it can damage the connectors.

If the batteries show a good charge and you suspect the PathAlignR's are damaged we can issue a RMA to return them for repair.
The cost for basic repair and calibration is $550 plus shipping.

Best practices for maintaining the batteries (lead acid batteries need to be maintained with periodic charges)

Email from Dave Lorah (30 Oct 15): Here is some information on the PathAlignR batteries:
Best practices for maintaining the batteries:
• Do not store the batteries in the units for long periods of time.

• Always remove the batteries if the units will be in storage for greater than 30 days. There is a slow discharge if the batteries are left in the units even when turned off, and over time the batteries will be discharged to such a low level that they will no longer take a charge.

Replacement batteries can be purchased from Spectracom. Other batteries can also be used as long as they meet the specification attached to this article.

The battery is a PowerSonic PS-1223. Spectracom Part number ACC 320. We have them at list price $85 each.

Q …available to discuss the batteries for the path align kits? Part # 2241CR. We have noticed, for quite some time now, that the batteries do not hold a charge for very long, which is creating some operational issues for us.

A (reply from Dave Lorah, 8 Feb 16) I can assist you with answering this question.
The batteries that power the Path AlignR are the sealed Lead Acid type. They are the same type as car batteries. These batteries do have a shelf life and their capacity is also severely degraded if stored in a discharged condition. Fresh batteries may be the best solution for you. Then make sure to fully charge them before storage or after use. Even then the batteries do wear out over time. Typically, they have a life of about three years.

Also, like car batteries, the batteries will not last as long in cold weather.

Best practices for maintaining the batteries:
• Do not store the batteries in the units for long periods of time.

• Always remove the batteries if the units will be in storage for greater than 30 days. There is a slow discharge if the batteries are left in the units even when turned off, and over time the batteries will be discharged to such a low level that they will no longer take a charge.

Replacement batteries can be purchased from Spectracom.

Report of newly purchased batteries failing too soon after purchase (CAPA-068, March, 2016)

➢ Reported by Wade Sober (10 Mar 16)

Email from Wade Sober to Derek, Justin and others (10 Mar 16) I am not sure how this should be addressed internally but I am pretty sure that we have a problem with our Path Align-R batteries we are offering. They may have sat on the shelf too long.

To recap, I had three customers complain about the life of the batteries, Jump Trading, Ceragon and just recently I

sold a new Path Align-R set to a customer in Canada who was out on a job and the batteries would not hold a charge. These batteries were well within the 90 day warranty period. For this customer, I told them to purchase new batteries and that we would reimburse them. If we had sent them batteries off our shelf they would most likely have failed and it would have taken too long to order new batteries as they were in Canada and trying to complete their installations.

The type of batteries that these are require periodic charging so they don't go bad. Per the attached data sheet:

Note: Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged within 6 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.

There are three issues that need to be resolve, the first is to send new batteries to these customers. The second is to verify our current inventory and determine if the batteries on our shelves need to be replaced and the third is how to manage batteries going forward. How do we proceed from here? What can I do to help?

Reply from Justin to Wade (10 Mar 16) Due to Power-Sonic's cryptic date coding and marking scheme, our supplier needs to confirm the batttery's build date. There are - 17 PEN6-1400-0100 (MPN: PS-1223) currently in finshed goods with a build date that appears to be 1/23/2015 (Ref# 01235U). All 17 were delivered to Spectracom on 2/11/2016.

Corrective Action, **CAPA-068** was assigned to track and resolve this issue.

Temperature restrictions

Do not use below -10°C (14°F) or above +40°C (104°F). If the temperature exceeds this upper limit, a safety device will automatically prevent operation of the battery.

Cold Battery Pack (ACC 400)

- External battery pack to extend battery life in cold-weather conditions.
- Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint
- Weight is close to 2.5 lbs.
- Our P/N for ACC 400: PEN6-1400-0300 (In Arena): https://app.bom.com/items/detail-spec?item_id=1203165921&version_id=10221202828
- Available for purchase from us: (In Salesforce), refer to: https://na28.salesforce.com/01t80000002GBCG?srPos=0&srKp=01t

How old are the batteries in your PathAlign-R set? It sounds like the batteries may need to be replaced if they are no longer holding a charge. The only issue I know of with the type of Lead-Acid battery is extreme cold weather. Then the batteries do not hold a charge long. If you find that they work well inside but have a short battery life in cold weather, then you may be interested in our cold battery pack.

The cold battery pack is a set of external batteries that are planned to last up to 4 hours of continuous use at a 0°C temperature. Other features are quicker charging time and an indicator light that shows when the battery is charged.
In addition to the Cold Battery Pack we have other accessories that may be helpful for you, please see the attached file Path Align-R Accessories.
http://www.pendulum-instruments.com/pdf/products/24-pd_2200_2240_41_rev08_200809.pdf

Not our biggest seller but does require lots of service because it is used in the field and gets bounced around in the back of trucks. We purchase the PathAlignR as semi-finished goods from Poland and do the final testing, configuration, calibration, adding accessories, and service here in Oakland.

TUNING/DISPLAY SEGMENTS

1) Connect the Aligners directly to the antennas. Connect to the appropriate band (one of the four) on the Aligners that corresponds to the antennas.

2) The display segments show DB loss. For frequency tune, tune to the lowest number displayed. For audio tune, tune to the highest pitch.

3) Expected DB values can be pre-determined using the supplied 3 foot cable, based on the selected frequency, using the Path Loss & Fresnel Calculator located at http://www.pendulum-instruments.com/support/software.html.

4) Actual value should be +/- 4DB of the predicted value. Otherwise, antenna may be tuned to wrong antenna at other site or locked onto a side-lobe versus being locked to the main-lobe.

Waveguide flanges/adapters are available for purchase through Spectracom.

"Acc" Cables and adapters for Path Alignr-s

- Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint

Acc 338

- Available for purchase from us
- In Salesforce: https://na28.salesforce.com/01t80000001Xvt6?srPos=0&srKp=01t

Earlier version   **Ruggedized cable (different vendor, but the specs are the same**

Email from Pete Screnci (5 Sept 2013) "The second photos is what I received. It looks different and is 4' shorter than what I have".

Acc 329

 - Coax SMA to N connector
 - Available for purchase from us. In Salesforce:
   https://na28.salesforce.com/01t80000001Xvsx?srPos=0&srKp=01t

Fresnel Loss / Path Loss & Fresnel Calculator Program

Fresnel Loss: The primary component to path loss is the free-space signal loss from the transmitting antenna to the receiving antenna. But additional path loss may also exist from multi-path reflections (sometimes called Fresnel reflective loss) due to reflective surfaces such as water near the direct wave, and intervening obstacles such as buildings, mountain peaks, etc., in the Fresnel zone.

Fresnel zone is an elliptically shaped conical zone of power that propagates from the transmitting antenna to the receiving antenna due to cancellation of some part of the wavefront by other parts that travel different distances. If the total path distance between the transmitting antenna, mountain peak, and receiving antenna is one wavelength greater than the direct distance between antennas, then the clearance is said to be two Fresnel zones.

Path Loss & Fresnel Calculator Program

A path loss and Fresnel clearance calculator that runs in Microsoft Windows (requires DotNet framework - will prompt for download during install). It calculates free-space path loss, antenna gain, beam width, RSL, Fresnel clearance, etc. of a microwave path in both English and metric units. Useful for estimating expected path loss when doing antenna path alignment and installation of microwave links and verifying actual measured values with the Path Align-R against calculated expectations.

Obtaining the Fresnel Program

➢ Can be downloaded at no cost from the Spectracom website: http://spectracom.com/documents/path-align-r-tool

After installing the program, to open it:

Start -> **All Programs** -> **Pendulum Instruments**

Shortcut: C:\Program Files\Pendulum Instruments\PathAlign-R Calculator\PathAlign-R Calculator.exe

Fill in all of the values on the right and hit "**Calculate**" on the left. This calculates the expected **RSL value** (Received Signal Level), displayed at the bottom of the screen.
.

Recommended GROUND TEST

- ➤ Refer to the "Field Verification Check" Section of the User Manual (such as Section 2.9) for details
- ➤ Link to manual I:\Engineering\Archive\New Released\Manuals\PEN9-xxxx-xxxx

A) Band 1 Field verification (1.8 -2.5 GHz)

- **Band 1** should show 40dB

Example 40 dB pad: Mini-Circuits, Model BW-S40W2.

.
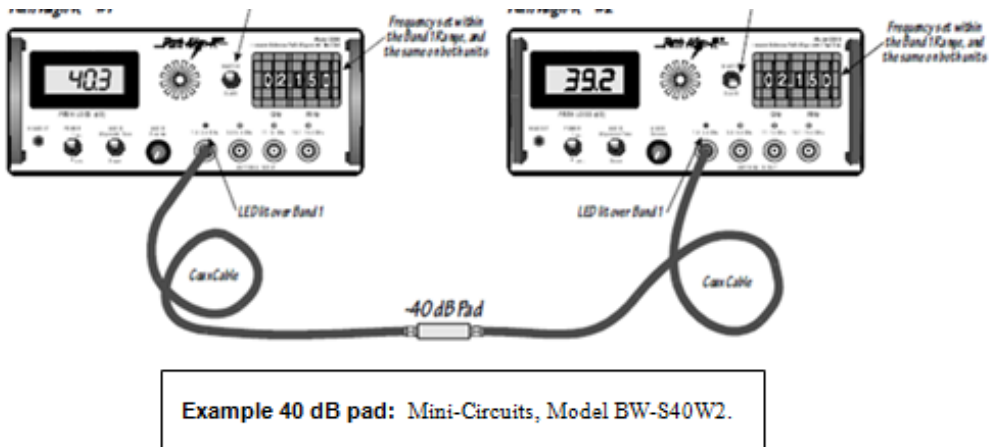
B) Bands 2, 3 and 4 Field verification (5.8-19.4GHz)

- **Band 2** (5.8-6.6 GHz) should show 40dB
- **Band 3** (11-12GHZ) should show 50dB.
- **Band 4** (18.1-19.4GHZ) should show 60dB

Transmit through about 3 feet of open space.
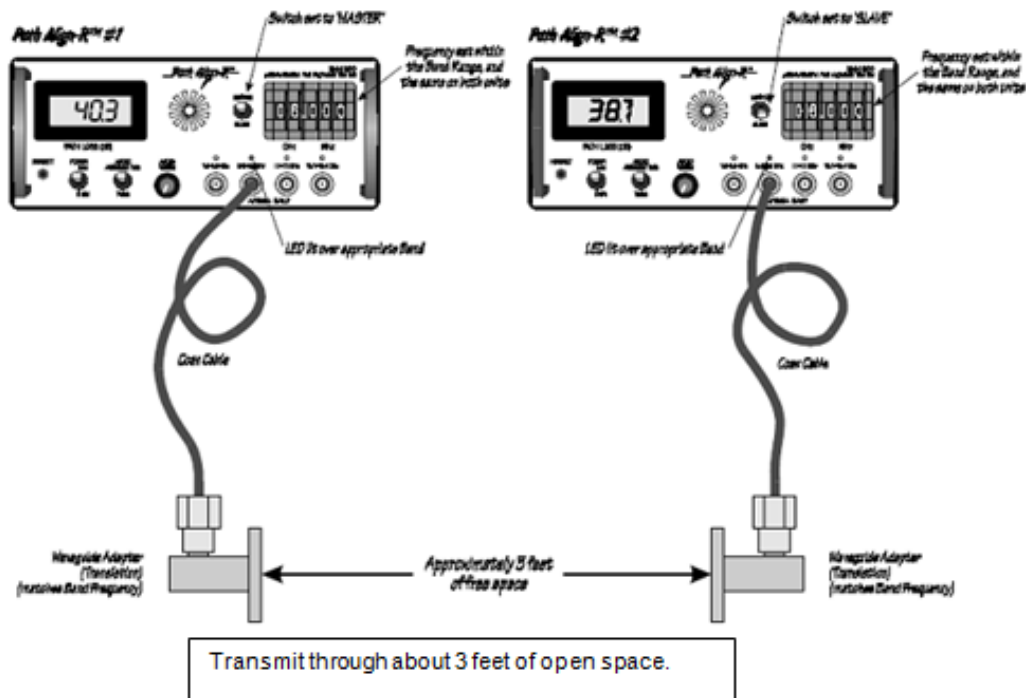
In the "**Documents & Files**" tab of the following page of our website, refer to "**PathAlign-R Field Verification technical Note**" http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=351&PortalId=0

Recommended to be performed every time they are used or if a problem is suspected. Direct connect both units together with wave-guide. Expected DB readout at a 3 foot distance is based on which of the four bands are connected together, as shown below:

Notes:
- The two Path aligners should be +/- 4dB of each other
- Do not use cables such as RG-58 (Cable loss is too high).
- Verify the frequency settings match on both units,
- Verify one is Slave and the other Master
- Verify cabling is good.
- Make sure the waveguide adapters are both in the same horizontal or vertical plane (polarization).

CALIBRATION/ Minor repairs

➢ Link to Cal costs https://na8.salesforce.com/01t80000001Xvtd?srPos=1&srKp=01t

➢ Currently- Yearly Cal/minor repair fee is $550.00 (per set, or $275.00 each) plus shipping.

➢ It's recommended this Calibration be performed once a year.

A) In-field/customer calibration (such as at a Cal lab) / calibration procedure

➢ "Not recommended" (and not supported by us) - but there is a test procedure available that they can review and decide if they wish to try it.

- Refer to Salesforce case 25098

- Requires specialized test equipment (listed at top of the cal procedure)

- The test

- There are no passwords or other items in the procedure that we "can't divulge".

- The cal procedure ("**pathalignr Part 3- Test and Cal**") is at: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\PathAlign-R\PathAlignR Test, Calibration, Repair

Email Keith sent to this cal lab (19 Apr 17) Though we don't normally support local calibration of these devices (we typically recommend the equipment be returned to us for calibration), we decided that we can at least send you the calibration procedure that we follow here, to see if it's a task that you feel that can be supported locally ☺!

The beginning of this test procedure lists the test equipment that we use during the cal process. If you need additional assistance beyond this cal procedure itself, we will need to recommend at that time you return the devices to us for calibration.

After reviewing this procedure, if you decide that you prefer/need to return the devices to us for factory calibration (instead of calibrating them locally), please just let me know and I will be happy to assign an RMA Number authorizing the return. In order to assign an RMA number, I just need to know the desired return ship to address, to whom it should be made attention to (if not yourself), the bill to address (if not the same as the ship to address) and the units Serial Numbers).

B) Returning to us for calibration (highly recommended)

Email from Keith to a customer (12 Jun 2013) FYI- There is a flat fee for basic repair and calibration for a Model 2240/2241 Path Align-R set. This fee is $550.00 (plus shipping costs) and covers simple repairs and includes factory calibration of the set. If there are extensive repairs needed such as replacing an entire board or module, the cost would be higher.   We will contact you when the equipment is evaluated if additional fees will be incurred. This fee also includes a NIST Traceable oscillator calibration certificate.

If you would like to return the units for evaluation, repair and calibration please let me know and will issue a RMA number and shipping instructions. In order to assign an RMA number, I need to know the desired return ship to address, to whom it should be made attention to (if not yourself), and the bill to address (if not the same as the ship to address).

For your future reference, I'm not one of the primary techs for this particular equipment. But I can always assign an RMA for you. The best point of contact for any technical assistance you may need with this equipment is Dave Lorah, also with Tech support. Our contact information is directly below.

Email from Dave Lorah to a customer (11 Mar 2013) There is a flat fee for basic repair and calibration for a 2240/2241 set. This covers simple repairs and includes calibration. If there are extensive repairs needed such as replacing an entire board or module, the cost would be higher.

This includes a NIST Traceable oscillator calibration certificate. If you would like to return the units for repair and calibration, please let me know and will issue an RMA number and shipping instructions.

Waveguide adapters

(Example of an adapter)

➢ For waveguide adapters (such as Ceragon and Dragonwave adapters), refer to (Path AlignR Accessories): link to datasheets in SharePoint

- **Example adapters include our P/Ns:** ACC 330 through ACC 334 (ACC 330, ACC 331, ACC 332, ACC 333 and ACC 334).

OUT DOOR UNIT (ODU) adapters (such as Ceragon, Dragonwave, Andrew, Remec)

➢ For waveguide adapters (such as Ceragon and Dragonwave adapters), refer to (Path AlignR Accessories): link to datasheets in SharePoint

(From wbmfg.com)
What does ODU stand for?

Out Door Unit.   Most popular radio manufacturers have switched from having a rackmount radio in a building at the base of the tower to a radio that is actually mounted to the back of the antenna. Some still have an IDU or In Door Unit that places some of the electronics at the base of the tower, but the connection between IDU and ODU is a low cost coaxial cable rather than the expensive waveguide that is used for all indoor units. The latest trend is to dispense with the IDU altogether and have everything in the ODU.

The transmitter is directly connected to the back of the antenna. This may use a proprietary connector from companies such as "Ceragon" or "Dragonwave". This can be disconnected by unclipping.

Q Will the 2200/2240 Path Align-R work on an elliptical waveguide setup and one that has a LMR/ODU setup? Also, does it matter if its 6 or 11 gig?

A (from Dave Lorah to customer 4 March 2013) The most common problem with an ODU setup is attaching the Path Align-R to the dish. You would need to use an adapter that has a coaxial connection that attaches directly to the dish antenna to be able to use the Path-AlignR. We carry adapters for Ceragon and Dragonwave but that is all. I have attached the accessories data sheet so you can see the adapters. Do you know what make the ODU is?

Connecting directly to the ODU will not work. The Path-AlignR has its own transmitter/receiver and requires a direct connection to the antenna to work properly.

It is recommended to align the antennas using the intended transmitter frequency. If the frequency required is between bands of the Path AlignR the nearest available Path-AlignR frequency can be used. Also, you should use waveguide adapters appropriate for the frequency used.

Example Waveguide Adapters

A) ATM (Advanced Technical Materials, Inc) adapters

➢ This company makes the Ceragon and Dragonwave adapters.

➢ http://www.atmmicrowave.com/wave-adaptr-wgtocoax.html

Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\PathAlign-R\waveguide adapters\ATM

Or (either "Ceragon adapters" or "Dragonwave adapters"): I:\Engineering\Products\Pendulum

Our Part Numbers

ATM Adapter	Our P/N
ACC 348	PEN5-9350-2348 (ATM part no 137-253B-6)
ACC 332	PEN5-9350-2112 (ATM part no 112-253B-2)
ACC 330	PEN5-9350-2137 (ATM part no 137-253B-2)
ACC 333	PEN5-9350-2242 (ATM part no 42-251B-6)
ACC 334	PEN5-9350-2275 (ATM part no 75-2538-6)
ACC 331	PEN5-9350-2290 (ATM part no 90-2538-6)
ACC 349	PEN5-9350-2349 (ATM part no 90-2538-2)

A) Ceragon adapters

Ceragon Adaptors

Waveguide-to-Coax SMA Adaptors
Acc 351 Ceragon ODU 11GHz
Acc 358 Ceragon ODU 18GHz
Acc 353 Ceragon ODU 23 GHz

Our Part Numbers

Ceragon Adapter	Our P/N
Acc 353, Adaptor, Ceragon ODU, 23 GHz	PEN5-9990-2423
Acc 351, Adaptor, Ceragon ODU, 23 GHz	1208-0001-0600
Acc 358, Adaptor, Ceragon ODU, 18 GHz	1208-0002-0600
Acc 351, Adaptor, Ceragon ODU, 11 GHz	1208-0003-0600
Acc 353-H, Adaptor, Ceragon-Harris ODU, 23 GHz	1208-0004-0600
Acc 358-H, Adaptor, Ceragon-Harris ODU, 18 GHz	1208-0005-0600
Acc 351-H, Adaptor, Ceragon-Harris ODU, 11 GHz	1208-0006-0600

B) Dragonwave adapters

Also refer to: I:\Engineering\Products\Pendulum\DragonWave adapters

Dragonwave Adaptors

Waveguide-to-Coax SMA Adaptors
Acc 361 Dragonwave ODU 11GHz
Acc 368 Dragonwave ODU 18GHz
Acc 363 Dragonwave ODU 23 GHz

Our Part Numbers

Dragon Wave Adapter	Our P/N
Acc 363, Adaptor, Dragonwave ODU,23 GHz	1207-0001-0600
Acc 368, Adaptor, Dragonwave ODU,18 GHz	1207-0002-0600
Acc 361, Adaptor, Dragonwave ODU,11 GHz	1207-0003-0600

C) Andrew Dishes

➢ Refer to Salesforce Case 11358

Per Dave Lorah (21 Aug 2013) This is a problem with microwave antennas that have the radio mounted directly to the dishes (ODU). One would need the right adapters. Basically it needs to adapt a type N connector to the dish.

I did a quick Google search but came up with nothing. Maybe Andrew Co. will have something?

D) Remec (Exalt-S series)

Q. What is REMEC? (From wbmfg.com)
A. Remec is a very large manufacturer of the ODU units used by many radio manufacturers. The radio manufacturer provides the IDU, ODU modifications and system software; but in many cases they don't build the actual ODU itself. Or if they do, they have standardized on the Remec mounting form factor which defines how the ODU mates with the antenna. Many brands use the Remec mechanical interface. The other popular mechanical interfaces are Dragonwave and SAF but those two interfaces are currently used only by those two companies.

Q. Do you make an adapter for direct antenna interface to Remec? (from Chuck Robertson)
A (Reply from Dave Lorah 1/13/13) The answer either way is unfortunately no, we only make the ODU adapters for Dragonwave and Ceragon. Due to low demand we would probably not do a one off-custom adapter. I can run it by product management but even if we did entertain producing a Remec adapter it would be a while before the design and manufacturing process was able to produce one. I think it may be too long a wait for you if you need them now.

Follow-up to the above

I was told that, should the Ceragon adaptors shown below are for their 1500P series ODUs (which I believe they are based on the picture provided below), then it should work with our Ex-s series ODUs.

Note: He is working with Wade Sober to see about purchasing a Ceragon or Dragonwave adapter to see if it will work for him.

E) Commscope antennas

1. Commscope Mode SC 241055

➢ Refer to Salesforce case 25428

Reply from Dave L (5/22/17) ODU Dishes are always a problem. According to the specs on this dish, it uses a CPR90G style adapter, but it needs an adapter to mount to the back of the dish. We do sell some type N to rectangular waveguide adapters but that is all. Unfortunately, we have nothing to direct fit this dish.

Backpack (Acc 336) and Hard Cases (Acc 326 and ACC 339)

➢ Refer to "Path AlignR Accessories" Data Sheet: link to datasheets in SharePoint
➢ Weather-resistant (Path AlignR's are not weather resistant, so keep them in the backpack)

Backpack (Acc 336)

Hard cases (two variations)

    A) **ACC 326**

- Designed for one Path-AlignR
- Water-tight to 30 feet
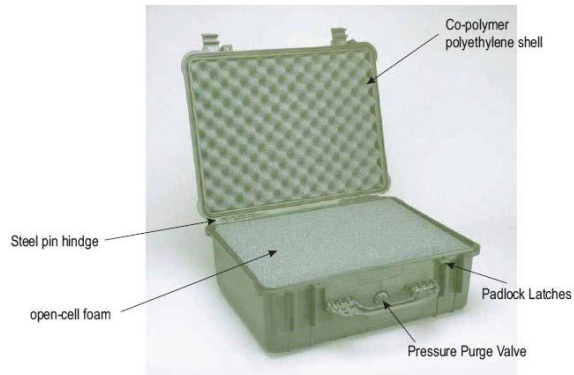
    B) **ACC 339**

        ➢ Case with wheels for a set of Path Aligners (holds two units)

*Record-R data logger and GPS lock (for Models 2241 and 2241A only)
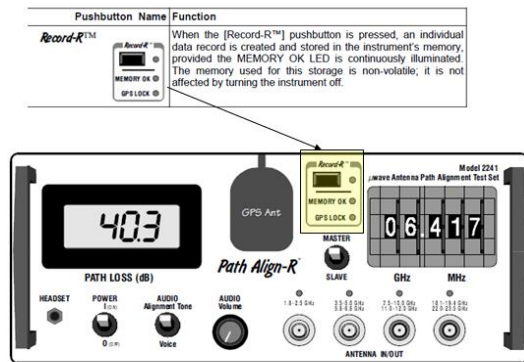
- ➢ Models 2241 and 2241A include the Record-R™ data logger, which allows the results of the antenna path alignment to be logged into internal memory. The Record-R™ contains an embedded GPS receiver to provide accurate date/time and position information added to the frequency and path loss data. The data is saved in memory for transfer to a PC using the LogView-R™ software.

- ➢ This is an Internal/integrated feature (not available for download)

- ➢ Non Volatile memory storage (persists through boot-ups)

Email from Sadie Nedo (21 Jan 2014) The **Record-R** feature (included in our 2241 and 2241CR models) allows you to record data about the alignment such as the GPS position, path signal level date & time. This information can be printed out after you finish the alignment and submitted to your customer for future reference. It is also good data for you to keep for future reference in case your customer complains about the path quality. If you have to go back to re-measure the path you will have a signal strength reference point to work from which you should be able to tell if for instance the dishes moved since your alignment.

GPS Lock
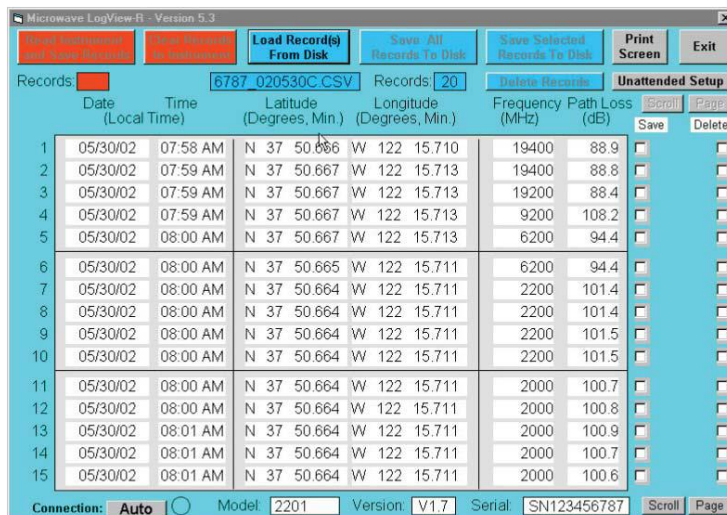
A) Recording Data with GPS Lock

If the GPS LOCK LED is illuminated continuously when the [Record-R] button is pressed, the information stored will consist of the instrument's model number, serial number, UTC date and time, location (latitude and longitude), Frequency in use, and the measured Path Loss power in dBm. The data recorded is the information displayed at the instant the Record-R LED illuminates.

B) Recording Data without GPS Lock

If the GPS LOCK is flashing (no lock), position is not known and cannot be recorded. If the [Record-R] button is pressed and held for three seconds, until the Record-R LED illuminates, a data record will be recorded along with frequency, path loss, date and time. The data recorded is the information displayed at the instant the Record-R LED illuminates.

LogView-R software for Path AlignRs (Log View-R)

- ➢ Free software used to download, view, save to disk and print stored records, and also clears the Path Aligner's memory

- ➢ Shows the recorded data (past versus present, for example) and to show the procedure was completed.

- ➢ Allows connection to a PC running Windows via RS-232 or USB cable.

- ➢ Free download from the Spectracom website:

(Support -> Library-> Product Manuals & Software -> Wireless Test)

(30 Nov 16 KW) appears this program is not on the newer version of our website (I deleted the old links we had to the earlier website).   However, the install file ("**logviewr_7_setup**") is available at: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\PathAlign-R\PathAlignR Test, Calibration, Repair\LogViewR Factory

Notes about LogView-R software

- • For Windows only!
- • Allows you to view files.
- • Instructions to load are in the Path-AlignR manual
- • As of at least June 2013, there is no additional info available about this program.

LogView-R (Log ViewR) software with newer versions of Windows (such as Windows 10)

Refer to Salesforce case 127536

email from Dave L (27 Feb 2018) I tried installing Log ViewR from our website to my Windows 7 64 bit Laptop and it loaded just fine. It has been tested on Windows 7 before.

Did you get this latest update from our website?

https://spectracom.com/documents/path-align-r-logview

Here are the software installation instructions:

1. Select "Search for the best driver for your device" (top selection) and specify the C:\Program Files\LogView (default).
2. Select "Install the updated driver"
3. If required, insert the Windows 95/98 CD and follow the on-screen instructions.
4. If required, reboot your computer to activate the drivers. The USB driver install is now complete.

Here are the software installation instructions from the user manual:
Before installing the supplied Log View-R Data Log Utility software into your computer (the computer must use the Windows 95/98 or later operating system and contain a USB or RS-232 port), ensure that the computer and the PathAlign-R are not connected. Windows 95 does not support USB, only Windows 98 and later operating systems support USB. If you are running Windows 95 use the RS-232 cable between the instrument and the COM2 port (RS-232) in your PC. Your computer display should be set to 600 x 800 or higher.
The following instructions should be followed in the order given.

1. Close all running programs before installing utility. If you are running Windows 2000 or XP on a network, see note below.
2. Insert the CD into the CD drive.
3. Go to 'Start', select RUN and enter the appropriate drive letter (e.g.: D:\setup.exe) and click [OK].
4. At the "close any applications you may be running", click [OK].
5. At the "change directory", click on the computer box icon in the upper left corner.
6. At the "Choose Program Group" {Log View-R}, click [CONTINUE].
7. At the "Set-up was complete", click [OK].
8. Remove the CD from the drive. The utility install is now complete.

Note: Installation under Windows 2000 and XP on a network may need to be done while logged in as an 'Administrator' rather than as a normal user. Windows 2000 install shows a message that file HID.DLL is newer than the one in the install package. You will be asked if you want to keep the newer file. You should answer 'Yes' to this question.
Windows USB Driver Installation
After installing the logging utility, the first time the instrument/computer connection is made through USB; Windows will detect a new device and launch its "Hardware Wizard" and search for "USB Human Interface Device" drivers for the instrument. The following instructions apply:

1. Select "Search for the best driver for your device" (top selection) and specify the C:\Program Files\LogView (default).
2. Select "Install the updated driver"
3. If required, insert the Windows 95/98 CD and follow the on-screen instructions.
4. If required, reboot your computer to activate the drivers. The USB driver install is now complete.

This should operate and communicate with the Path AlignR. Please let me know if there are any problems or error messages that you see.

Refer to Salesforce case 19031 (question below)

➢ (30 Nov 16 KW) It seems to have installed just fine on my Windows 7 64-bit machine.

Q I have a set of 2241 Path Align-R boxes. I'm trying to use them with the LogView-R software on a computer running windows 10. Whenever I hook up either set of path gear to my computer via USB cable, the LogView-R program does not detect them and when I click the 'Auto' button, the program locks up and the circle does not turn green. If I turn the path box off, a message appears that an unexpected response occurred. If I power the boxes up before starting the program, it locks up and doesn't fully open. Version of LogViewR is 7.

A Reply from Dave Lorah (2 Sept 2015) From your description it appears the LogviewR software is not able to reach the Path AlignR or the software is not operating properly in the system.

The LogviewR Data Logging Utility software is specified to work on Windows 95 – XP Operating Systems. I have tested it on Windows 7 and it works fine but I am not sure about Windows 10 compatibility.

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Can you try running in compatibility mode and make sure you are running in administrator mode? This may help.
Also if you are using a USB to RS-232 converter it could cause issues.
Version 7 is the current version for this software. Please let me know if the above resolves the issues or not and we can go from there.

Here are the software installation instructions from the user manual:

Before installing the supplied Log View-R Data Log Utility software into your computer (the computer must use the Windows 95/98 or later operating system and contain a USB or RS-232 port), ensure that the computer and the PathAlign-R are not connected. Windows 95 does not support USB, only Windows 98 and later operating systems support USB. If you are running Windows 95 use the RS-232 cable between the instrument and the COM2 port (RS-232) in your PC. Your computer display should be set to 600 x 800 or higher.
The following instructions should be followed in the order given.
1. Close all running programs before installing utility. If you are running Windows 2000 or XP on a network see note below.
2. Insert the CD into the CD drive.
3. Go to 'Start', select RUN and enter the appropriate drive letter (e.g.: D:\setup.exe) and click [OK].
4. At the "close any applications you may be running", click [OK].
5. At the "change directory", click on the computer box icon in the upper left corner.
6. At the "Choose Program Group" {Log View-R}, click [CONTINUE].
7. At the "Set-up was complete", click [OK].
8. Remove the CD from the drive. The utility install is now complete.

Note: Installation under Windows 2000 and XP on a network may need to be done while logged in as an 'Administrator' rather than as a normal user. Windows 2000 install shows a message that file HID.DLL is newer than the one in the install package. You will be asked if you want to keep the newer file. You should answer 'Yes' to this question.

Windows USB Driver Installation
After installing the logging utility, the first time the instrument/computer connection is made through USB; Windows will detect a new device and launch its "Hardware Wizard" and search for "USB Human Interface Device" drivers for the instrument. The following instructions apply:

1. Select "Search for the best driver for your device" (top selection) and specify the C:\Program Files\LogView (default).

2. Select "Install the updated driver"

3. If required, insert the Windows 95/98 CD and follow the on-screen instructions.

4. If required, reboot your computer to activate the drivers. The USB driver install is now complete.

Antenna Alignment Test Set to a PC.

➢ The free Log View-R software interfaces with a PC to display, save and print data records from the instrument's memory.

   Note: it says for Model 2241, but it is compatible with the lower number Models, also.

"**Unattended Setup**" **Button:** For Models 2261 and 2261A only (described in the 2261 manual)

Reset 2261 to factory settings

Email from Rick Kieft to Eva Chapa (10/19/09)
I spoke with Serge from Proxim this AM. He said the 2261A was always in automatic Run mode – as shown on the display, lower right corner – and he needed to return it to manual operation.

To do this, he needs to use LogViewR:
1. Connect up the unit with either USB or RS 232,
2. Save the current records (just to be safe),
3. Click the Unattended Setup button (upper right hand corner),
4. Click the Clear Setup in Instrument button (right side near top),
5. Click the Exit button (right side bottom),
6. When asked to send current setting to instruments click NO (this is the catch, the Clear Setup already cleared the instrument, a YES will send the old settings back to the unit),
7. If the memory is near full (255 records) then Read Instrument And Save Records, followed by Clear Records in Instruments.
   This will reset the unit to manual mode and if Clear Records is used that will free up all the memory.

**Troubleshooting Path Alignr's

A) **Not working at all**

- Was a Ground Test performed first? If not, we highly recommend it be performed before climbing the towers.

- Make sure both devices are selected to the same Frequency

- Make sure antenna is connected to the right band (LED above that band should be lit, indicating its programmed to operate in that particular band.

- If the LED is lit above another band, either the antenna is connected to the wrong band or the thumbwheel isn't set to the correct frequency.

- Make sure the polarization of the two antennas matches (Horizontal and Vertical).

B) **Path loss value not the expected value**

- Were the Path Aligner's recently calibrated?

- The Fresnel calculation may not have been performed correctly.

SpectraTime Frequency Standards/Test Set (MP34-000x-000x)

GPS PicoReference PicoTime/Pico Second Resolution Test Set (Picotime, Pico Time)

GPS PicoReference Pico Second Resolution Test Set
The GPS PicoReference™ is a low-cost, high-performance frequency reference and measurement test set. It integrates a smart GPS and a Rubidium reference, features a flexible 1-30 MHz frequency testing range and a cutting-edge 1ps measurement resolution. It's ideally designed for clock characterization and calibration applications.

➢ This is a product built by SpectraTime

➢ Link to data sheet: link to datasheets in SharePoint

   https://www.spectratime.com/products/itest/gps-gnss-rb-adev-clock-stability/gps-picoreference

➢ Link to manual (on the picotime CD): EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\picotime CD

➢ Link to our website:
   http://www.spectracomcorp.com/ProductsServices/TestandMeasurement/FrequencyStandards/GPSPicoReferencePicoSecondResolutionTestSet/tabid/1287/Default.aspxv

PicoReference Product Characteristics:

- Compact: 1U rack mount chassis

- GPS disciplined Rb clock: Auto-adaptive SmarTiming

- Testing Frequency Range: 1-30 MHz

- Reference Frequency: Integrated GPS-locked Rubidium clock

- Phase time resolution and noise: <2ps rms

- Output Frequency: 4x 10 MHz/4x 1pps or 8x 10 MHz

- User programmable SYNTH output

- Integrated smart auto calibration

The GPS PicoReference includes two modules: a Frequency Reference module and a Measurement module.

Available configurations

This is the current PicoTime Section in the MPL (24 Sept 2013)

PicoTime	Our P/N	Refer to
PicoTime Test Set	MP34-0001-0001	
PicoTime-1U/US/ST32 (with US power cord and Stable32 software)	MP34-0001-0002	https://app.bom.com/items/detail-spec?item_id=1250772922&version_id=11055481118
GPS PicoReference/S/E (with Option S & Option E)	MP34-0003-0001	https://app.bom.com/items/detail-spec?item_id=1203165892&version_id=10221202528&orb_msg_single_search_p=1
Stable32 Software	S-STABLE32-01	
GPS PicoReference with Opt US (US power cord)	MP34-0003-0002	https://app.bom.com/items/detail-spec?item_id=1208220017&version_id=10306331638

Note (Per SpectraTime) Without special request of "US" option, the GPSPICOREFERENCE it's delivered with a Euro power cable

US Power cord

Customer complaint:
The power cord that shipped with the unit had an international power prong configuration and had to be swapped with a standard US AC power cord.

SpectraTime reply: Without special request of "US" option, the GPSPICOREFERENCE it's delivered with a Euro power cable

Email from Lisa Perdue to Norm West (24 Sept 2013) Can you add a note to Picoreference product in SFDC that for orders in the US, they should automatically add option-US to the order so they get the proper line cord for the unit?
https://na8.salesforce.com/01t80000001XvvO?srPos=0&srKp=01t

Email from Tom R (24 Sept 13) This doesn't help this time and it is only one of the possible combinations available. Sales needs to check which country the product is going to be used in and configure accordingly.

Picoreference	Power cord	Backplane Outputs	Stability
Default	European Power Cord	4x 10 MHz, 4 x 1PPS	Standard Stability and Phas
	Opt US (North American power cord)	Opt 8RF (8 x 10 MHz)	Opt S (Better Stability and Phase Noise)
	Opt CN (China Power Cord)		
	Opt CH (Swiss Power Cord)		

Pendulum Frequency Standards/Test Set

➢ Link to detailed Engineering information for Pendulum devices: I:\Engineering\Products\Pendulum

Models 6688 and 6689 Stand-alone Frequency Standard (DISCONTINUED)

DISCONTINUED

Link to data sheet: link to datasheets in SharePoint

Link to manuals:
https://files.bom.com/download/uPFNZWOjppQYLVYGChCB5s8PHdN6e4qE/srqwgegzucmxvxnxxisdawbhlgftvyih/iTest_PicoTime-1U_Spec.pdf

EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\6688-6689

Link to 6688/6689 in CustService folder: EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\6688-6689

Link to our website:
http://www.spectracomcorp.com/ProductsServices/TestandMeasurement/FrequencyStandards/66886689StandaloneFrequencyStandard/tabid/1294/Default.aspx

➢ Pendulum Rubidium-based stand-alone Frequency Standard.

➢ Rubidium or high stability oven frequency reference standard

➢ Distribution amplifiers for 5x10 MHz and 1x5 MHz outputs as standard

➢ Optional 10x10 MHz outputs

➢ 0.001 ppm aging in 10 years (Rubidium)

➢ Ideal for telecommunication test systems and calibration laboratories

Models:

• **6688**: OCXO Frequency Reference

• **6689**: Rubidium Frequency Reference

Front panel/Rear panel/operation/specs

➢ Refer to 6688/6689 combined manual EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\6688-6689

Rochester repair capabilities

Let Lisa Perdue know what the failure symptoms are to know if it may be able to be repaired in Rochester.

Revised announcement
Email from Eric Girard (6 Jul 17) A short email to complete your answer about these products.

Until end of 2016, all counters support were held by Spectracom LU, Pendulum series, Spectracom series and also Tektronic series.

Since beginning of 2017 we sold our products to our factory company, Altaria in Poland. So now they are covering all support for counters, repair, calibration, production… etc
Here below our official communication with customers.

We want to inform you about a new official Spectracom announcement :

"Through a recent agreement, Altaria Services, a Swedish owned company with production facilities in northern Poland, has acquired Spectracom products currently marketed under the Pendulum brand. Specifically, these products are:

- Frequency Counters/Analyzers: models CNT-90, CNT-90XL and CNT-91 and companion products such as the TimeView modulation domain analysis software.
- Frequency Standards: models GPS-12R, 6688/6689, GPS-88/89.
- Frequency Distribution Units: models DA-35 and DA-36.

Since 2008, Altaria has been a contract manufacturing partner to Spectracom. As Spectracom continues to build on its market leading position for resilient positioning, navigation and timing solutions for critical infrastructure, Altaria is best-suited to directly support customers of Pendulum test & measurement products due to their strong knowledge with their design, manufacture, test and support.

As of Jan 1, 2017, all new requests for new sales will be re-directed to Altaria, as well as new customer Purchase Orders.
The same applies for service, support, repair and factory calibrations. Altaria will assume all Spectracom's warranty obligations, as well as out-of warranty repairs and calibrations.

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Altaria Services SP. Z.o.o.
ul. Lotnica 37
80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : orderdesk@penduluminstruments.com

Web : www.altaria.se

Pendulum Model GPS-88 and Model GPS-89 (Fluke 910R) (GPS-controlled Frequency Standards)

(GPS 88) / (GPS 89)

Link to data sheet ??: link to datasheets in SharePoint

Link to manual: ~~http://www.spectracomcorp.com/Portals/0/manuals/GPS-88-89_manual.pdf~~

Discontinued

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A) Pendulum (not Rapco) GPS-88 and GPS-89:

➢ ~~Per John Westwood's note below, forward tech support questions/concerns on these products to Tech Support in Les Ulis.~~

~~**(Note from John Westwood on 6 Nov 2012)**~~
~~The GPS-88 is not a Rapco product but ex-Pendulum and is a current T&M product under LU control. This is identical to the 910 Fluke badged product. Due to technical issues with the GPS-89 (Fluke 910R) these products are now supported from Les Ulis.~~

B) Fluke 910R

➢ Refer to sites such as ("Contact Us" for Fluke): en-us.fluke.com/customer-service/contact/

Email from Emmanuel (26 Sept 16) according to our agreement with Fluke, customers should refer to Fluke support directly for assistance.

Q (from Salesforce Case 240332. For their Fluke 910R) ...Fluke suggested we get a hold of you to see if we could purchase another display screen to replace the one we have. We can replace the screen ourselves so all we are looking for is another screen. Can you help?
A reply from Keith (11 Aug 2020) Thanks very much for your initial question about the Fluke 910 display.

As I suspected, we no longer have any of the components for this device.

The equivalent product to the Fluke 910 (the "GPS-89") which we used to offer, was sold off to another organization by the name of Altaria Services (in Poland), back in 2017. Since that product line was purchased by Altaria (now Pendulum Instruments), and according to our agreement with Fluke, customers with Fluke devices should refer to Fluke support directly, for all assistance with the Fluke 910.

However, you could also try contacting Pendulum Instruments directly (https://pendulum-instruments.com/). With a quick search, it appears they still offer the GPS-89 product (https://pendulum-instruments.com/products/frequency-time-standards/gps-88-89-traceable-gps-controlled-frequency-standards/). They may be able to help you with obtaining replacement parts.

Again, my apologies for now getting back to you with this info, before your reminder! Please let me know if Pendulum was able to help you.

***Fluke GPSview software (for Fluke 910R)

- ➢ Refer to sites such as http://www.fluke.com/fluke/caen/support/software/910software
- ➢ GPSView Software for the 910/910R GPS Controlled Frequency Reference

FAQs for GPS-88/GPS-89
E-12 error

Q. We purchased GPS-88 freq. Standart from your company last year. From time to time , the equipment gives **E-12** error. After switching the power of the equipment, error goes off.

A. Thank you for the screen shot, this is not an error code it is the calculated frequency error averaged over the last 24hours that is being displayed. (see 3.2 in attached). You can change the default screen to always display the time if required via the interface.

Below is a link to the GPS-88/GPS-89 User manual.
http://www.spectracomcorp.com/Portals/0/manuals/GPS-88-89_manual.pdf

Pendulum Models GPS-12 GPS-12R GPS-12R/HS GPS-12RG (GPS/Glonass-controlled Frequency Standards)

(GPS12 GPS12R GPS12R/HS GPS12RG)
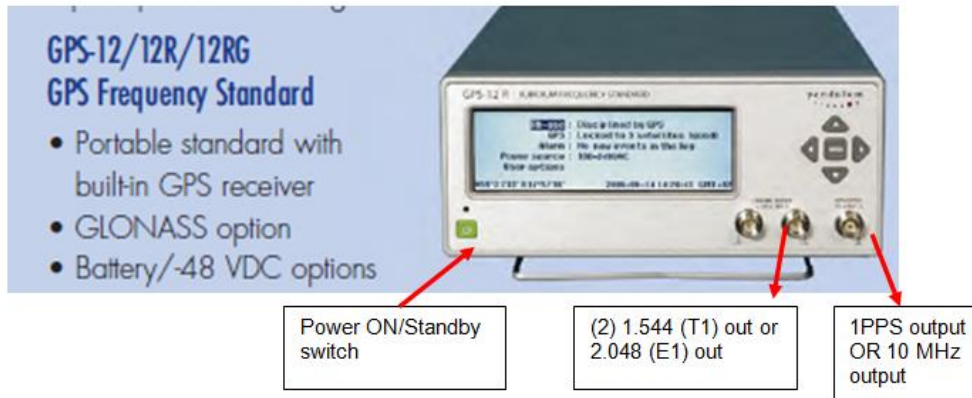
DISCONTINUED

Note: Spectracom no longer supports or services Model GPS-12 standards. They are now serviced/supported by Altaria in Poland

Revised announcement
Email from Eric Girard (6 Jul 17) A short email to complete your answer about these products.
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ul. Lotnica 37

80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : orderdesk@penduluminstruments.com

Web : www.altaria.se

Note: As of ~6 January, 2017, Spectracom no longer supports or accepts Counters for repair. Support of counters has been transferred to Altaria"

Through an agreement, Altaria Services, a Swedish owned company with production facilities in northern Poland, has acquired Spectracom products currently marketed under the Pendulum brand. Specifically, these products are:

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For the smoothest possible transition, Altaria will work with all Spectracom distribution partners and use Spectracom's last published price list (products and prices).
As of Jan 1, 2017, all new requests for new sales will be re-directed to Altaria, as well as new customer Purchase Orders.
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A mass email will be generated in the short term to our distributors and partners in order to formalize this announcement, that will be shared when sent.
The points of contact to be used within Altaria, in particular for sales requests, PO, support requests are provided below:
Altaria Services SP. Z.o.o.
ul. Lotnica 37
80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : office@altaria.se
Web : www.altaria.se

For general inquires: marcin.sawicki@penduluminstruments.com or harald.kruger@penduluminstruments.com
For sales: orderdesk@penduluminstruments.com
For service: service@penduluminstruments.com

Links/Shortcuts

➤ Link to datasheet on our website: https://spectracom.com/documents/gps-1212r-12rhs-datasheet

➤ Shortcut to datasheet: link to datasheets in SharePoint

➤ Link to User and Service Manuals: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R

➤ Link to GPS-12R in Customer Service folder: \\Rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R

D) Warranty period: Three years

GPS-12 series frequency standards

Available Models

- **GPS-12:** Freq Standard (OCXO installed)

- **GPS-12R**: GPS-Controlled Rubidium Freq Standard (not Glonass)

- **GPS-12R/HS**: GPS-Controlled high-stability, low phase noise Rubidium Freq Standard (not Glonass)

- **GPS-12RG**: GLONASS/GPS-Controlled high-stability, low phase noise Rubidium Freq Standard

Front panel

LCD display with backlight forming the User Interface (UI) together with the **CURSOR** and **ENTER** keys to the right.

The default messages inform the user about Control Mode (*Disciplined* or *Hold-over*), Satellite Status, Alarm, Power Source, User Options and Time/Position.

The **CURSOR** keys (with arrow symbols) are used for moving the cursor, marked by text inversion, around the menus on the display. By pressing the **ENTER** key you either confirm a choice or enter a submenu. Back one step by pressing the **LEFT ARROW** key.

1PPS output or 10 MHz out (1PPS is the default)

POWER ON / STANDBY key. A secondary power switch that ligths up the red LED above the key in standby mode.

BNC Reference Output Connectors
2 x 2.048 MHz + 1 x 1 PPS or
2 x 1.544 MHz + 1 x 1 PPS

The choice is made in the *User Options* submenu.

Optional outputs can be found on the rear panel.

GPS Signal strength display

➢ The Trimble GPS receiver signal strengths are reported in AMU (not dB/Hz)

Desire to convert AMU to dB/Hz

➢ **This is like comparing apples to oranges. They are two different units of measures and can't convert one to the other.**

Email from Emmanuel to TOYO (10 Aug 15) As explained in Eric's previous email, the "signal strength" information displayed on GPS12R is a signal to noise ratio, so it's a unit-less figure: S/N, where S is Signal expressed in dB, N, noise is expressed in dB, so S/N has no unit.

Email from Gilles Boime (20 Aug 15, sent to the same customer as the email above, as the customer continued to ask about this) We dig into the internal software and we can inform you that the signal level reported in this version including a recent GPS receiver is not the S/N that is usually expressed in dB/Hz but an arbitrary signal level that is not linear with signal in space strength. It is a measurement of the signal strength after correlation or dispreading of the CDMA code. The value is set to a negative value if satellite has been locked and is not currently lock. It is set to 0 if satellite has not yet been acquired. Positive values are monotonous with signal in space strength but we don't get any indication from the GPS receiver supplier about the reference level. So one cannot consider it is a value with a unit of measure.
Hope this may close the discussion.

Email from Emmanuel to TOYO (10 July 15) I confirm that the S/N is dimension-less or unit-less (I'm not sure which translation is the correct one), as a ratio of Signal power over Noise power. Of course, it can be expressed in dB: you're

correct that a S/N of 10000 can be also expressed as 40 dB.

I also agree that for a modulated signal, the S/N depends on the bandwidth of the receiver. However, the S/N which is displayed on GPS12R is directly measured / processed by the GPS receiver, so already takes into account its reception bandwidth. GPS12R embedded software doesn't make any calculation on the S/N provided by GPS receiver. So there's no point in trying to re-process the S/N provided by the receiver to take into account the bandwidth. We have no control on the S/N values provided by the GPS receiver.

In addition, we don't recommend to infer a precise signal power calculation from the S/N provided by the receiver. The S/N information is interesting for relative comparison of several satellite signal strengths, and to make sure it is in the appropriate range of value.

Note also that S/N value can be weak either the satellite signal is weak, or because environing noise (other emitters in particular) is high.

Rear Panel

Antenna cable input (N-contact)

Fan with automatic speed control

Power input 90-265 V, 45-440 Hz

Optional external DC power inputs

Optional Outputs

Option 70B: sine wave
3 x 10 MHz + 1 x 5 MHz

Option 71B: sine wave
1 x 10 MHz + 1 x 5 MHz + 1 x 1 MHz +
1 x 0.1 MHz

Option 72B: square wave
2 x 2.048 MHz +2 x 2.048 Mbps

Option 73B: square wave 4 x 13 MHz

Option 74B: square wave
2 x 1.544 MHz + 2 x 1.544 Mbps

USB port for firmware download from PC

Two relay-controlled alarm loops, one for urgent and one for non-urgent situations.

See page 3-6 for pin configuration.

Input Power

A) **AC input (on all units)**

➢ 90 to 265 Vrms, 45 to 440 Hz

B) **Optional additional DC input (in addition to AC power)**

- **Option 77:** AC and - 48VDC input power

- **Options 78 and 78/HS** add internal backup battery (see Options below).

  - maintain stability during transportation, as the internal reference oscillator is continuously powered.

- **Option 78/HS** can also accept 12vdc input.

Outputs

(1PPS and 10 MHz)

➢ Front panel of the GPS-12R can provide either 1PPS or 10 MHz signals (factory default is 1PPS).

➢ Its 1PPS or 10 MHz outputs are 0v to 2V into 50 ohm load.

➢ The default is 1PPS output but can be optionally changed to 10 MHz out under the *User Options* menu on the start screen.

Alarm outputs (rear):

➢ One urgent and one non-urgent alarm output

Internal Options (Refer to the data sheet for optional accessories)

Option 01: L1 band GPS antenna
Option 01/50: available antenna mounting kit

- **Option 02:** 20 meter cable

- Option 02/50: 50 meter cable

Option 29/12: GPS-12 Monitor software (Available Windows-based monitoring software)

➢ Refer to GPS-12R manual for details, including system requirements (I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R)

Operating systems: Win 2K, XP, Vista, Win7; 32 or 64 bit.

Function: GPS-12 Monitor is an optional software package allowing full remote control and monitoring of the instrument from a PC over the USB-B connector on the rear panel.

Software Operating system: Win 2K, XP, Vista, Win7 (32 or 64 bit)

Connection to PC

➢ GPS-12x connects to PC via USB ports

Main Features

- Collecting and presenting device data.

- Setting up device parameters.

- Taking snapshots of the device screen.

If you are in local mode and want to save the current screen contents as a bitmap picture file, then you can start GPS-12 Monitor and go to *Tools _ Snapshot* to catch the moment. Select a suitable file format and save the file.

- Uploading firmware and language packs.

Emulator mode

By downloading the unregistered version from our website www.pendulum-instruments.com you can get acquainted with the basic features of the instrument without having the actual hardware.

The emulator mode offers the operator the opportunity to choose among a number of different setups. The monitor screen mirrors the real front panel, so you can operate the virtual instrument with the PC mouse just about the same way as you press the keys on the real instrument.

- Emulator mode is selected under *Tools*, and is mainly intended for demonstration purposes, as no hardware of any kind is necessary. It allows evaluation of different options, for instance, and is indicated by an inverted E at the top left corner of the display. Use the form under *Tools_Emulator_ Options* for selection of options

Option 70B: One (1) 5MHz and three (3) 10 MHz low-noise outputs for test systems or metrology applications. This option is mounted as standard in the GPS-12R/HS model.

Option 71B: Four (4) sine wave outputs of 10 MHz, 5MHz, 1MHz and 0.1 MHz

Option 72B: Two (2) 2.048 MHz plus two (2) 2.048 Mbps (E1) for telecom applications.

Option 73B: Four (4) 13 MHz outputs for GSM radio base station tests.

Option 74B: Two (2) 1.544 MHz and two 1.544 Mbps (T1) outputs for telecom applications (SONET).

Option 77: - 48VDC input power

Options 78 and 78/HS (Rechargeable battery back-up power)

- **Option 78**: Internal rechargeable Battery
- **Option 78/HS:** Internal NiMH rechargeable battery. Same as Option 78 plus an additional inlet for +12 VDC external power supply/charging.

Maintain stability during transportation or to allow field use without access to AC mains. For the first time ever, it is now possible to transport an atomic frequency standard into the field and have instant access to the full stability, with zero warm-up time.

Per the GPS-12R manual: Option 78 and Option 78/HS have a NiMH battery pack that is specially adapted to its purpose. It must not be replaced by anything else but the original part, the order number of which is 4031 100 67190. Replacement is recommended when the battery operating time falls short of one hour, provided the battery pack has been charged in standby mode for at least 24 hours.

- ➢ Battery is a Nickel Metal Hydride battery (NiMH)
- ➢ **Battery specs:** 14/HR-AU 16,8V 2650 mAh NiMH
- ➢ MSDS sheet for the battery (Refer to NiMHMSDS.pdf in: \\Rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R
- ➢ Battery can be replaced in the field (Refer to pages 2-3 and 2-4 of the manual for the instructions to replace the battery)
- ➢ **P/N for replacement battery**: 4031 100 67190 (Note: in Visual as 403110067190). We buy the replacement batteries from Alteria using this P/N.
- ➢ Link to replacement batteries in Salesforce: https://na8.salesforce.com/01tC0000004KoJP
- ➢ We really don't have any details on this battery (Mfg, Mfg's P/N etc other than it can be purchased from Alteria),
- ➢ Refer to Salesforce case 14670.
- ➢ If battery is bad, note the charging circuit could have an issue:

Regarding the battery this could be replaced with no problem provided you use a standard ESD procedure. If the battery charging board has failed, then you want to send it in for service.

You can check the voltage levels on the following points to get a good indication as to whether the battery board is also failing:
- X20 = 24V ±0.5V
- X6 = 32mV ±5mV at low charge & 260mV ±10mV at high charge
- X17 = 3.35V ±0.1V

Email from Mike Steele to Morgan (11 June 2014) Yes, we can sell the batteries to the customer. Details below: Option 78 battery cell pack P/N: 4031 100 67190 Cost to purchase from Altaria = 118.18EUR Customer price = 200EUR or 162USD ex works.

Dave White has said we will sell it to the customer for $450.00 as noted below. This is also what I quoted the customer.

Also the PN in Visual, 4031 100 67160 is different from the one above which is also in the manual. I'm sure if there is a type-O somewhere of if there is a difference.

Option 79/01: Two (2) 10 MHz and one (1) 1pps output, together with one (1) 1pps input for external disciplining.

Available Language packs

The GPS-12 product family has the ability to utilize other languages on the front panel to allow for easier use where English is not the primary language.

Refer to knowledge base article 1274 (https://na8.salesforce.com/ka4C00000008QED)

Using the Controls/Menus

(Refer to **GPS-12om.pdf** and **User Manual** in: \\Rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R

Calibration/Validation

(Refer to **GPS-12RCalibration.pdf** and **User Manual** in: \\Rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R

Per Lisa Perdue (9 Jan 2013) There are no adjustable components in the GPS-12R, so there is no calibration. If the customer wants to verify the 10MHz output is on frequency, they can take it to any local calibration facility to measure the output signal. (Validation –> Not Calibration).

Hazardous substances

Note: Hazardous substances only apply if Option 78 or Option 78/HS is installed (the basic instrument has no batteries installed).

Hazardous substances

The GPS-12R does not have any hazardous substances to be concerned about except for the battery. Here is our official statement from the manual:

The basic instrument and all optional units except Option 78 have no batteries or other parts containing hazardous amounts of substances that require special attention or handling instructions. Option 78 contains a rechargeable NiMH battery pack that serves the purpose of providing uninterruptible power to the instrument. As all batteries, it has a finite lifetime. Although NiMH-based cells are by far less detrimental to the environment than their NiCd-based predecessors, we strongly recommend to dispose of them by controlled recycling.

CAUTION: Make sure the battery pack is recycled according to local regulations.

Refer to (NiMHMSDS.pdf): \\rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\GPS-12R

Oscillator Calibration / Oscillator drift

Q. Is there a unique procedure for recalibrating or something of the like that we would need to send the unit to you? Is that unit still under warranty? The battery pack is a standard Sanyo battery assembly and I did not see anything in the software that would require a factory level replacement or calibration. Please advise.
A. **Email from Morgan (16 May 15)** I also forwarded you questions to our group that repairs the GPS-12. They said that we don't generally calibrate the units but do offer as certificate of conformance. What they do is discipline the unit then let it run in hold over for a week and log the frequency.   If you are seeing drift from the 10MHz output, then the oscillator may need to be replaced.

Transport/Mobile operation of GPS-12R for 1PPS comparisons at various locations

➢ With Option 78 or 78H/S installed in the GPS-12R (one of these two Options is required for this application), the GPS-12R can be locked to GPS at one location and then transported, without needing to power-down, t other sites for 1PPS comparisons/system 1PPS calibrations.

➢ With this mobile testing for 1PPS calibrations, GPS should only be applied initially and not re-applied at the other various locations until the testing has been completed. Reconnecting GPS again at another location can induce GPS jitter (in the vicinity of +/- 50 ns) in the 1PPS signal. This movement of the 1PPS is not desired and therefore should be based only the minimal drift if the High stability oscillator while its being moved to the various sites.

Q. If we remove power from the GPS-12R and transport it 10 KM, will it re-lock to a GPS signal at the new site? How fast?
A. **Reply from Keith (5 Sept 16):** GPS input should not be reconnected once the oscillator has been locked to GPS and the GPS signal subsequently removed for transport.

Q. Could we perform the 1 PPS alignment without having the GPS-12R locked to the GPS signal?"

A. Reply from Keith (5 Sept 16): I recommend locking the oscillator to GPS initially, and with the battery option installed, remove AC power to allow the GPS-12R to operate off of its internal battery as its being transported to the various sites.

Calnex Sentinel: STA-61 STA-61G and STA-61GB (STA61) Sync Tester/Analyzer

➤ Refer to "STA-61 CustAssist document" (in the custservice folder) for all info on this product, which is now owned by Calnex:

I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\STA-61\STA-61CustAssist.pdf

Tech Support/Calibration of STA-61

➤ ~~Forward to Spectracom France.~~ Forward customer to Calnex Solutions

https://www.calnexsol.com/en/ (their contact info is listed on their web page under "**Contact**")

- For example, in **North America/South America**, contact **Spirent** (www.spirent.com)
- For example, in **Asia/Pacific**, they have several regional contacts:

ASIA-PACIFIC REGIONAL CONTACTS	
Australia	Malaysia
Brunei	Myanmar
Cambodia	New Zealand
China	Philippines
Hong Kong	Singapore
India	Taiwan
Indonesia	Thailand
Japan	Vietnam
Korea	

Wandermeter (WM-11) (discontinued)

> Data sheet and info: Refer to our website (in the retired products section)
> http://spectracom.com/Support/HowCanWeHelpYou/RetiredProducts/Wandermeter/tabid/1277/Default.aspx
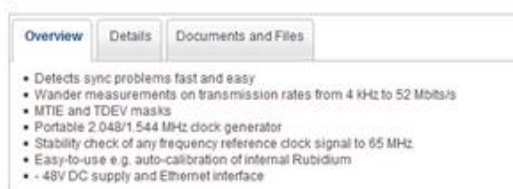
E) WanderView software (Windows-based control software for the Wandermeter WM-11)

> Software was verified by a Telecom India to be able to run on Windows 7 (30 Jul 2015)

Many thanks for your quick answer!
We managed to download the sw and install it on a Win7 PC (even if on the help it says it works on XP or older windows versions): from this PC we can now control the WM-11, so we are not any more linked to very old XP PCs.

Can be downloaded at no cost from our website:
Go to
http://spectracom.com/Support/HowCanWeHelpYou/RetiredProducts/Wandermeter/tabid/1277/Default.aspx
In the "Documents and File" tab, click on "WanderView Software"

Pendulum Spectrum Analyzers

Spectrum Analyzers

**Model 2261/2261A ("Analyze-R")

- ➤ This is an **XL Microwave** device
- ➤ Pendulum P/N: 944612261001
- ➤ We did not acquire this device from Pendulum or anything for it.
- ➤ Refer to websites such as: http://www.testequipmentconnection.com/40887/Pendulum_Instruments_2261A.php

Per Lisa Perdue – we don't support this very early Model (neither does Altaria)

Reset 2261 to factory settings

Email from Rick Kieft to Eva Chapa (10/19/09)
I spoke with Serge from Proxim this AM. He said the 2261A was always in automatic Run mode – as shown on the display, lower right corner – and he needed to return it to manual operation.

To do this, he needs to use LogViewR:
1. Connect up the unit with either USB or RS 232,
2. Save the current records (just to be safe),
3. Click the Unattended Setup button (upper right hand corner),
4. Click the Clear Setup in Instrument button (right side near top),
5. Click the Exit button (right side bottom),
6. When asked to send current setting to instruments click NO (this is the catch, the Clear Setup already cleared the instrument, a YES will send the old settings back to the unit),
7. If the memory is near full (255 records) then Read Instrument And Save Records, followed by Clear Records in Instruments.
This will reset the unit to manual mode and if Clear Records is used that will free up all the memory.

Pendulum XL/CNT-90, CNT-91 Frequency Counters

Spectracom no longer supports or services Frequency counters

- There is an exception is with the AFMETCAL and Redstone arsenal project counters)

Revised announcement
Email from Eric Girard (6 Jul 17) A short email to complete your answer about these products.
Until end of 2016, all counters support were held by Spectracom LU, Pendulum series, Spectracom series and also Tektronic series.
Since beginning of 2017 we sold our products to our factory company, Altaria in Poland. So now they are covering all support for counters, repair, calibration, production… etc
Here below our official communication with customers.

We want to inform you about a new official Spectracom announcement :

"Through a recent agreement, Altaria Services, a Swedish owned company with production facilities in northern Poland, has acquired Spectracom products currently marketed under the Pendulum brand. Specifically, these products are:

- Frequency Counters/Analyzers: models CNT-90, CNT-90XL and CNT-91 and companion products such as the TimeView modulation domain analysis software.
- Frequency Standards: models GPS-12R, 6688/6689, GPS-88/89.
- Frequency Distribution Units: models DA-35 and DA-36.

Since 2008, Altaria has been a contract manufacturing partner to Spectracom. As Spectracom continues to build on its market leading position for resilient positioning, navigation and timing solutions for critical infrastructure, Altaria is best-suited to directly support customers of Pendulum test & measurement products due to their strong knowledge with their design, manufacture, test and support.

As of Jan 1, 2017, all new requests for new sales will be re-directed to Altaria, as well as new customer Purchase Orders.
The same applies for service, support, repair and factory calibrations. Altaria will assume all Spectracom's warranty obligations, as well as out-of warranty repairs and calibrations.

The points of contact to be used within Altaria, in particular for sales requests, PO, support requests are provided below :

Altaria Services SP. Z.o.o.
ul. Lotnica 37
80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : orderdesk@penduluminstruments.com

Web : www.altaria.se

Email blast below was sent out on 5 Jan 2017

Note: As of ~6 January, 2017, Spectracom no longer supports or accepts Counters for repair. Support of counters has been transferred to Altaria"

Through a recent agreement, Altaria Services, a Swedish owned company with production facilities in northern Poland, has acquired Spectracom products currently marketed under the Pendulum brand. Specifically, these products are:

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For the smoothest possible transition, Altaria will work with all Spectracom distribution partners and use Spectracom's last published price list (products and prices).

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Altaria Services SP. Z.o.o.
ul. Lotnica 37
80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : office@altaria.se
Web : www.altaria.se

For general inquires: marcin.sawicki@penduluminstruments.com or harald.kruger@penduluminstruments.com
For sales: orderdesk@penduluminstruments.com
For service: service@penduluminstruments.com

Email from Dave Lorah to a customer (6 Jan 17) Here is the contact information for Altaria. They have assumed support, calibration and service for the CNT-9X Counter products. Spectracom does not own this product anymore. Please contact Altaria directly to arrange a RMA.

The points of contact to be used within Altaria, in particular for sales requests, PO, support requests are provided below:
Altaria Services SP. Z.o.o.
ul. Lotnica 37
80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : office@altaria.se
Web : www.altaria.se

For general inquires: marcin.sawicki@penduluminstruments.com or harald.kruger@penduluminstruments.com
For sales: orderdesk@penduluminstruments.com
For service: service@penduluminstruments.com

- ➤ Link to detailed Engineering information for Pendulum devices: I:\Engineering\Products\Pendulum
- ➤ Primary point of contact for counter support:

XL microwave counters

- ➤ These products were discontinued even before we acquired Pendulum.
- ➤ Not supported or accepted back for repair.
- ➤ Can Purchase CNT-90, CNT-91 or CNT-90XL
  - In the US- through Textronics
  - Outside of the US – ~~Can purchase direct from France or UK~~. (through Textronics)

Email from Mark Day (9 Dec 2013)
My colleague Keith is correct in that the XL Microwave product line has long since been discontinued. It is possible however to order the CNT-90, CNT-91 & CNT-90XL counters direct through Spectracom also. The units sold through Tektronix (sold as FCA/MCA), however have a restricted range of options available, which may not necessarily provide you with the best solution. The model from our current counter portfolio that would be a direct replacement for your older XL Microwave Counter is our CNT-90XL, 27GHz Ch. C input.

I see that you are based in France, and I have copied in Bruno Muzzolini, based at our Les Ulis, France office, who is your Regional Sales Manager who I am sure will be happy to assist you also. Should you have any technical questions on the counters or any Spectracom or Pendulum products, please do not hesitate to contact me.

Models XL 3030 / XL 3130 / XL 3260 / XL 3400 / XL 3400A (XL3400 XL-3400 XL-3400A)

Shortcut to XL Microwave info: EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\XL Micro

Note: All of these products have been discontinued and are no longer supported!

> - **Calibration** – Calibration is recommended yearly. We don't accept these for calibration or repair. But a local cal lab should be able to perform. Standard XL 3400 manual discusses oscillator calibration/maintenance (refer to Chapter 5).

- **Note (9 Nov 15)**: In the past, Lisa Perdue has offered to cal this Model for at least one customer. Talk to her for any requests to cal this unit, to see if she is interested in calibrating it, before assigning an RMA Number.

> - **Repair/Replacement**: We don't accept back for repair. In the US- we recommend they contact Tektronics to purchase a replacement (CNT-9x series counters): us-dist-iams@tek.com

Only certain Pendulum counters (such as the CNT series counters) carried forward for Sales and Support when we acquired this product line. The XL series of counters was not carried forward.

The Sales of all Pendulum counters is now handed directly by Tektronix. I recommend you contact Tektronix directly for information on obtaining an equivalent replacement. They can provide you with the recommended counter, based on your requirements.

The best way to reach them is via email at: **us-dist-iams@tek.com** (I have copied them in on this email for you). Depending on availability and your region, you will likely be contacted by Joe Horlacher, Dan Oman or Erin Larson.

> - Can you tell me what company handles the repair of these units now?

A   Reply from Keith (16 Apr 2014) Unfortunately, I'm not aware of any company that will accept this very early frequency counter for repair. This device has been discontinued for many years now, and the company that manufactured/offered this device no longer exists (since around 2005).

FYI- Spectracom merged with the company called Pendulum Instruments back in 2010. Pendulum had purchased XL Microwave back in 2005. Since this product was discontinued long before we merged with Pendulum, Spectracom did not carry forward from them support of this very early product.

A Google search of the Model Number with the XL Microwave company name may allow to you to find someone that can work on it for you.

The XL Microwave counters were replaced by the Pendulum "CNT" series frequency counters. Please let me know if you need any additional information about this.

(Older info)
4/1/10 – Email from Rich Kieft-
"We have no spare mixers. There are no parts to repair the 3000 series counters. This XL 3400 counter is 14 years old. I would recommend replacement with a CNT90XL 40GHz."

Email from Lisa Perdue (9/30/11)
Eva had a customer wanting to order parts for the XL3400. Lisa responded with:
Eva, we have no parts. We can only calibrate and replace band 2 connectors.
counters of counters was not carried forward.

Battery/batteries

Q. Did we ever offer a 3400A Counter? Do we still offer batteries for the counters?
A. Per Lisa Perdue (19 March 14) It's the same as PA battery (referring to Path Align-R battery)

Model XL 500 (XL500)

Q. I own a XL Microwave Rb standard type 500, which needs repair. As far as I know,
Pendulum bought XL Microwave back in year 2005, later itself being bought by Spectracom. I am in need of user
and service manuals for this Rb reference. Maybe you can help with PDF manuals?
A. Reply from Lisa Perdue (22 Apr 2013) The model 500 was unfortunately discontinued by Pendulum prior to their
acquisition by Spectracom. I searched through all the documentation I could find and cannot locate any manual or
repair information on this unit.

Tek Model FCA3000 / FCA3100 Series frequency counters

➤ FCA3000 and FCA3100 are the Textronics Model Numbers for the privately-labelled Spectracom CNT-90 and
CNT-91 counters.

➤ Textronics FCA3000 is the equivalent of the CNT-90 (with only minor cosmetic difference)

➤ Textronics FCA3100 is the equivalent of the CNT-91 (with only minor cosmetic difference)

➤ Refer to the Textronics contact information further below to forward any questions or problems with the FCA3000
or FCA3100 Models to Textronics (we do not support these products here).

➤ Refer to the Tek website: http://www.tek.com/frequency-counter/fca3000-3100

Specific Models

A) **Tektronix FCA3000 P/N 944603000012D (CNT-90)**

➤ **Details**: Timer/Counter/Analyzer, 300MHz, 100 ps, Std Timebase, No Battery, Universal Power, Calibration Data
report, Option 11 Rear panel Connectors

➤ Refer to ECO-0562 for details

Model CNT-90/CNT-91 series counters

CNT9x Manuals

> Link to all CNT-9x manuals (programmers handbook, user manual, service manual) I:Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT frequency counters\CNT 9x\CNT manuals

CNT Service Manual

Regarding CNT-9x Service Manual (per Emmanuel, 22 May 2015) Our policy is to provide the Service Manual for counters or frequency references only to qualified technical support partners

Note: (26 May 15) Emmanuel OK'd sending just sending Chapter 7 for oscillator calibration.

General info on CNT-xx counters

> All Knowledge base articles for CNTs: http://support.spectracomcorp.com/search?q=cnt-

Tektronix (For all CNT counter Sales leads in the US)

Important Note:

> Most Frequency Counter sales (in the US) are now handled by Tektronix (except for larger volume Sales, which are still being handled in the US).

> International sales leads should continue to be routed to the typical Spectracom Sales channels.

Note: Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment

Tek Sales: us-dist-iams@tek.com
Depending on availability and your region, you will likely be contacted by: Joe Horlacher, Dan Oman or Erin Larson.

Dan Oman (Inside Account Manager): (503-627-7462) Dan.Oman@tektronix.com
Joe Horlacher | Distribution Inside Account Manager | Phone: 503.627.7280 | www.tektronix.com

Request from Tektronix

Key items we need to contact the customer and load our tracking database.
– Company
– Contact (Full Name)
– Phone Number
– Email Address (If possible but not mandatory)
– Zip code
– City, State
– Basic Product Interest or Model Number
– Qty
– Any helpful comments.

Tektronix website for Sales or Support: www.tek.com
Tech support for Tektronix-branded products

Some Key Phone Numbers

- Customers will be usually be asked to press a number to choose between sales, service, or technical support
- North/South America: 1-800-833-9200
- Austria, Belgium, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, Switzerland, UK: 00800 2255 4835
- China (PRC): 400-820-5835
- Taiwan (ROC): 886 (2) 2656-7527
- India: 000-800-650-1835
- Korea: 001- 800-8255-2835
- Singapore: 001-800-8255-2835

Cross Reference Spectracom/Fluke to Tektronix

Spectracom Model	Fluke Model	Tektronix Model	Description
CNT-90	PM6690/011	FCA3000	Timer/Counter/Analyzer, 300MHz 100ps
CNT-90 w/Option 10	PM6690/611	FCA3003	Timer/Counter/Analyzer, 300MH-3GHz 100 ps
CNT-90 w/Option 14B	N/A	FCA3020	Timer/Counter/Analyzer, 300MHz-20 GHz 100 ps
CNT-91		FCA3101	Timer/Counter/Analyzer, 300MHz 50 ps
CNT-91 w/Option 10		FCA3103	Timer/Counter/Analyzer, 300MHz - 3 GHz 50 ps
		FCA3103	Timer/Counter/Analyzer, 300MHz - 20 GHz 50 ps
CNT-90XL-27G (incl option 19/90)		MCA3027	Microwave Counter/Analyzer 300 MHz -27GHz 100 ps
CNT-90XL-40G (incl option 19/90)		MCA3040	Microwave Counter/Analyzer 300 MHz - 40GHz 100ps
Option 10	PM6690/6xx	see FCA3x03* models above	3 GHz input option for CNT-90 family
Option 11/90	PM6690/xx2	FCAXXXX RP* MCAXXXX RP	Rear panel inputs for CNT-90 family
Option 14B	N/A	see FCA3x20* models above	20 GHz input option for CNT-90
Option 19/90	N/A	FCA3XXX MS*	Medium Stability time base; 0.2 ppm/month
Option 23/90	N/A		Battery pack for CNT-90, CNT-90XL
Option 29/90	TimeView 90W	TVA3000	TimeView, Modulation Domain Analysis SW
Option 30/90	PM6690/x5x	FCA3XXX HS* MCA3XXX HS	High-stability oven oscillator
Option 40/90	PM6690/x6x	MCA3XXX US*	Ultra-stability oven oscillator
Option 22/90	PM9622/021	N/A	Rackmount Kit
N/A		RMU2U	Rackmount Kit
Option 90/02			Calibration certificate – any oscillator

Warranty, Tech Support and repairs outside of the US

Warranty length: 3 years (Except India: 1 year)

Repair of Counters sold in the US

For issues with counters that we sell out of Rochester, it should be returned to us first, to see if we can repair it. If not, we may need to send it to France for repair?

Tech Support/Repairs outside of the US

- Spectracom France owns the frequency counters.
- Spectracom France is the repair center for the frequency counters.

RMAs/repairs for CNT-9x

All RMAs from the US should come back to Rochester first. Assign an RMA for it to be shipped here. To keep equipment from sitting in "triage" and then having to be shipped out to Spectracom UK or Alteria for further service, add a note on the RMA folder for the folder to be brought over to Tech Support when equipment arrives. Then check with Lisa Perdue on how best to handle the RMA.

All RMAs from overseas should likely go directly to Spectracom France for evaluation/repair (instead of coming back to the US and then going to France???

Counter Repair RMAs /Calibration requests

(E**mail from Lisa Perdue)** From now on, please do not issue any RMA for CNT-90XL to be returned here. Please let Basingstoke handle it. We could ship through us if customer balks at shipping overseas, but let BAS issue the RMA and we can handle the ship-through using their RMA.

****** Counter CALIBRATION:**

> We are no longer accepting CNT-90 and CNT-91 counters back for calibration

Email from Dave Lorah (22 Jan 15) I must inform you that Spectracom is no longer performing calibrations on this equipment. Next year when the calibration is due you will need to contact a different vendor for service. Hopefully you can locate a calibration facility locally that will be able to perform this service.

Link to CNT counter calibration documents: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x\CNT calibration (can send Chapter 7 of the Service Manual – but the full service manual can only be sent to qualified partners).

- Chapter 7 of the Service Manual (for calibration) is available as its own separate document ("CNT9X_Calibration). Refer to/send ("**CNT9x_Calibration.pdf**"): ..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT frequency counters\CNT 9x\CNT calibration

Note about Chapter 2 : If a customer/cal lab requests **Chapter 2** of the **Service Manual** (Performance Checks) for "testing", this Section of the service guide is the same as the Section 7 CNT user manual ("CNT-9x_manual.pdf") , which can be sent to them with no restrictions   I:Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT frequency counters\CNT 9x\CNT manuals

> **Regarding CNT-9x Service Manual (per Emmanuel, 22 May 2015)** Our policy is to provide the Service Manual for counters or frequency references only to qualified technical support partners

> To maintain the performance of the timer/counter, we recommend that you calibrate the timebase of your instrument every year, or more often if you require greater timebase accuracy.

> All Models are "closed-case" calibration that can be performed at any cal lab (they do not have to be opened up to calibrate). Go into "User options" and the code to start the cal process is 62951413 (the password is Pi backwards). A separate calibration manual can be obtained.

> Calibrating the unit will not void the warranty.

> Customers need to use a local cal lab instead of returning to us. We have a great service manual that we can send to their cal lab.   http://www.spectracomcorp.com/Portals/0/repository/CNT-90XL91_ServiceManual.pdf

> The counters come with Certificate of Calibration and Conformance automatically but if they want cal data (which is what they are asking for when referencing Z540) they needed to order the Option 90/xx (for this unit, should have been Option 90/06).

> There is no sensitivity calibration available. Just the timebase can be calibrated.

~~Per Lisa Perdue:~~ We are not certified to perform calibrations on this equipment and don't even have an accurate

reference to use to perform a cal.

We should return to Alteria for calibrations. We need to assign an RMA for it to be returned to us. Since Alteria is outside of the US, a couple of extra weeks are needed to be added to RMA turnaround due to international shipping back and forth.

Cal requests for numbers such as "Z540","17025" or any other "numbers"

- 17025: Refer to knowledge base article http://support.spectracomcorp.com/articles/FAQ/ISO-17025-Calibration?q=17025&
- Z540, Z540.1, Z540.3: refer to knowledge base article: http://support.spectracomcorp.com/articles/FAQ/Z540-Calibrations?q=z540&

Email from Lisa Perdue (13 Nov 2012) ~~We do not provide Z540 or 17025 calibration here. If you have a local lab that can do it, I can send them the procedure/service manual.~~

Email from Lisa Perdue (14 Nov 2012) Normally for calibration of these units, we recommend that you use a local lab and we can provide the procedure for the calibration. It is a closed case calibration that can be performed at any calibration lab.

Email from Lisa Perdue (14 Nov 2012) Our factory is ISO 9001 certified ~~and we can calibrate the unit and provide before and after calibration offset. We can provide the equipment used in calibrated (which has been calibrated at a lab traceable to NIST). We do not hold any industry calibration accreditations.~~

Email from Lisa Perdue (21 Dec 2012) Any accredited calibration facility can perform the calibration on the CNT-90. We can also perform the service if the unit is sent to Rochester NY. The cost for calibration would be $200 plus shipping. If you are interested in sending it to Spectracom for calibration I will issue a RMA and return shipping instructions.

The turnaround time for calibration is 2 to 3 weeks.

Counter Calibration Menu

- The counters have a calibration menu, with a password of **62951413** (refer to the Service manual "CN-90XL91 Service Manual for more info: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x\CNT manuals
- **Regarding CNT-9x Service Manual (per Emmanuel, 22 May 2015)** Our policy is to provide the Service Manual for counters or frequency references only to qualified technical support partners

Known calibration issue based on change in orientation of the chassis

- Calibration value changes if chassis is re-oriented 90 degrees.
- Refer to Salesforce cases such as 17305.
- Apparently due to the presence of shielding on sides of chassis, but not on front/back panels.

Email from Emmanuel (4 Mar 15) Thanks Dave for correlating this observation with the previous one.
We take note of this observation, which is the same as the one you saw already, but arriving through a different path. We don't have a different answer than the one we provided for the first case.

All CNT91R-AF counters are likely to show the same behavior: the output frequency is affected by magnetic field variations. If the counter is in a dense EMC environment, then changing the orientation of the unit might result in a magnetic field change, in turn resulting into a frequency variation.

We need to provide the same explanation / recommendation to this individual.

We can also recommend the same testing approach to confirm the cause; in particular, checking that a different CNT91R-AF unit has the same behavior in the same environment would help confirming such cause

Q. I have attached 8 pictures showing the 10MHz output of the CNT-91R/AF and how the count changes depending on what position it is in. I am using an 53132A counter with a 1083B as the external time base. I have used different cables and checked the counter in different locations of the lab. Please let me know if you have issues downloading the pictures.

A. **Reply from Dave Lorah (27 Jan 15)**
   Our recommended tests for this counter are:

   - exchange with a different unit and see whether the frequency offset remains dependent on product orientation with a different unit

   - setup the same experiment on a table, far from any electric wire

   This behavior can be due to magnetic field generated by electric wires transporting significant current (either below the bench or close to it) or poorly grounded Ethernet signals. I know you have tried this in different parts of your lab. Could it be the entire building is subject to magnetic field interference? If shielding the unit has not given you any different results we should probably have the counter returned to Spectracom for evaluation. That way we can see if this counter behaves any differently from known good units.

Calibration environment

   ➢ Counters are calibrated in a controlled environment (23° +/-3°c)

~~Email from Dave Lorah (3 Aug 2015)~~ The Model CNT-91R/AF and all the similar counters are calibrated in a controlled environment.

The adjustments, calibration and final tests are made in temperature 23° +/-3°.
Also calibration and final tests are made when counter is in the cover to have a real working environment. We monitor and record the temperature in the room where we do adjustments, calibration and final test.

Performance checks discussed in the manual

Q I have one more question. There seems to be two contradictory statements in the operational manual's performance checks. There's a note on page 7-2 which says "The procedure does not check every facet of the instrument's calibration". This seems contradictory to the sentence directly above the note, which says that the performance checks are used for "checking the necessity of recalibration after the specified recalibration intervals".

   So if the counter passes the performance checks, is it considered within every facet of the manufacturer's specs? Or is there a separate procedure used for checking that the counter is within every facet manufacturer's specs?

A Per Dave Lorah (7 Aug 2015) What the statement means is; if the counter passes all performance checks there is no need for recalibration. The performance check tests the key parts of the counter and makes sure they are working properly. If the performance check passes we can assume with very good confidence the counter is performing within specifications.

Specific CNT series Frequency Counters

  A) **Pendulum CNT-66 (discontinued)**

  ➢ Discontinued product / no longer supported or accepted for repair

  ➢ Link to manual: \\rocfnp01\idrivedata\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT frequency counters\CNT-66

B) Pendulum CNT-81 (Fluke 6681)

  ➢ Discontinued product / no longer supported or accepted for repair

Email from Dave Lorah (3 Dec 2015) I checked with our office in France who serviced these older products in the past and found they no longer service the Fluke 6681 A.K.A. Pendulum CNT-81 Counters and have no parts stock for these either. So this product is no longer hardware supported.

Our current product it the CNT-90 line which is a replacement to this unit. In the US, Tektronix sells the CNT-90 as a model FCA3000.

C) Pendulum CNT-85/ CNT-85R (Frequency Counter) (discontinued/limited support)

Discontinued: End of Life letter going out Products page in May 2013, when inventory is depleted. 4 March 2013. Per Tim K and Emmanuel, we plan on adding it to the Retired

Email from Emmanuel (4 Mar 2013) Closest replacement for CNT-85 is more CNT-90. CNT85 will be supported for 5 years following last shipment.

  ➢ Shortcut to data sheets: link to datasheets in SharePoint

  ➢ Shortcut to all technical documents/manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x

CNT-90 Timer/Counter/Analyzer

- Affordable frequency measurements
- 0.001 Hz to 400 MHz, 20 GHz option
- 100 ps resolution

> Shortcut to data sheets: link to datasheets in SharePoint

> Shortcut to all technical documents/manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x

> Link to CNT-90/91 Service Manual on our website:

> Note: Service Manual (except chapter 7 by itself) shouldn't normally be sent out to any dealers or customers. See email from Laurent below

(per Emmanuel, 22 May 2015) Our policy is to provide the Service Manual for counters or frequency references only to qualified technical support partners. **Note**: (26 May 15) Emmanuel OK'd sending just sending Chapter 7 for oscillator calibration.

http://www.spectracomcorp.com/Portals/0/repository/CNT-90XL91_ServiceManual.pdf

Specs

Humidity

Q. General Dynamics is asking for a clarification in the Humidity Specification for the CNT-9X. The data sheet does not specify if the Humidity spec is STORAGE or OPERATING.

Is there a difference or is it the same for both Storage and Operating? Please let me know as soon as you can.

Per Emmanuel (21 March 14): The humidity spec is the same for storage and operating.

Display

A) Display contrast/intensity

> Display contrast can be adjusted using down/up buttons on the front panel.

B) Accuracy of the display reading

> Refer to CNT-9x data sheet

Q. I have a CNT-91 timer/counter/analyzer that I am running a few checks on to ensure that it meets proper specifications. There is one check we do to check the display of capability of the counter by inputting a signal and seeing what it reads. This is usually checked to a chart of ± a specific frequency example 10,000,000Hz ±1Hz. Going through your service and user manual that we have here we can't seem to find a specification for the display. I am hoping that any information to clarify the specifications of this unit would be greatly appreciated.

A Reply from Dave Lorah (25 Feb 14) I am not exactly sure what you are requesting but I believe you are looking for a spec for the accuracy of the display reading?

The display is 100% digitally driven by the microprocessor so there is no individual adjustment for the front panel display. The display accuracy is the same as the counter accuracy.

Configurations/Options

Configurations

➤ The three digits after the Model Number individually indicate different configurations (such as CNT-91/061)

➤ Refer to INTERNAL ONLY article https://na8.salesforce.com/ka3C0000000GqZ5

Modelno/XYZ or 9446 100 91XYZ

"X" = pre-scaler
0 = no prescaler
1 = 15 GHz, option 14
6 = 3 GHz, option 10
7 = 8 GHz, option 13
8 = 20 GHz, option 14B

"Y" = oscillator
0 = standard oscillator
4 = Medium stability, option 19/90
5 = High stability, option 30/90
6 = Ultra-high stability, option 40/90
7 = Rubidium oscillator (identifies CNT-91R)

"Z" = other options
1 = standard
2 = rear-panel inputs, option 11/90

➤ Excel Configurator INTERNAL USE ONLY: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT frequency counters\CNT 9x\configuration

Options

➢ Refer to CNT-9x data sheet (see excerpt below)

Input Frequency Options
Option 10: 3GHz Input C
Option 13: 8GHz Input C
Option 14: 15 GHz Input C
Option 14B: 20 GHz Input C

Time Base Options (CNT-91 only)
Option 19/90: MediumStability Oven Time Base;
0.06 ppm/month
Option 30/90: Very High Stability Oven Time Base; 0.01 ppm/month
Option 40/90: Ultra High Stability Oven Time Base; 0.003 ppm/month

Optional Accessories
Option 11/90: Rear Panel Inputs (replaces front panel inputs)
Option 22/90: Rack-Mount Kit
Option 27: Carrying Case - soft
Option 27H: Heavy-duty Hard Transport Case
Option 29/91: TimeView 3 Modulation Domain Analysis SW for CNT-91/CNT-91R
Option 90/01: Calibration Certificate with Protocol; Standard oscillator
Option 90/06: Calibration Certificate with Protocol; Oven oscillator
Option 90/07: (CNT-91R only) Calibration Certificate with Protocol; Rubidium oscillator
Option 90/00: Calibration Certificate with Protocol; Hold-over frequency aging/week
Option 95/05: Extended warranty from 3 to 5 years
OM-90: Users Manual English (printed)
PM-90: Programmers Manual English (printed)
SM-90: Service Manual English
GS-90-EN: Getting Started English
GS-90-FR: Getting Started French
GS-90-DE: Getting Started German

February 4, 2013 - 4031 600 91101 - rev. 17
Specifications subject to change or improvement without notice.
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****Option 22/04: side rack mount kit for one CNT and one Agilent**

➢ (May, 2017) I believe this kit is no longer available/removed from SalesForce (due to poor assembly instructions).

Older note: I don't see this kit listed on the CNT datasheet. But just in case it comes up, refer to the GSG CustAssistance document for info about this kit from Spectracom France.   (search the document for "**22/04**").

Option 22/90: Side by side Rack-mount kit for CNTs and GSGs

P/N for entire kit: 1211-0000-0701 (**In Arena at**): *https://app.bom.com/items/detail-spec?item_id=1203165709&version_id=10221247828*

Item #1211-0000-0701   **In Production**   🖼0 👤0 🔁0   📞 Save to Dashboard   ⤷ Export Item

RACK KIT, CNT/GSG, SIDE BY SIDE   ↻ Add to Qual

Revision: »A - In Production ▾ | **Effective** as of 01/16/2015 05:20:35 PM

Specs ▾ | **Bill of Materials** | Where Used | Sourcing ▾ | Costing ▾ | Files ▾ | Compliance ▾ | Revisions ▾ | Notifications ▾ | Supplier Access | Projects | Quality

Indented | Sourcing | Flat | Purchasing | Custom | Redline | Compare | Lookup

Contains **9** first-level Items, **9** line Items, **9** unique Items

	#	Item Number	Item Name	Category	Phase	Wkg Mods
☐	1	1211-1000-0706 rev A 🔍	BRACKET, REAR	🗎 Fabricated Metal	In Prod	
☐	2	1211-1000-0709 rev A 🔍	HINGE, SPRING LATCH	🗎 Fabricated Metal	In Prod	
☐	3	1211-1000-0714 rev A 🔍	EAR, RACK	🗎 Fabricated Metal	In Prod	
☐	4	1211-1000-0800 rev A 🔍	LABEL, BAG, SXS RACK KIT	🗎 Label	In Prod	
☐	5	1211-5000-0050 rev A 🔍	ASSY. INSTRUCTION, SXS RACK KIT	🗎 Manual	In Prod	
☐	6	HM10R-04R0-0008 rev 1 🔍	SCREW, PHP, M4, 316SS, 8MM	⊚ Fasteners/Spacers, Metric	In Prod	
☐	7	HM25R-05R8-0010 rev 1 🔍	SCREW, OHP, M5, 18-8SS, 10MM	⊚ Fasteners/Spacers, Metric	In Prod	
☐	8	HM50R-04R0-0016 rev 1 🔍	SPACER,HEX,F-F,ZINC PLT BRASS,M4X16	⊚ Fasteners/Spacers, Metric	In Prod	
☐	9	MP02-0003-0002 rev 1 🔍	LABEL STOCK	🗎 Label	In Prod	

Assembly instructions for rack mount (in Arena) 1211-5000-0050: https://app.bom.com/items/detail-spec?item_id=1203165717&version_id=10221247908

Software updates

Email from Dave Lorah (16 Apr 2015) CNT-90 can be updated but only if this is hardware version "S" or "T".
In the User Options/About menu you will see the firmware revision followed by a letter. For example, Firmware: V1.30s is hardware version "S".

Here is a link to the firmware update version V1.28.
http://www.spectracomcorp.com/portals/0/repository/CNT9x_V128.zip . This file contains the uploader.

Option 28/Opt 28 (pulsed RF)

Calibration of Option 28

➢ (From Salesforce case 21630)

Question: Could you send me a calibration procedure for the Pulsed RF (Option 28) for the CNT-90XL-27G. Background: I am an Electronics Engineer for the Air Force Primary Standard Laboratory in Heath, OH. One of our responsibilities is we develop calibration procedures for the Air Force. We have just over 100 units (CNT-90/91) that have been procured in the Air Force and we currently calibrate these units organically. Recently a unit with the Pulsed RF measurement was purchased and we have not dealt with this in our calibration procedure in the past. Thank You very much for any assistance you can provide

Answer: (reply from Dave Lorah, 18 Mar 2016)
The Pulsed RF option requires no calibration. There is no specific performance test for the Pulsed RF either that can be done by the customer.
This is originally performed in the factory using an ATE specific test.

The only calibration that can be done is the timebase, which does not affect the Pulsed RF function.

You can check the operation of the Pulsed RF measurement by doing a check of frequency and pulse width using a Microwave frequency pulse generator sending short pulses but this is just an operational check, not a performance specification check.

An easy setup for this is to use MW pulse generator and to measure the output of the pulse generator on channel C, using the statistics mode.

So there is no performance check for this option.

A) Pendulum CNT-90R (with Rubidium oscillator)

➢ Shortcut to data sheets: link to datasheets in SharePoint

Most common applications for these devices are to characterize an oscillator (warm-up time, Allen Variance, etc), RADAR, HP/Modulation and Pulsed RF analyzing.

B) Pendulum CNT-90XL (Microwave Counter/Analyzer) with OCXO oscillator

➢ Shortcut to data sheets: link to datasheets in SharePoint

➢ Shortcut to all technical documents/manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x

➢ Link to CNT-90/91 Service Manual on our website:

Note: Service Manual (except Chapter 7 by itself) shouldn't normally be sent out to any dealers or customers (see email further below from Emmanuel)

http://www.spectracomcorp.com/Portals/0/repository/CNT-90XL91_ServiceManual.pdf

Regarding CNT-9x Service Manual (per Emmanuel, 22 May 2015) Our policy is to provide the Service Manual for counters or frequency references only to qualified technical support partners

- ➤ Note: (26 May 15) Emmanuel OK'd sending just sending Chapter 7 for oscillator calibration.

- ➤ Similar to CNT-90 with mixer frequency of 27-60GHz.

*****Desire to upgrade CNT-90 to CNT-91

Q. Can we upgrade to firmware in a CNT-90 to become a CNT-91?

A (KW replied on 5/21/12) See Salesforce case 5500

…As for your desire to upgrade the CNT-90 to become a CNT-91, unfortunately this is not possible. There is no upgrade path for the CNT-90 to be updated to a CNT-91, without actually replacing it altogether, as they are different hardware platforms as well (in addition to using different software). So a CNT-90 cannot be converted to a CNT-91.

Pendulum CNT-91/ CNT-91R /CNT-91R-AF (Timer/Counter/Analyzer) with OCXO oscillator

Shortcut to all technical documents/manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x

Shortcut to manuals and software on our website: http://spectracom.com/support/product-manuals-software/model?model=cnt_9x

Shortcut to data sheets: link to datasheets in SharePoint

Link to CNT-90/91 Service Manual on our website:

Note: Service Manual (Except Chapter 7 by itself) shouldn't normally be sent out to any dealers or customers (see email from Emmanuel below)   http://www.spectracomcorp.com/Portals/0/repository/CNT-90XL91_ServiceManual.pdf

Regarding CNT-9x Service Manual (per Emmanuel, 22 May 2015) Our policy is to provide the Service Manual for counters or frequency references only to qualified technical support partners

Note: (26 May 15) Emmanuel OK'd sending just sending Chapter 7 for oscillator calibration.

- ➤ Both are 300MHz.

- ➤ CNT-90 is 100ps and CNT-91 is 50ps

- ➤ A and B input with optional C input as follows:

  - ▪ 3 GHz (Opt 10)

  - ▪ 8 GHz (Opt 13),

  - ▪ 14 GHz (Opt 14)

  - ▪ 20 GHz (Opt 14B)

➢ Designed to look like HP Models 53131A and 53132 on the IEEE interface.

****CNT-91R-AF (US Air Force)

➢ CNT-91R-AF is a special configuration for the Air Force METCAL project/contract). It is not commercially available for purchase. For any questions about this particular Counter, contact Mike Messina (the Account Manager).

➢ Note the reference Order Number for this purchase is T-37127.

Specific configurations

For specific configura**t**ions, get the full 12 digit P/N (begins with "9446") from the S/N tag:

A) P/N: NC 9446 100 91677

Email from Lisa Perdue (23 May 13)

CNT-91 – 9446 100 91XYZ   CNT-91R – 9446 100 91X7Z

> "X" = pre-scaler
> 0 = no prescaler
> 1 = 15 GHz, option 14
> 6 = 3 GHz, option 10
> = 8 GHz, option 13
> 8 = 20 GHz, option 14B
>
> "Y" = oscillator
> 0 = standard oscillator
> 4 = Medium stability, option 19/90
> 5 = High stability, option 30/90
> 6 = Ultra-high stability, option 40/90
> 7 = Rubidium oscillator (identifies CNT-91R)
>
> "Z" = other options
> 1 = standard
> 2 = rear-panel inputs, option 11/90
> 7 = AFMETCAL outputs (1x100kHz, 1x1MHz, 1x5MHz and 2x10 MHz)

Email from Dave Lorah (15 Jan 16) I received verification of the Model CNT-91R/AF /677 model numbering scheme.

The last digit "7" did not appear in the standard configurator model so I needed to verify with the product manager just what it represented. The last digit "7" indicates the counter is the special issue CNT-91R/AF built for the AFMETCAL program.

So the options /677 are:

6= 3 GHz Pre-scaler
7= Rubidium Oscillator
7= AFMETCAL

Air Force calibration error in the CNT-9x Service Manual regarding Trigger Levels Calibrations

  ➢ **Refer to Salesforce cases such as 25225**

Email from Dave L (4 May 17) We are aware of a problem with the trigger level sensitivity test. There was an error in the Service Manual and Spectracom has revised the manual to change the test parameters.

Here is a portion of your USAF procedure that needs to be updated:

4.4 TRIGGER LEVELS CALIBRATION:

4.4.1 Press the TI auto set key twice to preset the TI.
4.4.2 Press the TI 6 (input A) key.
4.4.3 Press the TI 2 key, as required, to select DC, the 3 key, as required, to select 50 Ω, then the 5 key to select Man.
4.4.4 Connect the Function Generator to TI input A.
4.4.5 Set the Function Generator for 10 kHz sinewave at 900 mV p-p with +0.5 V offset.
4.4.6 Press the TI Trig key, enter +1 V, then press the exit key.
4.4.7 The TI trigger indicator must be off.
4.4.8 Press the TI Trig key, enter -1 V, then press the exit key.
4.4.9 The TI trigger indicator must be on.
4.4.10 Press the TI Trig key, enter 0.0 V, then press the exit key.
4.4.11 The TI trigger indicator must be blinking.
4.4.12 Set the Function Generator for minimum output.
4.4.13 Disconnect the Function Generator from TI input A and connect to input B.
4.4.14 Press the TI meas func key, the 1 (Freq) key twice, the 3 (B) key, then the 7 (input B) key.
4.4.15 Repeat steps 4.4.3 through 4.4.12 for TI input B.
4.4.16 Set all POWER switches to OFF or STBY. Disconnect and secure all equipment.

The new Trigger Level Indicator test changes the following parameters:

4.4.8 Press the TI Trig key, enter 0.0 V, then press the exit key.

4.4.10 Press the TI Trig key, enter 0.5 V, then press the exit key.

Here is a link to upload the updated Service Manual: https://spectracom.citrixdata.com/d-s8265e950e334aa58

****Counter known issues/ ECNs

A) Counter orientation affects calibration (4 Mar 15 KW)

➢ Calibration value changes if chassis is re-oriented 90 degrees.

➢ Refer to Salesforce cases such as 17305.

➢ Apparently due to the presence of shielding on sides of chassis, but not on front/back panels.

➢ Also refer to "CNT counter Calibration" section of this document (above).

B) Green Power button only momentarily turns off equipment (6 Jun 13 KW)

➢ Refer to Salesforce Case 10144 https://na8.salesforce.com/500C000000RbEOn

➢ Alteria released an ECN change to address this on GSGs and Counters.

Q. The Green power button only turns the unit off for a moment and it turns back on after the button is released.
A. Per Lisa Perdue Give him an RMA for warranty repair. We need to change the load resistors for the power supply. Find out when he got it, this should have been noticed and corrected in manufacturing.

A. Email to customer from Keith FYI**-** This modification is not required to be performed. Keep in mind that the counter can also be turned off by simply removing power, if you need to turn it off for any reason. It doesn't hurt the counter at all to leave it powered-up or to simply remove the external power if you need to power it down.

****Counter firmware updates

➢ Firmware updates aren't "visible" to our customers on our website. Our website just says contact Spectracom to receive counter firmware updates:
http://www.spectracomcorp.com/Support/HowCanWeHelpYou/Software/tabid/61/Default.aspx#CNT-9X_Firmware

➢ Direct link to our website: http://spectracom.com/support/product-manuals-software/model?model=cnt_9x

Need to confirm Model/hardware revision (There will be either an "s" or a "t" after the firmware revision).

• The "s" units can be upgraded directly to the latest firmware rev 1.31.

• If the suffix is a "t", then the firmware must be updated to version 1.28 before upgrading to 1.31.

• "I can send you the firmware updates and instructions if you can identify the suffix from your version info. There is no charge for the firmware update."

CNT firmware updates are stored in SharePoint:

➢ https://oroliagroupemeamicrosoftonlinecom-1.sharepoint.emea.microsoftonline.com/Spectracom/customer_service/Lists/Pendulum%20Firmware%20Download/AllItems.aspx . This link will provide a link to a repository on our website that they can download the upgrade files from.

Release Notes: Release Notes are included with the file download.

Q. I see from your current info that there are numerous firmware upgrades on this series -- would any be suitable for our CNT-90 and what would the cost be to send it in for "upgrade"?

Also, present CNT-90 accepts up to 400 MHz on Ch A & B -- is this an upgrade that could be applied to our counter? Cost?

A. Reply from Dave Lorah (28 May 15) The CNT-90 firmware can be upgraded but we must confirm the hardware revision. There will be either an "s" or a "t" after the firmware revision.

The "s" units can be upgraded directly to the latest firmware rev 1.31. If the suffix is a "t", then the firmware must be updated to version 1.28 before upgrading to 1.31. I can send you the firmware updates and instructions if you can identify the suffix from your version info. There is no charge for the firmware update.

Your CNT-90 Counter would not have the -XL option as this was first released in 2007. Version 1.12 does not support the XL option. There is no upgrade to -XL for this unit.

****CNT-xx memory contents/sanitization procedures

- ➤ Refer to CNT-9x memory.pdf document at: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT frequency counters\CNT 9x\CNT memory

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****CNT-xx Repair parts

- ➤ Alteria is the source for replacement repair parts and info on parts

LCD display

Email from Lisa Perdue: The LCD display part number is **LDCD5T907GDS** and the manufacturer is **Nan Ya Plastics**. This is all the information I have on the LCD display.

CNT-xx Operation

> **Link to CNT 9x white papers**: EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x\CNT white papers-ap notes

***flashing padlock symbol (rb control loop not locking)

> Refer to **Salesforce case 171794** (info below is about this case)

Q CNT-91R/AF flashing padlock symbol with RB indicating control loop not locking. Flashes for over 24 hours when it should take 5 minutes.

A reply from Dave L (15 Aug 18) This indicates the Rubidium Oscillator module is failing and needs to be repaired. The Counter will need to be returned to Spectracom for repair. I can setup a RMA if you wish. Please reply with your billing and shipping addresses and the serial number of the counter and we will send you the RMA and shipping instructions.

***Magnetic/EMI interference (calibration changes when oriented in different directions)

> Use an RF shield to help alleviate this condition.

> Refer to **Salesforce case 16955** (for John Gurule with Kirtland AFB)

The cal in in tolerance (3.1mHz) in one direction but when they turn the unit 90 degrees it becomes out of tolerance. It is repeatable in all corners of a 200 foot lab and always in the same direction. They tried swapping cables and everything. It must be interference coming through the front or back of the unit.
He will try putting it in a metal garbage can (high tech) and see if it makes any difference.

Email from Dave Lorah to Emmanuel: The customer sent photos of the counter orientation vs. frequency readings. He believes there is something wrong with this equipment because the cal value is changing.
How can I reassure the customer the CNT-90R/AF is good?

OR is there something wrong with this counter?   I did explain there could be a magnetic field affecting the Rb oscillator but he did not try shielding it yet. He said he would try it again with a shield.

A. reply from Emmanuel (27 Jan 15) Recommended test is
- exchange with a different unit and see whether the frequency offset remains dependent on product orientation with a different unit
- setup the same experiment on a table, far from any electric wire

This behavior can be due to magnetic field generated by electric wires transporting significant current (either below the bench or close to it) or poorly grounded Ethernet signals.
Only the results of these two tests will test us if the CNT91 is good.

****Input sensitivities of channels A and B

Q **(Douglas Smith, 13 May 13)** just received the subject item (purchased by the Air Force) and was wondering about the input sensitivity of Channels A & B. The markings on the front panel indicate a frequency input range of 400 MHz. The Specs listed in the supplied manual give the same indication (Page 8-47, under Frequency A, B, C, Range heading; and Page 8-51, under Frequency Range, DC-Coupled & AC-Coupled). The specifications listed under Sensitivity (Page 8-51) only list sensitivity specs up to 300 MHz. Are there sensitivity specs above 300 MHz or not? Were they left out of the specs listings by accident or are there no verifiable sensitivity specs for applied signals >300 MHz?

A **Reply from Dave Lorah 14 May 13** The input sensitivity is different above 300 MHz for channels A and B on your CNT-91. It is listed on the attached data sheet. For Dc to 200 MHz the sensitivity is 15mVrms, from 200 to 300 MHz it is 25 mVrms and for 300 to 400 MHz it is 35 mV rms.

Measurements (such as TIE/TDEV-MTIE)

> Refer to the "Wander Parameter measurements (TIE/TDEV)" the "time and frequency measurements for oscillator manufactures.pdf" White paper document downloaded from our website: http://spectracom.com/sites/default/files/document-files/time-and-frequency-measurements-for-oscillator-manufacturers.pdf

Q I would like to measure TIE (Time Interval error) of oscillator by remote (GPIB) and calculate MTIE.
 A **Reply from Dave L (28 jul 26)** This white paper on Time and Frequency Measurements for Oscillator Manufacturers may be interesting to you as well as the attached document.

http://spectracom.com/sites/default/files/document-files/time-and-frequency-measurements-for-oscillator-manufacturers.pdf

If these do not answer your questions, please let me know and I will get in touch with our support engineers.

****Sample Frequency measurement program for Windows

> Refer to **Salesforce case 10752** https://na8.salesforce.com/500C000000RefqH

Q. Do you support a sample frequency measurement program for Windows?
A. (from Lisa Perdue 5 July 13). We have a LabView driver for CNT-90 that does contain some examples in it. You can download it from the National Instruments Driver Network: http://sine.ni.com/apps/utf8/niid_web_display.download_page?p_id_guid=27D243B111176A6DE0440003BA7CCD71

We also have a programming handbook that contains some examples in Chapter 4. I attached that here for you.

We have a software already made for use with the CNT-90, it is called TimeView (TimeView 2.1 is the version you want for CNT-90). You can download a trial version here: http://www.spectracomcorp.com/Support/HowCanWeHelpYou/Software/tabid/61/Default.aspx#TimeViewThis is a paid software, after the 30 day trial you must purchase a license to continue using it. If you are interested in pursuing that purchase, please let me know, I will put you in touch with a sales engineer.

The final option is a free software called TimeLab. You can find it by searching the internet. I have heard that it works with the CNT-90. This is not Spectracom software and it is not supported by us in any way.

I hope one of these options will help you get started. Please let me know if you need anything else!

Sample Rate (pacing)

Email from Mark Day (2 Feb 2015) The CNT-9x range of products is not fully compatible with the Agilent VEE. The Spectracom test and measurement products support the use of National Instruments VISA, which is freely available for download from the NI website, link below:

http://www.ni.com/nisearch/app/main/p/bot/no/ap/tech/lang/en/pg/1/sn/catnav:du,n8:3.25.123.1640,ssnav:ndr/

In order to set the sample rate (pacing), you need to use the following SCPI commands:

:TRIG:SOUR TIM   // enables pacing
:TRIG:TIM *<value>*   // sets the pacing time (sample rate)

I have attached a copy of the Programmer's Handbook for the CNT-9x product range for your records.

Meas

With MEAS function, the unit uses default settings and determines on its own the best measurement parameters in order to meet the required resolution.
If changing the resolution doesn't modify the number of digits during the measurement, it's because the unit cannot find settings that provide better resolution, in particular measurement time.

In this case, if the best resolution is 0.1 Hz, or 3.3 10-9, this means that the measurement time cannot go above 0.015 s. This is probably due to the shape of the signal (pulse duration?), which limits the "usable" measurement time.

Before trying to program it through SCPI commands, customer should first find the measurement parameters that allow to get the best resolution (including measurement time). Another way to increase resolution (and not accuracy) is to make multiple measurement and use statistics.

So, we first need to better understand what the customer signal under test looks like, and what is the rest of his code…

****Continuous Measurements with Zero dead-Time

➢ Refer to the "Continuous Measurements with Zero Dead-Time in CNT-91" white paper at:
EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x\CNT white papers-ap notes

Q. I want to remotely operate CNT-91 with zero dead time both in single measurement and block measurement. The problem are: (1) I did not know what's the difference between single measurement with dead time and without dead time. I used the command "INIT+FETCH?". Is there any other command I need to use in a measurement without dead time? (2) I want to measure the frequency of input signal without dead time in 1 s gate time with a total measurement of 10000. What is the best way to do this, block measurement or a single measurement using "while loop "?
A **Reply from Dave Lorah (6 Nov 2014)** Attached is a white paper instructional that should be able to help you. Please let us know if you need anything else.

****Totalize function

➢ Refer to **Salesforce case 5500**

Q. We have a CNT90 Counter, and would like to do Totalize which is only available on the CNT91. Can we upgrade to firmware to do this function?
A **(KW replied on 5/21/12) See Salesforce case 5500.** Your understanding that the Totalize function is only available with the CNT-91 counter is correct. It is not available with the CNT-90 counters.

As for your desire to upgrade the CNT-90 to become a CNT-91, unfortunately this is not possible. There is no upgrade path for the CNT-90 to be updated to a CNT-91, without actually replacing it altogether, as they are different hardware platforms as well (in addition to using different software). So, a CNT-90 cannot be converted to a CNT-91.

Meas:Freq? command

Desire to set the resolution below 1 Hz

➢ Info below is in reference to **Salesforce case 19930**

Q. The command to measure the frequency does not appear to be accepting the resolution parameter. Do you have anyguidance on how to improve the resolution of the frequency measurement. I have already located the programmers handbook but couldn't find an example that set the resolution below 1 Hz.

The command I am sending is:
MEAS:FREQ? 29999900, 0.001, (@1)

And the returned value is only displayed to 0.1 Hz (29999899.6 Hz)   The same number of digits are displayed regardless of what I pass in as the resolution

A. Reply from Dave Lorah (18 Nov 15) The CNT-91 will determine the measurement parameters on its own to meet the required resolution. If you have attempted to change the resolution by using the MEAS commands and the resolution does not change, it is because the counter cannot automatically find the settings to provide better resolution in the particular measurement time.

In this case, if the best resolution obtained is 0.1 Hz, (or 3.3 10-9), it means that the measurement time cannot go above 0.015 s.
This is probably due to the shape of the signal (pulse duration ?), which limits the "usable" measurement time.

We suggest first trying to find the measurement parameters that will allow the best resolution (including measurement time) before trying the SCPI commands.
If you have trouble accomplishing this please send us a description of the signal you are trying to measure.

Another way to increase resolution (and not accuracy) is to make multiple measurements and use statistics.

MEAS:FREQ:BURST?

Q. I am currently writing a custom application that includes remote control of a CNT-90XL/243 with the SN 281758. I'm using the Sense Command Subsystem to set some configurations, FREQ:BURST:APER, FREQ:BURS:SYNC:PER, FREQ:BURS:START:DEL, FREQ:BURS:PRES, after these are set I am trying to read FREQ:BURS? (@3) to get the burst frequency from channel C. However when I send the command FREQ:BURS? (@3) to the instrument, the above 4 fields are reset to system defaults, and no frequency information is returned.
With the above 4 configuration fields set to default, it is not possible for the CNT-90XL to read a burst frequency from channel C, However, when I manually set them to the values I need, the burst frequency is shown on the front display of the device. However, whenever I try to read he burst frequency the device is reset and nothing is returned, as well as the front screen on the CNT-90XL is reset to default and will not display the burst frequency information.
I'm wondering if this is because I am omitting a step while setting my configuration, or is it because I'm not using the appropriate command to read the burst frequency.

A (reply from Dave Lorah, 1 Oct 14) Thank you for contacting Spectracom Tech Support. If you are trying to measure the burst frequency, try using the **MEAS:FREQ:BURST? (@3)** command.
Here is a link to download the latest Programmers Guide in case you do not have it.
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=1316&PortalId=0

If you can describe exactly what you wish to measure and the signal structure we may be able to provide more assistance. Also if you would like to send a copy of your coding we could take a look and see if there are any problems.

****FETCh:ARRay? command

Email from Lisa Perdue (Dec 2012) I have looked at your question a little and it looks like when using the FETCh:ARRay? command the limit is 10k results like you are seeing. You need to issue multiple fetches to get all the

Note: she also included a copy of the programmer's handbook with her response.

****CNT uncertainty (Random and Systematic uncertainties)

➢ Refer to CNT-9x manual for more information I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x\CNT manuals

Email from Lisa Perdue (6/11/12) to David Steinfeld I got the message from Keith that you were looking for some uncertainty information for the CNT-90XL. All of the uncertainty information is found in the user manual chapter 8. For the CNT-90XL specifically this information starts on page 8-24. The time-base uncertainties can be found on page 8-30.

Question from Masataka: We received symptom report below from TEAC who are using CNT-91R.
  [Symptom]
  When they measure period of signal continuouusly using external oscilator(Rb) as External reference, measured value vary within 1[ns].
  But when they measure period of same signal using Internal oscilator as reference, measured value vary widely. (Difference between Max and Mimim value is about 3[ns].)

  #Please see attached "Period.ppt" for example.

  [Question]
  Only when they measure period of signal using Internal oscilator as reference, measured value vary widely.
  Could you please let us know possible cause of this symptom? (I doubt that there is any problem regarding internal oscillator of CNT-91R.)
A. **Reply from Eric Girard (13 Nov 15)**
  The understanding is that the measurement uncertainty is higher (3 ns) with internal reference, and lower (1 ns) when using external reference. The average value is the same with both internal and external reference.

  As the same configuration is used for both series of measurements, the only varying factor that impacts the systematic uncertainty is the timebase (please refer to section 8.42 and 8.44 of the user manual).
  So in order to check the assumption of the timebase impact can you please provide the following information:
  - Short term stability of external reference (Allian Deviation)
  - Pacing time of the measurement
  - Typical measured period
  - Total duration of measurement

GPIB/ USB interface

➢ The CNT Counter interface defaults to "GPIB" selected. Need to reconfigure CNT counter if you wish to use "USB" interface, instead of GPIB. Email response below from Lisa discusses how to change this configuration.

USB interface not seen on laptop

Q. When I try to connect the instrument, there is nothing to select in the Instruments window.
  Application version is TimeView version 3.0.1. I am new to using the pendulum CNT-91R. I can send a RF signal to the CNT and it reads what I am sending to it. However, when I try to analyze the input signal, it appears the USB connection is not seen by my laptop. I've had the IT folks look and check the installation. We tried a known good USB cable. It appears the USB isn't sending any info to my laptop.
A **(Reply from Lisa Perdue 8/6/12)**
  On the counter itself have you set the interface to be USB? The default is GPIB so if you have not yet done this, I think this explains the problem.

  On the counter press the '0' key for the User Options menu, then press the '3' for the Interface, then the '1' key will

allow you to change the interface type from GPIB to USB. Then press the exit/ok key twice to return to the menu (do not use the cancel key or your change will be canceled!).

****CNT troubleshooting

****"will not show Channel C on the Inputs menu"

Email from Dave Lorah to Mark Day, Sept 2014 We sold two CNT-90/XL -27G counters to National Instruments last February. Both are identical configurations and serial numbers 270741 and 270742.

One of these counters will not show Channel C on the Inputs menu. The other will. Is this a options configuration problem? Has there been a hardware failure in the unit that removed channel C from the selection? Can it be programed in the field to activate the Channel C option or is it best to return it for repair? Will it have to go back to Poland for repair?

Reply from Mark Day The most likely reason why the counter is not seeing Ch. C is because the mixer module has 'become' loose, and not making a good contact – it probably requires reseating and the securing clips adjusting to better hold the mixer module in-place. If it is just this, either you can do it in Rochester, or we can do it in Basingstoke, and just perform a quick set of measurements of varying frequency and power levels to ensure it is working correctly. There should be no need for any programming, and to confirm that both mixers were installed and tested, I have asked Altaria to send me the test result files for both units, and get back to you to confirm that both modules were fitted and tested correctly.

We can do most of the work in Basingstoke, however we can't test the mixer module to its max frequency!

Reply from Dave Lorah: So if the mixer is disconnected or somehow malfunctioning the "C" channel will not show up.

*****"Wrong time interval response

Q. We are not seeing the appropriate "Time Interval" response Despite using the same GPIB commands used successfully for both AGILENT 53132A and other SPECTRACOM CNT-91/011 using the same cabling.

A. email from Dave Lorah 15 Aug 14 I am not sure if I understand correctly, are you saying you have tried these exact same commands and cable setup successfully on an Agilent 53132A and also another CNT-91 and it works OK?
If that is the case we may have a problem with this CNT-91.Can you try resetting the CNT-91 to defaults and try again? Also please check the GPIB connector for damage and proper connection.

*****"Clipped" is being reported

Q. My Chinese counterpart has a CNT-90 which he reported that it shows "clipped" on Vmax, Vmin & Vp-p after preset. I am asking him to recall "DEFAULT" setting now.
I had verified that the internal oscillator is working but it cannot measure due to the above mentioned condition.

From your experience, is this hardware issue or it can be reset by some special setting of the unit.

A. Reply from Dave Lorah (6/19/12) This is a result of the input level being too high in amplitude. Or there may be a hardware issue. I have the Service Manual for you:
http://www.spectracomcorp.com/Portals/0/repository/CNT-90 XL91_ServiceManual.pdf

Check the input amplifiers voltage calibration. If this does not resolve the problem, the CNT-90 may have to be returned for repairs. This will go to Spectracom in the UK.

TimeView Modulation Domain Analyzer Software (Timeview software for counters)

- ➢ Link to Time view software data sheet: [link to datasheets in SharePoint](#)
- ➢ Link to TimeView software in Customer Service folder: [EQUIPMENT\SPECTRACOM EQUIPMENT\Pendulum equipment\CNT 9x\TimeView software](#)

Software is offered through Textronics

- ➢ Purchasable software to use in conjunction with CNT-xx frequency counters
- ➢ Offered/supported in the US through Textronics

Two program versions available:

- • *TimeView 2* that can use any CNT-9x counter.
- • The enhanced version *TimeView 3* that requires models CNT-91 or CNT-91R as front-ends.

30 day demo/trial software available for download.

- ➢ From the Textronics website: http://www.tek.com/frequency-counter-supplies/mca3027-software/timeview-modulation-domain-analysis-software-30-day-tria

Note: The 30 day demo software is full functionality, with the exception that you can't save or print data with the demo program.

Timeview license key

- ➢ Key never expires. The key is the serial number that is printed on a label inside the front cover of the CD case. This key is entered when installing the software. (it's not asking for the Serial Number of the counter)

   Email from Dave Lorah (16 Nov) The TimeView software is looking for a "license key" to activate the program, not a serial number from the CNT-90. The License key is the serial number of your TimeView software.

   If you have purchased the TimeView software, it will come with a CD and license key. If you have not purchased the TimeView software and are interested in obtaining a quote please reply with your location and I can direct you to the appropriate sales office in your region.

- ➢ If a customer wants a special key that has a limited time before it expires (specific example –customer was going into a classified environment for a week, and wanted it to expire after he left), sales needs to treat this as a special.

   Response from Leisa Butler to Jen Sanza (6/10/11) This customer says he didn't have the CD so we directed him to the Serial number on the invoice. To make it easier can we change the phrasing of "serial number" to "license key"? It might help the customer identify that as the key. We get a lot of calls from customers after their purchase regarding the key.

ONLY FOR "HOME HOBBYISTS" THAT COMPLAIN ABOUT COST FOR TIMEVIEW SOFTWARE

  Note: Not for regular customers. We want them to **PURCHASE** TimeView software!

Q I am a ham radio hobbyist getting to become a "time-nut". Is there any special discount I can buy the Timeview software from you for personal (no business or commercial use

A **Reply from Keith (10 May 13)** As for pricing for personal use of TimeView software, I'm sorry but we don't have special pricing for this situation.   However, you may want to check out a freeware program called Timelab software, which the CNT counters are compatible with.

The link to this freeware program is: http://www.ke5fx.com/timelab/readme.htm.   Please note that as this is a freeware program and not Spectracom software, we don't provide any technical support for this program.
GPIB/USB interface

Note: The Timeview software has native support for GPIB interface only. To support the available USB interface, the Runtime libraries have to be installed as part of the TimeView install (included with the TimeView software).

3/10/10
Equipment arrived and unpacked in Rochester.
    XP PC –
        Username – pitest
        Password-   test1
        Domain-   pi

Pendulum Coax/Fiber Distribution units

Pendulum FL-15 GPS antenna fibre link

➢ Refer to "FL-15" in: ..\CustomerServiceAssistance.pdf

_____

Pendulum 10 MHz distribution units

A) Models DA-36 and DA-35 (DA35 and DA36) (Fiber distribution box for 10 MHz sine waves)

Model DA-36 (Fiber distribution)   **Model DA-35 (coax distribution) (discontinued)**
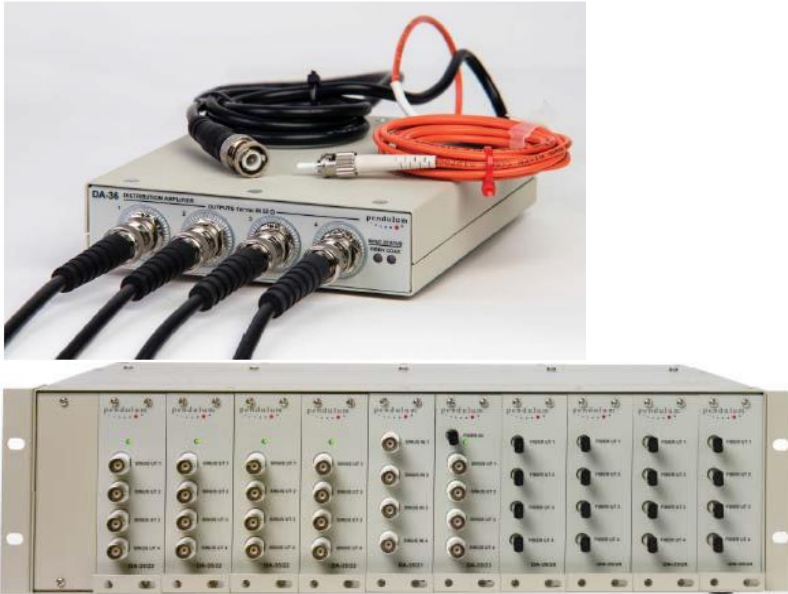
Discontinued

Spectracom no longer supports or services DA-35/DA-36

- There is an exception is with the AFMETCAL and Redstone arsenal project counters)

Revised announcement
Email from Eric Girard (6 Jul 17) A short email to complete your answer about these products.
Until end of 2016, all counters support were held by Spectracom LU, Pendulum series, Spectracom series and also Tektronic series.

Since beginning of 2017 we sold our products to our factory company, Altaria in Poland. So now they are covering all support for counters, repair, calibration, production… etc
Here below our official communication with customers.

We want to inform you about a new official Spectracom announcement :

"Through a recent agreement, Altaria Services, a Swedish owned company with production facilities in northern Poland, has acquired Spectracom products currently marketed under the Pendulum brand. Specifically, these products are:

- Frequency Counters/Analyzers: models CNT-90, CNT-90XL and CNT-91 and companion products such as the TimeView modulation domain analysis software.

- Frequency Standards: models GPS-12R, 6688/6689, GPS-88/89.
- Frequency Distribution Units: models DA-35 and DA-36.

Since 2008, Altaria has been a contract manufacturing partner to Spectracom. As Spectracom continues to build on its market leading position for resilient positioning, navigation and timing solutions for critical infrastructure, Altaria is best-suited to directly support customers of Pendulum test & measurement products due to their strong knowledge with their design, manufacture, test and support.

As of Jan 1, 2017, all new requests for new sales will be re-directed to Altaria, as well as new customer Purchase Orders.
The same applies for service, support, repair and factory calibrations. Altaria will assume all Spectracom's warranty obligations, as well as out-of warranty repairs and calibrations.

The points of contact to be used within Altaria, in particular for sales requests, PO, support requests are provided below :

Altaria Services SP. Z.o.o.
ul. Lotnica 37
80-297 Banino
Poland

Tel : +48 (58) 681 89 01
Email : orderdesk@penduluminstruments.com

Web : www.altaria.se

- Shortcut to DA-36 Datasheet: link to datasheets in SharePoint
- DA-36 Info on our website: https://spectracom.com/documents/da-36-datasheet
- Sales info on DA-36 (in Salesforce): https://na28.salesforce.com/01t80000001XvtZ?srPos=0&srKp=01t
- The DA-36 can only have 1 fiber input and 1 fiber output. There is no option for 4 fiber outputs. They would need to use the DA-35.
- These devices are specifically designed for 10 MHz distribution (more info further below)

These devices are designed for 10MHz sine waves (not designed for IRIG/1PPS distribution)
- For 1PPS/IRIG distribution via fiber optic, refer to "Luxlink IRIG fiber Optic…" and "SI Tech Fiber converter equipment" in the Customerserviceassistance doc for info on these fiber converters we have resold on occasion.

Email from Dave Lorah (21 Dec 16) I recall you needed to send an IRIG Signal about 1 km from a Securesync to a remote IRIG receiver.

IF this is true, you would not want to use the DA-36 because this was designed for 10 MHz sinewave only and will not work with IRIG Signals due to the filter circuits in the receiver side. I am not sure how we missed this. I do not work with the DA-36 very often.

To send IRIG a long distance you would be best to use a product designed for such an application. Spectracom does not carry such a product in our catalog.

I googled "irig to fiber converter" and got a lot of hits. You may want to try this and select from one of the vendors there.

Email from John Westwood (5 Feb 2013) Attached (**below**) is a spreadsheet that documents the different versions of

the DA35 modules. Please note that the DA35/21 and DA35/24 have two sales numbers but they are identical units.

SMD Part#	Sales Part #	Reference	Description	Notes
60-00-2419	944610035211	DA35/21-10M	FDR 4x BNC in	There is no difference for 10M and 2M versions
	944610035212	DA35/21-2M		
60-00-2474	944610035021	DA35/02	Mini-rack 2 cards	
60-00-3170	944610035231	DA35/23-10M	Opto In ST, 4xBNC Out + LED	
60-00-3171	944610035221	DA35/22-10M	4xBNC Out + LED	
60-00-3180	944610035241	DA35/24-10M	FDR 4*Opto UT ST Modul	There is no difference for 10M and 2M versions
	944610035242	DA35/24-2M		
60-00-3610	944610035101	DA35/10	Rack 10 cards	
60-00-5122	944610035111	DA35/11	Blind panel	
60-00-5654	944610035232	DA-35/23-2M	FDR Opto In ST, 4 BNC Ut + LED 2MHz	
60-00-6002	944610035222	DA-35/22-2M	FDR 4xBNC UT+LED 2MHz	

Export info/ECCN classification for DA-35/DA-36

Q Would you be able to tell me the ECCN classification of the Model DA-36
A reply from Dave Lorah, 6 Oct 16: The DA-36 is 3A992a   HTS 8543.70.9610

B) DA-34 (DA34) (Discontinued 10 MHz distribution unit)

➢ Datasheet for DA-34: link to datasheets in SharePoint
➢ The DA-35 Transmitter needs the mainframe, at least one input card, and at least one output card.
➢ This device is specifically designed for 10 MHz distribution (not 1PPS/IRIG compatible)

C) DA-33 (DA33) (Discontinued 10 MHz distribution unit)

➢ 14 channel 10 MHZ distribution unit (not 1PPS/IRIG compatible)
➢ Datasheet for DA-33: link to datasheets in SharePoint

Calibration of DA-33

The DA-33 is not a frequency generator. This is a distribution amplifier that has no need for calibration. We do not see the need to have this device calibrate on a periodic basis. It would only need service in the event of a failure. We suggest marking the DA-33 as "No calibration needed" and remove it from your yearly cal list.

Rapco (Now Spectracom UK)

Rapco equipment support contacts

➢ The best contact is via "SC-BAS techsupport" or direct to John Westwood or Mark Day

➢ Link to Rapco folder in Custservice drive: I:\Customer Service\Equipment\Spectracom Equipment\Rapco (Spectracom UK)

➢

Rapco Models advertised on the Spectracom website

➢ The following Models are listed on the Spectracom website

Model 900 series, Model 1800 series, Model 1804, Model 2804 and Model 7370

➢ Refer questions pertaining to Rapco equipment to ~~Mark Day, John Westwood, others with Spectracom UK.~~ Jeremy Thomas, Ben Cosstick or Spectracom France

Note: All Model 1800 series devices are discontinued/ no longer available.
➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

Rapco Models with automatic change-over for redundancy (discontinued)

➢ **1866A** Frequency and Timing Changeover/Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1866C** Frequency Changeover/Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. A.C. power with dc support.

➢ **1886A** Frequency and Timing Changeover/Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1886C** Frequency Changeover/Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. A.C. power with dc support.

Rapco Models with signal distribution from one source (discontinued)

➢ **1876A** Frequency and Timing Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. A.C. power with dc support.

➢ **1876C** Frequency Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. A.C. power with dc support.

➢ **1896A** Frequency and Timing Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1896C** Frequency Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1896D** imecode Distribution Unit. Accepts 1 x Timecode input (BNC) and produces up to 14 x outputs 50ohm, BNC. Timecodes supported include IRIG-A, IRIG-B, XR3, or 2137.

➢ **1976D**G703.10 Frequency Distribution unit. Accepts 1 x 2.048MHz Frequency (sine) input 50ohm, BNC and produces 24 x outputs 75ohm, BNC. A.C. power with dc support.

RAPCO SIGNAL DISTRIBUTION DEVICES

Note: All Model 1800 series devices are discontinued/ no longer available.
  ➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

**RAPCO Model 1866E (IRIG distribution switch)
  ➢ Shortcut to manual (in Customer Service folder) I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)

On our website:
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=841&PortalId=0
This appears to be a Rapco product that is similar to the Model 7535 as it distributes IRIG. However, it appears to be more flexible in the frequency range that it can cover, and less expensive to manufacture.   As on around 11/30/09, we are looking at replacing the Model 7535 distribution amp with this product. Apparently, this is the only Rapco product we plan on carrying over from Rapco and will be discontinuing all of their other products.

This IRIG distribution amp has two inputs (selective redundancy) and 14 outputs. From what I understand, unlike the 7535 that requires one output of four to feed the next input, the 1866E does not need one output to feed the next input.

The information below is from our website:
http://www.spectracom.co.uk/Distribution/1800SeriesDistributionAmplifiers/tabid/1163/Default.aspx

(Frequency and Timing Distribution with Optional Auto-Changeover)

Model Summary

Model	Switch (2x sources)	Distribution	Frequency Outputs	Timing Outputs	IRIG A/B AM Outputs	Power
1866A	X	X	10	10	—	AC/DC
1866C	X	X	14	—	—	AC/DC
1866E	X	X	—	—	14	AC/DC
1876A	—	X	10	10	—	AC/DC
1876C	—	X	14	—	—	AC/DC

Note: Pictures below of front and back are of a Model 1866**A** (not 1866E). We apparently don't have a data sheet for the 1866E or any pictures in 1866E manual.

Master/Auto/Standby switch

Input Fault LEDs:
Master   Standby

AC/DC inputs
(AC not shown)

J4: Timecode Master in (sine wave only)

J3: Timecode standby (backup) input (sine wave only)

J17-J30 are frequency outputs (Sine wave only)

(Model 1886 shown)

Alarm relay output
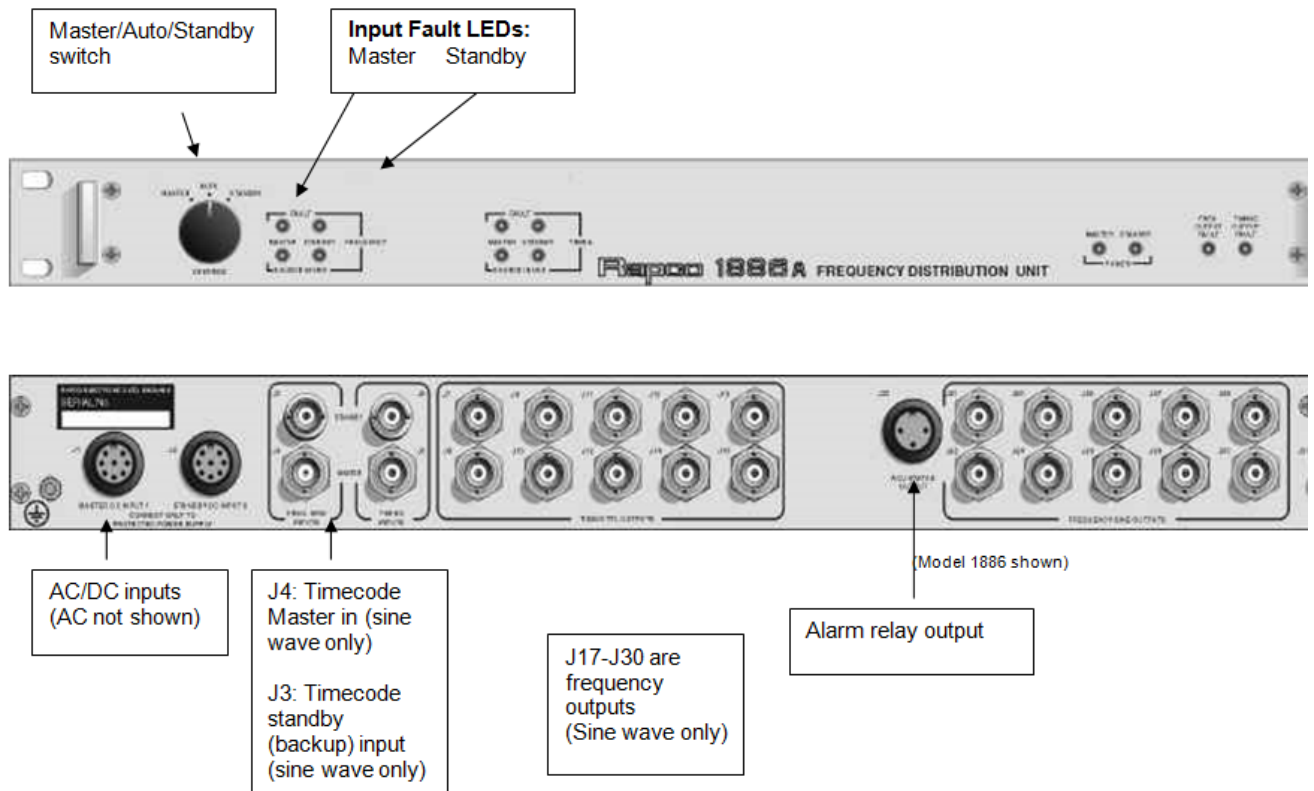
Common Features

➢ 19" Rack-Mount x 1U Height

➢ Alarm Contact Unit gives indication of power, input or output faults

➢ Cables Interconnection cables for power and input signal are available for order

➢ Amplifier gain Input to loaded output voltage gain 0 ± 1dB

The models 1866 and 1886 distribution amplifiers provide fully automatic switchover function between a pair of time & frequency sources in the event of signal loss. The models 1876 and 1896 provide signal distribution from only one source. In both cases, a built in high-quality signal distribution function, provides up to 10 frequency (RF), and 10 timing (1 Hz) or 14 RF outputs in 1 RU of rack space. Each output is driven by an independent buffer, and individually monitored for signal failure. These units are AC and/or DC powered from time sources for reliability and battery backup possibility. Units may be powered from dc output from a master clock such as a model 1804. Special versions are available for timecode distribution (model 1896D) and telecom E1 frequency 2.048 MHz per G703.10 (model 1976).

Model 1866 variants

➢ **1866A** Frequency and Timing Changeover/Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1866C** Frequency Changeover/Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. A.C. power with dc support.

Auto-changeover / Distribution Units (models 1866 & 1886) provide full duplex master/standby operation of two frequency and/or timing sources.

Power

AC and/or DC input
AC: 115/230vac, single phase
DC: +24V or +28V d.c. nominal, negative ground only.
+19V to +34V d.c. range
(see manual for DC power connector pin-outs)

Front panel Indicators

- "Power AC" = green when power is present

- "Power DC" = green when power is present

Master/Standby/Auto switch

Master: Forces input selection to be the Master (J4) input, no matter the signal status or alarm state.

Standby: Forces input selection to be the Standby (J3) input, no matter the signal status or alarm state.
  Auto: Selects input channel based on alarm and signal status state.

Front panel indicators:

Source-in-Use: Master (green)
  Standby (amber)
Source fault: Master (red)
  Standby (red)
Power (status): a.c. OK (green),
d.c. OK (green)

Output Fault: signal failure, any output (red)

IRIG Inputs

- ➤ Two inputs: J4 (Master) is primary input and J3 (standby) is backup input (both are 50 ohm inputs).

- ➤ Frequency range: 100Hz – 10KHz, waveform sinusoidal (AC)

- ➤ Input level: 1V p-p to 3V p-p in 50ohm, typical.

- ➤ Alarm threshold: Factory set 1V p-p but internally adjustable.

Important Note: Model 1866E Accepts IRIG AM input only! It DOES NOT accept IRIG TTL/DCLS input

There are two types of modulation for IRIG output signals. There is amplitude modulation (AM) and TTL (also known as Pulse Modulation). AM modulation is two sine waves while TTL is a pulse width modulation. With TTL, the amplitude of the signal is always the same- only the width of the pulses changes.

the Model 1866 only accepts the AM –Amplitude Modulated- IRIG signals. If you are inputting an IRIG DCLS/TTL signal, the Model 1866 will not accept it as an input (as indicated by the input Fault LED being red). It cannot switch inputs until an Amplitude Modulated sine wave is provided.

When using a SecureSync IRIG Option Card connected to the Model 1866, make sure that the Setup/Inputs/IRIG page of the web browser has the "Modulation" dropdown set to "(1) IRIG AM". The Model 1866 is not compatible if this drop-down is set to "(0) IRIG DCLS", instead.

IRIG Outputs

➢ **Fourteen buffered (no gain) outputs**: (J17 to J30) which are 50 ohm outputs.

Channel selection

- In Auto mode, Master input is selected if input is good.

- Switches to Standby mode if the Master source input signal falls below a preset amplitude limit (by default, set to approximately 1V p-p in 50ohm).

Stays in Standby mode after switching, even if Master input becomes valid again. Only switches back to Master if the Standby input then fails.

Rapco Model 1876 (discontinued/no longer available)

➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

Data sheet On our website:
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=841&PortalId=0

Rapco Models with signal distribution from one source:

➢ **1876A** Frequency and Timing Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. A.C. power with dc support.

➢ **1876C** Frequency Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. A.C. power with dc support.

Model Summary

Model	Switch (2x sources)	Distribution	Frequency Outputs	Timing Outputs	IRIG A/B AM Outputs	Power
1876A	—	X	10	10	—	AC/DC
1876C	—	X	14	—	—	AC/DC

Rapco Model 1886 (discontinued/no longer available)

➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

Model 1886 variants

1886A **Frequency and Timing Changeover/Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10 10 x outputs 50ohm, BNC. D.C. power (twin inputs).**

1886C **Frequency Changeover/Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. A.C. power with dc support.**

Rapco Model 1896 (discontinued/no longer available)

➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

Rapco Models with signal distribution from one source:

Model 1896 variants

➢ **1896A** Frequency and Timing Distribution Unit. Accepts 1 x Frequency (sine) and 1 x Timing input 50ohm, BNC and produces 10-10 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1896C** Frequency Distribution Unit. Accepts 1 x Frequency (sine) input 50ohm, BNC and produces 14 x outputs 50ohm, BNC. D.C. power (twin inputs).

➢ **1896D** Timecode Distribution Unit. Accepts 1 x Timecode input (BNC) and produces up to 14 x outputs 50ohm, BNC. Timecodes supported include IRIG-A, IRIG-B, XR3, or 2137.

**Rapco Model 1976 (discontinued/no longer available)

➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

Model 1976D

• G703.10 Frequency Distribution unit.

• Accepts 1 x 2.048MHz Frequency (sine) input 50ohm, BNC

• Produces 24 x outputs 75ohm, BNC. AC power with DC support.

RAPCO TIME STANDARDS (Models 1804/1804L25E8B 2804 and 2816) (Discontinued)

A) Models 1804/1804L25E8B (Discontinued April 2013)

- ➢ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf
- ➢ Replaced by SecureSync
- ➢ GPS-based time standard.

NOTE: Rapco products are retired/discontinued. But in some cases, can be replaced by SecureSyncs: Refer to " Replacing a discontinued Rapco Model 1804/2804 with SecureSync" in: ..\SecureSync CustAssist.pdf

Note: Refer also to info in the Rapo Model 2804 section (next section down). the info on 2804s MAY also apply to 1804s????

Shortcut to Rapco manuals (in Customer Service folder): EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)

Date/year issue occurred with 1804L-17 (date shows July3, 1996)

- ➢ This particular Model 1804 is an OEM Raytheon variant
- ➢ This issue reported by Raytheon 17 Feb. 2016
- ➢ Refer to Salesforce cases such as 21169 and 21170.
- ➢ Contact Spectracom France support for details

Email from Dave L (7 Feb 17)
Concerning the Rapco Model 1804 and 2804 GPS Systems.

As you know, these older Rapco models 1804 and 2804 have experienced a problem where the date has become erroneous. This is a problem caused by the GPS Receiver module. These 1804/2804 units have been discontinued for quite some time now and we have had no luck getting any updates for the GPS Receiver modules to resolve the problem. Since the technical expertise for these products is no longer available, it is not feasible to support firmware development on these obsolete products.

In your case the 10 MHz and 1PPS signals are not affected and will continue to operate normally, just the date will be incorrect so any NTP or Time of Day data from the 1804 will be erroneous.

Unfortunately, we have no solution for this problem. You may be interested in replacing the device with a new SecureSync GPS Time Server. Here is a link to our website for more information on the SecureSync.

https://spectracom.com/products-services/precision-timing/enterprise-class-securesync

~~The Rapco serial numbers all have six digits. so the correct serial number for the 1804 in question is 461501.~~

B) Rapco Models 2804 / 2804A / 2804B

(Models 1804, 2804 and 2816 Discontinued April 2013)

- ➤ Refer to (on our website) https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf
- ➤ Replaced by SecureSync

NOTE: Rapco products are retired/discontinued. But in some cases, can be replaced by SecureSyncs: Refer to "**Replacing discontinued Rapco Models 1804/2804 with SecureSync**" in: ..\SecureSync CustAssist.pdf

Shortcut to handbook: EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)\Model 2804A

Email from John Westwood to Eva (5 Nov 2012)
At Basingstoke UK, we were Rapco Electronics in our previous existence - before becoming part of Spectracom/Orolia and we are still supporting Rapco products here.

The GPS receiver in the 2804A (Trimble SKII) is obsolete and unobtainable, but we have an alternative (Trimble Res-T) which we can fit (unit becomes a 2804B).

We have full repair facility for these units on site.

We do not manufacture these units unless there is no alternative Spectracom product available. I am not aware of a planned obsolescence date.

For most applications, the SecureSync is a suitable replacement, but please be aware of the limitations.
There are some options for the 2804A which are not yet available on the SecureSync
SecureSync Rb version is not suitable for digital broadcast applications
The 2804 serial data format is not available on the SecureSync serial interface

I do not have any record of a 2804 sale to Harris Corporation or Elotek, so I would be interested to know the serial number.

Attached is the latest version of the handbook for your information, but if you have any further questions please don't hesitate to ask.

Serial commands

- ➤ Refer to list of available commands: EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)\Model 2804A

Q **From Dave L to Les Lis**: I was working with our customer and have some information from our USAF customer in Colorado. They have about 5 of these units.
They have a Model 2804, so the commands are not the same as the 1804. The RC did not work. So, I looked through the manual and selected a couple commands I thought might help.
They told me they have put the unit in INHIBIT Mode and set the time and date manually. Otherwise it will be set to July 11, 1996.

Here are the commands we looked at and results:
Read GPS Status: RGS = 00005A00 (the fourth digit is the battery health, 0 = battery OK) (receiver identity = 5A)
Read Software Version RSV = 08.06;10.10
Read Week Number: RGW = 035D
Read Local Time   RLT = 201602254056120138 (This was manually set)
Read Hardware Configuration   @H = 1004A

If there are more commands you would like us to run, they have the unit right there and are willing to help. They are pretty anxious to get this resolved. It is an important system.
Just let me know what to ask them.

A. Reply from Frederique (26 Feb 16) Thanks for the feedback. Commands for 2804 are not the same than for the 1804. I have found the following commands list. See attached document. But these are only READ commands.

Date/year issue occurred with 2804L-17 (date shows July3, 1996)

➢ This particular 2804 is an OEM Raytheon variant

➢ This issue reported by Raytheon 17 Feb. 2016

➢ Refer to Salesforce cases 21169 and 21170.

➢ Contact Spectracom France support for details

Email from Dave L (7 Feb 17)
Concerning the Rapco Model 1804 and 2804 GPS Systems.

As you know, these older Rapco models 1804 and 2804 have experienced a problem where the date has become erroneous. This is a problem caused by the GPS Receiver module. These 1804/2804 units have been discontinued for quite some time now and we have had no luck getting any updates for the GPS Receiver modules to resolve the problem. Since the technical expertise for these products is no longer available, it is not feasible to support firmware development on these obsolete products.

In your case the 10 MHz and 1PPS signals are not affected and will continue to operate normally, just the date will be incorrect so any NTP or Time of Day data from the 1804 will be erroneous.

Unfortunately, we have no solution for this problem. You may be interested in replacing the device with a new SecureSync GPS Time Server. Here is a link to our website for more information on the SecureSync.

https://spectracom.com/products-services/precision-timing/enterprise-class-securesync

The Rapco serial numbers all have six digits

Model GPS 1000 W5 (Discontinued)

- ➢ GPS-based time standard. See manual in the Rapco folder.
- ➢ Shortcut to manual (in Customer Service folder):EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)

Email from John Westwood to Dick Fox (7/2/12)
Hi Dick,
Sorry for the delay but you sent it to the wrong John who has been off work and only returned today. Please use the sc-bas techsupport email as cc'd above.

The GPS 1000 was one of our first models as was produced from 1992 to 1998. The GPS 1000M variant was sold to Matra Marconi, Korea Telecom and Electro-Comm and last sold in Feb 1997.

The specification for this unit is:-
Configuration   : GPS L1 C/A Signal Compatibility
: TC1 Timecode option IRIG B122
: 10MHz Drift corrected reference
: 1 pps GPS on-time Output
: 1 Hz Drift corrected on-time Output
: Serial RS232 I/F
: IEEE-488 I/F
: a.c. or d.c. power

This can be replaced by the SecureSync unit, except for the IEEE-488 (GPIB), although the serial interface data will be different.

We can only offer limited support for this unit due to the obsolescence of components (GPS Rx etc.)

We have a handbook, but it is in Wordstar6 format, please let us know if this is required.

Rapco P/N 3446-5533 (Discontinued)

Q I'm with the FAA Logistics Center in Oklahoma City, OK in searching for the bottom cover of RAPCO GPS receiver, P/N: 3446-5533. Please send me a quote for 3 ea.
A Reply from Dave L (16 Jan 18) The Rapco product line was discontinued in 2013 and parts are no longer available for these GPS Receiver units.

Here is the official notice posted on our website:
https://spectracom.com/sites/default/files/document-files/Rapco%201804-2804-2816%20Discontinuance%20Notice.pdf

Sorry for the bad news. I hope you can find an alternative.

**Model 900 series Modular Frequency Distribution System (Discontinued)

- Versatile Low-noise Distribution
- Up to 30 channels available from each rack
- Ultra low noise and EMC profile
- Flexible configuration and mounting arrangements
- Auto changeover units for fully redundant switching ensures safe, continuous 24/7 operation
- Wide range of modules available including reference frequencies, 1PPS timing and a variety of timecodes

The 900-series distribution amplifiers are for local distribution of time code signals, 1PPS timing signals, sinewave reference frequency to multiple outputs, up to 30 per cabinet.

Shortcut to documents (in Customer Service folder): EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)\Model 900 series

On our website: http://spectracom.com/documents/900-series-datasheet

Packaging options:

3U x 19inch rack housing -- up to 7 modules total
…………………./dual power modules optional
6U x 19inch rack housing -- up to 14 modules
/dual power modules required
…………………./triple power modules optional

Available Modules

Ordering Information

900A:	19" mainframe
909B:	Standard sinewave output module
909E:	Timecode output module
910D:	Input splitter module
911D:	230 V AC mains power module
911E:	115 V AC mains power module
919A:	Hi-level sinewave output module
920B:	5 to 10 MHz frequency doubler module
922A:	10 MHz TTL to RS422
922B:	1PPS TTL to RS422
922C:	10 MHz RS422 to TTL
930A:	Universal fiber transceiver module
980A:	RF auto-changeover module
980B:	Timecode auto-changeover module
980C:	1PPS auto-changeover module

Included with Shipment
Mains cable (to power module 911)
User manual
2 year warranty
†The warranty period may be dependent on country.

Technical Specifications: 900-Series

Input Modules

910D - Input Conditioning/Splitter Module
Input freq. range: 1 MHz to 10 MHz
Input level: 0 dBm to +13 dBm (adjustable)
Input connector: 1 x Input, N-Type
Output connector: 6 x SMA (Signal split to five output modules, 1 spare for local cascade connection)
Alarm: Input level and Output level fault indicators, with alarm threshold adjustment on front panel

980A - RF Auto-Changeover Module
Input freq. range: 1 MHz to 10 MHz
Input level: 0 dBm to +13 dBm
Input connector: 2 x BNC (Master and Slave inputs)
Output connector: 3 x BNC (Buffered Master, Buffered Standby, and Source-in-use)
Indicators: Input level fault indicators, with alarm threshold adjustment on front panel + source in use
Remote control: TTL remote control interface and status readout, 'D-sub' connector. Front panel manual override switch

980B - Timecode Auto-Changeover Module
Input connector: 2 x BNC (Master and Slave inputs)
Output connector: 3 x BNC (Buffered Master, Buffered Standby, and Source-in-use)
Indicators: Input level fault indicators, with alarm threshold adjustment on front panel + source in use
Remote control: TTL remote control interface and status readout, 'D-sub' connector. Front panel manual override switch

980C - 1PPS Auto-Changeover Module
Input signal: 1PPS; TTL-levels in 50 ohm
Input connector: 2 x BNC (Master and Slave inputs)
Output connector: 3 x BNC (Buffered Master, Buffered Standby, and Source-in-use)
Indicators: Input level fault indicators, with alarm threshold adjustment on front panel + source in use
Remote control: TTL remote control interface and status readout, 'D-sub' connector. Front panel manual override switch

RF (1 to 10 MHz) Output Modules
Common
All output modules receive normally their input reference signal from the Input / Splitter module 910D or the 980 Changeover module.
Input signal connector: 1x SMA

909B - Standard Sinewave Output Module
Output level: specify at time of order
Output connector: 6 x BNC
Indicators: Individual output alarm indicators and user adjustable alarm threshold level

G919A - Hi-level Sinewave Output Module
Output level: up to +19 dBm 50 ohm (adjustable)
Output connector: 3 x BNC

920B - 5 to 10 MHz Frequency Doubler Sinewave Output Module
Input freq.: 5 MHz
Output freq.: 10 MHz
Output level: +13 dBm in 50 ohm
Output connector: 6x BNC

922A/B/C - TTL RS422 Output Module
Input freq.: A and C (1 to 10 MHz), B (1PPS)
Input signal.: A and C (TTL), B (RS422)
Output signal: A and B (RS422), C (TTL)
Output connector: 6x BNC

Timecode Output Modules
909E - Timecode Output Module
Input: 1x SMA (from input module 910D)
Timecode: modulated codes as presented at input
Output level: up to +13 dBm in 50 ohm (adjustable)
Output connector: 6 x BNC

930A - Universal Fiber Transceiver Module
Two channel copper/fibre transceiver module for timecodes and/or logic signals
Input: 2x BNC (TTL-levels), 2x opto (ST)
Timecode: IRIG-A, IRIG-B, NMEA, or any logic signal to 500 kHz
Output level: TTL-levels in 50 ohm (BNC)
Output connector: 2x Opto (ST-connector) 2x BNC logic outputs
Indicator: Front-panel input/output fault monitor

Power Supply Module
911 - Power Supply Module
AC mains: 115 or 230V ±10% (45 to 66 Hz)
DC output: via ribbon connector +/- 14V, 1A nominal, to other modules in cage
Indicators: Low voltage warning for internal DC voltages.
Alarm input: Module alarm signal input via power ribbon cable from all cage modules
Alarm output: Cage alarm relay on isolated BNC connector (normally closed)

General Specifications
Environmental Data
Operating Temp: 0°C to +50°C
Storage Temp: -40°C to +70°C
Safety: EN 61010-1, EN 60950, CE
EMC: EN 50081-1, EN50081-2, CE

Dimensions and Weight
Rack Width x Height x Depth: 483 x 134 x 350 mm (19" x 5.3" x 13.8")
Module Width x Height x Depth: 60 x 130 x 230 mm (2.4" x 5.1" x 9")
Weight: 4.0 kg (mainframe only) to 11.0 kg (fully populated)

Ordering Information
900A: 19" mainframe
909B: Standard sinewave output module
909E: Timecode output module
910D: Input splitter module
911D: 230 V AC mains power module
911E: 115 V AC mains power module
919A: Hi-level sinewave output module
920B: 5 to 10 MHz frequency doubler module
922A: 10 MHz TTL to RS422
922B: 1PPS TTL to RS422
922C: 10 MHz RS422 to TTL
930A: Universal fiber transceiver module
980A: RF auto-changeover module
980B: Timecode auto-changeover module
980C: 1PPS auto-changeover module

Included with Shipment
Mains cable (to power module 911)
User manual
2 year warranty
†The warranty period may be dependent on country.

Model 909B: Standard Sinewave Output Module

Refer to (spec-909module-Alav-ISS2.doc): EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)\Model 900 series

 ➢   6 BNC outputs

 ➢   1MHz to 10 MHz Sinewave or   1MHZ to 5 MHZ TTL

 ➢   50 or 600 ohm input impedance (jumper selectable)

 ➢   50 ohm output impedance (jumper selectable)

10 MHz Phase Noise

Email from John Westwood to Leisa Butler (20 May 2013) (regarding comparison to SASe Phase Noise)
The 900 series is also wide bandwidth, but we do have different versions with modified time constants in the signal detect circuitry, AC/DC coupling etc.

As the 900 series is modular and subject to many build configurations it is quite difficult to specify the phase noise exactly. However attached is a brief specification of the 909B module which includes phase noise. The phase noise floor is -155 dBm/Hz due to the output amplifier noise, so probably not good enough for your requirement. Note that other modules in the signal chain would also add to the phase noise – the 910 input module can have up to 3 amplifiers in the signal path.

Normally we would construct a representative system and measure the performance, but currently our PN test set is in LU. They are using it to test SS-LPN & SAS-E system and if you would like up to date information on this configuration then please contact Gilles.

Model 980 (Auto-changeover modules for 900 series) (Discontinued)

- ➢ Shortcut to manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)\Model 900 series

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**Model 7370 (discontinued)

- ➢ Refer to manual: EQUIPMENT\SPECTRACOM EQUIPMENT\Rapco (Spectracom UK)\Rapco Model 7370

Epsilon products

Technical contact **techsupport@spectracom.fr**

Sylvain Dessapt
Customer Support
Dial 9 011 331 64 53 94 29

(A general voice mail message in French may be heard with his name. Just leave a message after the general message)

Eric Girard
Customer Support
Dial 9 011 33164539421

(A general voice mail message in French may be heard with his name. Just leave a message after the general message)

Gilles Boime (lead Engineer) gilles.boime@spectracom.fr
Emmanuel Sicsik-Pare   In charge of Spectracom France
Thierrry Delhomme   Lead Product Manager (Jim Allocco's boss)

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Harmonized code for Epsilon Clock products (like EC1S) : 8543 20 0000

EAR code for Epsilon Clock products (like EC1S) : EAR99

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MTBF Data

➢ Refer to the « MTBF/MTTR (for all products) »section in the Customerserviceassist document:
..\CustomerServiceAssistance.pdf

EpsilWin32 software (also called "Remote Interface")

➢ Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\Epsilwin software

➢ Limited access link to download this software from our website (Lisa Perdue uploaded it on 9/11/12):
http://www.spectracomcorp.com/Portals/0/repository/EpsilWin32.zip

➢ Purpose: Available (purchased) software for interfacing with Epsilon products, such as EC1S

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Remote interface protocol

➢ Allows Epsilon customers to be able to create their own custom interface with epsilon products, (instead of using the Spectracom EpsilWin32 software)

Email from Sylvain (11/20/09):
I can confirm that the remote interface protocol is given to our customers to allow them to develop their own communication software.
So you can develop your own interface without using Epsilw32 software.

The protocol is given in the chapter 5 of the Manuel guide. I send to you one copy attached in PDF file.
I give you a other note which gave an additional information about ETX and STX specific characters used by the protocol.

➢ Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC1S\USE STX & ETX.pdf and the EC1S manual in the EC1S folder.

".His" log required

➢ I can't get past creating the profile. The program wants a .his log file and I can't find one anywhere.

A Reply from Keith This was a "head scratcher" for a few moments. I didn't initially know what would cause this to be displayed. So I downloaded and installed it myself.

The ".his" is a log that needs to be created as part of creating a "New Profile".   Per the attached document, when you create the new profile, there is a field for "Log File". Hit the button next to the blank field and choose a temporary location.
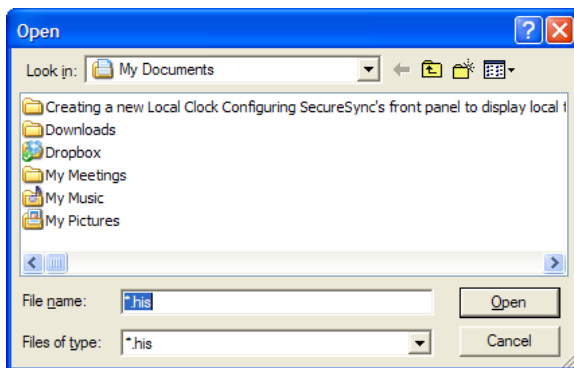
You'll notice that the file extension for the log is .his. if you haven't created a new profile and defined the location/name of the temp file, I can now see why you are getting this message. This file is created with the profile- it's not included with the bundle I sent to you.

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GPS reception: Number of satellites being tracked and Signal Strengths

EpsilWin32 software provides interface with Epsilon equipment to show GPS position and satellite tracking information, lock status, etc. refer to screenshot below:

Page | 300
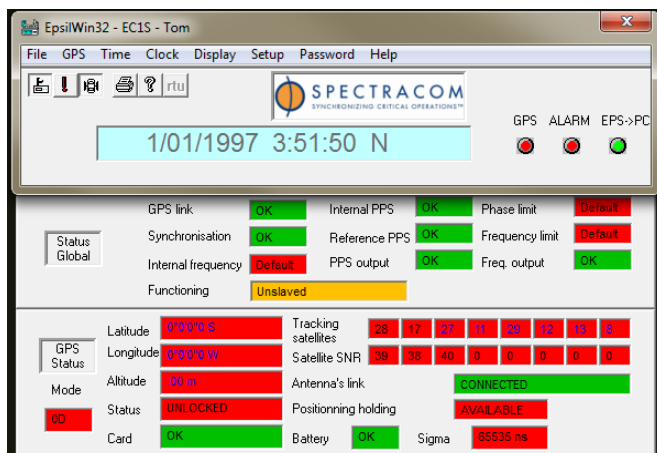
> ➢ EpsilWin software shows only 8 sats: it drops the four satellites with the lowest signal strengths, if the receiver is tracking more than 8.

Number of sats being tracked/SNR Signal strengths

Email Keith sent to a customer (Sept 2012)
The way to tell how many satellites are being tracked is by the number of "SNR" fields that are reported as having a number other than "0" (In this screenshot, three of the eight fields have numbers other than 0 in them). Reported SNRs above 30 or so are good signal strengths (signal strengths are a factor of the antenna gain versus the cable loss, which is based on the type and length of coax between the GPS antenna and GPS receiver).

Antenna coax cable problem:

The Epsilwin32 "Antenna's Link" field will display a green "Connected" when the antenna is connected and no opens/shorts detected. It switches to a red "Not connected" when either an open or short is detected (is does not differentiate between opens and shorts).

EpsilWin32 while tracking satellites
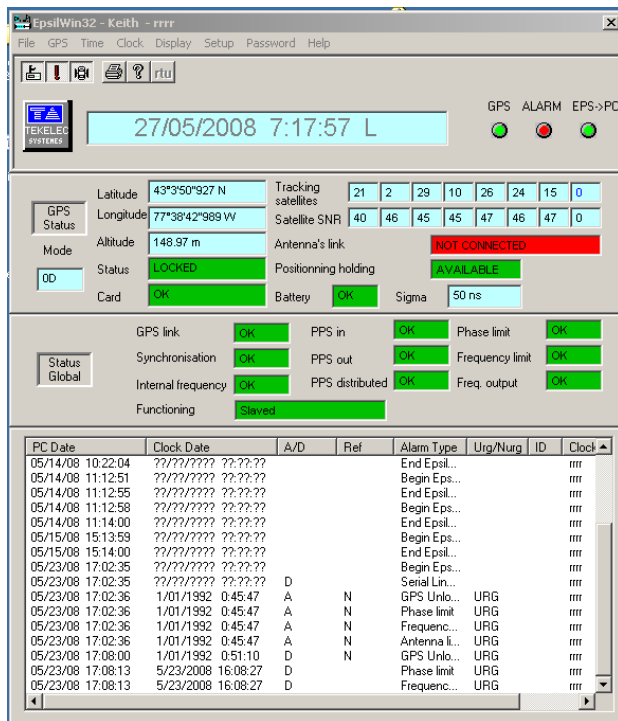
Epsilwin32 software specific with the EC1S

Remote interface protocol:

Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC1S\USE STX & ETX.pdf and the EC1S manual in the EC1S folder.

Note: Use "**EB0_OEM**" as the selected model in profile.

Email from Thierry about EpsilWin used with EC1S:

Q. The EC1s is not available in the drop down selection of product type.
A. See EC1S user's Manual, § 2.5, p 2.4 : «EPSILWIN32 is Windows software, trademarked to this company, which is designed to monitor and command the EC1S with an EBO OEM profile."

Q. There is no manual for the software, only the help screens.
A. That's true that there is not any user's manual for EpsilWin 32. We just provide helps screen.

Q. The configuration drop downs are all greyed out i.e. (unavailable).
It's true that we provide limited possibilities for EC1S configuration through EpsilWin32.

Q I don't think the Epsilwin32 software has been tested with the EC1S.
EpsilWin32 has been tested with EC1S ; however as mentioned above, functionalities are limited compare to EC2S or EBO.

Q. The Epsilwin software does not return the EC1S product information in the Help, Version screen.
EpsilWin32 is compatible with EC1S but its profile is not managed.

Interface cable:

Cable between EC1S connector "J1" and PC is a straight-thru DB9F to DB9M serial cable

<u>EC1S "J1"   PC</u>
5 ----- 5 (ground)
2------2 (EpsilWin32 RS-232 data)

Garbage characters displayed in HyperTerminal.

Can't use standard RS-232 pin-out. Otherwise, you see the once-per second comms with EpsilWin32 software that occurs on Pin 2 of the DB9 port. The TOD data string is present on pin 9, so pin 9 needs to connect to pin 2 of the PC instead when looking for time code data. The two Pin-out configurations are as follows.

Pin-out for TOD data   (viwing time strings inHyperTerminal)
<u>EC1S   PC</u>
5 ------ 5 (ground)
9 ------ 2 (TOD output data, present once-per-second)

Note: Use "**EB0_OEM**" as the selected model in profile.

Email from Thierry about EpsilWin used with EC1S:
Q. The EC1s is not available in the drop down selection of product type.
A. See EC1S user's Manual, § 2.5, p 2.4 : «EPSILWIN32 is Windows software, trademarked to this company, which is designed to monitor and command the EC1S with an EBO OEM profile."

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EpsilWin32 has been tested with EC1S ; however as mentioned above, functionalities are limited compare to EC2S or EBO.

Q. The Epsilwin software does not return the EC1S product information in the Help, Version screen.
EpsilWin32 is compatible with EC1S but its profile is not managed.

ESSU (Discontinued)

- ➢ This device is no longer available

"TE-" series clocks (such as TE-672, TE-822)

Per Eric Girard (12 Nov 2020) the "TE-6" and "TE-8" clocks are much earlier/long discontinued Epsilon Clocks which Les Ulis still repairs for French customers, such as French Military. These pre-date other Epsilon Clocks such as EC2S for instance.

EBO3 OEM board

Note: as of Oct 2014, this product is nearing end of life (not yet discontinued)

- ➢ Shortcut to data sheet: link to datasheets in SharePoint
- ➢ Shortcut to EBO3 in Customer Service: EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EBO3
- ➢ Available EpsilWin32 interface software for EBO3: Refer to: EpsilWin32 software section in this document for more information on this available (purchased software)

EBO3 Part Number structure:

EBO3**X**-**Y**G   Where **X** is either: **T** for top connector or **B** for bottom connector
              Where **Y** is either: **B** for broadcast osc or **W** for Wimax osc.
               G is for GPS input.

                Like: EB03T-WG, EB03B-WG, EB03T-BG, EB03T-WG.

- ➢ Part number on the oscillator determines if Wimax or broadcast oscillator.

2576 is Broadcast Oscillator (better specs)
        2572 is Wimax Oscillator (relaxed specs)

-Test fixture for boards is around 15,000 euros each /12 week lead time/ includes adapter boards, power supply, counter.   Update process uses Quatros.

OCXO has no mechanical adjustment- good for about 15 years.
-Application software is Linux OS. (Software can't be updated in the field. Uses JTAG for parallel flash programming of the Bootloader, file system and kernel). Application software is FTP transferred to board.

ICD 135C / ICE 153 qualification

- ➢ Is the EBO3 Board ICD-153C or ICE-153 qualified? NGC is asking for documentation.

A. Reply from Wade Sober

Curtis, the EBO3 boards is not currently ICD-153C qualified. It would require some engineering. We can provide the ICD-153C qualification as a special.

1.7 Board View

J1 – 10 MHz

J2 – 1 pps

MAC address of the EBO3

GPS MCX connector
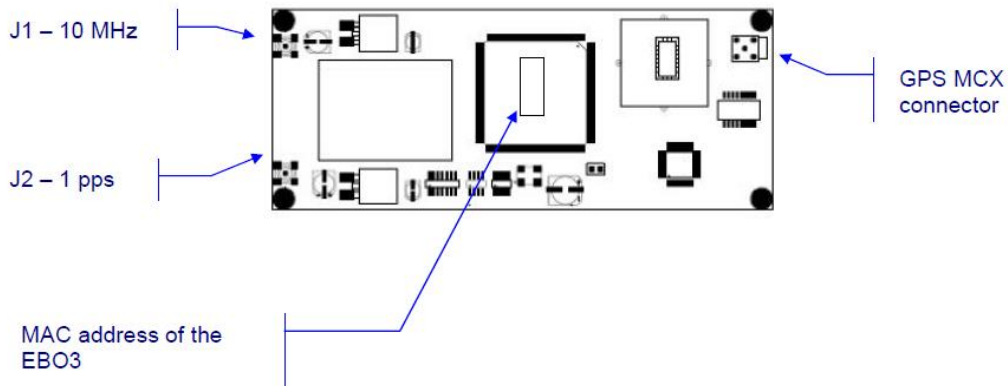
LEDs:

➢ Status LEDs (D1 through D5) are located on the same side of the board as the GPS jack

LEDs
D1 (Power)

D2 (EBO OK)

D3 (GPS OK)

D4 (SFN OK)

D5 (ext 1PPS/10 MHz in OK)
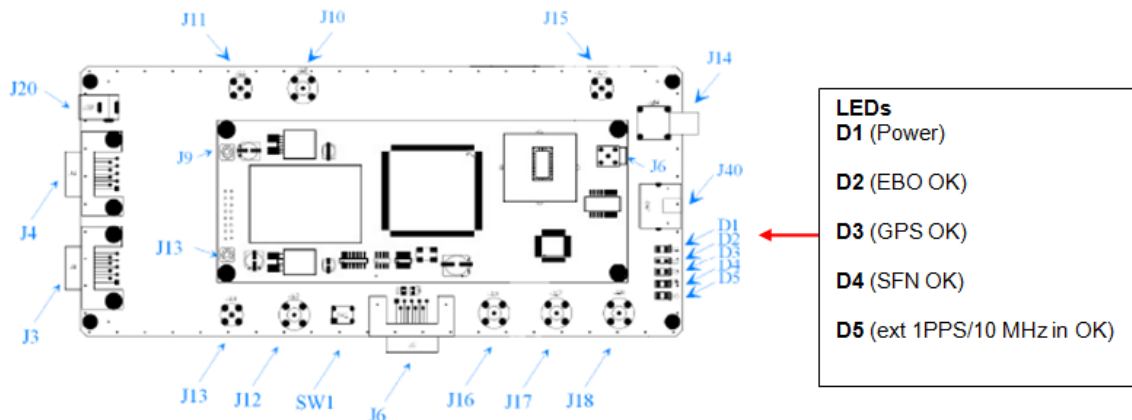
- D1: Power led On indicates the Adaptation Board is correctly powered on

- D2: EBO_OK led On indicates the good working order of the board

- D3: GPS_OK led On indicates that the GPS reception is correct

- D4: SFN_OK led On indicates that the 10MHz frequency is cycle locked to the 1pps, meaning that there are always 10000 000 cycles between consecutive 1pps occurrences.

- D5: EXT_REF_OK led On indicates that the External_1pps_10MHz and /or optional inputs are connected

D5 (Ext Ref OK)

Email from a customer regarding the **D5 LED** on the board; I found this LED will not function until the External 1PPS/10MHz Priority Level on the Time and Reference setup is configured. By default these inputs are disabled. You need to go into the web browser interface and set the Priority level to enable this function. After I changed the 1PPS/10MHz Priority Level from DISABLED to PRIORITY 2 the LED would illuminate if I connected either the 1PPS or 10 MHz external inputs.
The GPS was set to Priority 1.
GPS input cabling

The EB03 uses an MCX connector on the board. You can use short lengths of RG-174 or RG-58 as desired with an MCX connector on the end of the cable.

BTU- The EBO3 needs to power supplies:
- One in 5 Volt DC that consumes 500 mA. So the power is 5 x 0.5 = 2.5 Watts
- One in 12 Volt DC that consumes 300 mA. So the power is 12 x 0.3 = 3.6 Watts.

Total power = 2.5 + 3.6 = 6.1 Watts.
So the energy provided by the EBO3 in 1 hour is 6.1 Wh = 21 960 Joules = 20.79 BTU if we use the average conversion rate of the BTU to Joules.

Inputs

➤ GPS

➤ External 1PPS

➤ Optional inputs such as 2.048 Mbits/s (E1) or IEEE-1588 (PTP) available using a "piggy-back" board.

Reference Priority

Q. We are also noticing that, with the External 1-PPS set as a Priority-2, if the GPS antenna is removed, the board is not indicating it has changed over.

A. For this function, you must set the GPS reference in priority 1 and External 1pps in priority 2.
With this configuration, when the GPS is unlocked (0 satellites) and when External 1pps available and detected by the EBO3 (see the matching status)

External 1pps / 10 MHz presence	Ok

The EBO3 switch automatically on the 1 pps-external. On the clock status web page, the synchronization source is set with External 1pps/10MHz

Synchronisation Source	External 1pps/10MHz

Manual time sync

Q-We have also been able to get into the Network port and view the GPS status and make changes where necessary. However, not sure why we should have to--- (thought the GPS signal would update the date/time automatically), but when we change the date and time, and save it, it will not remember, and the numbers go back to the previous numbers. Again, since there is no battery on-board, I would think the GPS signal would update this data.

A- The manual time function is only used when there are no reference inputs (GPS, NMEA) available. When the EBO3 is locked on GPS, the date and time is automatically updated on the GPS time. You can use the UTC, local time (UTC plus or minus offset) but it's always based on the GPS time.

Outputs
**1PPS Output

Rise-Time of the 1PPS

➤ From Spectracom France: The rise time of the EBO 3 – 1PPS output is typically <20ns.

1PPS output pulse width

➤ Hello Leisa, Sam Messina at NGC hooked the EBO3 Board to the lab scope and he noticed the 1 PPS pulse is about 50us second long and NGC standard 1PPS antenna puts out a 20us pulse. Can the 1 PPS pulse be adjusted or tuned

A. **From Wade Sober (12/20/12**) Out of the box there is no way to change the pulse width. Our engineers feel that they could make a software change to get it to be 20us. We would have to pursue what is required to do this after the first of the year.

1PPS output jitter

From Spectracom France

➤ When the EBO 3 (BG-WiMax Type) is locked on GPS, the accuracy to UTC (after 24h GPS locked) will be ± 50 ns (1σ). – Information available in the Datasheet.

➤ When the EBO 3 (BG-Broadcast type) is locked on GPS, the accuracy to UTC (after 24h GPS locked) will be ± 25 ns (1σ). – Information available in the Datasheet.

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Kalman filter:

• Used for frequency generation.

• It takes 10 seconds of loss of GPS before holdover mode begins.

• In holdover mode- the oscillator is not steered.

• Fast jumps stop when SFN (Single Frequency Network) mode starts.

• Data from the Kalman filter is proprietary data- don't give out.

• J1 is 1PPS out, J2 (labeled PP) is 10 MHZ out,

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EB03 web browser (uses Epsilwin32 software program)

• Software shows only 8 sats- drops the four with the lowest signal strengths.

• SFN (Single Frequency Network)- tells the Application it is locked. Takes about 10 minutes after power-up to enable

• MAC addresses are all programmed as the same- set later via the browser.

• SNMP- two destinations available.

• Web pages refresh every 5 seconds.

• Ethernet connector is 10baseT only. Not 100base T.

• A jumper in new board rev is for a static address on a non-DHCP network.

• IP address/factory for factory mode. Password is: 'orange'

• HTTP only- Does not support HTTPS.

• Do not use the debug dropdowns- for engineering only.

• Osc voltage field change only takes affect after a power cycle of the board.

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Communications with the EB03/Epsilwin Software

Epsilwin software can be used to communicate with the EBO3 J3 RCI/TCI port (Remote Control interface/Time Code interface).

Email DL sent- We are working on the Epsilwin32 connection to the EB03 board now. From what I now understand, if the PS1 jumper is removed the port is in RCI mode. This mode does not communicate in ASCII, but in binary to specific commands. These commands can be controlled by the Epsilwin32 software or sent by code. The protocol is outlined in the manual in section 5 as well as the commands.

Q- We have been able to 'get in' via RCI to change the IP addresses okay, but still cannot do anything with the RCI data: With the 'program jumper' PS1 removed, all we get are the 'wing dings' every pulse per second. There is no keyboard control, so we cannot command [GSS] to get the satellite display. Should we expect more?

A- When the PS1 is open, the RCI (remote control interface) is available. It's means that you have an access of the ebo3 status with using the Spectracom (EpsilWin32) protocol. You can use our Epsilwin software in order to monitor the EBO3 through this protocol. But you have the same functionalities with the Ethernet port.

    RCI (no solder on PS1) = Use EpsilWin32 software
      TCI (solder on PS1) = Use HyperTerminal

RCI/TCI settings= 9600 baud, 8 bit, 1 stop bit, odd parity. (Use RS-232 cable pinned straight-thru).

Q. Wayde Allen at NIST, Boulder Co wants to know if he can get the software data stream protocol for the EC1S-SO Epsilon Clock to write his own communication protocol code. He is using Lynx-Python operating system.
A. (Refer to \\Exchange\empshare$\Customer Service\Equipment\Spectracom Equipment\Epsilon Clocks\Epsilwin software) I am Sylvain from Spectracom support team in France. I can confirm that the remote interface protocol is given to our customers to allow them to develop their own communication software.   So you can develop your own interface without using Epsilw32 software. The protocol is given in the chapter 5 of the Manuel guide. I send to you one copy attached in PDF file.
I give you a other note which gave an additional information about ETX and STX specific characters used by the protocol.

NOTE: Per Spectracom France, the RCI serial interface is to backward support EBO2. It is not being upgraded to support newer EBO3 capabilities. Customers should use Ethernet interface only. See email below:

The RCI function is a legacy of previous generations of EBO boards which were not supporting the management over IP. At this time the only way to communicate for configuration and status is a serial port. The EBO3 supports this function just for backward capabilities. The intention is that only our existing customers of previous generations of EBO will actually continue to use it on the EBO3. For new customers we do not recommend using the RCI as it has not been updated to support some new features of the EBO3.
To make it clear:
- RCI has not evolved along with the EBO3 new features, it has stopped its evolution at EBO2 – for new customers we do recommend using it

- Only Ethernet communication fully supports all the features of the EBO3.

FAQs

I was able to locate another evaluation board here and I found that even after shorting the PS1 pads on the board I could not get into the setup interface through HyperTerminal. I am checking on this with the design experts now and will get back to you as soon as I hear.
I was able to obtain an IP address using DHCP on our network and using freeware Zenmap to scan the network for the MAC address. Hopefully you can do the same.

Regarding the **D5 LED** on the board; I found this LED will not function until the External 1PPS/10MHz Priority Level on the Time and Reference setup is configured. By default these inputs are disabled. You need to go into the web browser interface and set the Priority level to enable this function. After I changed the 1PPS/10MHz Priority Level from DISABLED to PRIORITY 2 the LED would illuminate if I connected either the 1PPS or 10 MHz external inputs. The GPS was set to Priority 1.

Q Connector J8 has four pins listed as 'GROUND', pins 3, 4, 13 and 14. Although electrically they are all common, are the pins designated as power supply common, digital ground, serial port ground, etc. Presently, I'm bringing all four up to my board, and then bussing them together for current purposes. Could you check with your engineers to see if this is a good practice or not? I need to meet with them today.
  ➢ A quick discussion with our engineers told me that all the grounds are common on the board, so you can use a single ground connection. The practice you described is OK.

Q. Some logical outputs are indicated "TTL compatible level" but the Voh is not given. Is it 3V3 max for all? Can you give it to us?
A. I am Sylvain Dessapt from the French technical support department. We can support you in France. I can confirm that the Voh is 3V3 for all the outputs on the EBO 3 board and they are TTL compatible.   (It uses a 3.3 v LVTTL/LVCMOS).

Email from Sylvain (2/22/11)
I don't know if you have already done it but for factory parameters you must connect the unit by entering the following IP address: http://172.16.207.231/factory 172.16.207.231 is a LU example but it is necessary to enter /factory at the end of the address. FYI: this is as same for EC20S, EBO III, EC22S etc….

EC1S (Discontinued 8 Dec 16)

- ➢ Shortcut to EC1S Data sheet: link to datasheets in SharePoint
- ➢ Shortcut to EC1S manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC1S
- ➢ Shortcut to EC1S in Customer Service: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC1S
- ➢ Available EpsilWin32 interface software for EC1S: Refer to: EpsilWin32 software section in this document for more information on this available software.
- ➢ Also refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\Epsilwin software

EC1S Discontinuance

- ➢ Discontinued 8 Dec 16
- ➢ Refer to: ..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC1S

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Email from Emmanuel (8 Dec 16) After a very long operational life (it was introduced in 2002), Spectracom today announces the end of life of Epsilon Clock EC1S. This is effective immediately. There will not be any Last Buy Order. Spectracom will support this product (repairs only, no SW evolution) for 5 years. EC1S will not be part of the next price list, and all related accessories have been also removed.

EC1S was a compact GPS clock. Its closest replacement is VersaSync, which is quite a higher end product, featuring extreme interface flexibility, high networking capability and full ruggedization.
Due to this, VersaSync is much more expensive than EC1S and will not be a good fit for customers looking for low end products – we don't plan any replacement as a low end replacement of EC1S.

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Chassis related

Email from Dave Lorah on 11/11/10)
I found the screw size for the EC1S Mounting kit. It is a Metric 3mm (M3) standard thread Phillips pan head screw 6mm length. It is stainless steel.

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Available Oscillator configurations

- **EC1S-SO**: High Performance Single Oven OCXO (standard configuration)
- **EC1S-DO:** Double Oven OCXO (excellent temperature stability and very low aging)
- **EC1S-LC:** Low Cost OCXO (for less demanding applications)

**Input power and specs:

Ground   +Vdc (Model dependant)
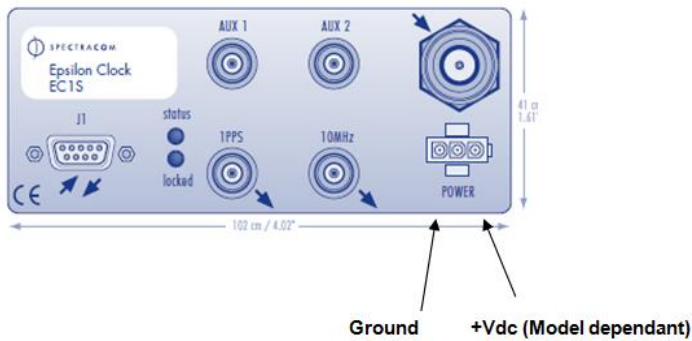
Input Power (Model dependant)

EC1S Model	P/N	Input VDC
EC1S-SO		18-36vdc
EC1S-SO-12VDC		10-18vdc
EC1S-SO-013		18-36vdc
EC1S-01		
EC1S-02		
EC1S-SO-48vdc		37-72vdc
EC1S-SO-011		18-36v
EC1S-SO-01		
EC1S-SO-50MHz		18-36v
EC1S-SO-012		18-36v
EC1S-SO-12VDC-SQ-IR		18-36v
EC		18-36v

Standard configuration

Standard input: Accepts 19-36 vdc input, normally provided by a customer's own power supply (EC1S is shipped with just an input power connector that requires wires to be crimped on).

Optional power configurations: Some EC1S units have inputs of 12vdc, 4vdc and 72vdc. Not all units have 19 to 36vdc input range.

Available "EC1S-DC" power pack

An **EC1S AC to DC converter** is available for purchase from us (our P/N: **236293**).

Refer to MFG data sheet: EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC1S\EC31S-DC power pack

Company: http://www.phihong.com/
Model: PSAC30U (we use the specific Model **PSAC30U-240**)
AC Input: 100 to 240VAC, 47 to 63 Hz
Power: 30W
Output Voltage: +24VDC

Important Note: This AC to DC adapter has a 24vdc output. It is ONLY compatible with EC1Ss that have an input range of to 19 to 36vdc. It is NOT compatible with other input power configurations.
See the EC1S configurations in Salesforce for input power specs of each Model
EC1S Current ratings

EC1S-SO
Email from Tom Richardson (7 Feb 2013) EC1-SO is 10W warm-up, 7 W typical. 10W/12V=0.8A

EC1S Power-up (two Status LEDs on the front)

After initially applying DC power:
- ➢ For the first 28 seconds or so, neither the "Status" nor the "Lock" light is lit (both are dark).
- ➢ After 28 seconds or so, the "Status" and "Lock" lights will temporarily turn on.
- ➢ About 45 seconds after power is applied, both LEDs turn off, one at a time.
- ➢ Both LEDs will then remain off for about 20-30 minutes (assuming the GPS antenna is connected and installed outdoors with a good view of the sky).

Note: The "Status" LED (and therefore the "Locked" LED) will not turn green unless GPS reception is present (Both LEDs remain dark if GPS is not connected). If GPS is connected and present, the Status and Lock lights both turn solid green within about 30 minutes.

If neither LED temporarily illuminates upon applying power, verify there is between 19 to 36vdc present on the front panel Power connector.

Please let us know that both LEDs go from dark to solid green within about 30 minutes after connecting and installing the GPS antenna in a location where it has a clear view of the sky (preferably 360 degree view, but at least as much view as possible, so that it can track at least four satellites)

Front panel outputs
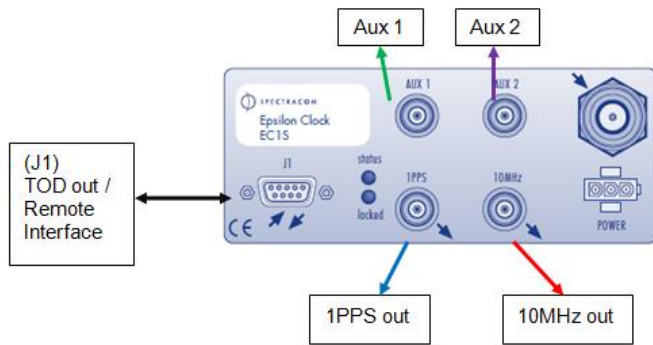
1PPS output: 1 Hz pulse starts outputting even before sync to GPS. Output amplitude is about 5vp into high impedance. The pulse width of the 1PPS is very narrow (about 1 microsecond, whereas the 819x series is about 200 milliseconds).

---

10 MHz output: 10 MHz sine wave starts outputting even before sync to GPS. Output amplitude is about 1.2vp-p into 50 ohms.

Aux 1 and Aux 2 outputs (desire for a specific output frequency)

> Both are SMA connectors

(info from Sylvain as of 6/2/10).

From the EC1S manual, these two connectors are optional.

Existing standard VERSION:
AUX 1 is a 2.048MHZ INPUT
AUX 2 is a 2.048MHZ OUTPUT

This option does not exist for the moment (it can be developed under request) :
AUX 1 & 2 as an 2.048MHZ OUTPUTS is not available for the moment

---

Available alternate Aux 1 and Aux 2 output configurations

  Refer to (EC1S Options) for addition info: link to datasheets in SharePoint

Model	AUX 1	AUX 2
EC1S-SO	none	none
EC1S-SO-011	1PPS output	10 MHz output
EC1S-SO-012	10 MHz output	10 MHz output
EC1S-SO-013	1PPS output	1PPS output
EC1S-SO-2MHz	2 MHZ Input	2 MHZ output
EC1S-SO-50MHz	2 MHZ Input	adjustable frequency output

Model EC1S-SO-011

This option provides one (1) additional 10 MHz frequency and one (1) additional 1PPS outputs on AUX1 & AUX2 connectors.

Model EC1S-SO-012
This option provides two **(2) additional 10 MHz frequency outputs** on AUX1 & AUX2 connectors.

Model EC1S-SO-013
This option provides two (**2) additional 1PPS outputs** on AUX1 & AUX2 connectors.

Model EC1S-SO-2MHz
This option provides one **(1) 2.048 MHz frequency input** and one **(1) 2.048 MHz output** on AUX1 & AUX2 connectors.

➢ 2.048Mhz input is a backup to GPS. It is not a primary input that replaces the need for GPS input

➢ GPS lock is required for at least one hour before 2.048MHz can discipline the oscillator if GPS reception is lost.

From the EC1S manual: The EPSILON CLOCK MODEL EC1S can be synchronized with an external input 2.048MHz when GPS is lost. This yields excellent holdover performance.
Before all switching, the EPSILON CLOCK MODEL EC1S must be locked on GPS at least one hour to allows a good 1PPS synchronization to the UTC.

After this delay, if an external reference is connected, the EPSILON CLOCK MODEL EC1S switch automatically on this last as soon as the GPS is lost. The led "locked" is blinking . The 1PPS and frequency drifts are in accordance with the external input 2.048MHz medium term accuracy.

The 1PPS timing performances are again guaranty respect to UTC, ½ hour after the GPS is back.

Email from Frederic (17 Sept 2013) When the 2 MHz is used as the external reference, it is used to discipline the internal OCXO (aka to control the frequency of the OCXO).
The output of the OCXO is used as the 10 MHz signal output and for creating the 1 PPS(though the processor) and 2.048 MHz signal (through the Digital frequency synthesizer). Note that the 1PPS and 10 MHz are phase locked, meaning that phase corrections on 1PPS are done through frequency corrections on the OCXO.

When the GPS is locked, it's also used to discipline the internal OCXO through the 1 PPS coming from the GPS receiver.
This 1 PPS is equivalent to a 1 Hz frequency reference, and also carries the phase information (edge of 1PPS is the second "top").

So in theory, the OCXO could be directly disciplined by the 2.048 MHz input, like in a PLL (just considering the frequency disciplining function)

But as EC1S is a timing device, with 1 PPS and 10 MHz phase locked, initialization phase requires the internal timescale to be initialized, which can be done only through the GPS reception. This allows also to ensure that the OCXO frequency is within a range that allows "fine" disciplining, resulting on a very good long term frequency stability.

Model EC1S-SO-50MHz

This option provides one (1) 2.048 MHz frequency input on AUX1 and one (1) adjustable frequency output, in the range of 1 MHz to 50 MHz.
on AUX2.

Q. Is there a supported option for EC1S that allows for a programmable 24.192 MHz output? If so, do you have any additional information available about this for our salesman to forward along to his dealer?
A. EC1S can support a 24.192MHZ output, yes, but it needs to be integrated in the units at our factory before delivery. The DDS cannot be set up through Epsilwin32 but only at factory upon request from customer (it can be developed under request).

- The EC2S has an equivalent option (as EC1S) – in the same way (setup in factory) you can deliver 2 programmable outputs (not independently).

TOD Data Format (TOD Link output) Connector J1
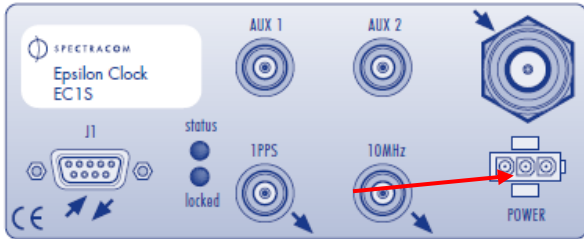
TOD output message

(9/13/12 KW) (Note per Eric Girard): NMEA format **GPRMC** is the only available TOD output string. Without a special EC1S software change applied, there is no abilty to change it any other NMEA output string, such as either GGA or ZDA).

Example GPRMC output string: 9/06/2008 14:40:58L

Diagnostic - 0irig: bad ir_conf 0irig: bad ir_conf 0irig: bad ir_conf 0irig: bad ir_conf 0 (repeated every second).

Garbage characters displayed in HyperTerminal.

Can't use standard RS-232 pin-out cable for TOD output   Otherwise, you see the once-per second comms with EpsilWin32 software that occurs on Pin 2 of the DB9 port. The TOD data string is present on pin 9, so pin 9 needs to connect to pin 2 of the PC instead, when looking for time code data. The correct pin-out configurations for the TOD output are as follows.

Pin-out for TOD output data (viewing time strings in HyperTerminal)
```
               EC1S     PC
                5 ------ 5 (ground)
                9 ------ 2 (TOD output data, present once-per-second)
```

EC1S GPS receiver/ GPS reception

GPS receiver:
- EC1S uses a Toshiba M12 GPS receiver (not a Trimble Res-T receiver)

Email from Eric Girard 9/14/12
The EC1S doesn't use the GPS receiver Trimble resolution T, but the Toshiba (Motorola) M12 model. We only use 8 satellites even if the receiver can get much more.

EpsilWin32 Software shows only 8 sats- it drops the four with the lowest signal strengths

Knowing the number of satellites being tracked and their signal strengths (SNRs) requires the Epsilwin software (or a custom-created remote interface). Refer to: EpsilWin32 software for more information.

GPS input / GPS cabling to antenna

➢ TNC Female connector on EC1S

➢ When using our RG-213, RF-400 or LMR-400 cable, a type "N" Female to TNC Male adapter (Our P/N AD-NT-MF) is required. Or, purchase the GPS cable with Type N with one end and TNC on the other, such as the following Spectracom cables:

RG-58 CABLE

• RG58NT-10 (10 meter RG-58 cable with Type N male to TNC male connectors)

• RG58NT-25 (25 meter RG-58 cable with Type N male to TNC male connectors)

RG-213 CABLE

• KX4NT-25 (25 meter RG-213 cable with Type N male to TNC male connectors)

• KX4NT-50 (50 meter RG-213 cable with Type N male to TNC male connectors)

• KX4NT-100 (100 meter RG-213 cable with Type N male to TNC male connectors)

GPS reception requirements

Apparently, GPS receiver initially needs to track at least four satellites to complete a GPS survey. Once survey has completed, the GPS receiver only needs to track at least one satellite at all times.

GPS Mobile (Dynamic) mode:

Email from Sylvain-
The EC1S CAN work on mobile mode, you can select this mode by EPSILWIN32 interface or by sending a command line with the Serial protocol…

Here is a picture (Below) of the GPS menu that you have to select to enable this function. In this MOBILE mode, the GPS always track a new position. (useful if the antenna is mounted on a boat for example…).
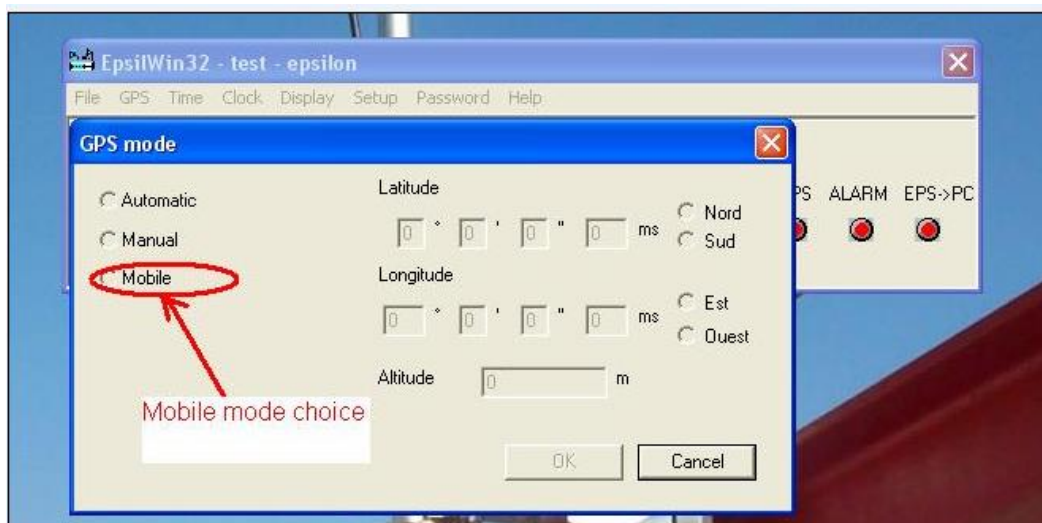
Automatic Self survey with rebust 0D fixed mode

Q. I'm translating Spectracom datasheet, there is a sentence "Automatic self survey with robust 0D fixed mode" in spectracom_Epsilon_Clock_Model_EC1S.pdf. I don't know what mean "robust 0D"
A. (email from Norm West) "Automatic self survey with robust 0D fixed mode" means that in automatic mode, the EC1S calculates the position of the antenna and, after testing the result, imposes the position on the internal GPS receiver. The receiver therefore functions in GPS 0D (Single Satellite) reception mode, meaning that the EC1S is synchronized by tracking at least one satellite.

EpsilWin32 software (also called "Remote Interface") for EC1S / Custom interface

➢ Refer to: EpsilWin32 software section in this document for more information on this available software.

➢ Also refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\Epsilwin software

Details for the Remote Interface are in section 5 of the EC1S manual
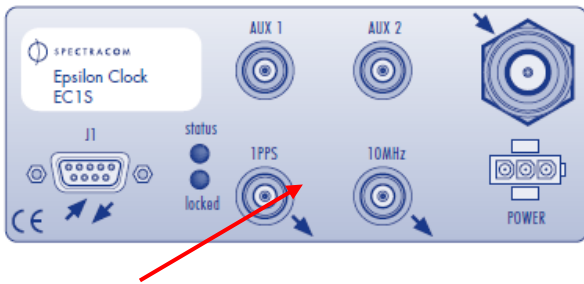
Communucation Protocol: 9600 baud, 8 bit, 1 stop bit, **odd** parity (doesn't work correctly with even or no parity)

RS-232 cable Pin-out for Epsilwin software/ custom interface

```
EC1S     PC
 5 ------ 5 (ground)
 2 ------ 2
```

EC1S Troubleshooting

Correct pin-out but time stamp present every second (no responses to commands being sent)

Make sure parity is set to ODD parity (not even or no parity).

EC2S/EC2T (discontinued/no longer supported)

- ➤ Link to EC2S/EC2T data sheet: link to datasheets in SharePoint
- ➤ Link to EC2S/EC2T manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC2S
- ➤ Link to EC2S/EC2T in Customer Service: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC2S

Discontinued/No longer supported

Email from Eric Girard to a customer (18 Sept 2020) "This product is now not supported."

Discontinuance/last time buy for EC2S/EC2T

- ➤ Per the "**Spectracom Timing Partner Info Letter"** (sent out via email from Tim K on 24 Sept 2013)

   Last Time Buy Notice for Epsilon Clock models EC2S and EC3S

   http://www.spectracomcorp.com/ProductsServices/TimingSynchronization/GPSTimeFrequencyReferences/EC2SEpsilonGPSClock/tabid/1309/Default.aspxYou have until October 31 to place last time buy orders for EC2S and EC3S. This does not affect other models in the Epsilon Clock family, EC20S, EC22S, EC1S, EBO3, which continue to be the global standard for synchronizing digital broadcast applications.

Input power

Main power supply input (90 to 265V / 48 to 63 Hz) (Switched power)
1 DC power supply input (**EC2S**=18 to 32 vdc   **EC2T**=36 to 72 VDC), (no power switch)

Power

EC2S/EC2T OCXO: < 25W typical
EC2S Rb: < 40W typical

Outputs

EC2S/EC2S-RB (4) x 10 MHz sine-wave out   *EC2T (*4) x 2048 kHz sine-wave outputs (G 703 § 13 / 75 ⬜),
  ➤   1PPS output (TTL / 50 ⬜),

"Time of Day" time code output (RS232C)

Programmable 24.192 MHz output

Q Is there a supported option for EC1S that allows for a programmable 24.192 MHz output? If so, do you have any additional information available about this for our salesman to forward along to his dealer?
A. **Email from France** EC1S can support a 24.192MHZ output, yes, but it needs to be integrated in the units at our factory before delivery. The DDS cannot be set up through Epsilwin32 but only at factory upon request from customer (it can be developed under request).

  ➤   The EC2S has an equivalent option (as EC1S) – in the same way (setup in factory) you can deliver 2 programmable outputs (not independently).

Front panel
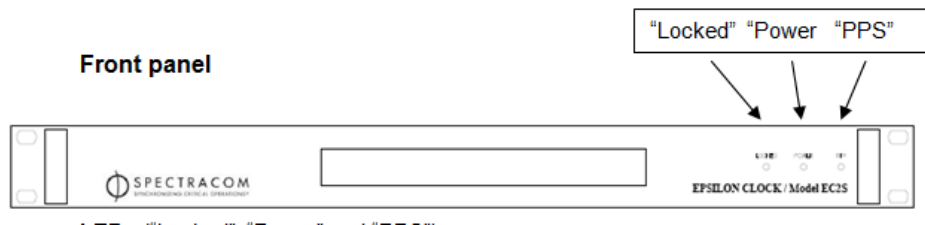
LEDs ("Locked", "Power" and "PPS")

"PPS": About 10 seconds after the power is switched on, the "1PPS" indicator will start flashing once--Per-second. This indicates the normal generation of the 1PPS signal by the built-in oscillator.

"Locked" and "Power":

	Locked	Power	Notes
Standard hardware automatic test	Red	Red	Checks the basic features of the clock
Optional hardware Test	Green	Red	Checks optional features
Period of synchronization	Red	Green	Looking for signal emitted by GPS satellite
Synchronization	Green	Green	The distributed time is synchronized to UTC (GPS)

The Power led turns red in the following cases:

- Faulty GPS receiver

- Faulty frequency driver

- Faulty frequency divider loop

- Faulty frequency or synchronization outputs or impedances not matched

- Faulty frequency or synchronization performances*

Rear panel
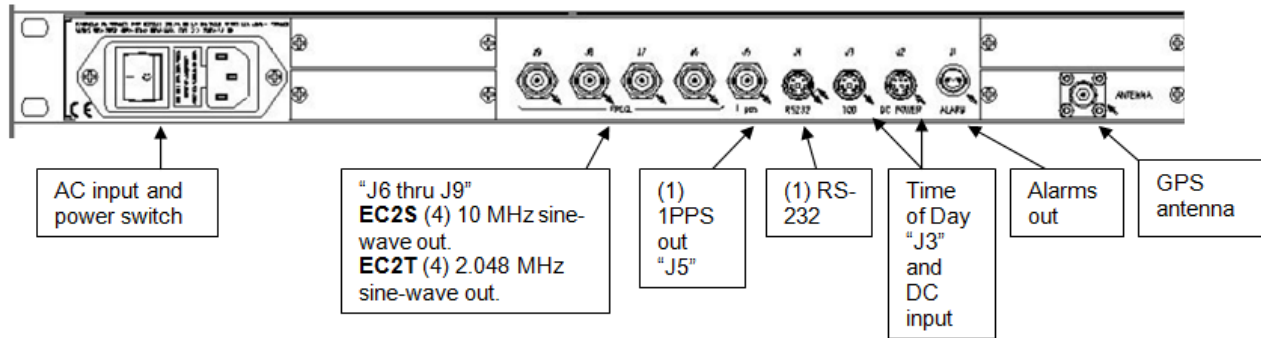
- 1 GPS antenna input

- 1 main power supply input (90 to 265V / 48 to 63 Hz),

- 1 DC power supply input (36 to 72 VDC),

- 4 x 2048 kHz outputs (G 703 § 13 / 75 Ω),

- 1 1PPS output (TTL / 50 Ω),

- 1 time code output (RS232C),

- 1 alarm output (relay contact),

- 1 remote control interface (RS 232C).   For EpsilWin32 software (or HyperTerminal) 9600, 8, 1, Odd parity

---

Epsilwin32 software

I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\Epsilwin software

Note: Also refer to (in this document): EpsilWin32 software (also called "Remote Interface")

STANAG 4430 (NATO standard), available as an output in lieu of IRIG (Can have IRIG out OR STANAG out. Both outputs not available at the same time). A switch setting determines which output is provided.

EC2S with IRIG Stanag option

Modification of an EC2S to add Stanag (havequick output).

➢ Refer to \\Exchange\empshare$\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC2S for more information (this folder includes an addendum for the Stanag modification - including Havequick connector pinouts).

Email from Sylvain regarding this mod:
"Yes this is the STANDARD STANAG 4430 SUBD25 used by all our DEFENSE CUSTOMERS. I have attached to this Email the addendum note that we add to the User Manual of the EC2S when they use STANAG or IRIG option card. I hope this will match with your needs."

EC2S/EC2T FAQs

Q. Is there a supported option for EC1S that allows for a programmable 24.192 MHz output? If so, do you have any additional information available about this for our salesman to forward along to his dealer?
A. EC1S can support a 24.192MHZ output, yes, but it needs to be integrated in the units at our factory before delivery The DDS cannot be set up through Epsilwin32 but only at factory upon request from customer (it can be developed under request).

> The EC2S has an equivalent option (as EC1S) – in the same way (setup in factory) you can deliver 2 programmable outputs (not independently).

EC3S (Discontinued)

Discontinuance/last time buy for EC3S

➢ **Per the "Spectracom Timing Partner Info Letter" (sent out via email from Tim K on 24 Sept 2013)**

Last Time Buy Notice for Epsilon Clock models EC2S and EC3S

http://www.spectracomcorp.com/ProductsServices/TimingSynchronization/GPSTimeFrequencyReferences/EC2S EpsilonGPSClock/tabid/1309/Default.aspxYou have until October 31 to place last time buy orders for EC2S and EC3S. This does not affect other models in the Epsilon Clock family, EC20S, EC22S, EC1S, EBO3, which continue to be the global standard for synchronizing digital broadcast applications.

_____

➢ Link to EC3S/EC2T in Customer Service: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS

➢ Link to EC3S/EC2T manual (manual is in Customer Service folder- link above):

Note: (EC3S is very similar to EC2S but with a keypad)

Input power

1 main power supply input (90 to 265V / 48 to 63 Hz),
1 DC power supply input (20 to 75 VDC/-75 to -20VDC)

Power: < 60 W typical

Front panel (2U high chassis)
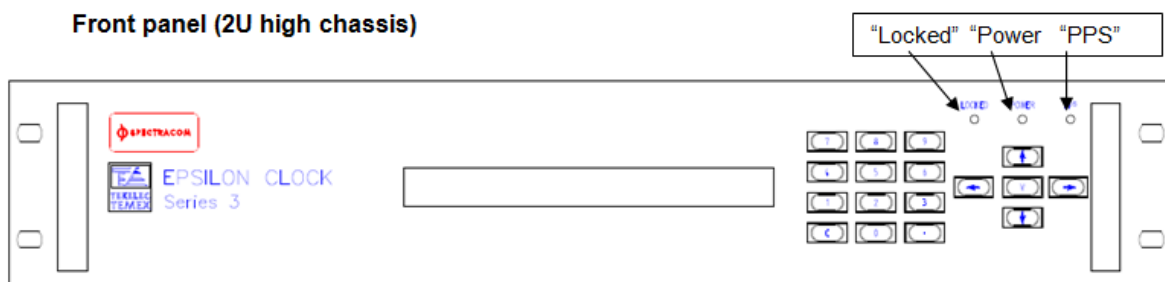
Front panel (2U high chassis)

LEDs ("Locked", "Power" and "PPS")

"PPS": About 10 seconds after the power is switched on, the "1PPS" indicator will start flashing once--Per-second. This indicates the normal generation of the 1PPS signal by the built-in oscillator.

"Locked" and "Power" LEDs:

	Locked	Power	Notes
Standard hardware automatic test	Red	Red	Checks the basic features of the clock
Optional hardware Test	Green	Red	Checks optional features
Period of synchronization	Red	Green	Looking for signal emitted by GPS satellite
Synchronization	Green	Green	The distributed time is synchronized to UTC (GPS)

The **POWER** Led will indicate red until the end of the oscillator warm-up time (15 minutes for OCXO, 1 hour for Rb).

The Power led turns red in the following cases:

- Faulty GPS receiver

- Faulty frequency driver

- Faulty frequency divider loop

- Faulty frequency or synchronization outputs or impedances not matched

- Faulty frequency or synchronization performances*

Keypad:

Refer to Section 6 of the EC3S manual for info on the keypad/screen.

6.3.5 Menus Organization

Back panel

| AC input and power switch | "J6 thru J9" 4) 10 MHz sine-wave out. | (1) 1PPS out "J5" | (1) RS-232 remote interface | Time of Day "J3" and DC input | Alarm out | GPS antenna |
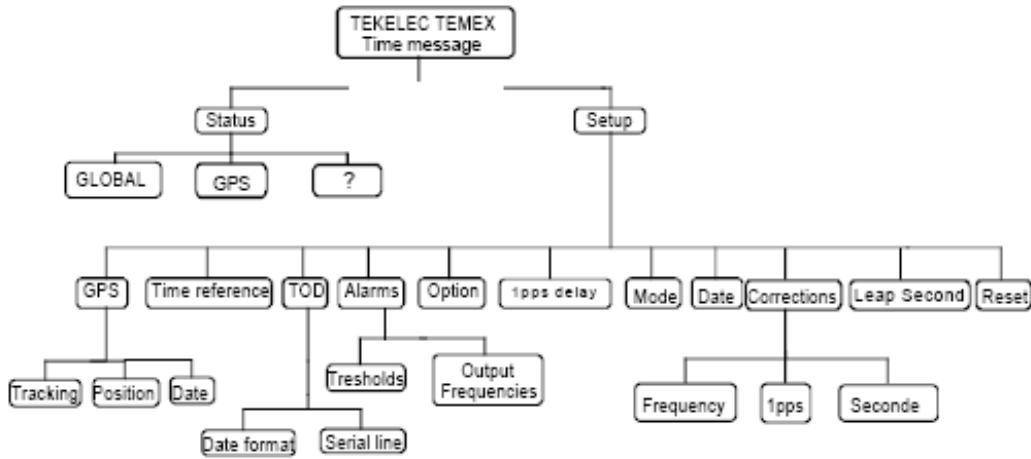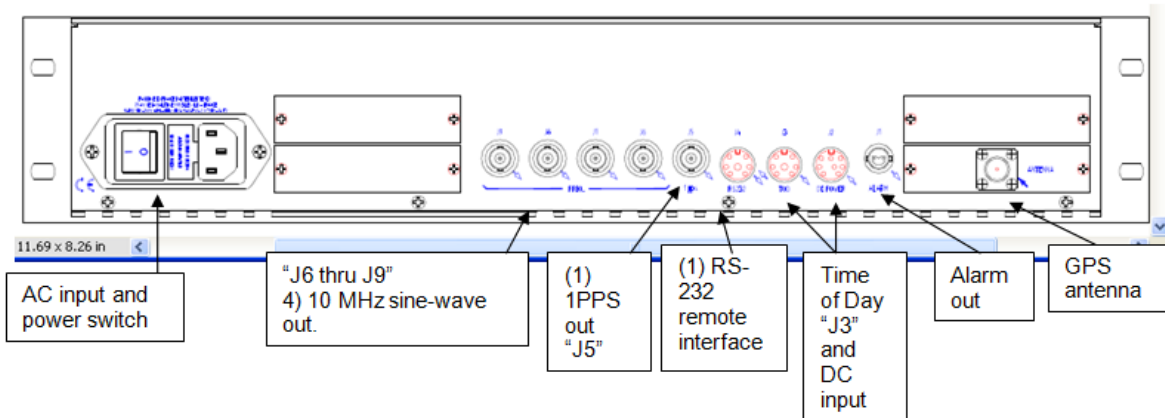
- 1 GPS antenna input,
- 4 x 10 MHz outputs (>10 dB / 50 Ω),
- 1 1PPS output (TTL / 50 Ω),

- 1 time code output (RS232C),
- 1 alarm output (relay contact),
- 1 remote control interface (RS 232C).

EC20S (EC-20S)

> ➢ **Shortcut to EC20S manual (P/N 1195-5000-0050)** in Arena: https://app.bom.com/changes/list-main?stay_here_p=1

>> previous revs: I:\New Released\Manuals\1195-xxxx-xxxx

> ➢ **Shortcut to EC20S data sheet**: link to datasheets in SharePoint

> ➢ **Shortcut to EC20S in Customer Service**: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC20S

Broadcast sync White Paper on our website (talks about EC20S and EC22S)
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=1208&PortalId=0

EC20S Part Numbers/ Configurations

Part Number	France P/N	EC20S configuration	Notes
250083	EC20S-XO	EC20S with OCXO	
	EC20S-Rb	Epsilon Clock EC20S with Rubidium	
	EC20S-XO-O1	Epsilon Clock EC20S with OCXO and 3 additional 1 PPS outputs	
250115	EC20S-XO-02	EC20S with OCXO & 3 additional 10 MHz outputs	
250116	EC20S-XO-03	EC20S with OCXO & 3 additional 10MHz outputs and 3 additional 1PPS out	
250404	EC20S-GLO	EPSILON CLOCK EC20S OCXO oscillator, Glonass option	

250405		EPSILON CLOCK 20S with Rb & 3 additional 1 PPS and 10 MHz outputs	**Released on ECO-0507 (~Jul 2015)**
	EC-PK3	GPS antenna pack for EC20S, includes 35 dB GPS antenna + post-mount kit, lightning protection, 10 m RG58 cable, 25 m RG213 cable	

Front panel LEDS

> In normal operation, all LEDs should be green. Only available synchronization sources should be enabled. Only available power alarms should be enabled

.

Rear panel
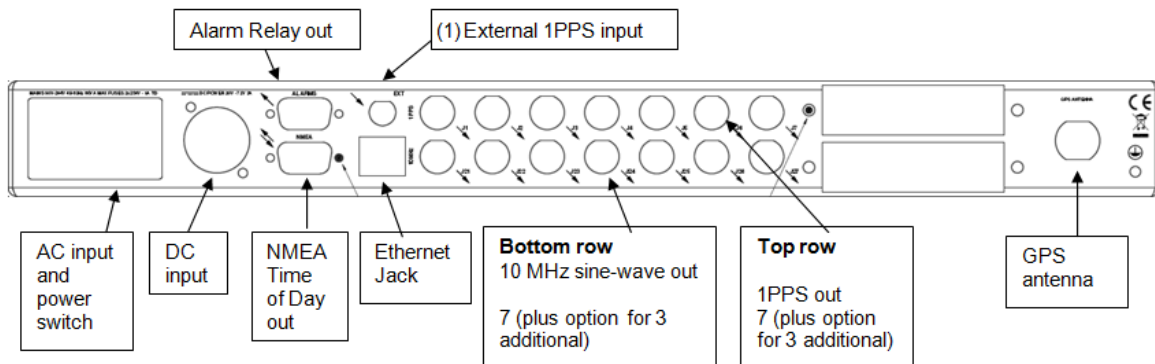
Weight: 8.2 pounds

Factory defaults:

Static IP address: 192.168.0.100 (have to first press the recessed button on the front panel)

Front panel "**Set IP" Reset button** sets the address to this when held for 2 seconds.

Power:

AC power (90 to 264 VAC / 48 to 63 Hz) is ON/OFF switchable but if DC power (20 to 72vdc) is connected and present, the equipment will always be on. To turn off the unit with DC input applied, the DC input has to be disconnected.

AC power is selected over DC input, if it is present. (DC is always a backup to AC).

Power consumption: < 55 Watts

Power alarms/Disabling power alarms

➢ Power status shown in the Clock Status menu at the top of the browser.

➢ AC and/or DC power alarms can be disabled via the browser

(Clock Setup -> Power Setup page) as shown below

4.3.9 Power Setup Page

As determined by the actual power supply connection, the operator must set which power alarm (AC or DC, left and right) should be enabled.
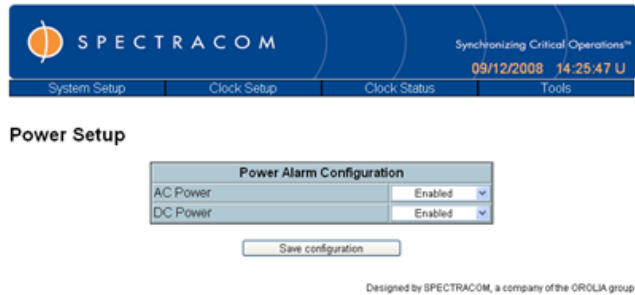
- AC Power:

  Check AC power supply:
  - Enable: Generates an alarm if AC power supply is not available.
  - Disable: No alarm generated.
- DC Power:

  Check DC power supply:
  - Enable: Generates an alarm if DC power supply is not available.
  - Disable: No alarm generated.

Power alarm setup

Can enable or disable the non-urg alarms for loss of AC or DC power

By default, the "Non Urg" alarm relay will not be activated upon either AC or DC input voltage not being present. If you wish for the relay to be activated upon loss of either AC or DC voltage, the Power Alarm configuration needs to be "Enabled".   If you are only providing only one type of power but not the other (such as AC input only), as shown below, you would enable the AC Power alarm and also disable the DC power alarm, so that it's not in a constant alarm condition.

Alarms / Alarm relays

➢ Loss of Power alarms: Refer to the previous "Power" section for info on the loss of power alarm configuration.

➢ Here are the criteria for the 2 relays of the EC20S (From Sylvain on 2/14/12)

	Relays	
Stat	Non Urg	Urg
Source GPS in Alarm (if enable)	X	
Source Ext PPS in Alarm (if enable)	X	
Source NMEA in Alarm (if enable)	X	
Alarm Oscillator		X
Alarm Internal PPS		X
Alarm Phase PPS Threshold		X
Alarm Frequency Threshold		X
SFN Mode Off		X
Alarm Power supply (DC or AC)	X	
Status Option1 (reserved)		X
Status Option2 (reserved)		X
status Option3 (reserved)		X

		Relays	
Stat		Non Urg	Urg
Alarm PPS Output			X
Alarm Freq Output			X

➢ Alarm relays are disabled by default

➢ For 1PPS and/or 10MHZ alarms, need to enable the Mute mode (as shown below). These are disabled by default.

You have to enable the Mute function if you want to activate the Alarm relay following 1PPS phase issue (for example)

When disabled, no alarms associated to inputs will be asserted

*Network related:

Network Setup
➢ Network configuration is via the System Setup menu -> Network Setup page of the browser

**MAC address:

The MAC address is located on a label located on the side of the unit, (near the Spectracom Serial Number tag and right next to the FCC part 15 sticker).

Example MAC address (from a packet capture): Spectrac_09:01:E7 (00:0c:ec:09:01:e7)

———————————————————————————————

Supports DHCP, but no way to retrieve the DHCP assigned address from the EC-20S (have to retrieve it from the DHCP server). Recommend setting it to a desired static address using a cross-over cable and the default static address.

* Pressing the front panel Reset button for two seconds sets it to the default static IP address mentioned above. (The switch is on the front panel, right side, just below and between the "PWR" and "SRC" LEDS. (Not currently labeled)

DHCP only happens at power-up. If the network cable is not connected at power-up, power cycle the EC-20S to take the new address.

You can connect a standard DB9 cable to the DB9 Alarms output connector. Using HyperTerminal with our standard configuration, hit <enter> and this will take you into a setup menu. Power cycle the EC-20S to take the changes.

**Web Browser

> Browser is HTTP only (Does not support HTTPS).

***login Password

> Default password is "pwd" (lower-case)

> Password can be changed as desired at the bottom of the System Setup -> Network Setup page of the browser.

Page Auto-Refresh

> The web pages auto refresh about every 7 seconds or so. If you're looking at the bottom of the page, when it refreshes, you'll be back up to the top.

Time display/ Local Time display (for the time display at the top of the browser window).

> The date/time on the top of the menu will show default of Nov 1999 until synced to GPS. Then it will correct with a European date display.

Local time display

Can configure only a Time Zone Offset in the Clock Setup/Time and Synchronization Source Setup page. There is no DST capability, though.

To configure local time display, change "Time Reference: from UTC to LOCAL. Then change OFFSET value to the desired value.

Email from Sylvain (2/22/11)
I don't know if you have already done it but for factory parameters you must connect the unit by entering the following IP address: **http://172.16.207.231**/factory

172.16.207.231 is a LU example but it is necessary to enter /factory at the end of the address.
FYI : this is as same for EC20S, EBO III, EC22S etc….

*Inputs

**External 1PPS input (labeled EXT")

> external 1PPS can be used as a primary or a backup synchronization source.

> In the EC20S manual, under "External 1PPS Synchronization Source" (as excerpted below)

The external 1PPS shall be input on the '**EXT**' connector located on the rear panel according to the following features:

- **TTL level**

- **Input impedance**: 50Ω

- **BNC connector**

- **Active rise edge** (high level duration 100µs minimum)

- **Minimal Accuracy to UTC**: ±50ns (1σ)

**GPS input

> GPS setup configuration is via the **Clock Setup menu** -> **Setup** page of the browser

GPS position and status are via the "Clock Status" menu at the top of the browser.

Mobile operation of the EC-20S

> To use the EC-20S while in motion, on the Clock Setup/GPS Setup page, change the GPS mode from Automatic to Mobile.

> Switching from Automatic, to Mobile and then back to automatic will cause the GPS Self Survey to restart (as indicated by "Self Survey" in the Clock Status page indicating "in progress".

Issues with Trimble Res-SMT-GG receiver

➢ Trimble software version 1.06

➢ Like the same issues observed with SecureSync and its Res-SMT-GG receiver firmware

Fix to this issue for the EC-20S

➢ Refer to ECO 331 (Apr 2015)https://app.bom.com/changes/detail-summary?change_id=2384807051

"Current LAssenIQ form factor of GNSS receiver need to be upgraded to Resolution T form factor"

Email from Emmanuel, 2 Oct 14
Could you please summarize the issues you've been facing with Trimble GG receiver (or point out towards some existing documents).

We are currently facing some "fleeting loss of GPS" with these receivers on EC20S and would appreciate your inputs to identify whether this is one of the known issues you ran into with SecureSync.

What we've seen last week for the first time, looks (from the logs provided by customer) to be a reference time jump which caused the EC20S algorithm to get out of precise tracking mode 2 times in row, with around 12/14 minutes between both jumps. This can be caused by a GPS 1PPS jump or maybe also by a ToD jump, and seems to correspond to the first issue you mentioned.

With Ron's help:
   How did was this issue fixed? What's Trimble position on this issue?
   New firmware in the GG receiver? Workaround to detect time jumps and mitigate them?

GPS year 2019 new week rollover (20 year week rollover)

The Epsilon Clock Models EC20S and EC22S units were equipped with one of two different types of GPS receiver modules. Only one of these two GPS receiver types is affected by the GPS Week Rollover issue – the **Trimble Lassen IQ** type receiver.

Here is more information on this GPS receiver week rollover issue. You may already have this information.

https://support.spectracom.com/bulletins/epsilon-clock-issue-2019-gps-rollover-event

Customer reported observations, after 2019 rollover occurred (how to tell if the unit was affected)

➤ Refer to Salesforce Case 190430

➤ Refer to **Clock Status** page of the browser and see if looks like the screenshot below (which shows one that was affected and hasn't had the necessary patch applied)

Most of them have problems with the date/time, as you have mentioned in your Notification.

I guess we should update all the Spectracom units that have these problems (around 90).

Could you help us sending us the intermediate firmware if necessary, before installing the 6.0x?

Oscillator / Input Synchronization

Oscillator

- Tracking Status: Slaving algorithm status:

  - Warming up: The EC20S internal oscillator is warming up.
  - Tracking search: The EC20S receiver is searching best slaving conditions.
  - Locked: The EC20S receiver has reached the best slaving conditions.
  - Holdover: The slaving has been suspended because of loss of synchronization conditions.
  - Forced Holdover: The slaving has been suspended on user request.

Input sync

➢ Time and Synchronization configuration is via the Clock Setup menu -> Time and Synchronization Setup page of the browser

➢ Selected input reference is reported in the Global status section in the **Clock Status** menu

Clock Status

Global Status			
EC20S Status	Ok	SFN Status	On
Synchronization Source	GPS	Oscillator Control Voltage	4.308 V
Tracking Status	Locked	Synchronization Time	1841 s

**1PPS alignment/generation (10,000,000 counts between each 1PPS)

Q. How does the EC20S re-align the 1ppS output to the GPS receiver when GPS is restored?
Does the 1ppS jump to the correct position, or is the rate of correction limited (e.g. 1ns/S)?
A If the difference between PPS GPS and 1PPS is higher than 2.5µs then the is a jump phase else the PPS is re-aligned in 800 seconds. These parameters are defined in factory set (Kalman parameters). (You can see with EC20 in ULIS at 172.16.207.235)

Q. Does this vary with the accumulated error of the 1ppS, or the length of time that GPS was unavailable?
A. It varies with accumulated error of the 1PPS.

Q. Are there always 10,000,000 cycles of the 10MHz between 1ppS pulses e.g. is the frequency changed to move the 1ppS?
A. Yes, the 1PPS is generated after 10 million cycles. You have always 10 million cycles between 1PPS.

Holdover mode

➢ Unlike TSync and SecureSync, there is no configurable Holdover period in the EC20S

➢ Holdover in the EC20S is perpetual (it never expires).

➢ Refer to "NTP" further below.

**Clock Status

> Sync and alarm status is via the Clock Status menu at the top of the browser.

Clock Status

Global Status			
EC20S Status	Ok	SFN Status	On
Synchronization Source	GPS	Oscillator Control Voltage	4.308 V
Tracking Status	Locked	Synchronization Time	1841 s

Alarms			
GPS Alarms		**Synchronization Sources Alarms**	
GPS Locked	Ok	External Reference	Disabled
Antenna Status	Powered	NMEA Validity	Disabled
GPS Module Status	Ok		
Internal Alarms		**Synchronization Alarms**	
Internal Oscillator	Ok	Phase Accuracy	Ok
Internal 1PPS	Ok	Frequency Accuracy	Ok
Power Supply			
AC	Ok		
DC	Ok		

Distribution Alarms		Optional Distribution Alarms	
Global 1PPS Outputs	Ok	IRIG Board	Disabled
Global 10 MHz Outputs	Ok	STANAG Board	Disabled
		2 MHz Board	Disabled

Output Status										
N°	1	2	3	4	5	6	7	8	9	10
1PPS	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Disabled	Disabled	Disabled
10 MHz	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Disabled	Disabled	Disabled

GPS Status					
GPS Longitude	2° 11' 30" 206ms E	**Best Satellites**			
GPS Latitude	48° 41' 16" 968ms N	ID	11	19	32	22
GPS Altitude	205.84 m	SNR	42	39	39	38
Self Survey	In Progress	ID	14	3	28	6
Visible Satellites	9 / 12	SNR	37	36	34	34

NMEA Status	
NMEA Longitude	0° 00' 00" 000ms E
NMEA Latitude	0° 00' 00" 000ms N
NMEA Altitude	0.00 m

*Outputs:

**Distribution/Output status

> Distribution alarm/Output status shown in the Clock Status menu at the top of the browser.

Distribution Alarms		Optional Distribution Alarms	
Global 1PPS Outputs	Ok	IRIG Board	Disabled
Global 10 MHz Outputs	Ok	STANAG Board	Disabled
		2 MHz Board	Disabled

Output Status										
N°	1	2	3	4	5	6	7	8	9	10
1PPS	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Disabled	Disabled	Disabled
10 MHz	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Disabled	Disabled	Disabled

**1PPS outputs

- ➢ 10 x 1PPS outputs (3 additional for a total of 10 is optional) '"J1 through J7"

Pulse Width of 1PPS outputs

- ➢ Per the EC20S user manual: "Active rise edge (high level duration 100µs minimum)"

Regarding SF case 120502 (comparing SecureSync's and EC20s' 1PPS out to each other on a scope)

Email from Keith (24 Oct 17" Please be aware that the EC20s has a much faster/narrower 1PPS output pulse width than the SecureSync's 1PPS output. Per the EC20S user manual (attached for your reference just in case you don't already have a pdf copy of this document) about its 1PPS output:

"Active rise edge (high level duration 100µs minimum)"

Because of the much faster/narrower pulse width, I suspect you are not able to see the EC20s's 1PPS output while using the same oscilloscope settings which are currently being used to see the SecureSync's slower/wider pulse width

**10MHz outputs

- ➢ 7 x10 MHz outputs standard (3 additional for a total of 10 is optional) "J21 thru J29"

**IRIG/Stanag/2MHz outputs

- ➢ EC-20S can have:
  - IRIG output OR
  - Stanag output OR
  - 2 MHz output.

- ➢ Stanag output or 2MHz/2MBit outputs are available with option boards (each is an option board installed in place of the IRIG board (these can't be in addition to IRIG output and can have only one option or the other).

**NTP

- ➢ Number of NTP requests per second the EC20s can respond to
- ➢ Refer to kb article "…requests per second that the EC20S can handle?" https://na8.salesforce.com/ka0C0000000LLcZ

NTP sync status/Stratum level.

- ➢ Once synced to GPS, NTP continues to be Stratum 1, even upon loss of GPS, until the unit is power cycled (perpetual Holdover mode never times out). This is because NTP cannot lose sync without being restarted
- ➢ By design of the EC-20S, it doesn't change Stratum level when GPS is lost (it stays in Stratum 1 unless it is power cycled).

SNMP/SNMP Traps

➢ SNMP/ trap configuration is via the System Setup menu -> Traps Setup page of the browser

as of 2/18/2009 anyways (pre-product release):

SNMP Protocol:

There is a bug in the MIB File. The SNMP Protocol uses integer, bytes ... for some parameters (SNR of GPS, stratum, etc). Actually,in the MIB file, all parameters are defined with 'String'.
We must update this file in the next software release.

SNMP TRAPS- (As of 6/17/09) The drop-downs blank-out with no values displayed. Email from Sylvain: "is a known issue only link with the use of **Internet Explorer** (same issue with SAS E) (I should have touch you about this point), The solution will be implemented in a future release. To avoid this situation, you can use **Mozilla** and not Internet Explorer. The problem does not occur with Mozilla."

SNMP report hostname of EC-20S as "helpdesk" even though it's configured as a hostname of either Spectracom or Spectracom tech (for test purposes). As of 6/23/09 anyways, the hostname for the EC-20S is showing up in SNMPC as "helpdesk". Unknown reason why at this time.

MIB file

MIB file can be extracted from the EC20S. Click on "**Download MIB**" at the bottom of the SNMP Setup page of the browser.

Traps Setup

Trap Community Name	public	Ex : public
IP Address Traps Destination 1		Ex : 192.168.0.101
IP Address Traps Destination 2		Ex : 192.168.0.102

Global Traps Enable	No

EC20S Status Change	Yes
GPS Fault	Yes
External 1PPS Fault	Yes
NMEA Fault	Yes
Internal Oscillator Fault	Yes
Internal 1PPS Fault	Yes
Phase Accuracy Fault	Yes
Frequency Accuracy Fault	Yes
Synchronisation Source Change	Yes
Tracking Status Change	Yes
Power Fault	Yes
Option Distribution IRIG Fault	Yes
Option Distribution STANAG Fault	Yes
Option Distribution 2 MHz Fault	Yes
1PPS Output Fault	Yes
10 MHz Output Fault	Yes

Save Traps Setup

Download MIB

Designed by SPECTRACOM, a company of the OROLIA group

*Reboot

➢ Reboots are performed via the Tools -> Reboot page of the browser

➢ Can perform either a software or a hardware reboot (outputs are lost with a hardware reboot)

Select the type of reset.

Click on Yes to confirm the reboot.

NOTE: A hardware reset will cause the distribution of signals to cease. Be aware of this when choosing the type of reboot you wish to apply.

*Software version/software updates

➢ Release Notes are maintained in SharePoint:
  http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=1232&PortalId=0

➢ Software version is reported in the Tools -> Software Version page of the browser

This page displays the version number of key elements of EC20S software and firmware.

➢ Software updates are performed via the Tools -> Software upgrade page of the browser.

*Calibration

Email from Dave Lorah (8/22/12) The EC20S is fully automatic and self-calibrated. It does not require maintenance for a period of 10 years. The GPS reference disciplines the onboard OCXO, so there is no need for calibration. If you absolutely must send it to us, we can run the test procedure on it and verify the operation is within spec. We can come up with some final test data using NIST traceable equipment. This can be done at our Rochester NY facility.

The cost for this service would be $300 plus return shipping. The turnaround time is 2-3 weeks.

Spectracom requires credit card as payment for orders under $750.

Watchdog reboot and Precise mode ("Oscillator disciplining isn't in precise mode")

Email from Morgan to Eric Girard (22 Jun 17) We have case 25728 in our queue they are seeing (2) problem with the EC20S:

1) The EC20S unit has according to the Event logs watchdog reset on the 09/06/2017 for an unknown reason as far as I can tell. Currently it is running 16.02 firmware. Do you have any suggests on what to do about this?

2) The same unit has recently reported, and has also reported this in the past, a few times the "Alarm. Reason: Oscillator disciplining isn't in precise mode". This did affect the 10Mhz reference signal to some of our devices. Any suggestions on what to do about this? Is it normal to get these messages from time to time?

Reply from Pierre (23 Jun 17) (Note: broken into two sections, for two different topics)

A) Watchdog reboot

1) As far as I know, it is not the first time that we are encountering a watchdog reboot issue. We already had a meeting about this issue because some of our customers are experiencing it while other don't. So, it is quite a narrow issue and it will be hard to find the root cause of this because we cannot reproduce it in our lab or in the lab of our distributors. Watchdog reboots only appears on customers transmitters. So, there is an external reason/cause with occur this and we have to find it.

A watchdog reboot starts when the internal software doesn't send any answer after 2-3 seconds. After this delay we consider the software as crashed and we reboot the unit. But we can't confirm the origin of this reboot and why the software doesn't respond after 3 seconds.

B) Oscillator disciplining isn't in precise mode

2) This is probably not an issue with the clock itself but with the GPS receiver installed in the clock. Depending on the GPS receiver, sometimes, we are experiencing fugitive's alarms because of the vibrations or the movements of the receiver. So, it should be interesting to know what kind of GPS receiver is installed in the EC20S.

Hope this could help you. Please, let me know if you need more details but I cannot be sure to provide a quick answer.

EC22S/EC-22S (double redundancy)

- Shortcut to EC22S data sheet: link to datasheets in SharePoint

- Shortcut to EC22S in Customer Service: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC22S

- Shortcut to EC22S manual (P/N 400011) in Arena: https://app.bom.com/items/detail-spec?item_id=1202838699&version_id=10212863648&

(1/27/12 Can't find it in the released drives, so I downloaded it from our website and placed it in the customer service folder –use the link above to the customer service folder)

Features

- Redundant power supplies (both AC and DC are redundant for each of the two channels), redundant left/right clock generation, redundant GPS receivers.

- Can accept external 1PPS input

- Has four (4) standard 10MHz output and four (4) 1PPS outputs.   Optional (8) 10MHZ outputs available.

- NTP available on the single Ethernet port.

- Hardware monitoring and software select which channel provides output.

- Clock modules are hot swappable but remove power to channel first.

- Initiation of IP address is DHCP or fixed (configured on front panel)

- Doesn't revert to original channel if switches and the problem fixes (stays on the other channel).

- Unlike EB03, has squelch auto mode.

- The management board is not required for operation – will still work without it.

- The 1PPS and FREQ Out LEDs on the front panel do not light green. They are amber normally. They should be green with no output faults. Looks like a bug.

- NTP Reports Stratum 2 from the EC22S.

Broadcast sync White Paper on our website (talks about EC20S and EC22S)
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=1208&PortalId=0

Front panel

Clock module for EC22S (EC22S-CLK)
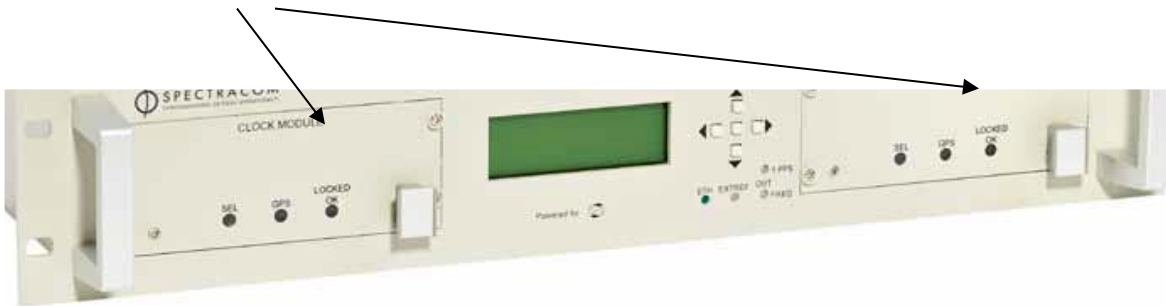
Clock modules (EC22S-CLK)

Note: At least one Clock module is needed to supply power and generate a Clock signal. The operator must first check that the module to be extracted is a Slave module. If not, the operator should force-switch it to Slave and then extract the module.

- ➢ Clock modules are hot-swappable
- ➢ Two clock modules installed in each EC22S
- ➢ P/N for the Clock Module itself: 240013
    - • In Salesforce (for purchase/pricing) at: https://na28.salesforce.com/01t80000001XYzy?srPos=1&srKp=01t
    - • In Arena at: https://app.bom.com/items/detail-spec?item_id=1202847579&version_id=10221260768
- ➢ P/N for the EC22S with two Clock Modules installed: 240011
- ➢ P/N for the EC22S with no Clock Modules installed: 250101

LEDs

A) EC22S Base Unit LED Indicators

- **ETH** Green when communication between EC22S and Ethernet network is established, off if no connection, useful to check that the Ethernet interface is up and connected to a switch or a PC

- **EXTREF** Red if alarm detected on the External PPS reference source, green if reference is OK, off if reference disabled.

- **OUT 1PPS** Red if loss of signal on at least one PPS output, green if output is present,

- **OUT FREQ** Red if loss of signal on at least one FREQ output, green if output is present.

B) Clock Modules LED Indicators

- **SEL LED** It is activated green on the Master Clock module, off on the Slave Clock module,

- **GPS alarm** Shows the validity of the Ref source generated by the associated GPS receiver. Red on alarm and green otherwise.

- **LOCKED – OK** General alarm, green when tracking algorithm is locked, all enabled reference sources are available, all enabled power supply are available, red otherwise and when any system alarm is on.

- During startup sequence, LEDs show several patterns (all orange - green+red, green and red) before setting to red for GPS and LOCKED-OK. If LEDs remain orange, boot has failed on the Clock module. Try to restart with the power switch (AC and DC) or through the web page reboot procedure.

1.7.1.1   Clock Module LEDs

SEL	
Green	Indicates the current selected module providing distributed frequency. Green on the Master module, off on the Slave module.

GPS	
Green/ Red	Indicates the current status of the GPS reception. Green for reception OK, red for alarm.

LOCKED/OK	
Green/ Red	Indicates the current status of the tracking algorithm. Red during warm-up, tracking start, and green after locking to a reference input. Orange indicates non-urgent alarm

1.7.1.2   Front Panel LEDs

ETH	
Green	Indicator of Ethernet connection. Green indicates good physical connection with network. LED is off if Eternet network is not connected.

EXTREF	
Green/ Red	Alarm indicator on External 1PPS input. Red if input enabled and in alarm, green if input enabled and OK.

OUT FRQ	
Green/ Red	Indicates the current status of the 4 (or 8) x distributed frequency outputs. Red if one or more channels are not present. Should always be green.

OUT 1PPS	
Green/ Red	Indicates the current status of the 4 (or 8) x distributed 1PPS. Red if one or more channels are not present. Should always be green.

Rear panel

1.7.2 **EC22S Back Panel Connectors**

AC POWER (90 to 230 VAC)	
Schaffner	AC power entry with integrated fuse

DC POWER (-48 VDC)	
Bulgin circular	Nominal -48 VDC power supply input. One Input and DC/DC converter per Clock module provides redundancy

Freq (4 + option 4)	
50 Ω BNC	Distributed sinus frequency outputs

1PPS (4 + option 4)	
50 Ω BNC	Distributed One Pulse Per Second outputs

Ethernet 10/100 BaseT	
RJ45	Network connectivity.

GPS Antenna	
50 Ω TNC	Antenna inputs for GPS receiver and remote active antenna 5VDC supply

EXTERNAL PPS	
50 Ω BNC	External 1PPS reference input

ALARMS	
SubD 9	Dry contacts

GROUND	
⏚	Casing grounding.

Input Power / Power Alarm

➢ Dual AC and Dual DC input (rear panel)

➢ AC input takes priority over DC input

AC input: 100 to 240 Volts AC / 48 to 63 Hz

DC input: -48vdc (Range is -44vdc to -55vdc)

2 EC22S Back Panel Connectors

AC POWER (90 to 230 VAC)	
Schaffner	AC power entry with integrated fuse

DC POWER (-48 VDC)	
Bulgin circular	Nominal -48 VDC power supply input. One Input and DC/DC converter per Clock module provides redundancy

Power alarm configuration

➢ User needs to enable the Power alarm based on actual power configuration of the EC22S

➢ System Setup -> Power Setup page of the browser

System Setup	Clock Setup	Clock Status	Tools

Power Setup

Power Alarm Enable

	Left	Right
AC	Enabled	Enabled
DC	Enabled	Enabled

Save configuration

Ethernet interface

➢ 10/100 BaseT only (not 1000 baseT)

➢ HTTP only (does not support HTTPS)

➢ Default (static) IP address: 192.168.0.100

Default password: pwd (lower-case)

System Setup > **Network Setup** page of the browser

DHCP

DHCP can be enabled, if desired. ("**System Setup -> Network Setup**" web page, shown below)

If DHCP is chosen, the address is assigned at start-up by a DHCP server on the network. If no DHCP is chosen, the address is entered manually in the IP address field.

Changing the default password

➢ Default password: pwd (lower-case)

The password can be changed, if the current password is known ("**System Setup -> Network Setup**" web page, shown below)

EC22S alarms/alarm conditions

- **Non Urgent** = still providing 10 MHz and the 1PPS but the unit is not fully ok

- **Urgent** = unit does not provide good 10 MHz and 1 PPS

Q. They would like to know what type of alarms are referring to be **urgent** and what are referring to be **non-urgent**. Do you have a list for the definition?
A. **Reply From Eric Girard (9/7/12**) A Non Urgent alarm is a warning, it means that the unit is still providing the 10 MHz and the 1PPS but the unit is not fully ok. For example if there is only one power supply, the other could be off, the status is Warning, the unit can work with one clock module. Same for GPS, Holdover mode etc…

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An Urgent Alarm is an alarm, it means that the unit does not provide good 10 MHz and 1 PPS

Q. Why does the FREQ and 1PPS LED be orange? Does it not connect the GPS in right module to cause?
A. (from Eric Girard 3/28/12) It is because you have a minor error. The LED status change into red for a strong alarm. To avoid this, you have to connect your second GPS and wait until it locks.   If you don't use the DC power, select DISABLED.

Watchdog reboot and Precise mode ("Oscillator disciplining isn't in precise mode")

➢ The following info was regarding an EC20S. But I believe this same info also applies to the EC22S:

Email from Morgan to Eric Girard (22 Jun 17) We have case 25728 in our queue they are seeing (2) problem with the EC20S:

1) The EC20S unit has according to the Event logs watchdog reset on the 09/06/2017 for an unknown reason as far as I can tell. Currently it is running 16.02 firmware. Do you have any suggests on what to do about this?

2) The same unit has recently reported, and has also reported this in the past, a few times the "Alarm. Reason: Oscillator disciplining isn't in precise mode". This did affect the 10Mhz reference signal to some of our devices. Any suggestions on what to do about this? Is it normal to get these messages from time to time?

Reply below from Pierre (23 Jun 17) (Note: broken into two sections, for two different topics)
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<center>**B)   Oscillator disciplining isn't in precise mode**</center>

2) This is probably not an issue with the clock itself but with the GPS receiver installed in the clock. Depending on the GPS receiver, sometimes, we are experiencing fugitive's alarms because of the vibrations or the movements of the receiver. So, it should be interesting to know what kind of GPS receiver is installed in the EC20S.

   Hope this could help you. Please, let me know if you need more details but I cannot be sure to provide a quick answer.

EC22S alarm relays

➢ The alarm relay is disabled by default. It's controlled by the "Squelch Auto Mode"

Email from Sylvain (2/17/12) (discussing the comparison of EC22S to the EC20S)
Anyway, if your customer wants to use the "MUTE" function: you must know that we gave another name for that (our old "mute" name is SQUELCH)

The "SQUELCH" or "MUTE" function is set by the following button in the Clock Setup / Time & Reference Setup
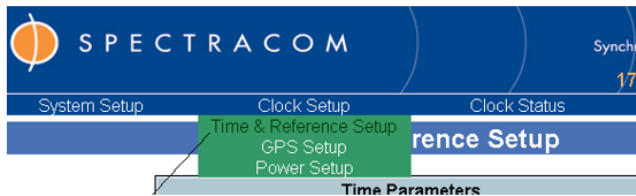
Please find our explanation about the EC22's relays.

Relay function on the EC22S (email that Eric Girard sent to a customer 7/10/12)

On the User manual, there is the text below:

8.1.6 Alarms

Pin	Signal	Description
1	Common 1	Urgent Alarm common contact
2	TX TOD	Transmission of Time Of Day message
3	RX TOD	Not used
4	Common 2	Warning common contact
5	GND	Electrical ground
6	Active Closed 1	Urgent Alarm active closed contact
7	Active Open 1	Urgent Alarm active opened contact
8	Active Closed 2	Warning active closed contact
9	Active Open 2	Warning active opened contact

Table 8 - 3. connector ALARMS.

If one wants to get a closed contact when Urgent Alarm is active, 1-6 should be used.

If one wants to get a closed contact when Non Urgent Alarm is active, 4-8 should be used.

If one wants to get an opened contact when Urgent Alarm is active, 1-7 should be used.

If one wants to get an opened contact when Non Urgent Alarm is active, 4-9 should be used.

There are two relays on the EC22S:
One named 'Urgent' (like Critical) and works when there is a critical problem (no distribution, no SFN …)
One named 'Non-Urgent' (like Warning) and works when the product distribute signals but need to be checked.

When an Urgent Alarm is present, 1-6 is closed. When an Non-Urgent Alarm is present, 4-8 is closed.

To catch all alarms on two wires: 1 and 4 must be wired together, 6-8 together.

When the entire product is off, the two alarms are present. This is the only state where the two alarms are active at the same time
Few minutes after power up, only the Urgent Alarm is active: The product try to synchronize the two clocks.
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When the first clock is synchronized, the Urgent Alarm become inactive, and the Non-Urgent become active.
When the second clock is synchronized, the Non-Urgent become inactive (the Urgent Alarm remain inactive).

At this step, if a clock loses the synchronization (or power off), only the Non-Urgent Alarm is active because the product continue to distribute signals with the other clocks.

An Urgent Alarm is active only if the both clocks are non-synchronized, or distribution is down (output driver issue).

Email from Eric Girard to Gregory Wong (11/23/12)
There are two relays on the EC22S:
One named 'Urgent' (like Critical) and works when there is a critical problem (no distribution, no SFN …)
One named 'Non-Urgent' (like Warning) and works when the product distribute signals but need to be checked.

When an Urgent Alarm is present, 1-6 is closed. When an Non-Urgent Alarm is present, 4-8 is closed.

To catch all alarms on two wires: 1 and 4 must be wired together, 6-8 together.

When the entire product is off, the two alarms are present. This is the only state where the two alarms are active at the same time

Few minutes after power up, only the Urgent Alarm is active: The product try to synchronize the two clocks.
When the first clock is synchronized, the Urgent Alarm become inactive, and the Non-Urgent become active.
When the second clock is synchronized, the Non-Urgent become inactive (the Urgent Alarm remain inactive).

At this step,
if a clock loses the synchronization (or power off), only the Non-Urgent Alarm is active because the product continue to distribute signals with the other clocks.

An Urgent Alarm is active only if the both clocks are non-synchronized or distribution is down (output driver issue).

EC22S Inputs

- AC and 48VDC power supply redundancy

- Dual Clock Modules

- Dual high performance OCXOs

2 EC22S Back Panel Connectors

AC POWER (90 to 230 VAC)	
Schaffner	AC power entry with integrated fuse

DC POWER (-48 VDC)	
Bulgin circular	Nominal -48 VDC power supply input. One Input and DC/DC converter per Clock module provides redundancy

Ethernet 10/100 BaseT	
RJ45	Network connectivity.

GPS Antenna	
50 Ω TNC	Antenna inputs for GPS receiver and remote active antenna 5VDC supply

EC22S Outputs

- Up to 8 x 1 PPS outputs

- Up to 8 x 10 MHz outputs

Freq (4 + option 4)	
50 Ω BNC	Distributed sinus frequency outputs

1PPS (4 + option 4)	
50 Ω BNC	Distributed One Pulse Per Second outputs

Ethernet 10/100 BaseT	
RJ45	Network connectivity.

ALARMS	
SubD 9	Dry contacts

**GPS input

> ➤ EC22S has dual GPS input connectors on the rear panel (one for each clock module)

Note – need to connect two separate GPS antennas in order to clear alarm associated with each channel

GPS input configuration

> ➤ **Clock Setup** -> **GPS Setup** page of the browser

GPS modes of operation

The operator may choose among three operating modes:

- Manual or fixed: The operator sets manually the accurate coordinates for the receiver. The receiver can then start immediately in an accurate timing reception mode. This mode needs only one satellite.

- Automatic: The receiver starts computing its polar coordinates and after 1 hour switches to the accurate timing mode. The first step requires the reception of 4 satellites to compute the coordinates.

- Mobile: The receiver expects the antenna to move permanently and evaluates coordinates continuously. It is not then able to switch to the most accurate timing mode.

GPS input status

➢ GPS status for both inputs is displayed in the "Clock Status" page of the browser.

GPS Status Left						
GPS Longitude	0° 00' 00" 000ms E	**ID**	21	24	30	31
GPS Latitude	0° 00' 00" 000ms N	**SNR**	43	43	42	42
GPS Altitude	0.00 m	**ID**	6	16	7	5
Self Survey	Pending	**SNR**	41	41	40	38
Nb of locked Satellites	10					

GPS Status Right						
GPS Longitude	0° 00' 00" 000ms E	**ID**	0	0	0	0
GPS Latitude	0° 00' 00" 000ms N	**SNR**	0	0	0	0
GPS Altitude	0.00 m	**ID**	0	0	0	0
Self Survey	Pending	**SNR**	0	0	0	0
Nb of locked Satellites	0					

GPS year 2019 new week rollover (20 year week rollover)

The Epsilon Clock Models EC20S and EC22S units were equipped with one of two different types of GPS receiver modules. Only one of these two GPS receiver types is affected by the GPS Week Rollover issue – the **Trimble Lassen IQ** type receiver.

Here is more information on this GPS receiver week rollover issue. You may already have this information.
https://support.spectracom.com/bulletins/epsilon-clock-issue-2019-gps-rollover-event

Customer reported observations (after 2019 rollover occurred)

- ➢ refer to Salesforce Case 190430
- ➢ Refer to **Clock Status** page of the browser and see if looks like the screenshot below (which shows one that was affected and hasn't had the necessary patch applied)

Most of them have problems with the date/time, as you have mentioned in your Notification.

I guess we should update all the Spectracom units that have these problems (around 90).
could you help us sending us the intermediate firmware if necessary, before installing the 6.0x?

Time & Reference Setup

➢ **Clock Setup** -> **Time & Reference** Setup

5.2.7 Time & Reference Setup page

This page is used for setting time computation and display parameters, synchronization source parameters, and Distribution parameters.

Switching between the two Clock Modules

**Web browser functionality

System Setup:

➤ Password is required to access these pages. Default password is pwd (lower-case)

   Network setup: Network connection parameters (protected by password)
   SNMP setup: SNMP parameters and traps enable (protected by password)
   Logout: Logout from the web site

Clock setup

➤ Password is required to access these pages. Default password is pwd (lower-case)

   Time and Reference Setup: Setting the time and synchronization parameters (protected by password).
   GPS Setup: GPS reception parameters (protected by password)
   Power Setup: Enable of power supply monitoring alarm (protected by password)

Clock Status: Summary of status and alarms of the EC22S

   Tools

   Events Logging: Display of events history
   Versions: Display of current version of software parts
   Software upgrade: Upgrading software
   Reboot: Per module hardware reset

NTP server functionality:

➤ The EC22S can provide NTP time stamps. But, there is no configuration available. Because of the implementation of the NTP client, it doesn't report it's a Stratum 1 server. It reports that it is a Stratum 2 time server, instead.

Email from Sylvain (2/22/11) I don't know if you have already done it but for factory parameters you must connect the unit by entering the following IP address: http://172.16.207.231/factory
172.16.207.231 is a LU example but it is necessary to enter /factory at the end of the address.
FYI : this is as same for EC20S, EBO III, EC22S etc….

Poor NTP output performance

Note (As of at least Aug, 2016): The NTP output performance of the EC22S and other Epsilon products is not very good (as compared with a product such as SecureSync)

Report (refer to SR 6283 for details- with management board at rev 6.0) We have recently purchased many (15+) units of the E Epsilon EC22S for a large LMR simulcast system we are in the process of staging. Our basestations have

a high reliance on accurate NTP to be provided to them along with 1PPS and 10Mhz. We have found that while the 1PPS and 10Mhz outputs are stable, the NTP source/server on the EC22S is unstable and drifts back'n'forth several hundred ms. Our basestations see this as an anomaly and fail to sync with NTP correctly.

In our troubleshooting we compared this with the NTP output on a NetClock 9483 using a tool called NTP Monitor. The 9483 provided very stable time and when overlayed in a graph format you can clearly see the issue. In the attached pictures the 9483 has a steady green line at the 0ms mark on the scale. The EC22S graphs are all over the map in comparison and also show sync as LOCL as opposed to the expected GPS. We have confirmed that the GPS antennas are OK, and the units are correctly syncd to many satellites.

With the current NTP behavior of the EC22S it is a gating issue to our deployment of this radio system. We typically use Spectracom SecureSyncs hardware in many of our other deployments without issue, but this is the first time we were planning to deploy with the EC22S. Can you outline if this is the expected NTP server behavior from this hardware? If not, can you outline next steps to investigate why we are seeing this instability?

A, (reply from Dave Lorah, 11 Aug 16) NTP performance from the EC22S is best when the system is synchronized and the SFN Status = ON.

Please check in the web UI clock status page and verify the SFN Status for Master Clock = ON.

 Master Clock is in SFN mode; means that the 10MHz frequency signal is cycle locked to the 1PPS signal (10 000 000 cycles from the 10 MHz equals 1PPS period) and provides a frequency accuracy better than 1x10-8 and a phase accuracy better than 1µs

In this case it is OFF:
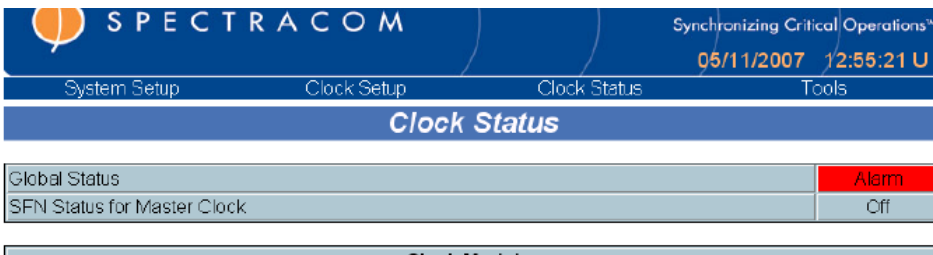
Could you send us a screen shot of the Clock Status page please?

Q (email from Lisa Perdue 2 Aug 2014) [10:42:04 AM] Lisa Perdue: All - we have a customer that has decided on EC22S for NTP because of its redundancy features. Normally we would offer 2 x SS for this application, but they have already picked the EC22S. So, I have a couple of questions. 1. Do we recommend EC22S for an NTP only application? 2. If not, I will need to explain to the customer why not? So, I need some details on the limitations of NTP in EC22S.
A. reply from Emmanuel EC2SS NTP implementation works but is simplistic, with following main limitations:
-       No stratum management: when the unit has gone to stratum 1, it doesn't change its stratum when it loses GSP (both receivers)
o We developed a fix for Geo-PNT and EC20S, that could be applied to next EC22S release if needed
-       No peering mode, NTP stratum 2…
-       No security protocol implementation: no MD5, autokey, authentication implementation
-       There might be a ms level jitter (we didn't measure it precisely)
    -       In order to give you a better idea: this NTP implementation is so simple that there is nothing on the web UI that related to NTP management… (nor in the User Manual…) :-p
     That said, it supports a reasonably good request rate (several hundreds).
     We direct customers to SecureSync as soon as the application requires primarily NTP or strong network capabilities in general.
    I fully agree that NTP redundancy is best obtained with two SecureSync working in parallel.

    EC22S redundant architecture (similar to 2 x SecureSync + SAS-E) is relevant only when requiring redundancy on 1

pps & 10 MHz signals.

NTP Reference ID is always reported as "uncalibrated local clock" (instead of "GPS)

➢ NTP Reference ID is always reported as "uncalibrated local clock" (instead of "GPS)

➢ Refer to SF case **122238**

Email from Pierre 21 Nov 17) A further update on this. The NTP is working but doesn't appear to be working correctly. Below is an extract from Wireshark that shows it is arriving but does not appear to be saying it is locked to GPS but clearly is based on the earlier screen shots provided.

Email from Eric G (21 Dec 17) I already contacted the customer.
Unfortunately for him, the EC22s can't provide a good status with the NTP.
The EC22s didn't receive all software improvements we added to the EC20s.
This product is now reaching its end of life. So no new release is expected.

Email from Eric Girard (6 Dec 17) Our dev team is working on a fix, probably a patch, to solve the NTP flag issue. Let they work on their investigation and confirm how long it can take to the team do develop it.

In parallel of this, the monitoring of the SFN can be done via the SNMP mode.

They can check which clock is the master

```
clockrightStatusRefSrc          OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..18))
        MAX-ACCESS              read-only
        STATUS                  current
        DESCRIPTION             "Synchronization source of the Right Clock:
                                            0: None
                                 1: GPS
                                 2: External 1PPS/10MHz
                                 3: Optional Reference
                                 4: Master Clock
                                 5: NMEA
                                 6: ieee1588
                                 7: AUTO"
        ::= { clockrightStatus 4 }
```

Then, confirm the SFN status of the clock.

```
clockleftStatusSfn              OBJECT-TYPE
        SYNTAX                  OCTET STRING (SIZE(0..18))
        MAX-ACCESS              read-only
        STATUS                  current
        DESCRIPTION             "Whether the Single Frequency Network conditions of the
Left Clock are met (1) or not (0).
                                 0: Off
                                 1: On"
        ::= { clockleftStatus 1 }
```

SNMP

➢ **System Setup** -> **SNMP Setup** page of the web browser

SNMP Setup

| SNMP RO Community | public | Community name
ex: *public* |
| SNMP RW Community | private | Community name
ex: *private* |

The above values become effective after a reboot (management board).

Trap community name	public	Community name ex: *public*
Traps destination 1	1.1.1.1	IP address ex: *192.168.0.101*
Traps destination 2	55.55.55.55	IP address ex: *192.168.0.102*

| **Global traps enable** | Yes ▼ |

Clock Fault	Yes ▼
GPS Fault	Yes ▼
External 1pps Fault	Yes ▼
Optional Reference Source Fault	Yes ▼
Internal Oscillator Fault	Yes ▼
Internal 1pps Fault	Yes ▼
Phase Accuracy Fault	Yes ▼
Frequency Accuracy Fault	Yes ▼

Power Fault	Yes ▼
Clock Master/Slave	Yes ▼
Output Fault	Yes ▼

Save configuration

download MIB   Designed by SPECTRACOM, a trademark of the OROLIA group

SNMP MIB file

➢ The MIB file is located inside this product (click on "Download MIB" in lower-left corner of the SNMP Setup page to download this file),

Clock Status: Summary of status and alarms of the EC22S

➢ **Clock Status** page of the browser

System Setup   Clock Setup   Clock Status   Tools

Clock Status

Global Status	Alarm
SFN Status for Master Clock	Off

Clock Modules

	Left	Right
Master/Slave	Master	Slave
Clock Module Status	Alarm	Warning
Synchronisation Source	GPS	None
Oscillator Control Voltage (V)	4.094	4.148
Tracking Status	Tracking Search	Holdover

Alarms

GPS

	Left	Right
GPS lock	Ok	Alarm
Antenna	Powered	Unpowered
GPS module	Ok	Ok

Reference Sources

	Left	Right
External 1pps	Disabled	Disabled
Optional reference	Disabled	Disabled

Internal

	Left	Right
Internal Oscillator	Ok	Ok
Internal 1pps	Ok	Ok

Synchronization

	Left	Right
Phase Accuracy	Ok	Alarm
Frequency Accuracy	Ok	Alarm

Power Supply

	Left	Right
AC	Ok	Ok
DC	Alarm	Alarm

Outputs

Frequency	Ok
1pps	Ok
Optional Outputs	Disabled

GPS Status Left

GPS Longitude	0° 00' 00" 000ms E
GPS Latitude	0° 00' 00" 000ms N
GPS Altitude	0.00 m
Self Survey	Pending
Nb of locked Satellites	10

ID	21	24	30	31
SNR	43	43	42	42
ID	6	16	7	5
SNR	41	41	40	38

GPS Status Right

GPS Longitude	0° 00' 00" 000ms E
GPS Latitude	0° 00' 00" 000ms N
GPS Altitude	0.00 m
Self Survey	Pending
Nb of locked Satellites	0

ID	0	0	0	0
SNR	0	0	0	0
ID	0	0	0	0
SNR	0	0	0	0

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Troubleshooting the EC22S

➢ The two installed clock modules are inter-changeable. They can be switched for troubleshooting, to see if the issue follows the clock module.

Email from Eric Girard to John Abdelsater after reported GPS issue: Before returning the unit to us for investigation and due to very huge shipping cost, could you confirm me that your customer had connected 2 GPS sources to their EC22s?

When we look at the photo and the screen shot you have sent us, it seems not.

In this situation, the EC22s is not working as it should be. The unit is also not connected to their network. May I ask you to check these points with your customer?

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EC31M (time synchronization module)

- Developed for use by the Swiss Army/Thales

- Inputs are IRIG A/B NMEA and GPS

- Has one (1) Rb oscillator

- Has one (1) power supply.

- Has two (2) NTP ports

- Has two (2) 10MHz outputs and 2-1PPS outputs available.

- Has NMEA output port on rear panel and NMEA output port of front panel.

- Has one IRIG output connector.

- Setup is via RS-232 connector on front panel.

Links/Shortcuts

- ➢ Shortcut to EC31M data sheet: link to datasheets in SharePoint
- ➢ Shortcut to EC31M in Customer Service: EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC31M
- ➢ Shortcut to EC31M manual: EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\EC31M

Email from Eric Girard (2/22/11)
- ➢ There are 3 different EC31M. But in fact. there are two with Rubidium and one with the OCXO oscillator.
- ➢ The **IFASS** is only dedicated to only one customer, Swiss Army. The only difference is the software.

There are 3 x DCV (P/N):
- ➢ 250060 - EC31 M with Rubidium
- ➢ 250061 – EC31M with OCXO
- ➢ 240014 – EC31M IFASS (with Rubidium)

Email from Sylvain (2/22/11)
I don't know if you have already done it but for factory parameters you must connect the unit by entering the following IP address:

http://172.16.207.231/factory

172.16.207.231 is a LU example but it is necessary to enter /factory at the end of the address.
FYI: this is as same for EC20S, EBO III, EC22S etc….

Email from Eric Girard:

Front panel
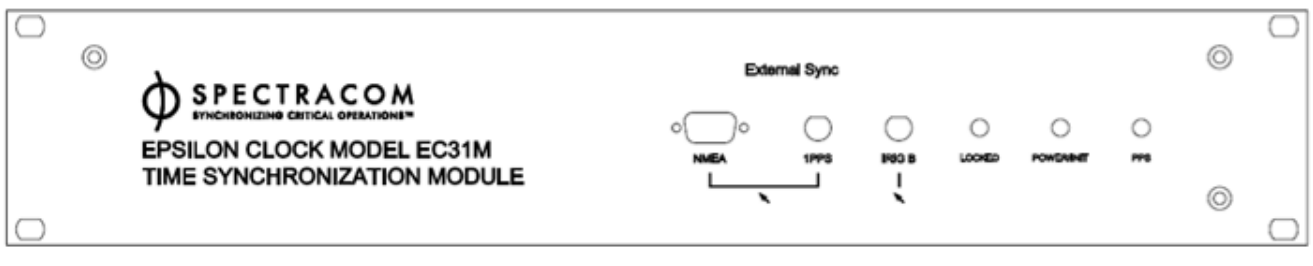
Rear panel
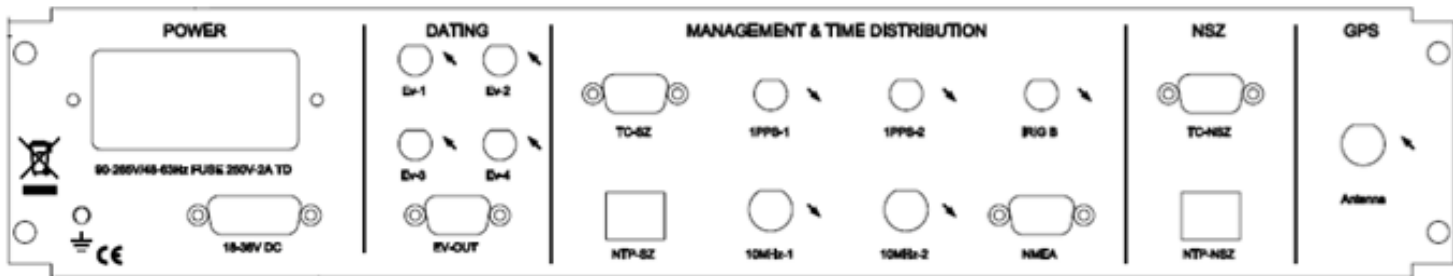
SASe (Models SAS-17E-IR, SAS-17E-IR-AL, SAS-17E, SAS-36E)

> ➢ **Link to SAS17E/SAS36E manual:** SAS-17E-IR, SAS-17E-IR-AL, SAS-17E, SAS-36E
>
>   **Or, download from our website**: https://spectracom.com/documents/users-manual-epsilon-switch-amplifier-system-e-sas17e-sas36e
>
> ➢ **Shortcut to SASe data sheet (SAS-E):** link to datasheets in SharePoint
>
>   **Or, download from our website**: https://www.orolia.com/sites/default/files/document-files/Orolia_SAS-E_Epsilon_revF_web_1.pdf
>
> ➢ **Shortcut to SASe info in customer service drive**: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E_ SAS17E-IR

Discontinued variants of the SAS series

1. SAS-17 (no "E" at the end)
2. SAS-36 (no "E" at the end)
3. SAS-17-RC (Remote Control)???
4. SAS-36-RC (Remote Control)

Email from Sylvain (26 Jan 2015) You're right, the SAS-36 RC is obsolete as well the SAS 36 standard model since more than 5 years.

Now it is recommended to use the SAS 36-E which contains all the main features than the SAS 36. The "RC" Remote control that you could find in the previous SAS 36-RC is now supported by the Network capability of the SA 36E (WEB UI / SNMP commands).
As the SAS 36E is the current standard product of Spectracom range, it will be a cheaper than the specific SAS-36-RC.

Here you will find the link to the product Datasheet available on our web site.
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=281&PortalId=0

Web page (User Manual is also available through this page):
http://www.spectracomcorp.com/ProductsServices/TimingSynchronization/TimeandFrequencyDistribution/EpsilonSwitchAmplifierSystem/tabid/1301/Default.aspx

If you can get all the functions currently in use by the customer with his SAS 36RC, we can help you to check if the SAS 36E can be fully ready to replace the previous one.

Available SASe hardware configurations

- **SAS-17E**:   8 x 1 PPS/DCLS, 8 x frequency outputs
- **SAS-17E-10**   8 x 1 PPS/DCLS, 8 x 10 MHz outputs
- **SAS-36E**   16 x 1 PPS/DCLS, 16 x frequency outputs
- **SAS-36E-10**   16 x 1 PPS/DCLS, 16 x 10 MHz outputs

Models SAS-17E-10/SAS-36E-10:

- These variants of the SASe are listed on the SASe Data sheet under "**Ordering information**"
- I don't know for certain, but I suspect these Models change the wide range Frequency inputs from 1-16MHz (which results in very poor phase noise for outputs such as 10 MHz) to 10 MHZ on/out only (better filtering for lower phase noise).

Using a SecureSync as an alternative replacement to an SASe switch

- ➢ refer to Salesforce Case 184370

Q Is this SAS32 platform End of Life but still under support? If yes, for how much longer? Is there a newer model that will replace this model?
A Reply from Sadie Nedo (10 Apr 2019) The SAS platform is still an active product and an EOL/EOS date has not yet been determined; meaning that we will continue to offer this platform for the foreseeable future. If there are any changes to this status, we'll communicate to all our customers.

The SAS platform was designed as a distribution amplifier system and although it does include some networking functionality the core feature set is focused on its distribution of 1PPS and frequency signals and its fast switching capability and is priced accordingly for that feature set. For a secure networking device with sophisticated features such as monitoring, authentication etc. this is more function of our SecureSync platform.

SecureSync can accept multiple 1PPS inputs and provide multiple 1PPS outputs as achieved with the SAS platform while also providing the network communication you're seeking.
SecureSync is a configure to order platform which can be configured with single or dual power, and can be built without a GNSS receiver to save some cost to the user when used purely in a distribution application.

If you'd like to learn more about SecureSync for this application, please let me know.

MTBF for the SASe series

- ➢ Refer to the "MTBF/MTTR (for all products)" Section in: ..\CustomerServiceAssistance.pdf

CE certification/Declaration of Conformity for SASe/Reach

- ➢ Refer to:
  ../../EQUIPMENT/SPECTRACOM%20EQUIPMENT/Epsilon%20Clocks%20and%20SAS/SAS17E%20SAS36E%20%20SAS17E-IR/CE-Declaration%20of%20Conformity-RoHS-Reach

REACH/RoHS

Email from Sylvain (30 July 2019) Here is the most recent certificate for CE.

T**he ROHS** status is not officially stated in this document but the SAS E is compliant. We will update it.

REACH is changing every 6 month , so we only publish it under request. If you need one, we can provide it but it may takes some time to update. (especially because REACH generally changes in July and December)

Serial Number of the SASe

➢ Unit's Serial Number is only available via the affixed Serial Number tag.

➢ S/N is not available via the web browser or via SNMP

Email from Dave L (2 Nov 16) The SAS unfortunately does not have the capability to store the serial number in memory. The serial number would have to be read from the Serial Number tag on the side of the unit.

Chassis/cooling requirements (no cooling fan)

➢ no cooling fan in SASE

➢ entire top and bottom is perforated

➢ Vent holes are on the left side of the chassis

Q I need to know how much cooling the SAS-17E requires. Can it operate with the top and/or bottom panel obstructed?

A Reply from Dave L (15 Feb 20189)

From the SASE manual:

"The unit can be used by itself or mounted in a rack. Leave free space of a few centimeters under the unit, in order to facilitate natural air flow from the bottom to the top of the SAS-E."

Q follow-up question: So it sounds like the vents are in the top and the bottom of the chassis (not the sides). Is that correct? Does it have a fan?

A Reply from Dave L (18 Deb 2019) The entire top and bottom is perforated and there are also vent holes on the left side of the chassis. There is no fan in the SAS.

Input power / power monitor alarms / fuses

Input Power (One AC and one DC input connector)
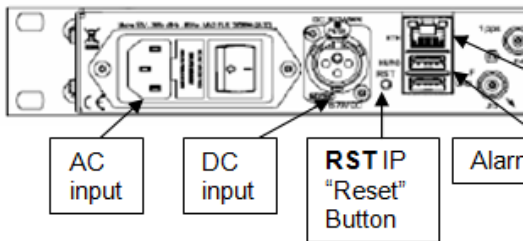
All units have **one AC input and one DC input**.

Redundant power supply switches between one DC and one AC input.

AC power is ON/OFF switchable, but if DC power is connected and present, the equipment will always be on. To turn off the unit with DC input applied, the DC input has to be disconnected.

(1) AC Input power: 90 to 265 V / 48 to 63 Hz (60VA max.) 18 Watts typical

(1) DC Input power (VDC): 20vdc to 72vdc < 50 Watts typical.

   A) **1st gen SASe (all silver chassis) had a three pin XLR style DC input connector on its rear panel (mating with an XLR/Audio type connector)**

B) **2nd gen SASe (black front panel faceplate) now has a four pin DC input connector on its rear panel**

   ➤ The DC input of the SAS E is now the same as SecureSync (four-pin connector)

4 pin DC connector on SASe rear panel (1st gen SASe -all silver chassis- had a 3 pin DC connector, instead of 4 pin)

DC Mating Connector for 2nd gen SASe

Extract + Farnell distributor example Links:
* Mating DC Connector, circular, 3-pin, solder socket, 16AWG,13A,300V: Amphenol P/N DL3106A10SL-3S; (Spectracom part no. P240R-0032-002F)

Link to Farnell ref: http://fr.farnell.com/amphenol-industrial/dl3106a10sl-3s/fiche-femelle-libre-3-voies/dp/3911068?mckv=sxMxVAxn5_dc|pcrid|79376528114|kword|+amphenol%20+dl3106a10sl-3s|match|b|plid|&CMP=KNC-GFR-GEN-SKU-MDC&gclid=EAIaIQobChMI5NydwMKv2wIVo7ztCh0WMg3sEAAYAiAAEgLQ4vD_BwE

- **Cable Clamp, circular**: Amphenol part no. 97-3057-1004(621); (Spectracom part no. Spectracom part no. MP06R-0004-0001)

Link Farnell: http://fr.farnell.com/amphenol/97-3057-1004-1/raccord-serre-cable/dp/151626?st=97-3057-1004-1

> Not individually provided with the SASe (but is included on the end of the optional **PS06R-2Z1M-DT01** AC to DC converter, if it's purchased for "dual AC input". See additional info on this optional power supply further below)

- **Amphenol P/N DL3106A10SL-3S** circular, 3-pin, solder socket, 16AWG,13A,300V:

A) PS06R-2Z1M-DT01: Optional, available power supply (for "Dual AC" input to the 2nd gen SASe)

➢ The external AC/DC converter which is recommended is the same as for the SecureSync: **PS06R-2Z1M-DT01**

➢ **PS06R-2Z1M-DT01 (in Arena)** https://app.bom.com/items/detail-spec?item_id=1202845989&version_id=10298327858

Per Sylvain (18 Apr 18) The DC input of the SAS E is now the same as SecureSync. So, the external AC/DC converter which is recommended is the same as for the SASE. **PS06R-2Z1M-DT01**

A) 1st gen SASe (silver chassis/silver front panel faceplate)

➢ The DC input of the all silver SASE was a **three-pin XLR** connector
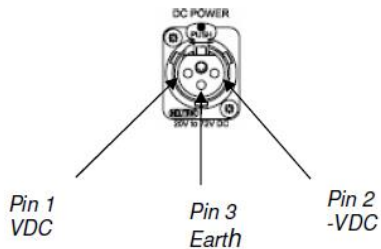
B) PS06R-2Z1M-DT03: Optional, available power supply (for "Dual AC" input to the 1st gen SASe (all silver enclosure)

- **PS06R-2Z1M-DT03**: **Power supply for 1st gen SASe (all silver chassis)**: (in Arena at: https://app.bom.com/items/detail-spec?item_id=1202845991&version_id=10298327878)

Our P/N for DC (XLR/audio) 3 pin connector: P240R-0030-0000

DC power monitoring/Power alarms

Redundant input power verses single input power

The SASe is designed to accept dual input (one AC input and one DC input) power for redundancy.

If it's not desired to provide dual input power (both AC and DC) disable the associated Monitoring of the power not being supplied. Otherwise. the alarms for missing power alarms will be constantly asserted.

To disable the input power alarm for the redundant input power when connecting only a single power source

1. Go to the **SAS-E Configuration** -> **SAS-E Setup** page of the GUI interface
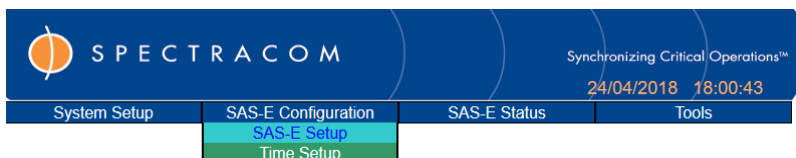
2. Enter the Password of "**pwd**"

3. In the "**Monitoring**" table, change ether "**AC Presence**" or "**DC Presence**" (as applicable) from "**Enabled**" to "**Disabled**" (as shown below):

3) Press "**Save Configuration**"

Troubleshooting DC input issues

The DC power supply connects to the rear panel of the SAS. It is an AC to DC converter. Please check the power supply connections to the SAS, and also the connections of the AC cable to the power supply and to the AC source. The problem may simply be a loose connection.

Spurious Power Supply alerts

➢ Refer to Salesforce case **24735**: Report of power monitor alarms

➢ One second durations

here are examples of the logs
10/03/2017 08:13:44N SASE Warning Power Supply Fault
10/03/2017 08:13:44N SASE Warning No Urgent Alarm Fault
10/03/2017 08:13:45N SASE Warning Power Supply OK
10/03/2017 08:13:45N SASE Warning No Urgent Alarm OK
11/03/2017 07:00:13N SASE Warning Power Supply Fault
11/03/2017 07:00:14N SASE Warning Power Supply OK
14/03/2017 15:16:40N SASE Warning Power Supply Fault
14/03/2017 15:16:41N SASE Warning Power Supply OK
15/03/2017 02:45:30N SASE Warning No Urgent Alarm Fault
15/03/2017 02:45:31N SASE Warning No Urgent Alarm OK

Reply from Dave L (15 Mar 17) The logs show intermittent "No Urgent" alarms as well as the Power Supply Fault alarms. The "No Urgent" alarm will appear if one of the power supplies is lost.

Unfortunately, the logs did not indicate whether the AC or the DC power supply was failing. These alarms occur for only one second randomly every other day or so., so capturing the failure visually would be difficult.

Disabling the DC Power monitoring to see if the alarm stops could tell us if it is the DC power failing. This may be the only option. I am consulting our product manager to see if he has any more ideas.

Follow-up reply from Dave (16 Mar 17) We have determined this SAS may have a hardware fault in the power supply sensing circuit. It would be best to replace this device

Fixes for spurious SASe Power Supply alarms issue (~Dec, 2017)

➢ Both involve firmware updates and hardware mods

• **SAS-17E update**: Refer to **ECO-1410** (in Arena): https://app.bom.com/changes/detail-summary?change_id=2390130948&

• **SAS-36E update**: Refer to **ECO-1408** (in Arena): https://app.bom.com/changes/detail-summary?change_id=2390125261&

Power cycle/Reboot

Procedure to power cycle an SASe

➢ Simply remove power from the rear panel.

Email from Dave L (30 Apr 16) To power cycle a SAS product simply remove power at the rear panel. There is no official shut down procedure. These units may have redundant Ac and DC power inputs so please make sure both are disconnected.
Observe the LEDs on the front panel. The LEDs should all turn off when all power has been disconnected.

Allow the power to remain off for ten seconds or so, then reconnect the power inputs. It is not important which Ac or DC power is removed or reconnected first. The LEDs will light again.

This will complete the power cycle procedure.

Procedure to remotely reboot (software or hardware) an SASe

A) Via the web browser

➢ **Tools** -> **Reboot** page of the browser

➢ Can select either "**Software"** or "**Hardware"** reboot

➢ Two types of remote reboots are available (Software or Hardware)

Reset type:

- Software: Reset only the Ethernet port (including Web server and SNMP server). This reset has no effect on the signals selection and distribution.

- Hardware: Reset the SAS-E. This reset affects the signals selection and distribution.

B) Via SNMP ???: (5 Dec 17, KW) "Reboot" is not listed in SASe's MIB file. Nothing about this in the SASe user manual. SASe doesn't appear to be able to be rebooted via SNMP, but not confirmed.

C) Via telnet CLI ???: (5 Dec 17, KW) customers do not have access to CLI interface. Nothing about this in the SASe user manual. Not sure if LU can remote in and perform reboot via CLI command

PS06R-2Z1M-DT03 Available power pack for redundant AC input (PS06R-2Z1M-DT03)

- ➢ (converts AC to DC for connection to the DC input connector):
- ➢ **Spectracom P/N:** PS06R-2Z1M-DT03 (Released on ECN 2829 ~Jan 2012)
- ➢ Also called "Special Item Timing – USA"
- ➢ Refer to (in Salesforce): https://na8.salesforce.com/00kC000000NQgoZ

Refer to Our P/N **PS06R-2Z1M-DT03** in the "**power packs for all products"** section in this document.

SASe (Second DC input for redundant input power) (called "Special Item Timing – USA")

Model	Power Supply	Associated ancillary kit	Also known as	Was P/N
SAS-17E and SAS-36E	PS06R-2Z1M-DT03 (released on ECN 2829)	N/A	N/A	N/A

Fuses

As mentioned in the SASe manual (and shown below), the SAS-17E and SAS-36E do contain two power fuses in the rear panel AC power jack:

"Fuses: 2 x 250 V – 1A TD (Time Delay)"

2 Fuses, 5 x 20 1A TD 250V
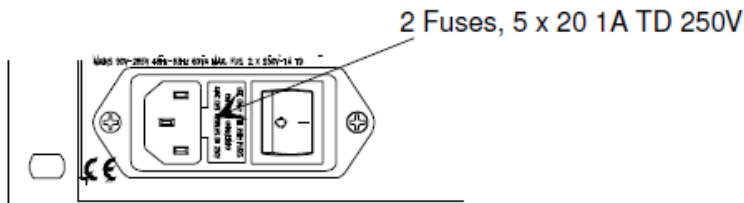
A (Response from Eric Girard on 7/29/11) We never had met such issue on the SAS E units (SAS 17E and SAS 36E) we regret this matter, and this bad impact on your system.   I can inform you that we have a new type of fuses on our last product generations that increase the robustness of the unit regarding this risk at starting. We use some 1A-250V-D1TD fuses (you can see the attached datasheet) and we are very satisfied by these parts.

We are waiting for spare parts from our supplier, if you need, we can ship 2 new fuses when we will receive them.

When the user connects the AC source and DC source to the SAS-36E and reloads the browser (with the F5 key) after enabling the DC power input on the GUI, an error message appears, and the setting window disappears, which makes it impossible for the user to make any operation after that. (The customer would like to enable both AC and DC sources to make the SAS-36E have power redundancy).

[Details]
The customer has encountered the above symptom in the following way:
(1) Connect the DC source to the SAS-36E.
(2) Go to SAS-E Configuration->SAS-E Setup page on the GUI.
(3) Make the following settings for power sources:
   "Monitoring AC Presence"=Enabled
   "Monitoring DC Presence"=Enabled

(4) To reload the browser, press the "F5" button.
(5) A message saying "I'm busy please try later ... Wait 5 seconds before
   retry" appears (refer to attached "Error.jpg") and the setting window

disappears.

- The setting window reappears if the user re-open the browser. However, the user encounters the same symptom if he goes to the SAS-E Setup page in Step (2) and press the F5 button.

- When the following settings are made in Step (3), this symptom does not appear:

  "Monitoring AC Presence"=Enabled, "Monitoring DC Presence"=Disabled
  "Monitoring AC Presence"=Disabled, "Monitoring DC Presence"=Enabled

  So, this symptom appears only when both AC and DC power sources are enabled (but the customer needs to enable both of them to give the SAS-36E power redundancy).

- This symptom appears also with a replacement you sent to us. Therefore, we suspect that the cause of this symptom may lay in the hardware design of the SAS-36E or in the software.
- For the SAS-36E software information, please refer to attached "system version.jpg" and "Configuration Report.pdf".

- We found nothing strange on the log of the SAS-36E that indicates the cause of this symptom.

Reply from Eric Girard to Masataka (9 Apr 14) The general background is that SAS-E has a small CPU and therefore limited networking capability. In particular, the HTTP server which allows to display status/configuration pages can rely only on limited processing resource.

This is why you can get sometimes, randomly, the "I'm busy, please retry in 5 seconds" messages, which reflects that the http server lacks of resource to answer; in this case, you just need to wait for a few seconds and press again F5 for refreshing the page.
A few tips:
1. Even If it works with Internet Explorer, we recommend to use rather Chrome or Firefox web browser

2. Don't make too fast requests on the UI pages; wait for each page to be displayed before requesting another one

3. Open only one http session at a time on the same SAS-E

4. For SNMP: don't poll the unit (with GET commands) at a higher rate than 10 times/s

5. Have the SAS-E connected to a network portion which is not too much loaded with traffic (< 70 % capacity)

And also remember that you need to push the "save configuration" button in order for your setting change to be taken into account.

(if you press F5 without having saved the configuration, nothing will happen).

On your specific issue:
We tried to reproduce the issue associated with AC and DC enabling and couldn't see any issue with this; we then believe that what you observed is rather linked to the limited networking capability as described above.

At this time, an improvement would require to redesign the HW (more powerful CPU), which is not in our plan; There is no new SW version that would allow to improve the situation.

Internal battery (batteries)

➢ Per Eric Girard (Oct 2014) there are no batteries inside the SASe
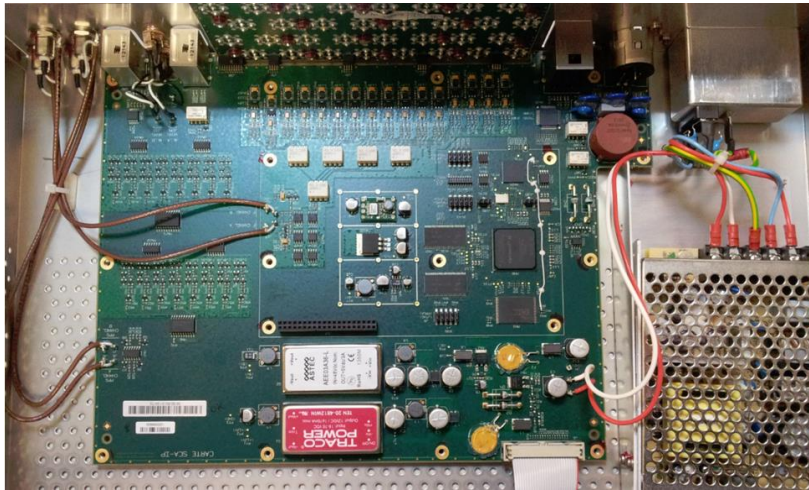
RS-232 Setup port

Email from Emmanuel: "We confirm that SAS17E / 36E don't have a serial port for management. Instead, there is an Ethernet port, which allows both local and remote IP management. Status, configuration, can be performed through a standard web browser"

Front panel LEDs/indicators

|
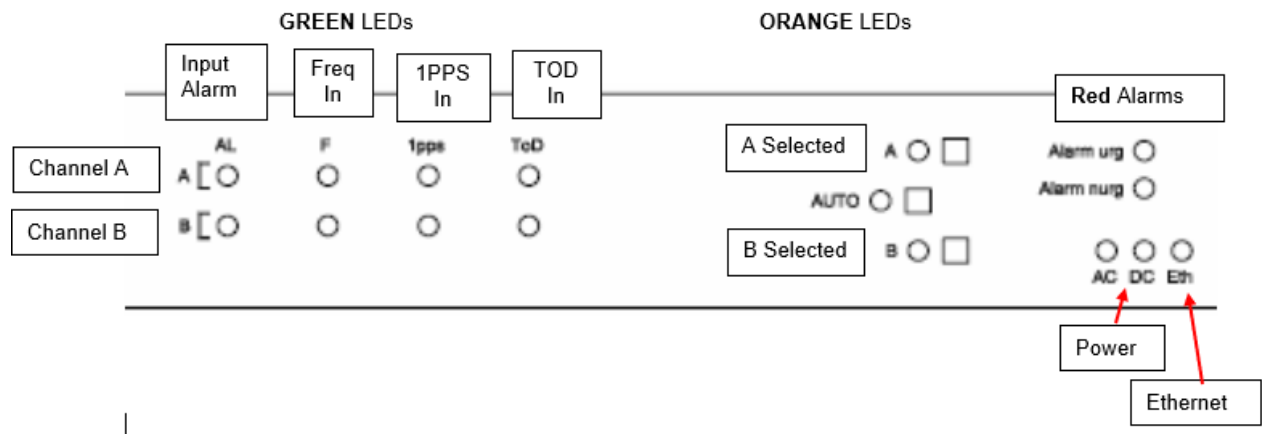
A) Green Status LEDs (on left-side) for each channel (Channel A and Channel B)

➢ LEDs are ON when signal is monitored and present. If the signal is absent or not monitored, the corresponding LED is off.

➢ There are **4 green status LED** for each source:

- **AL:** Result of alarm input monitoring,
- **F:** Result of frequency monitoring
- **1PPS:** Result of 1PPS monitoring
- **ToD:** Result of ToD monitoring

There are 3 orange status LEDs for the source selected:

- **A: ON** when the channel A is selected and used to supply the signal outputs
- **B: ON** when the channel B is selected and used to supply the signal outputs
- **Auto:**

   ON- when the automatic mode is selected through the front panel or the Ethernet port

   OFF- when the SAS-E is forced on a specific channel

B) Other LEDs:

LED green AC:

- ON when AC power is monitored and present
- OFF when AC power is not monitored
- OFF when AC power is monitored and not present (in this case, "Non Urgent alarm is active)

LED green DC:

- **ON** when DC power is monitored and present,
- **OFF** when DC power is not monitored

- **OFF** when DC power is monitored and not present (in this case, "Non urgent alarm is active)

LED green Eth: ON when the SAS-E is connected with a network

LED red "Alarm nurg": ON when a non urgent alarm is generated
LED red "Alarm urg": ON when a urgent alarm is generated

SASe's Operating System (OS)/uname -a

➢ uClinux

Email from Eric Girard (22 Jan 2019) Here below what you need

```
root:~> uname -a
uClinux Spectracom 2.6.11-uc0 #133 Mon Mar 3 11:30:07 CET 2008 nios2nommu unknow
n
```

Network related/CLI (Telnet)

Network ports used with the SASe

Port	TCP/UDP	Function
20	TCP	FTP: data - File Transfer Protocol
21	TCP	FTP: File Transfer Protocol
80	TCP	HTTP
123	UDP	Network Time Protocol (input time sync)
161	UDP	SNMP - Simple Network Management Protocol
162	UDP	snmptrap - Simple Network Management Protocol Trap

**CLI interface/telnet

> SASe has telnet enabled, but it's not accessible to customers (and can't be disabled, see update below). The login credentials are reserved for factory/engineering use only.

> > **Update note (Jun, 2017)** Sylvain supplies us with a special patch for Morgan Stanley, which disables telnet connection.

> Unlike the SecureSync, the SASe doesn't have a user-accessible CLI (command line) interface. So, the CLI interface won't be reachable. Management of the SASe is limited to just its web browser (GUI) interface (and SNMP).

Example attempt by Morgan Stanley to connect to SASe via telnet

changd hz101c14n1 changd$telnet go01pdei06
Trying 10.181.246.216...
Connected to go01pdei06.
Escape character is '^]'.
go01pdei06 login:
Email from Emmanuel (4 Feb 15) The telnet accessible functionalities are very limited (reboot, relaunch services, etc). This access is reserved for engineering and support. We do not document this interface, and are very reluctant to provide the password for this access.

In other words, the SAS-E has not been designed so as to be monitored / controlled through telnet nor CLI.

The way to implement script-based control and monitoring on SAS-E is through SNMP.

Email Keith sent to Morgan Stanley (4 Feb 15) For your information and to answer your question, telnet is enabled in the SASe, but it's not a user-accessible interface. The telnet login credentials are reserved for factory and Engineering use only.

Configuration of the SASe is limited to its web browser (GUI) interface, while monitoring capabilities are available via either its web browser or via SNMP.

**Default settings/default password:

IP address: 192.168.0.100   Rear panel Reset button (labeled "RST") sets the address back to this (when held for 2 seconds). Note that the ETH LED will blink during this process.

Password

Default Password: "pwd"

Abilty to reset the password if no longer known:

 ➢ Refer to SR 4442 in SAP

NOTE: The user cannot reset the password if forgotten. This can ONLY be done via the command line interface through Telnet with a special login and procedure known by Eric Girard. A webex session would be required so we can login remotely and reset the password. Otherwise the unit must be returned to the factory.

DHCP

Supports DHCP, but no way to retrieve the DHCP assigned address from the SAS-17/36 (have to retrieve it from the DHCP server). Recommend setting it to a desired static address using a cross-over cable and the default static address.

*Pressing the rear panel Reset (RST) button until the ETH LED blinks (should be about two seconds) sets it to the default static IP address **192.168.0.100**. About 5 seconds later, the SAS reboots. About two minutes later, it will be back up and running with the static IP address.

Email from Dave L (3/1/12)
This device is DHCP capable by factory default. It will acquire a DHCP address which can be obtained by examining your network traffic or info from the DHCP server.
Usually the system is setup using the default static IP address 192.168.0.100. This is set by holding the RESET button on the rear panel for 2 seconds. Then you can connect using a crossover cable or to a 192.168.0.X network. The IP address can then be configured to your permanent static address.

I have attached the manual for this product. Please see page 3-1 for the network connection procedure.

DNS / Host name

(KW, as of 12/23/09) The Host Name has a limited number of allowable characters (15).   Tektronix wanted to enter one with 26 and preferably 28 characters long. Emmanuel says they plan on lengthening the number in a future release (expected Q1 2010).

Port Speed/settings

 ➢ 10/100, auto negotiate Ethernet port (1): (ping/telnet can work at 100 MB connection, but HTTP browser requires 10MB connection only. Browser not accessible with 100MB or 1 GB speeds).

Email from Emmanuel (3 Nov 16, regarding report of HTTP browser not being accessible): They just need to configure the switch port in auto-negotiation mode, as SAS-17E only talks at **10 Mbit/s.**

Network configuration via the interface GUI

      System Setup -> **Network Setup** page of the browser

Web browser stuff

- ➢ **HTTP only (**Does not support HTTPS)

- ➢ Requires **port 80** (for HTTP) be open on the PC and any firewalls in between

- ➢ Even If it works with Internet Explorer, we recommend using **Chrome** or **Firefox** web browser instead,

- ➢ As mentioned below, browser access requires its switch port be set to auto to negotiate a 10 Base-T connection only. If the switch is set to either 100 Base-T or 1GB, ping/telnet will work but HTTP web browser will NOT be available.

***NO HTTPS Support (HTTP only) and no available CLI interface -request for secure connections)

- ➢ refer to SF case 173657

Q Understood http is the only access method now, however, there's a potential risk concern for us authenticating via http. Could I check if Spectracom can offer us other much secure authentication method, like radius/tacacs auth., 2-factor auth. or token based?
Or even develop a CLI interface for us via ssh?
 A reply from Dave Lorah (17 Sept 2018) Keith is out of the office today so I can assist you.

The SAS-36E was not designed for secure environments and has some limitations on the ethernet interface. It would not be powerful enough processor-wise to support interface authentication.

Developing a CLI based interface would involve some cost to you for the service. IF you are interested, I could run this by our Product Manager and see what our options are.

***Apache web browser software in the SASe

- ➢ The SASe also uses an Apache web browser (similar to SecureSyncs and other products)

- ➢ Refer to case **184370** (regarding a CVE in the Apache version 1.3.37 installed)

Email from Eric Girard (5 Feb 2019) Here below the Apache version for SASE

```
root:~> uname -a
uClinux Spectracom 2.6.11-uc0 #133 Mon Mar  3 11:30:07 CET 2008 nios2nommu unknow
n
root:~> httpd -v
Server version: Apache/1.3.37 (Unix)
Server built:   Mar  5 2007 16:51:45
root:~>
```

Email from Erhan to Dave Lorah (29 Jan 2019) Please see below when we poll one of the SASEs.

80/tcp   open http   Apache httpd 1.3.37 ((Unix))

Note from Keith: Not sure which version software is currently installed in the SASe they polled/

Associated Email from Sadie (10 Apr 2019) regarding Apache version upgrade There are no planned changes to Apache. We currently do not have any firmware releases scheduled for this platform as there is no further feature development planned for this platform on Orolia's product roadmap. We will continue to monitor and address any bugs or vulnerabilities that critically affect the core distribution functionality of this product, however as networking is not a core functionality of the SAS distribution platform, there are no changes regarding networking slated for development at this time.

Troubleshooting issues with the HTTP-only web browser

A) **Error message observed on a new SASe: "Failed to open include file /flashfs/www/Ec20sStatus.inc Internal Error Please contact the SPECTRACOM support"**

  Customer report: "When connecting to the SAS-17E, we are gating the following error:"
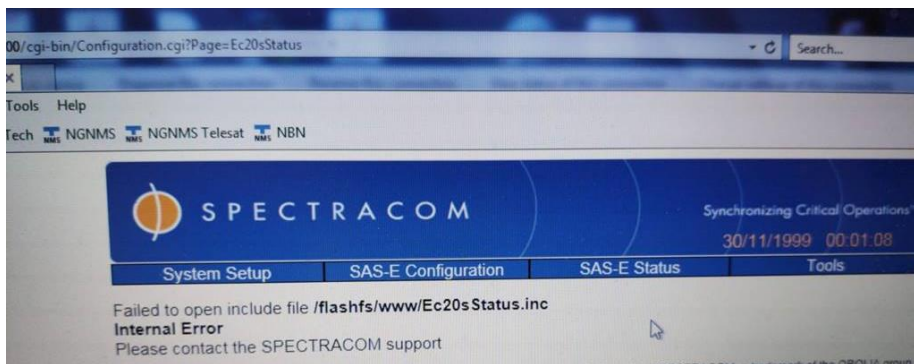
  ➤   Refer to Case 204572 (31 July 2019- first time we've seen this one in Rochester)

Customer reported a resolution "We faced the same issue on the other SAS-17E unit that we have. After changing the unit IP address, issue was solved and both units are working well. We will keep monitor the unit and let you know if anything new will pop up"

B) Errors displayed while trying to http in ("Failed to create session file")

➢ Refer to Salesforce case **172662**

➢ Refer to info further below ("No HTTP, but ping and telnet are working fine") about confirming the switch port SASe is connected to is set to auto-negotiate

➢ The root cause is a too big size of the temp file. Each time you access to the unit, you increase this file. And unfortunately, the size allowed to this, is very low. When the unit reach it, all web pages are unreachable.

➢ This issue was temporarily fixed with a reboot/power cycle of the unit.

- Eric Girard provided a patch to prevent it: **Note**: for patch referred to below, go to "**patch to prevent tmp file too big**" at: ..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E SAS17E-IR

Q When trying to access one of our SAS36E devices over http we receive the below issue. Is there a way to log in to the device by alternative means to perform a software reset?

A reply from Eric Girard (8 Dec 2017) This morning I worked in deep on your issue.
As explained previously, the basic fix in your situation is a power cycle of the SAS-E.
The root cause is a too big size of the temp file. Each time you access to the unit, you increase this file. And unfortunately, the size allowed to this, is very low. When the unit reach it, all web pages are unreachable.

The Telnet access, is a Spectracom access. This root account is dedicated to "maintenance"
Based on my investigation this morning, I can remotely reboot you unit via our Telnet access.
Can you provide me a Telnet access with Teamviewer and Putty?   Please note that after my action, your SAS-E will reboot.

FIX / Follow-up email from Eric Girard (7 Dec)

➢ **Note**: for patch referred to below, go to "**patch to prevent tmp file too big**" at:
    ..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E SAS17E-IR

Please find enclosed our patch which will fix your remote access.
To avoid the the tmp file is increasing, we have change rules for the management of remote session.

After having installed this patch, you will always have to re-enter the administration password to access to any configuration menu. This fix kills active session.

C) No HTTP, but ping and telnet are working fine

➢ Make sure the switch port is set to auto-negotiate so that it can be set to 10 Base-T (not even 100 Base-T will work)

Troubleshooting tip: If no HTTP connection is available, but ping and telnet are both good, verify any switches located in between the SASe and the PC are not hard-set to either 100 Base-T or 1000 Base-T (GB). The switch must operate in **10 base T ONLY** (not even 100 Base T) mode to allow HTTP to work. Refer to Salesforce case 00005539 (John Abdelsater with Open Access) for more info.

Email from Emmanuel (3 Nov 16, regarding HTTP browser not being accessible): They just need to configure the switch port in auto-negotiation mode, as SAS-17E only talks at 10 Mbit/s.

REPORT FROM Masataka to Eric Girard (28 May 2014 about SASe)
We have been informed that the following symptom appears with the SAS-36E (S/N:LX1200053126) which was delivered to NTT Communications the other day.

[Symptom}

 When the user connects the AC source and DC source to the SAS-36 and reloads the browser (with the F5 key) after enabling the DC power input on the GUI, an error message appears and the setting window disappears, which makes it impossible for the user to make any operation after that. (The customer would like to enable both AC and DC sources to make the SAS-36E have power redundancy).

In this connection, could you please respond to the following requests:

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[Requests]

1. Please check using an actual unit whether this symptom is duplicated
   in your environment or not, referring to [Details] below.

2. Please investigate the cause of the symptom (whether it lies in the
   hardware, software, or usage).

3. If there is a way to avoid this symptom, please let us know.

4. If this symptom can be avoided by upgrading the software, please advise
   us to which version the software should be upgraded with instructions
   for the upgrade.

[Details]

The customer has encountered the above symptom in the following way:

(1) Connect the DC source to the SAS-36E.

(2) Go to SAS-E Configuration->SAS-E Setup page on the GUI.

(3) Make the following settings for power sources:

   "Monitoring AC Presence"=Enabled
   "Monitoring DC Presence"=Enabled

(4) To reload the browser, press the "F5" button.

(5) A message saying "I'm busy please try later ... Wait 5 seconds before
    retry" appears (refer to attached "Error.jpg") and the setting window
    disappears.

- The setting window reappears if the user re-open the browser. However,
  the user encounters the same symptom if he goes to the SAS-E Setup page
  in Step (2) and press the F5 button.

- When the following settings are made in Step (3), this symptom does not
  appear:

   "Monitoring AC Presence"=Enabled, "Monitoring DC Presence"=Disabled
   "Monitoring AC Presence"=Disabled, "Monitoring DC Presence"=Enabled

  So, this symptom appears only when both AC and DC power sources are
  enabled (but the customer needs to enable both of them to give the
  SAS-36E power redundancy).

- This symptom appears also with a replacement you sent to us. Therefore,
  we suspect that the cause of this symptom may lay in the hardware design
  of the SAS-36E or in the software.

- For the SAS-36E software information, please refer to attached "system
  version.jpg" and "Configuration Report.pdf".

- We found nothing strange on the log of the SAS-36E that indicates the
  cause of this symptom.

Dear Eric-san,

Thank you for your reply.
Sorry for late response. We added comments as below.

>in this case, you just need to wait for a few seconds and press again F5 for refreshing the page.

We asked them to do as above, and then, they tried. But this symptom remained.

A few tips:

1) **Even If it works with Internet Explorer, we recommend to use rather Chrome or Firefox web browser**

   Ok,we will ask them to use Chrome or Firefox.

2) **Don't make too fast requests on the UI pages; wait for each page to be displayed before requesting another one.**

   Customer wait for enough time. They never made fast requests on the UI pages.

3) **Open only one http session at a time on the same SAS-E.**

   Although they opened only one http session on the same SAS-E, this symptom appeared.

4) **For SNMP: don't poll the unit (with GET commands) at a higher rate than 10 times/s.**

   They are not using SNMP polling to SAS-36E.

5) **Have the SAS-E connected to a network portion which is not too much loaded with traffic (< 70 % capacity)**

   No, SAS-36E was not connected to a network portion which was too much loaded with traffic.

6) **And also remember that you need to push the "save configuration" button in order for your setting change to be taken into account. (if you press F5 without having saved the configuration, nothing will happen).**

   They pushed the "save configuration" button in order for setting change to be taken into account.
   (They pushed "save configuration" button between step(3) and step(4) in procedure in former mail. Sorry for forgetting to tel.)

we then believe that what you observed is rather linked to the limited networking capability as described above.

We do not think so, because of the reason as below.

<Reason>
Usually, they can operate SAS36E via GUI comfortably.
Only when they do procedure which we indicated in former mail,this symptom appeared.

<Request>
Could you please retry procedure which we indicated on your side again?
(Please enter "save configuration button" step between step(3) and step(4) in procedure in this time
Dear Tokikuni-san
May I ask you to confirm me that your customer is not using Internet explorer for its several tries?
We recommend to use Firefox or Chrome. We have noticed some similar issue with Internet Explorer.
Another test for your customer is to connect directly the SASE to their computer. In this case they might use a static IP address or the factory IP address (192.168.0.100) used by default after having resetted the unit with the reset button on the rear panel.

Please let me know if the situation remains the same.

**Web browser pages

SASe Status page
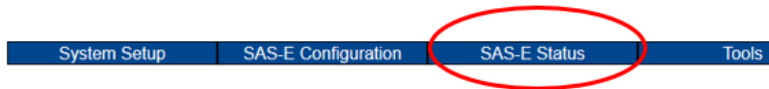
SAS-E Status

STATUS		
Equipment type	SAS17	
Input Channel		
	Channel A	**Channel B**
Frequency input	Disabled	Disabled
TOD input	Disabled	Disabled
1PPS input	Alarm	Alarm
Alarm input	Disabled	Disabled
Selected channel	Automatic A	
Channel selection source	Front Panel	
Output Channel		
Frequency output	Disabled	
TOD output	Disabled	
1PPS output	Alarm	
Power Supply		
AC	Ok	
DC	Alarm	
Alarms		
Urgent	Alarm	
No Urgent	Alarm	

Events Logging page

(**Tools** -> **Events Logging**)

Time	Module	Gravity	Message
19/07/2017 15:11:05N	SASE	Warning	No Urgent Alarm OK
26/07/2017 11:10:09N	SASE	Warning	Channel B 1PPS Input Fault
26/07/2017 11:10:09N	SASE	Warning	No Urgent Alarm Fault
26/07/2017 11:10:10N	SASE	Warning	Channel B 1PPS Input OK
26/07/2017 11:10:10N	SASE	Warning	No Urgent Alarm OK

Designed by SPECTRACOM, a trademark of the OROLIA group

Time Sync Setup/NTP input sync

➢ Requires port 123 be open between SASe and NTP time server

➢ The time shown will be always be UTC Time, not local Australian time. The SAS is not capable of correcting UTC for local time zones so please keep this in mind when examining log entries.

➢ Manually set date/time doesn't persist through a reboot/power cycle (so it's better to sync the SASe to an NTP time server, instead)

• **Note**: It will NOT allow a manual time set, if the "**Use NTP Server"** field is "**Enabled"**

Note: Emails below are from Dave to Morgan Stanley (20 Jan 17)

To allow manual setting of the time and date you must first change the "Use NTP Server" field to Disabled, then Save Configuration and then use the SET button to set the time.

It will not allow a manual time set, if the "**Use NTP Server"** field is **Enabled**. Please give this a try and it should work.

Please check your settings in the Network Setup and make sure the Subnet mask and gateway etc. are correct. This is all you should need to configure to allow sync.

Sorry to have to continue but I need to point out that the time and date information will not persist through a power cycle or reboot so it is best to use a NTP server to set the time in the SAS. Otherwise you would need to manually set the time each time the unit s rebooted or power is lost.

"NTP Server address field"

Software issue with NTP input configuration – not enough digits in the IP address supported (need all 15 digits "165.168.140.205 for instance, but only 14 of the digits are supported- truncating it to "165.168.140.20" for instance (dropping the last digits)

➢ Refer to Salesforce case 25137 (reported Apr, 2017)

"**Actual version**" installed was reported as v1.26, but it sounds like all earlier versions may also have this condition

Email from Eric Girard to Morgan (25 Apr 17) It's the first time we receive a such demand. I have to admit they are right. Let me check with the dev team what we can do.

I have tried their IP address on one of our SASE. I confirm the last digit is canceled after having submitting it.

System Setup	SAS-E Configuration	SAS-E Status	Tools

Time Setup

NTP Parameters		
Use NTP Server	Disabled ▾	Select if you want to update system time with NTP server
NTP server address	165.168.140.20	NTP server IP address ex:192.168.0.101
Request frequency	300	NTP request frequency in second (65535 seconds maximum)

Save configuration

Time Parameters	
Date = DD / MM / YYYY	10 ▾ / 03 ▾ / 2017 ▾
Time = HH : MM : SS	13 ▾ : 30 ▾ : 17 ▾
Manual Time	Set
Manual Time Adjust	-1 s +1 s

**Output modes/switching (Channel Selection- switching from one channel to the other):

➢ All outputs switch to the alternate channel when one output switches.

"SAS-E Configuration" -> "SAS-E Setup" page of the browser

Monitoring	
Channel	A and B
Frequency Signal	Enabled
1PPS Signal	Enabled
TOD Signal	Enabled
Alarm Signal	Disabled
AC Presence	Enabled
DC Presence	Enabled

Channel Selection	
Network channel selection	Automatic
Front panel switch	Enabled

Save configuration

Output modes (configured via web browser or front panel switch)

"**Forced A**": When this mode is selected, the LED "AUTO" in the front panel is always off and the LED "A" is on. This mode forces the selected channel A, whatever the results of the signal monitoring process.
In the case of a channel A default, the "Urgent Alarm" is active, and in the case of a channel B default, the "Non Urgent Alarm" is active.

"**Forced B**": When this mode is selected, the LED "AUTO" in the front panel is always off and the LED "B" is on. This mode forces the selected channel B, whatever the results of the signal monitoring process.
In the case of a channel B default, the "Urgent Alarm" is active, and in the case of a channel A default, the "Non Urgent Alarm" is active.

"**Automatic**": When this mode is selected, the LED "AUTO" in the front panel is always on. The selection of the channel (A or B) depends on the results of the monitoring process. The following table gives the source selection versus fault detection.

Note: You can't manually switch channels from the front panel or while the "Auto" LED is lit.

The SAS-36E consists of two INPUT channels. One is referred to as "Channel A" and the other is "Channel B". The SAS-36E selects which input channel (A or B) is used to provide all of the outputs on the rear panel. There is only one complete set of outputs, will all outputs being provided from the same input channel (all outputs use the Channel A inputs or all use the Channel B inputs).

As indicated in the manual, when Channel A is selected, all 16 frequency outputs are using the Input frequency that is connected to J2. However, when Channel B is selected, all 16 frequency outputs are using the Input frequency that is connected to J25.

For example, if Channel A is the selected channel, all 16 frequency outputs are provided by the Channel A Frequency input. The outputs are not split into two groups of 8. All 16 use the same input channel

Reasons for channel switching to occur

Email from Emmanuel (24 July 13) Customer should refer to the User Manual for full details, but basically a switch is generated (in automatic mode):

➢ By the absence of current signal on 1 pps, or on 10 MHz (only one or both signal types can be monitored)

- **Note**: It is not possible to monitor the quality of the input signal (there is no available reference to compare against).

➢ In case of alarm raised by the current clock (dry contact)

SASe Channel Switching is non-revertive

➢ SASe doesn't automatically switch back to the other channel when the reason for the switch-over has cleared. It instead stays on the channel it switched to.

➢ Revertive switching (Switching back to the original channel) requires manual intervention.

➢ Revertive channel selecting is not available.

Email from Emmanuel (23 July 13) The SAS-E implements a non-revertive behavior in order to minimize switches which generate phase jumps in automatic mode. This cannot be configured.
This means that it's not possible to determine a "primary" source to which the SAS-E would switch as soon as it's present/valid.

So revertive switching must be done manually:
If clock A is the primary source, and SAS-E has switched to clock B (because clock A signal disappeared), and once clock A is available again, then user must first force SAS-E to input A, and then setup automatic mode.

Q It looks like when both PPS inputs are active Source A is always picked - Is there a way to have Source B chosen when both sources are valid?
A Reply from Dave L (15 Dec 17) You may select Source B by disabling the auto switchover and manually selecting the Source. This is done by setting the Network Channel Selection to Forced A or Forced B.

Time to switch between channels

Q. I couldn't find the time it takes to make that decision and switch over to the secondary input. Would you please find that out for us?
A Email from Emmanuel to Sam Otto (30 May 2013) The time needed to switch from one reference to the other is the addition of:

The time to detect the loss of input signal:

- A few seconds for 1 pps signal (checks that at least two pulses occurrences are missing)

- Typical 200 to 300 ns for 10 MHz signal (check that a two to three alternances are missing)

- The time to switch once the loss of signal is detected

- 20 ns (it is an AsGa switch)

Note a good practice is to connect the alarm output of the clock to the alarm input of the SAS-E; the SAS-E can be configured so that it switches upon alarm input raising, which takes a few 10 ns to be detected.

Report of SASe periodically at start-up, switching back and forth between channels

➢ Refer to SR 5753 in SAP

Sometimes when we power our SAS-36 units on, they exhibit very strange behavior. Immediately upon powering the

units on, they begin toggling back and forth between the "A" and "B" channel inputs. This toggling appears to be synchronous to the 1PPS input signal. This behavior will continue indefinitely. Only a hard reboot of the device can correct it. This does not happen all of the time. Only ~10% of the time when we power on.

**All Inputs and Outputs

****SAS17E (1U High)

2 input channels: 1 Freq input (for 1 to 16 MHz sine wave input) 1PPS in, TOD input, Alarm input, 2 external signals

 Outputs: 8 x frequency outputs, 8 x 1PPS outputs, 2 x ToD outputs, 2 x external signals.
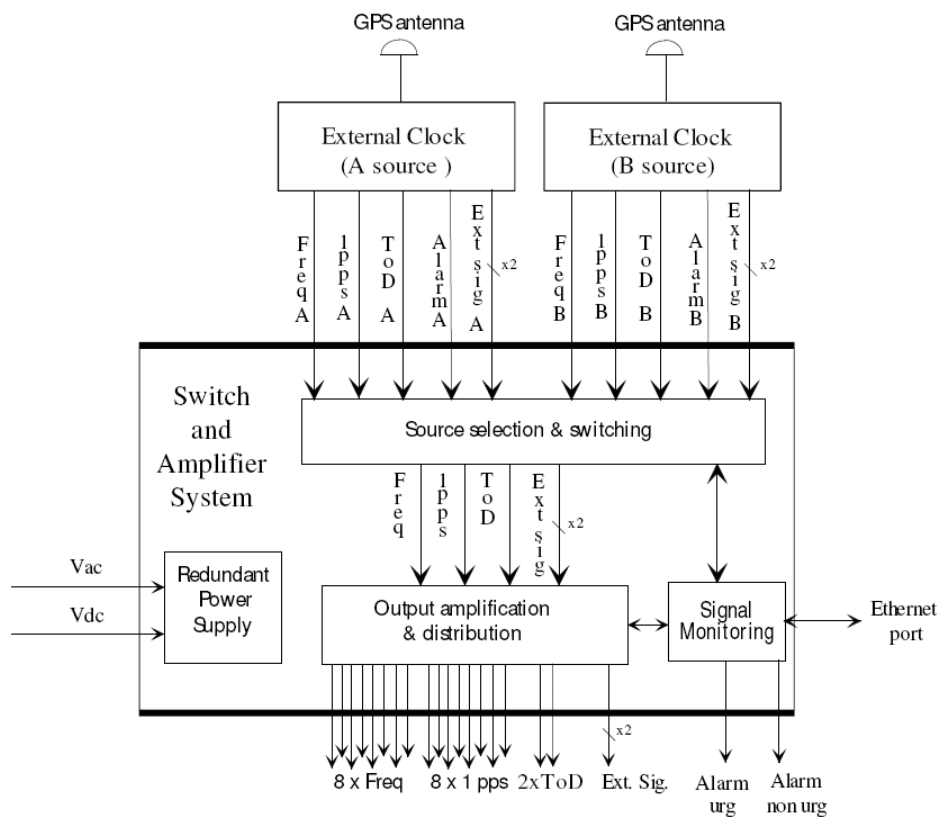
****SAS-17E-IR Option 10 (IRIG/Low-level Freq out)

➢ (1U high) (for Globecomm): Adds IRIG, and low-level FREQ out capability

Refer to: EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E SAS17E-IR\SAS17E-IR (Option 10)

Inputs: (2) FREQ inputs (1 to 16MHz), (2) 1PPS inputs, **(2) TOD/IRIG inputs**, (2) Alarm inputs   (Each of these are one per channel A and B)

Outputs: (16) FREQ outputs (1 to 16MHz), (2) 1PPS outputs, **(1) TOD/IRIG outputs**, (2) Alarm USB connectors
Note: FREQ outputs have 6 dB loss for a lower level output (Compared to standard SAS-17E and SAS-36E)

A) SAS-17E-IR INPUTS

J1	Clock A	Frequency In (1MHz to 16MHZ)	BNC
J26	Clock B	Frequency In (1MHz to 16MHZ)	BNC
J2	Clock A	1PPS In	BNC
J25	Clock B	1PPS In	BNC
J4	Clock A	Alarm In	Mono
J23	Clock B	Alarm In	Mono
J3	N/A	TOD/IRIG (In/out are on same connector)	DB9

B) SAS-17E-IR OUTPUTS

J6- J21	Frequency out (1MHz to 16MHZ) (16 Total)	BNC
J5 and J22	1PPS (2 Total)	BNC
J3	TOD/IRIG (In/out are on same connector)	DB9
URG	Urgent Alarm output	USB
NURG	Non-Urgent Alarm output	USB

C) SAS-17E-IR Input connectors (IRIG/TOD, Frequency and 1PPS inputs)

➢ Connectors J1 (Channel A) and J26 (Channel B) are the Frequency (F) inputs

➢ Connectors J2 (Channel A) and J25 (Channel B) are the 1PPS inputs.

➢ Connector J3 (DB9) is the differential IRIG input

external clock B		
ToD/IRIG In external clock A	J3	SubD 9 pins Female: Pin number: 1: ToD/IRIG_A+ (*) 6: ToD/IRIG_A- (*) 2: ToD/IRIG_B+ (*) 7: ToD/IRIG_B+ (*) 3: NC 8: NC 4: NC 9: c.f. Output 5: c.f. Output
ToD/IRIG In external clock B		(*): level RS485

D) SAS-17E-IR Output connectors (IRIG/TOD Frequency and 1PPS outputs)

➢ **Connector J3 (DB9)** is also the differential IRIG output

		Braid: electrical ground

ToD/IRIG_Out	J3	SubD 9 pins Female:
		Pin number:
		- If external clock A selected :
		    5: signal of J3 pin 1 ToD/IRIG_A+ (level RS485)
		    9 signal of J3 pin 6 ToD/IRIG_A - (level RS485)
		- If external clock B selected :
		    5: signal of J3 pin 2 ToD/IRIG_B+ (level RS485)
		    9 signal of J3 pin 7 ToD/IRIG_B - (level RS485)

The SAS-36E consists of two INPUT channels. One is referred to as "Channel A" and the other is "Channel B". The SAS-36E selects which input channel (A or B) is used to provide all of the outputs on the rear panel. There is only one complete set of outputs, will all outputs being provided from the same input channel (all outputs use the Channel A inputs or all use the Channel B inputs).

****SAS36E (2U High)

2 input channels: 1 Freq input (for 1 to 16 MHz sine wave input), 1PPS in, TOD input, Alarm input, two external signals

Outputs: 16 x frequency outputs, 16 x 1PPS outputs, 2 x ToD outputs, 2 x external signals.
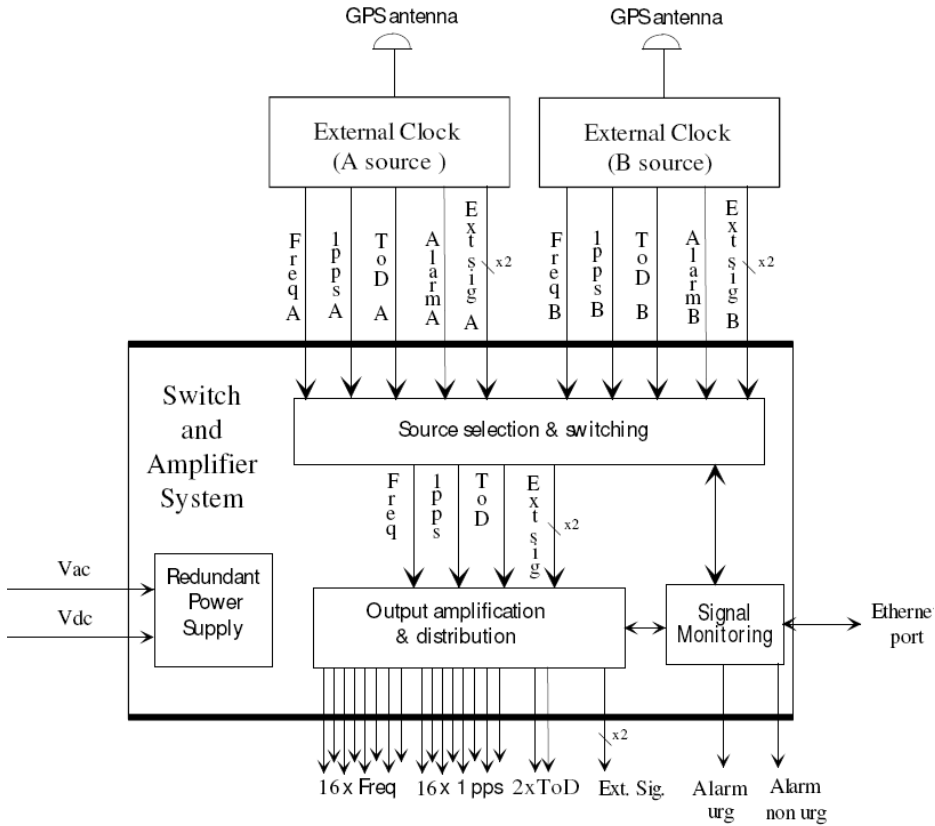
****Typical Noise measurements (jiiter) / propagation delays for the 1PPS inputs/outputs

➢ The propagation delay in the SAS is indeed purely hardware. The signal is routed through some switches and buffer amplifiers and there is no software conditioning involved.

The delay is constant:

- Typical delay between input and output = 35ns
- Standard deviation for delay, on same output port: 200 ps
- Standard deviation for delay, on different output ports (port to port delay variation): 500ps

Calculated processing delays of the 1PPS input versus each and all the 1PPS outputs.

Email from Emmanuel on 3/6/12 Please find enclosed an interesting report from Thierry Gouillou about 1 pps propagation duration dispersion between outputs and over several units.

The jitter on 1 pps outputs is around 200 ps. The delay between different outputs is below 500 ps. This document can be communicated to the customer.

We had only 2 units available, so from a statistic point of view it's a limited sample, but the measurements on this 2 units are rather consistent, and there is no technical reason or manufacturing reason why there should be higher variations).

Now, the customer should be aware that SAS36E does not include any internal oscillator nor phase lock loop: it's just an amplifier. Due to this, the jitter on the propagation is rather low (and at least below the customer specification).

Note: For this test report referenced above, refer to:
EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E_SAS17E-IR\Noise-jitter

****Connectors/Inputs and Outputs:

Q. Is the 6 pin DIN mating connector included with the SAS-36E or available for purchase?
A No, the 6 pin DIN is not included. But it is available under the following references:

- **500197**: one meter cable with 2 mini-Din 6 (for the connection between an Epsilon clock and the SAS E input)
- **235908**: 3 meters cable with mini-Din 6 and SUBD 9 connector (for the connection Output with a PC)

➢ Can the IRIG-B signal be passed thru the SAS36E on the Ext Signal input?

A YES as the commutation is done by an electromagnetic relay but the Ext_signals are not supervised and don't enter in the criteria selection. The both outputs are the same.

➢ From the manual, the ToD input/output signal appears to use the same connectors as the "External Signals" input/output.

➢ YES

➢ Is the SAS36E configured to use one or the other connector? If not, can a customer use both the "ToD" and the "Ext Signals" input/outputs?

➢ YES, the costumer can use both Tod signal and Ext_signal. But as the ext_signal are not supervised and don't enter in the criteria selection, then the SASE can't switch when one the ext signals disappeared.

Q. Do the outputs have individual amplifiers? In other words, are the outputs isolated from each other with individual amplifiers? If so, do we have an isolation specification between outputs?

A Individual amplifier for each output: YES   Isolation between each outputs: 55dB

==Inputs==

****TOD inputs

> Refer to knowledge base article "**SAS E description of the TOD Pinout for input and Output signal**" (still in Salesforce- no longer available on our website): https://orolia.my.salesforce.com/kA3C0000000TZwG?srPos=0&srKp=ka3&lang=en_US

Redundant verses single inputs

the SASe is designed to accept dual 1PPS, Dual Frequency and Dual ToD inputs (on two separate Channels) for redundant switching.

If its not desired to provide dual inputs for all the input signals, place all inputs on Channel A and disable the associated alarms for Channel B (otherwise the alarms for missing redundant alarms will be constantly asserted.

To disable the input alarms for the redundant input channel (channel B) when connecting only a single source.

1. Go to the **SAS-E Configuration** -> **SAS-E Setup** page of the GUI interface

2. Enter the Password of "**pwd**"

3. In the "**Monitoring**" table (directly below), change "**Channel**" from "**A and B**" to "**Only A**" (shown further below).

4) for any inputs not physically applied to Channel A (such as "TOD" for instance), change its associated **Monitoring** field to "**Disabled**". Example below for "ToD"

5) Press "**Save Configuration**"

****FREQ (10 MHz) input

- ➢ SAS-36E Can accept 1 MHz to 20 MHz sine waves
- ➢ SAS-17E and SAS-17E-IR can accept 1MHz to 16 MHz sine waves
- ➢ The input spec is 0dBm to +17dBm.
- ➢ **Connectors J1 and J26** are the **Frequency** inputs

**IRIG/1PPS input (referred to as "pulsed")

- ➢ 1PPS DCLS input should be applied to the **1PPS input connector** (**J2 and J25**)

*******IRIG DCLS input/output (IRIG AM not supported)

- ➢ Requires software version 8 or higher be installed
- ➢ IRIG DCLS only (IRIG AM not supported)
- ➢ IRIG DCLS input should be applied to the 1PPS input connector (J2 and J25)
- ➢ IRIG DCLS outputs are available on the 1PPS output connectors.

Timing Product News submitted by Sylvain (21 Nov 2013) SAS E Breaking news! I am pleased to inform you that we have performed some tests recently using IRIG DCLS signals on the SAS E inputs and it works ! So now we can propose some IRIG DCLS distributors (tested with B/A/G formats - 1KHz - 10KHz) so 8 or 16 outputs: using the 1PPS input of the SAS E units.

Minimum software version installed in order to support IRIG input

Email from Tony DiFlorio to demo customer (7 Jan 2016, after talking with Sylvain) If it is version 7 or lower, it will need to be updated. It needs to be version 8 or higher (see below screen shot for reference). If you get that info before Jeff Stevens comes in to meet with you, perhaps you can both discuss an arrangement to have the unit shipped back to us.

1PPS inputs

➢ 1PPS input is 50 ohm input impedance.

SASe Users manual

1PPS_In external clock A	J2	BNC Female: - Core: periodic pulse period : 1s High Level: > 2.4V load 50 Ω low Level : < 0.7V load 50 Ω - Braid: electrical ground
1PPS_In external clock B	J25	

Email from Dave L (3/1/12) The input spec is 0dBm to +17dBm. Does your input signal conform to this spec? 1204-12

The SAS36E input impedance of the 1PPS signal is 50 Ohms. Your source should be able to drive TTL into 50 Ohms. 3.9 V is sufficient to drive the SAS36E input.

1.7.1   **SAS17E**
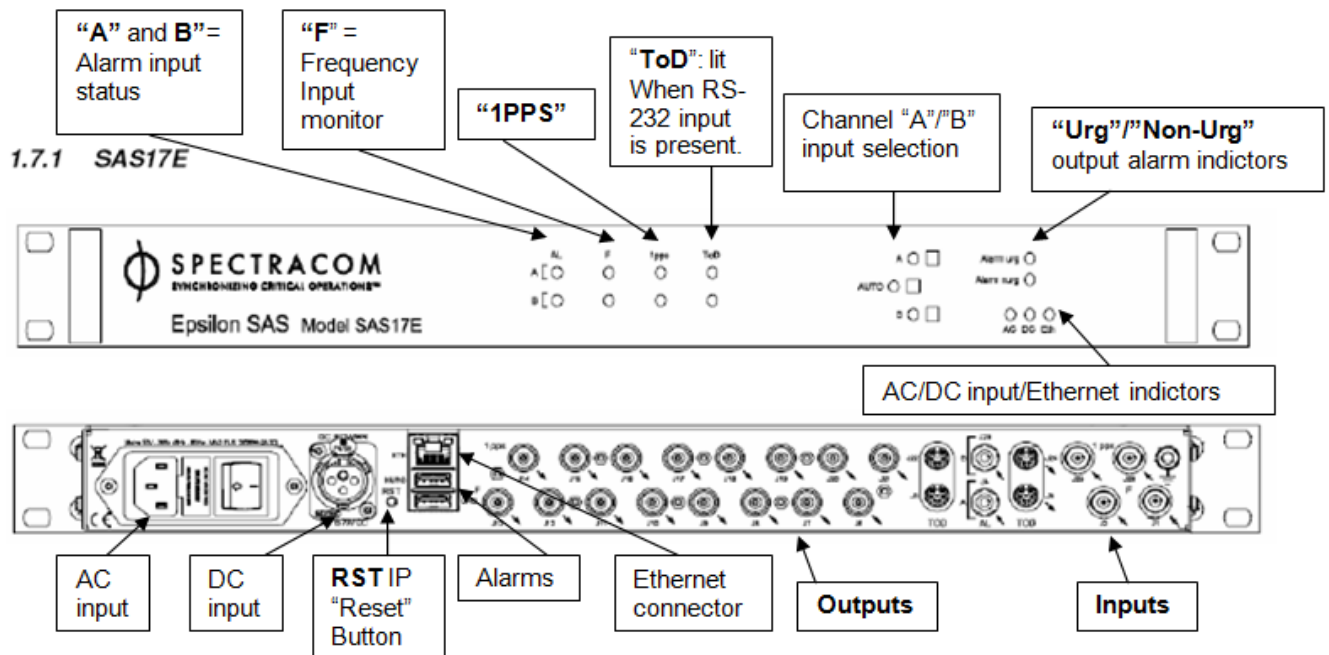
Inputs: (2) FREQ (1MHz to 16MHZ), (2) 1PPS, (2) TOD, (2) Alarm inputs (Each of these are one per channel A

Outputs (8) FREQ (1MHz to 16 MHZ) (8) 1PPS, (2) TOD,
        Note: FREQ outputs have 0 dB gain/ loss (unlike the SAS-17E-IR)

"A" and B"= Alarm input status

"F" = Frequency Input monitor

"1PPS"

"ToD"= lit When RS-232 input is present.

Channel **"A"/"B"** input selection

"Urg"/"Non-Urg" output alarm indictors

1.7.2   *SAS36E*

SPECTRACOM
SYNCHRONIZING CRITICAL OPERATIONS™

Epsilon SAS   Model SAS36E

AC/DC input/Ethernet indictors

AC input

DC input

RST IP "Reset" Button

Alarms

Ethernet connector
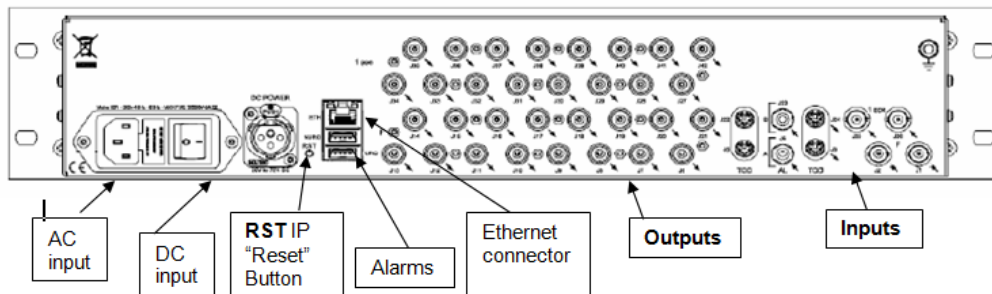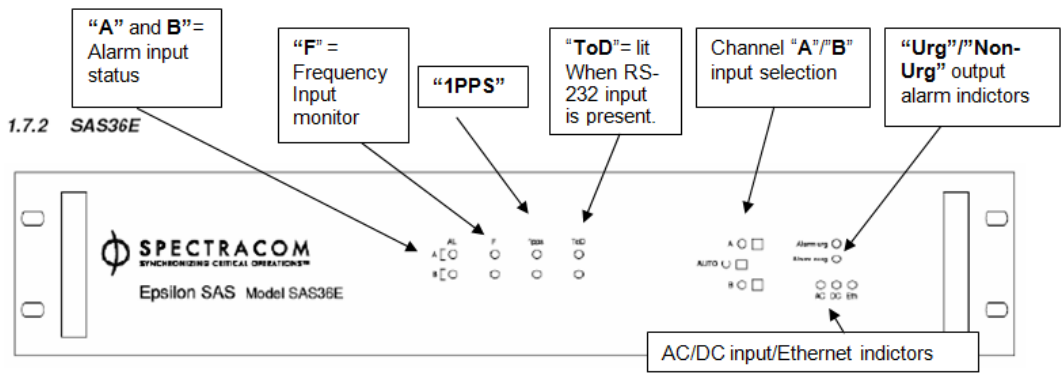
Outputs

Inputs

Inputs: (2) FREQ (1MHz to 16MHz), (2) 1PPS, (2) TOD, (2) Alarm inputs (Each of these are one per channel A and on per channel B)

Outputs: (16) FREQ (1MHz to 16 MHz), (16) 1PPS, **(**2) TOD outputs

   Note: FREQ outputs have 0 dB gain/ loss (unlike the SAS-17E-IR)

SAS-17E and SAS-36E INPUTS (Not SAS-17E-IR)

J1	Clock A	Frequency In (1MHz to 16MHZ)	BNC
J26	Clock B	Frequency In (1MHz to 16MHZ)	BNC
J2	Clock A	1PPS In	BNC
J25	Clock B	1PPS In	BNC
J4	Clock A	Alarm In	Mono
J23	Clock B	Alarm In	Mono
J3	Clock A	TOD IN	Mini Din 6
J24	Clock B	TOD IN	Mini Din 6

SAS-17E and SAS-36E OUTPUTS (Not SAS-17E-IR)

J6- J13	(SAS-17E) Frequency out (1MHz to 16MHZ) (8Total)	BNC
J27–J42	(SAS-36E) Frequency out (1MHz to 16MHZ) (16 Total)	BNC
J14–J21	(SAS-17E) 1PPS out	BNC
J27–J42	(SAS-36E) 1PPS out	BNC
J5 and J22	TOD (2 Total)	Mini Din 6 pin 6
URG	Urgent Alarm output	USB
NURG	Non-Urgent Alarm output	USB

****Alarm relay input Interface cable for SAS-36 to NetClock 9383/SecureSync

➢ Our P/N for this 10 foot cable: CA21R-1002-0010

Email from Sam Otto to Jeremy Onyan (16 apr 2013)
I looked at that back of NetClock and noticed that the wired pins on the CA21R-1003-0010 cable, pins 3 & 4 are Normally closed and common respectively.

I compared it to the pin out displayed in the figure below which is from the 1204-0F relay option card portion of the presentation that Dick Fox and I will be giving next week. Please let Eric Powers know that the cable will work between the SAS to either the SecureSync option card or the NetClock.

Outputs

****TOD outputs

> Refer to knowledge base article "SAS E description of the TOD Pin-out for input and Output signal"
> https://na8.salesforce.com/ka3C0000000Ta4t

****1PPS (pulse) / IRIG output (on 1PPS output connectors)

Output Connectors: BNC female

Number of available 1PPS outputs

- **SAS-36E**: 16 1PPS outputs
- **SAS-17E**: 8 1PPS outputs
- **SAS-17E-IR**: 8 1PPS outputs

Output level: TTL

High Level: > 2.4V load 50 Ω
Low Level : < 0.7V load 50 Ω

Partial Email from Dave L (3/1/12)
The output spec is rated at >2.4V into a 50 Ohm load and may not reach 5V. This is not adjustable.

Does your new equipment input spec TTL level or does it need absolutely 5.0V? If it requires TTL anything over 2.4V should be OK. If it needs 5.0 V from the SAS36E this could be a problem.

Output impedance: 50 ohms

- Note that unused outputs of the SASe do not need to be terminated but can be used to store extra 50 ohm terminators for future use- this helps them from becoming lost).

Rise time:

Recommended cable: 50 ohm RG-58 cable

Max cable distances: Refer to: Max cable distances that can be run for 1PPS outputs

IRIG output on 1PPS outputs

Timing Product News submitted by Sylvain (21 Nov 2013) SAS E Breaking news! I am pleased to inform you that we have performed some tests recently using IRIG DCLS signals on the SAS E inputs and it works! So now we can propose some IRIG DCLS distributors (tested with B/A/G formats - 1KHz - 10KHz) so 8 or 16 outputs: using the 1PPS input of the SAS E units.

1PPS output Delay and Jitter (1PPS input to 1PPS output)

➢ Refer to kb article "…**what is the internal static delay…**" (still in Salesforce, no longer on our website):
https://orolia.my.salesforce.com/kA0C0000000LDsF?srPos=0&srKp=ka0&lang=en_US

From the SASE datasheet

Pulse
- Regenerated pulse with same pulse width / period as input
- TTL level, BNC 50 Ω
- Pulse delay between input and ouput : 35 ns ± 0.5 ns

➢ Refer to kb article "**what is the internal static delay**" (still in Salesforce but no longer available on website):
https://orolia.my.salesforce.com/kA0C0000000LDsF?srPos=0&srKp=ka0&lang=en_US

Q. What are the 1PPS Delay and Jitter specs on the SAS?
A. In March 2013 we received these specs for the SAS 1PPS signals: jitter is approx 200pS and the delay from input to output is approx 35nS. The delay variation from output to output is approx 500pS.

Q (from TOYO 30 Aug 2019) Our customer JAXA inquiry about the test report in page 4
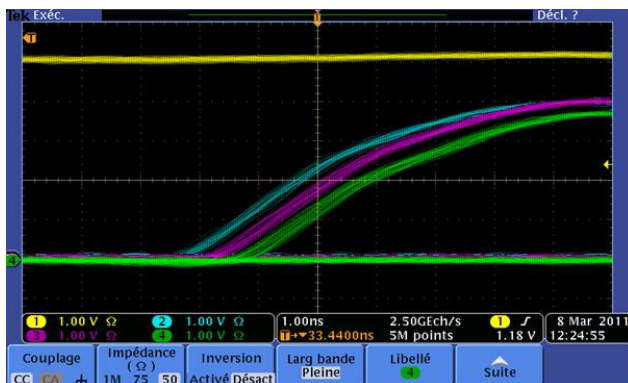
Jitter on each output: 200ps
Delay between each output: 500ps

The Jitter of the above graph looks like 300~400ps, not 200ps.
How did you measure this value?

A Reply from Dave L (30 Aug 2019) This report was generated some time ago. The jitter was measured on three different outputs by looking at the time between the highest and lowest traces for each channel and dividing by two, taking into account the mean of the two would be the true center of the 1PPS signal and the jitter would be positive and negative.

In this case the difference is about 200pS as reported.

SASe 1PPS output delays do NOT provide any adjustable delay compensation

 ➢ individual cable delay for each SAS output needs to be accounted for (in available) within the 1PPS slave's configuration.

 ➢ If 1PPS slaves don't provide the ability to compensate for PPS delays, the various cable lengths will need to be "averaged" together to calculate an "average cable delay" which can only be accounted for within the SecureSync's (or other PPS source) output delay compensation (where the 35ns internal delay of the SASE can also be accounted for, as well)

(per Keith, Feb 2019) as far as I am aware, and as of at least now (and I am not aware of any plans to change this), there is **NO** ability to provide **DELAY compensation** in an SASe for its 1PPS outputs (to compensate for varying PPS distribution cable lengths between the SASe and its various 1PPS slaves which are connected to the SASE)

if the individual 1PPS Slaves don't provide the user with the ability to add a delay compensation, the various cable lengths between the SASe outputs and all its Slaves can be averaged together, to calculate the average PPS cable delays.

This average output cable delay, in added to the nominal cable delay between the SASe's 1PPS input to its 1PPS outputs (about 35ns) can then be entered into the configuration of the applicable SecureSync's (or other 1PPS source) output which is providing the SASe with a PPS input, to account for the cable/processing delays between the SecureSync and the various PPS slave devices

Note: to calculate the inherent 1PPS cable delays (from the SecureSync/1PPS source to the SASE- and also from the SASE to the PPS Slaves): refer also to "**1PPS Propagation/cable Delays**" in: ..\CustomerServiceAssistance.pdf

Email Keith sent to PICO (20 Feb 2019) To begin, the most accurate location to account/compensate for individual 1PPS processing/cable delays is within each 1PPS slave device receiving a 1PPS signal (if these slave devices receiving the signal provide the ability for a user to configure an input delay compensation). Each Slave can then be compensated for any individual cable length variations between its SASE and each slave.

If the 1PPS slave devices don't have the capability to account for 1PPS delays, each individual 1PPS output from the SecureSync (whether using its base 1PPS output, or 1PPS outputs from various available 1PPS output distribution Option Cards) can be configured with a 1PPS offset to help account for the inherent cumulative delays (SASe delays, cable delays, slave processing delays, if known, etc,) between the SecureSync's 1PPS output and the Slave devices receiving its provided 1PPS output.

As the SASe doesn't have the ability to provide individual output delays, if the various 1PPS slaves don't provide the ability for a user to compensate for input PPS delays, any variations in the cable lengths between the second SASe and its individual slaves can be averaged for their cable delay compensation calculation below.

Calculating the cumulative path delay between the SecureSync's 1PPS output and the slave devices' inputs for the offset calculation value to enter into the SecureSync's web browser includes (this is an alternative to using an oscilloscope to measure the actual offset between the 1PPS output from the SecureSync versus the 1PPS output of a Slave, especially if a scope is not readily available, or these devices aren't co-located for an accurate measurement to be performed):

  1) Adding together the nominal delay (about 35ns) though each SASe device (about 70ns total for two inline SASe devices)

  2) Plus adding in the typical 1PPS coax cable delays per foot (which varies slightly, depending on the type of cable installed) for the approximate total cable distance from the SecureSyncs to the 1PPS Slaves. Note we normally recommend using 50 ohm **RG-58 (Belden 8259)** cable for 1PPS distribution, which has a nominal cable delay of about **1.54ns per foot** of cable.

   RG-8 (Belden 7810A) has a nominal delay of **1.17ns per foot.**

   Times Microwave LMR-400 (or equivalent) nominal delay is **1.34ns per foot.**

   Multiply the total length of PPS cable (in feet) by the applicable delay value above to obtain the total cable delays (in nanoseconds, and then add this calculated value to the SASEs' total delay from above.

  3) Add to this delay calculation above, any 1PPS processing delays of the various 1PPS Slaves (if known).

The combined total cable/processing delays can then be entered into the "**Offset**" field in for the applicable 1PPS output being used from the SecureSync, via its web browser.

For information on the available 1PPS "**Offset**" field (specifically the 1PPS output located on the back panel of the chassis of every SecureSync), refer to the SecureSync online user guide at: http://manuals.spectracom.com/SS/Content/NC_and_SS/Com/Topics/SETUP/1PPS_outp_conf.htm.

Note this "**offset**" field is also available for each individual output from the 1PPS distribution Option Cards (if installed in the SecureSync), As excepted below, entering the delay value is the same for every 1PPS output,

Offset [ns]: Allows to offset the system's 1PPS on-time point, e.g. to compensate for cable delays and other latencies [range = – 500000000 to 500000000 ns = ±0.5 s]

If there is at least one 1PPS distribution Option Card installed in the SecureSync, and at least one of its outputs is being used, this same calculation process above can be repeated for each individual SecureSync 1PPS output.

(1PPS output versus 1PPS input) Delay and jitter: refer to (**170663_SAS36E Test Report**): EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E_SAS17E-IR\Noise-jitter

Note: Answers below in red are from Emmanuel and green are from Sylvain (22 Apr 13)

How closely are the channel outputs matched?
Time Deviation (Skew) between channel Typ 500 ps
we can remember that the Jitter for each output is <5ns

Will all output channels have the same rising/falling times?
Rising time : yes
Falling time : not garunteed
Rising time < 10ns – falling time < 500ns

Q. How clean are the 1 PPS output channels?
A. What is the isolation between channels?
We have no specification on isolation between channels, as they all emit the same 1 pps pulse

Isolation compliant with 55dB between each output (I am looking for the Isolation between Input and output with Tom nowadays…)

Q. If one channel shorts or load changes, will the other channels be affected?
A. No- Each output is individually buffered / has its own amplifier.

***1PPS Output Fault in Alarm state reported in the "Status page"

STATUS		
Equipment type	SAS36	
Input Channel		
	Channel A	Channel B
Frequency input	Disabled	Disabled
TOD input	Disabled	Disabled
1PPS input	Ok	Ok
Alarm input	Disabled	Disabled
Selected channel	Automatic A	
Channel selection source	Network	
Output Channel		
Frequency output	Disabled	
TOD output	Disabled	
1PPS output	Alarm	
Power Supply		
AC	Ok	
DC	Disabled	
Alarms		
Urgent	Alarm	
No Urgent	Ok	

Email Keith sent to customer (26 Jul 17) The "Status" screenshot indicates the "**1PPS Output Fault**" alarm is asserted. This alarm is asserted whenever there is a short in (or improper termination at the other end) of the coax cable connected to one or more of the 1PPS output ports.

The web browser does not report which 1PPS output port(s) have a cable issue (note the CLI Console port is for internal Engineering use only. It is not accessible by customers). As there may be more than one Output port with a cable issue, the recommended method to troubleshoot this condition is to first disconnect all of the coax cables attached to the 1PPS output ports. Then verify the "1PPS output" indicator is no longer in the "Alarm" (red fill) state.

With "1PPS Output" not in "Alarm" state, reconnect each 1PPS output cable until the "1PPS Output" goes back into Alarm condition in the browser. The most recent cable attached has an issue. As there may potentially be other cables with an issue as well, disconnect the "bad" cable and continue reconnecting the remaining output cables to each of the 1PPS output ports. If the Alarm remains extinguished with all other cables reconnected, the issue is with just that one particular cable.

After isolating which cable(s) are resulting in the Output Fault alarm being asserted, look for a short being present in that cable, or one of the "Slave" devices receiving the 1PPS signal from the 1PPS output port. Note that the 1PPS outputs of the SASe have a 50 ohm impedance. So each output can be connected to one "slave" device for its sync, if the "slave" device has a 50 ohm input impedance.

Verify the affected coax cable is not connected to more than one "slave" device, unless all of the other "slave" devices connected to the same cable have a high impedance input. In this case, since the SASe is expecting a 50 ohm termination at the end of the cable, a 50 ohm terminator needs to be installed at the end of each cable.. If a device with 50 ohm termination is not connected to the end of the cable, a separate 50 ohm load will need to be added to the very end of the cable (nearest the last device connected to that output port). This will provide proper termination, which will prevent ringing of the 1PPS signal (ringing of the 1PPS due to improper termination can cause false triggers in the devices receiving the 1PPS signal).

Also note for proper termination of each output port in-use, the 1PPS output cables are not recommended to be "split" so that the cables can go in different directions to more than one device having a high input impedance. Though the best scenario is only one device being connected to each output port, if a port needs to be connected to more than one high impedance device, the 1PPS signal should be in a daisy-chain formation (from one device to the next, with a BNC T connector allowing connection to each device, while continuing the signal to the next device inline.

FYI- any unused 1PPS output ports (no cable attached) do not need a 50 termination connected to the port. These can be left open-ended on the back of the SASe without affecting any other 1PPS output which does have a cable connected.

**Freq Outputs

Standard SAS-17E and SAS-36E: Output levels are +/- 10% of the input levels.
Per Tom Richardson, "what goes in the SAS is what comes out ,+/- 10%"

SAS-17E-IR: 6dB attenuation on outputs (as compared to input level).

**FREQ Output levels

Number of Freq outputs

- **SAS-36E**: 16 outputs
- **SAS-17E**: 8 outputs
- **SAS-17E-IR**: 8 outputs

- ➢ SAS-36E can output 1 MHz to 20 MHz sine waves (same as the input frequency).
- ➢ SAS-17E and SAS-17E-IR can output 1MHz to 16 MHz sine waves (same as the input frequency).

Output levels (Signal gain/loss through the SASe)

- ➢ **Note**: The standard SASe is not an amplifier. It provides 0 dB gain (note the SAS17e-IR has 6 dBm loss).
- ➢ Output level is dependent upon the input signal level.

Standard SAS17E/SAS36E: 0 dbm gain

SAS-17E-IR: 6 dBM signal **loss** (see Notes below)
- Model 9383's 10 MHz output is 10dBm. Output from SASe-IR will only be 4 dBm
- SecureSync's 10 MHz output is 13dBm. Output from SASe-IR will only be 7dBm

Reason why there is 6 dBm loss on the SAS-17e-IR

- ➢ 6dBm loss was requested by Globecomm because the standard 0 dBm output was too large for their systems. They desired 4dBm outputs.

Email from Tom Richardson (9 May 13) In reference to your inquiry about Globecomm signal levels and a new equipment that they are using. According to Globecomm-NATO SGS Technical Proposal Sept 18-09 (Rev B) Globecomm signal levels were specified at 4 dBm +/- 1dB but levels can be changed if desired by Globecomm. Signal levels are set by 9383 option 10 output levels being +10 dBm and SAS17E-IR attenuating those signals by 6 dB to achieve +4 dB final level. If we want to change the levels, we should look at changing the attenuator in the SAS.

Email from Emmanuel: The output level is equal to the input level (gain: 0 dB). We don't have measurement data for isolation and crosstalk. In terms of phase noise, the floor added phase noise is -160 dBc/Hz (@10 kHz from a 10 MHz sinewave).

Email from Keith to Joe DelPriore
Q   If one of the 10 MHz input from the source exceeds the 1 MHz to 16 MHz window, an alarm will be declared and the SAS will switch to the other input?

A The spec of 1 MHz to 16 MHz input sine wave frequency is for optimum performance of the SAS-17E, with a clean signal output and with no loss of signal amplitude – gain factor of 1 (0 signal gain and 0 signal loss). They are not specific cut-off limitations on the input frequencies, where the input signal is not passed if it is above or below this specified range.

As shown in the following two tables, input frequencies above and below the specified range will remain "locked" with no channel switching occurring, but the amplitude of the output signal is decreased (as compared to the input level).

As the frequency decreases below the 1 MHz spec, the SAS-17 remains locked, but the output signal amplitude starts to decrease (signal loss starts to occur). The output frequency remains the same as the input frequency.

Frequency at 0dBm input signal level	Output signal amplitude	Lock LED indication/channel switching
1 MHz	516mv	Still locked so no switching
800 kHz	516mv	Still locked so no switching
500 kHz	372 mv	Still locked so no switching
200 kHz	148 mv	Still locked so no switching
100 kHz	50 mv	Still locked so no switching
35 kHz	9mV	Still locked so no switching
10 kHz	No output signal	Still locked so no switching
The signal generator I was using can't generate below 10kHZ		

As the frequency increases above 16 MHz, the SAS remains locked for quite a range, but the output signal amplitude starts to decrease (signal loss starts to occur). The output frequency remains the same as the input frequency.

Frequency at 0dB in	Output amplitude	Lock LED
16 MHz	588mv	Still locked so no switching
37 MHz	396mv	Still locked so no switching
53 MHz	288 mv	Still locked so no switching
70 MHz	187 mv	Still locked so no switching
128MHz	74 mv	Still locked so no switching
176 MHz	42 mV	Still locked so no switching
200 MHz	34 mv	Still locked so no switching
247 MHZ	15mv	Still locked so no switching
357 MHz	No output	Intermittent lock- would switch
375 MHZ	No output	Lock lock- would switch

Q. If so, are the low frequency and high frequency limits of this window independently adjustable?
A. The low and high frequency limits (1MHz and 16MHz), as shown above, are not user-adjustable/configurable. They are configured in the hardware itself (not in software) in order to provide the 1 to 1 signal input to output correlation.

Q If one of the 10 MHz input from the source exceeds a +0 to +17 dBm window, an alarm will be declared and the SAS will switch to the other input ?
A Input levels below theSAS-17E specs still continue to provide an output signal, though signal loss begins to occur as the input levels decrease. For input levels above +17dBM, I expect the signal would continue to be present, but would likely start to clip. For operation above +17dBM, the signal generator only goes to +6dBM output, so I couldn't test this operation.

Please see the table below for the operation of input signals below +0 dBm.

Input level at 1MHz	Output amplitude	Lock LED
0 dBm	508 mv	Still locked so no switching
-5 dBm	270 mv	Still locked so no switching
-10 dBm	157 mv	Still locked so no switching
-15 dBm	83 mv	Still locked so no switching
-20 dBm	50 mv	Still locked so no switching
-22dBm	41 mv	Still locked so no switching
-26 dBm	24 mv	Intermittent locked so would switch
-27 dBm	23 mv	Lost lock so would switch

Q If so, are the low level and high level limits of this window independently adjustable?
A Again, the low and high signal level limits, as shown above, are not user-adjustable/configurable. They are configured in the hardware itself (not in software) in order to provide the 1 to 1 signal input to output correlation.

- ➤ Amplitude Balance (peak-to-peak): the power difference in dB between two output ports. +/- 20% max of power input.

- ➤ Coupling from input to output ports (in dB): -10 log (Power at an output terminal/Power at input) 3dB +/-10%

- ➤ Phase Balance: The phase difference in degrees between two output ports at the nominal frequency. Need to do a measurement (we can do the operation and get the element for the end of next week, if you can do the test in Rochester, you will may be do it faster don't hesitate to revert to us).

**Signal loss on the FREQ outputs

Email from Dave Lorah (3/1/12)
There is a slight reduction of the signal when using the SAS36E. The output spec is within 10% of the input. What you are seeing is typical output from the SAS36E. There is no gain adjustment on the SAS36E. You would need to boost your input source to compensate for the loss.

**Distorted frequency outputs

Email Dave sent to Dennis Warnock
Hi Dennis,

The output may distort if the input signal is too high amplitude. The specs say the input should be 0dBm to +17dBm. (0.7 Vrms to 5 Vrms).
Also please make sure you are going into a 50 Ohm load.

Have you any more SAS-17E units to compare this one to? Please make sure you are connected to the 10 MHz Inputs/Outputs.

**Harmonics:

Harmonics out of spec with 10MHz inputs

As on Dec 2009:   Harmonics are not meeting the specs that are in the data sheet (with at least 10 MHz input). Harmonics are stated as <-35dbc, when we are seeing -28 dbc here in Rochester with a 10 MHz input.

Emmanuel commented on this:
I believe Tektronics has "instrumentation" driven requirements that we don't face in other applications like defense / broadcast. So any decision regarding improvement for SAS17/36E (like this high level input issue) should be looked at through our market focus on defense.

In this approach, improving the supported level of input signal or adding functionalities on the front panel would lead to a significant redesign / NRE that I don't recommend at this step, unless we have a perspective of large volume with Tektro.
Improving the harmonics needs to change the concept of the SAS17/36E to a "broadband amplifier" to a "narrow band" amplifier; I'm not really in favor of that.

Email from Dave Lorah (3/21/12)
I created NC5699 to address a spec issue for the SAS17E. I tested three units with the same results. We need to change the specs on the data sheet to meet the actual performance of the product. Globecomm may be disappointed. The SAS17E-IR does meet the spec but the SAS17E-IR signal gain is about 0.4.

Details:
Customer Globecomm returned SAS17E complaining the unit caused spurs on their block down converter. While testing I observed high harmonic content on the 10 MHz output, about -27 db. The test procedure does not check harmonics. I

checked the data sheet from our website and it specs harmonics at <-35db. I contacted Laurent Borgagni who replied:

The SAS-E current datasheet is a bit inaccurate about Harmonics: what is stated in the datasheet is -35dBC. The issue is that if the input level is roughly in the higher part of the range specified in the datasheet i.e. between 7 to 17 dBm then the spec of -35dBC for harmonics is not met.
This is probably what you are observing.

Please advise what level of input do you have on your side to make sure that this explanation meet reality.

DL - I tested the Sas17E with a 9383 that Globecomm was using and at that level the harmonics are -27db. This exceeds specs of the data sheet. I tested three different SAS17E units with similar results. This must be a product of the wide range frequency spec of the SAS17E.
Using the 9383 the input to the SAS17E is 1.6Vp-p and the output is 2.13Vp-p with harmonics of -27db.
Using a signal generator with an input to the SAS17E of 380mV p-p the output is 520mVp-p with harmonics of -32db.

**Output alarms

"Urg" and (1) "Non urg"

- "Urg" = "Urgent" (Major alarm)
- Non urg" = "Not Urgent" (Minor alarm)

Alarm relays

➢ Both alarm relays are 30 volt relays using USB type connectors (but not USB operation).

1/29/10 KW- Email from Sylvain - I have finally some news about the requested elements for SAS IR-17. We didn't have done these specific measurements on the SAS IR-17 (and it would be difficult now because we don't have any unit here for now…). But, regarding our experience on the SAS17E and the concerned component specifications we can warranty some values:

****Known sporadic issue with intermittent 1PPS alarms

➢ Refer to Salesforce case 24024.

➢ Missing diodes are causing intermittent 1PPS alarms

➢ ~ Feb, 2017 (as reported by Eric Girard)

➢ Refer to emails/photos in: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E_ SAS17E-IR\diodes not installed

➢ Missing diodes are 1N4148 diodes (we no longer stock them in our inventory, though there may be some stashed somewhere)

** Output Fault alarms (Frequency Output /1PPS Output/ToD Output) / short-circuit protection

STATUS		
Equipment type		SAS36
Input Channel		
	Channel A	Channel B
Frequency input	Disabled	Disabled
TOD input	Disabled	Disabled
1PPS input	Disabled	Ok
Alarm input	Disabled	Disabled
Selected channel		Forced B
Channel selection source		Network
Output Channel		
Frequency output		Disabled
TOD output		Disabled
1PPS output		Alarm
Power Supply		
AC		Ok
DC		Ok
Alarms		
Urgent		Alarm
No Urgent		Ok

Troubleshooting "Output" fault alarms (Frequency Output /1PPS Output/ToD Output)

➢ Refer to salesforce case 24564

Output Channel: Status of all Outputs:

1. Frequency output

   a. OK (Green): Frequency inputs are monitored and all frequency outputs are OK

   b. Alarm (Red): Frequency inputs are monitored and at least one frequency output is failed

   c. Disable (gray): Frequency inputs and outputs are not monitored

2. ToD output

   a. OK (Green): ToD inputs are monitored and all ToD outputs are OK

   b. Alarm (Red): ToD inputs are monitored and at least one ToD output is failed

   c. Disable (gray): ToD inputs and outputs are not monitored

3. 1PPS output

   a. OK (Green): 1PPS inputs are monitored and all 1PPS outputs are OK

   b. Alarm (Red): 1PPS inputs are monitored and at least one 1PPS output is failed

   c. Disable (gray): 1PPS inputs and outputs are not monitored

1. Disconnect each associated output BNC cable (for instance, if the alarm is the "1PPS output fault", disconnect the 1PPS cables) one-at-a-time until the alarm clears (Note there may be a delay of a few seconds after the cables are disconnected for the alarm to clear).

   • If the alarm clears with a cable disconnected the alarm is related to this cable being shorted. Or a problem with the input of the device on the other end of the cable.

   • If the Output fault alarm remains asserted with all associated output cables disconnected, the output fault alarm is likely due to a problem inside the SASe (related to the output ports).

A) Frquency output fault

B) 1PPS output Fault

Q. (From Dave Lorah to Laurent) The customer returned this SAS17E because they said Alarms A and B remain on. I found the unit to be operating normally except when three of the outputs were shorted (J15, J17 and J19) an output fault would not be generated. All other 10 MHz outputs would produce an output fault if shorted. So I tried replacing the transistors but that would not fix the problem.

SASe Configurations

**SAS-17E-IR Option 10 (with IR option)

➢ Created for Globecomm

➢ Adds IRIG, and low-level FREQ out capability

➢ 1U high chassis

Refer to: EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E SAS17E-IR\SAS17E-IR (Option 10)

Inputs: (2) FREQ inputs (1 to 16MHz), (2) 1PPS inputs, **(2) TOD/IRIG inputs**, (2) Alarm inputs (Each of these are one per channel A and B)

Outputs: (16) FREQ outputs (1 to 16MHz), (2) 1PPS outputs, **(1) TOD/IRIG outputs**, (2) Alarm USB connectors

Note: FREQ outputs have 6 dB loss for a lower level output (Compared to standard SAS-17E and SAS-36E)

INPUTS

J1	Clock A	Frequency In (1MHz to 16MHZ)	BNC
J26	Clock B	Frequency In (1MHz to 16MHZ)	BNC
J2	Clock A	1PPS In	BNC
J25	Clock B	1PPS In	BNC
J4	Clock A	Alarm In	Mono
J23	Clock B	Alarm In	Mono
J3	N/A	TOD/IRIG (In/out are on same connector)	DB9

OUTPUTS

J6 - J21	Frequency out (1MHz to 16MHZ) (16 Total)	BNC
J5 and J22	1PPS (2 Total)	BNC
J3	TOD/IRIG (In/out are on same connector)	DB9
URG	Urgent Alarm output	USB
NURG	Non-Urgent Alarm output	USB

Input connectors (IRIG/TOD, Frequency and 1PPS inputs)

➢ Connectors **J1** (Channel A) and **J26** (Channel B) are the Frequency (F) inputs

➢ Connectors **J2** (Channel A) and **J25** (Channel B) are the 1PPS inputs.

➢ Connector **J3** (DB9) is the differential IRIG input

external clock B		
ToD/IRIG_In external clock A	J3	SubD 9 pins Female: Pin number: 1: ToD/IRIG_A+ (*) 6: ToD/IRIG_A- (*) 2: ToD/IRIG_B+ (*) 7: ToD/IRIG_B+ (*) 3: NC 8: NC 4: NC 9: c.f. Output 5: c.f. Output
ToD/IRIG_In external clock B		(*): level RS485

Output connectors (IRIG/TOD Frequency and 1PPS outputs)

➢ Connector J3 (DB9) is also the differential IRIG output

ToD/IRIG_Out	J3	SubD 9 pins Female: Pin number: - If external clock A selected : 　　5: signal of J3 pin 1　ToD/IRIG_A+ (level RS485) 　　9　signal of J3 pin 6　ToD/IRIG_A - (level RS485) - If external clock B selected : 　　5: signal of J3 pin 2　ToD/IRIG_B+ (level RS485) 　　9　signal of J3 pin 7　ToD/IRIG_B - (level RS485)

The SAS-36E consists of two INPUT channels (One is referred to as "Channel A" and the other is "Channel B"). The SAS-36E selects which input channel (A or B) is used to provide all of the outputs on the rear panel. There is only one complete set of outputs, will all outputs being provided from the same input channel (all outputs use the Channel A Inputs or all use the Channel B inputs).

_____

**Ability to store (backup) and restore configurations of the SASe

➢ KW- As of at least 9/8/11 this capability does not exist,

As verified by Eric Girard I asked to our engineer, it is not possible to store the customer configuration yet. May be with a new release of the software version.

Email from Dave Lorah to a customer (21 June 2013)
There is no way to download a backup file like in the SecureSync unit.
The configurations are not too complicated on the SAS-36E. It would be best to note the configuration of the currently installed unit by taking screen shots of the SAS-E Configuration from the web browser and then using them as a guide when configuring the replacement SAS-36E.

_____

**SAS17E/SAS36E Internal memory and cleaning/wiping (sanitize) the SAS for classified environments

➢ **Refer to SASe memory documents:** I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E_SAS17E-IR\Memory-COVs

Email from Emmanuel (11/19/2010): For the SAS17/36E, there are two non-volatile flash memory components, located on the main board:

Serial flash:
Type　Intel SPI flash memory
Size :　　　　8Mbits
Manufacturer : ST Micro
Part Number :　M25P80-VMW6G
Quantity　　: 1
Contains　　: FPGA image (Firmware)
No user modifiable (no user read/write/erase)

Parallel flash　:
Type　MirrorBit Nor flash
Size :　　　　128Mbits
Manufacturer : Spansion
Part Number :　S29GL128P11TFI023
Quantity　　: 1

Contains : applicative software (Software), All log files and configuration files
user modifiable via web UI: erase log files and possibility to set configuration files in default setup

➢ There is no way to erase the content of these flash memories. The components must be removed / destroyed to wipe out the content of the flash.

➢ Note that the SAS36E memory storage contains only software, status parameters, logs, IP settings, and pwd. There is no other sensitive information (like position) stored in the unit.

Email from Dave L (8 May 18) The SAS products can have the configurations cleaned or be "Sanitized" by using the web browser to overwrite the configurations with. There is no "CLEANING" command or function available to erase the logs and set the configurations to defaults.

I have attached documents describing the memory of the SASE and the sanitization of the system.

Alarm input signal (from external input reference) that causes the switch-over to the standby channel

Email from Sylvain: You can see on the 2.3 chapter of the SAS E manual the J4 and J23 connectors (jack 3.5mm) are some inputs for relay contacts.

For example, the input can be directly connected to the alarm outputs of the EPSILON CLOCKS or a Relay contact of the SecureSync.

- External Alarm input ("**Alarm Signal**") is disabled by default.

- **J4** is the "**A Alarm input**" and **J23** is the "**B Alarm input**"

- Enable the external alarm Input ("Alarm Signal") in the **SAS-E Configuration** / **SAS-E Setup** page of the web browser ("Alarm Signal" field)

With no alarm inputs connected to J4 and J23 and when no alarms are active when the "Alarm Signal" (External alarm input) is enabled in the browser, the "urg" and "non-urg" alarms will become active, until the relay closure is connected and causes the Alarm input to be false on both channels. Then, the alarms will be de-activated.

2.3 Input Signals

	Connector ESAS	Electrical Characteristics

Frequency_In external clock A	J1	BNC Female:
		 - Core: Sine-wave signal
		          Frequency: 1MHz up to 16MHz
		          Level : 0dBm up to +17dBm
		 - Braid: electrical ground

Frequency_In external clock B	J26	

1PPS_In external clock A	J2	BNC Female:
		 - Core: periodic pulse
		          period : 1s
		          High Level: > 2.4V load 50 Ω
		          low Level : < 0.7V load 50 Ω
		 - Braid: electrical ground

1PPS_In external clock B	J25	
ToD_In external clock A	J3	Mini Din 6 pins Female: Pin number: 1: Reserved 4: NC 2: Reserved 5: Electrical ground 3: Electrical ground 6: Message input (*) (*): level RS232C, ASCII message
ToD_In external clock B	J24	
ALARM_In external clock A	J4	Jack 3,5mm Mono Female: Input for open collector (current drive: 0,5mA) or for relay contact Braid: Electrical ground
ALARM_In external clock B	J23	
External Signals_In external clock A	J3	Mini Din 6 pins Female: Pin number: 1: External_signal 1 4: NC 2: External_signal 2 5: Electrical ground 3: Electrical ground 6: Reserved Characteristic: 30VA / 250V max.
External Signals_In external clock B	J24	

Reboot/Reset type (hardware and software)

Software: Reset only the Ethernet port (including Web server and SNMP server). This reset has no effect on the signals selection and distribution.

Hardware: Reset the SAS-E. This reset affects the signals selection and distribution.

Software updates /Software versions

A) Software updates

➢ **For SASe software update information, refer to:** EQUIPMENT\SPECTRACOM EQUIPMENT\Epsilon Clocks and SAS\SAS17E SAS36E SAS17E-IR\software updates

➢ updates on our website: https://spectracom.com/documents/sas-e-firmware-update

Software versions

➢ Latest version of Archive software (as of at least 12 Apr 18): 01.26

Email to Eric Powers on 2/15/12:
The reported "**Archive Version**" is the definitive Application software version for the product. Each of the software sub-components that comprise the Archive Version are displayed below the reported Archive version, in the "**Software Version**" table. These software components can be updated (when updates are made available) using software

upgrade files downloaded from the Spectracom website. Note that Version 1.2.6 is the latest version of Archive software for the SASe.

Also for your reference (as also displayed in the Versions page of the browser):

- "**System Version**": This table reports the internal OS version (OS-Kernel). This software is not separately upgradeable with a download from the Spectracom website.

- **"Hardware Version**": This table reports the FPGA firmware version. This firmware is not upgradeable with a download from the Spectracom website.

System Setup	SAS-E Configuration	SAS-E Status	

SAS-E Version

Archive Version	
Actual Version	01.20
Date	22/04/2009 13:44:40

Software Version	
Principale	01T03a
Seconde	01T09a
Traps	01T07b
Agent SNMP	01T07a
Web	01T07a

System Version	
Actual Version	01.06a
Date	14/09/2007 14:52:55

Hardware Version	
Carte	00.05

Logs/Loggings

➢ SAS-17e and SAS-36e contains logs ("Event Logging") on the "Tools" page of the web browser.

This page displays the recording of events detected (alarms, warning, information) within the SAS-E. Only the information in the MIB (Get information) is logged.

Time stamps in logs are always in UTC timescale

Email from Dave L (20 Jan 17) The SAS is not capable of correcting UTC for local time zones so please keep this in mind when examining log entries

SNMP operation for SASe

SNMP starting object

➢ The SASe (designed before SecureSync) unlike SecureSync, does not use the Spectracom-specific OID of ".1.3.6.1.4.1.18837" in front of objects

Example responses from SASe

.1.3.6.1.2.1.1.1.0 = STRING: Spectracom Product
.1.3.6.1.2.1.1.2.0 = OID: .1.3.6.1.4.1.18837

SNMP Gets and Sets

➢ SASe supports SNMP Gets (and SNMP traps)

➢ SASe does not support any SNMP Sets (as of at least May 2013, anyways)

- **Status Update (24 Oct 16 KW)** Dave L informed Morgan Stanley that the SASe now supports two SNMP sets.

Email Keith sent to a customer (15 May 2013) For each object at the beginning that do not indicate **NOTIFICATION-TYPE"**, there is a "MAX-ACCESS" value. This SNMP value for any SNMP object indicates if the object is only available as an SNMP Get (with no configuration capability- the value can only be read) or if it's available as both an SNMP Get and a Set (the value can be either read or configured).

Specific to the SAS17E MIB file, you will notice in this file that all of the listed items are "**read-only**". This indicates all of the objects are only available as SNMP Gets. They are not available as SNMP Sets. So these values cannot be configured via SNMP. They can only be configured via the unit's web browser. However, you can read these configurations using SNMP, if you like.

In summary, the SASe does not provide the ability to configure the unit via SNMP. However, its SNMP functionality allows SNMP traps to be automatically generated when specific events occurs (the objects listed at the bottom of the MIB file). It also allows values to be read using SNMP gets (the objects listed at the beginning of the file).

Serial Number of the SASe via SNMP?

➢ Unit's Serial Number is only available via the affixed Serial Number tag.

➢ S/N is not available via SNMP (or via the browser)

Email from Keith (15 Dec 17) (just modified from Dave's directly below) Regarding the SASE's Serial Number, the SASE unfortunately does not have the capability to store its Serial Number in memory/be read via its browser or SNMP. Its Serial Number has to be read from the Serial Number tag on the side of the unit.

Email from Dave L (2 Nov 16) The SAS unfortunately does not have the capability to store the serial number in memory. The serial number would have to be read from the serial number tag on the side of the unit.

Rate of SNMP operation

Meehan Huq (from Globecomm) found the high rate of SNMP polls of the SASe can cause it to stop responding. Her email is below:

I have determined that the issue is that the SAS17E can't handle being polled every 300 or so milliseconds. If you see the attached wire capture, you can see that the anomalies that existed in the prior wire capture, do not show up anymore. The device doesn't fail any more, no matter how many SET commands are sent. This is because the rate that data is being sent to the SAS17E has been reduced from around 700 bytes/sec to around 300 bytes/sec.

Response from Laurent about this: Thanks for the feedback. Our engineers confirm that the product has not been designed to sustain a very fast polling through SNMP. I think we need to keep this in mind for possible similar questions.

SNMP Traps (System Setup -> SNMP Traps page)

(As of 6/17/09) The drop-downs blank-out with no values displayed. From Sylvain: "is a known issue only link with the use of Internet explorer (same issue with SASE) (I should have touch you about this point), The solution will be implemented in a future release. To avoid this situation, you can use Mozilla and not Internet Explorer. The problem does not occur with Mozilla."

Email Keith sent to a customer (15 May 2013) Please be aware that all of the "**NOTIFICATION-TYPE"** objects listed in the MIB file are SNMP traps for the SAS-17E. All of these items can result in an SNMP trap being sent to an SNMP Manager when a specified condition occurs. SNMP traps are not objects that can be configured (They are not available as either SNMP sets).

4.1.6 SNMP and Traps Setup Page

In this page, the operator can enable the SNMP Traps generation. The SNMP traps repo event (alarm or configuration modification) by sending a trap message to a destination.

Known issues and Troubleshooting SASe

A) Known potential issues

1) Events Logging page contains False (one second duration) alarm entries (~Jul 2017)

System Setup	SAS-E Configuration	SAS-E Status	Tools

Events Logging

Display Filter	☑ Information	☑ Warning	☑ Alarm
Max lines	10 ▾		

Update list

Clear logs

<<	<	98/98	>	>>

Time	Module	Gravity	Message
19/07/2017 15:11:05N	SASE	Warning	No Urgent Alarm OK
26/07/2017 11:10:09N	SASE	Warning	Channel B 1PPS Input Fault
26/07/2017 11:10:09N	SASE	Warning	No Urgent Alarm Fault
26/07/2017 11:10:10N	SASE	Warning	Channel B 1PPS Input OK
26/07/2017 11:10:10N	SASE	Warning	No Urgent Alarm OK

Email Keith sent (26 Jul 27) The Events Logging screenshot shows an intermittent condition which can occur with the Model SASe, where false alarms (having only a one second duration) can be asserted in the log. The Engineering team is investigating the cause of this sporadic condition. These one second alarms can be disregarded. I have flagged your record in our database and will get back to you with more information on this minor reporting issue, once the engineers have been able to determine the cause and a solution is available.

Email Dave sent (17 Aug 17) We have done some long term testing on the SAS and have identified an issue with the product that causes intermittent alarm reports for one second intervals. This does not affect the outputs or the operation of the device and affects all SAS products.

Our engineering group is looking into the problem but as of this date we have no solution. We are shipping your SAS back to you now. The SAS will still produce alarms once I a while. Please ignore these alarms for now and we will send you a notification when the problem has been resolved. There may be a firmware update available then with a fix.

B) Troubleshooting the SASe

Tools available to help troubleshoot

1. **Copy of the unit's logs:**

- SAS-17e and SAS-36e contains logs ("**Event Logging**") on the "**Tools**" page of the web browser. This page displays the recording of events detected (alarms, warning, information) within the SAS-E. Only the information in the MIB (Get information) is logged.

2. **Status of the front panel LEDs?**

3. **Any SNMP traps that were/are being sent from the device?**

4. **Is/are the Master reference(s) into in an alarm condition?**

5. **Oscilloscope available to look at the signals??**

If symptoms are not yet known, example questions to ask:

Email from Morgan (10 Feb 17) We need some more information on the failure mode. So I have some questions for you:

- ➢ Will the unit power up?
- ➢ Has this unit ever worked?
- ➢ What are you using for the input?
- ➢ Can you send a picture of the LED's on the front of the device?
- ➢ Do you see any outputs?
- ➢ Are they switching?
- ➢ What are the other symptoms?

This will help to determine next steps. You also have the option to RMA this device.

1PPS Output Fault alarm is asserted in the Status page (indicating short or open in one or more cables connected to the 1PPS output ports

- ➢ Refer to the 1PPS output section of the SASe section of this doc: ***1PPS Output Fault in Alarm state reported in "Status page"

SASe Alarms/SNMP traps

SAS E Channel Swap / SAS E No Urgent Fault / SAS E Channel B1 PPS Input Fault

- ➢ Refer to Salesforce case 24852

    Name : hz02mfai04
    Alarm Title : SAS E CHANNEL SWAP
    Alarm Title : SAS E NO URGENT FAULT
    Alarm Title : SAS E CHANNEL B1 PPS INPUT FAULT (typo ? I suspect its actually meant to be "**SAS E Channel   B 1PPS Input Fault**"???)

  Reply from Dave L (27 Mar 17 KW) These alarms mean that one of the 1PPS Inputs has failed or possibly the configuration has been changed, it is hard to tell. Have the alarms stopped now?

  A screen shot of the Status page or the Log page may help if you need help diagnosing the problem.

**Known software issues/Version changes associated with SNMP

A) **Setting the SNMP RW Community string does not seem to be saved when it was modified; instead, the default string is still used by the agent. The SNMP RO Community and Traps Community seem to have been saved just fine when I modified them. This was tested by doing an SNMP SET command using the new RW community string, and I got an authentication error in response.**

- Per Eric Girard- Resolved in version 1.24 update

B) **More importantly, I cannot enable/disable traps from the web interface. The pull-down menus for the Global traps enable and individual trap entries do not have any options (no 'Yes'/'No' strings are displayed).**

- Per Eric Girard- Resolved in version 1.20 update

C) **When I did a walk of the sas-e-MIB, I got the following output:**

```
SNMPv2-SMI::enterprises.25121.4.1.1.0 = STRING: "Automatic A"
SNMPv2-SMI::enterprises.25121.4. = STRING: "Front Panel"
SNMPv2-SMI::enterprises.25121.4.1.3.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.4.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.5.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.6.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.7.0 = STRING: "Disabled"
SNMPv2-SMI::enterprises.25121.4.1.8.0 = STRING: "Disabled"
SNMPv2-SMI::enterprises.25121.4.1.9.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.10.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.11.0 = STRING: "Disabled"
SNMPv2-SMI::enterprises.25121.4.1.12.0 = STRING: "Disabled"
SNMPv2-SMI::enterprises.25121.4.1.13.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.14.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.15.0 = STRING: "Disabled"
SNMPv2-SMI::enterprises.25121.4.1.16.0 = STRING: "Ok"
SNMPv2-SMI::enterprises.25121.4.1.17.0 = STRING: "Disabled"
SNMPv2-SMI::enterprises.25121.4.2.1.0 = STRING: "Automatic"
SNMPv2-SMI::enterprises.25121.4.2.2.0 = STRING: "Enabled"
SNMPv2-SMI::enterprises.25121.4.3.1.0 = STRING: "10.100.40.10"
SNMPv2-SMI::enterprises.25121.4.3.2.0 = STRING: "INVALID"
SNMPv2-SMI::enterprises.25121.4.3.3.0 = STRING: "gstarran"
SNMPv2-SMI::enterprises.25121.4.3.4.0 = STRING: "Not initialized"
```

- Per Eric Girard- Resolved in version 1.24 update

```
sas-e-NETWORK-CHAN-SELECTION  1.3.6.1.4.1.25121.4.2.1
Sas-e-FRONT-PANEL-SWITCH 1.3.6.1.4.1.25121.4.2.2)
```

***CZ01-010 (SASe to Model 9383 interface cable)

➢ Our P/N is CZ01-010

➢ As of 8 July 2013, not yet in Visual or Salesforce (this is something Jeremy Onyan is working on)

➢ Refer to: Salesforce case 9080

https://na8.salesforce.com/500C000000Pwg5R?srPos=0&srKp=500 for Morgan Stanley

		Accessories	
Vendor	Model #	Description	QTY
Spectracom	CZ01-010	Alarm relay contact cable, xx ft. CZ01-010, 10 ft. Cable for SecureSync to SAS to provide alarm status for fail-over.	2

Sapling display clocks

- Link to Sapling display clock data sheets: https://oroliagroup.sharepoint.com/site
- Link to Sapling display clocks in Customer Service: \\rocfnp02\idrive\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks
- Link to **Sapling manuals**: I:\New Released\Manuals\1168-xxxx-xxxx
  - 1168-5001-0050 Wireless RF clock system
  - 1168-5001-0052 Elapsed timer
  - 1168-5001-0053 Digital IP clocks
  - 1168-5001-0054 Analog IP clocks

Sapling Contact information

Sapling, Inc
670 Louis Drive
Warminster PA, 18974

(8:30AM to 5PM Eastern)

Ilan Shemesh (President of Sapling)
215-322-6063 ext 1112
ilan@sapling-inc.com

Mitch Goebtz (no longer in Tech support)
215-322-6063 ext 1145
mitchg@sapling-inc.com

Sapling Engineering:

Robert Bongiorno
robertb@sapling-inc.com
Chief Engineer

Sapling Repairs/RMA requests

Customer Service issues, Ordering issues, RMA requests

*Submit RMA online: https://sapling-inc.com/repair-request/

Sapling, Inc
Attn: Repair Department
670 Louis Drive
Warminster PA, 18974
RMA@sapling-inc.com

Raymond Stys
Technical Support Specialist
670 Louis Drive
Warminster, PA 18974
P: 215.322.6063 ext. 1133
Toll-Free: 888.809.6063
F: 215.322.8498
E: raymonds@sapling-inc.com
W: www.sapling-inc.com

Michael Pregler
Technical Support Specialist
The Sapling Company
670 Louis Drive,
Warminster,
Pennsylvania 18974,
United States of America
Tel: +1-215-322-6063 ext. 1111
Fax: +1-215-322-8498
Web: www.sapling-inc.com
Email: michaelp@sapling-inc.com

Finding the original Orolia PO used for us to purchase the device/devices from Sapling (As requested from Sapling for RMAs)

> Refer to the email from Danielle Masson (17 Nov 2020): I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Find our Sapling Purchases

Summary:
In **SAP** -> **Sales Orders**

1) Search by sales order, purchase order, or customer

2) Select the **Sales Order Number**

3) Select **More**

4) Select the **Purchase Order PDF Icon**

   This the purchase order from Orolia USA to Sapling and should contain all the necessary details

Orolia PO required for all Sapling repairs (July 2018)
email from Marlea (30 July 2018) Going forward all Sapling RMAs require a p.o. from Mike, Sara, Charlie. Warranty or non-warranty. This must be done before you get the RMA # from Sapling because it needs to be on all of their paperwork. This is going to become a new process soon. So, whomever picks up this case, please ask purchasing for a p.o., document it in the case and copy me.

Sapling Repair turn-around time

Email from Natalie: Usually 2 business days. If you provide the tracking info once available, I will be able to give the tech department a heads up

Blank display on IP clock (as soon as it was reinstalled from a recent RMA)

> ➢ Refer to Case 231731

Reply from Sapling (22 June 2020) Hello Keith,

I am sorry to hear that the customer is having an issue with the clock they received. There are a few things that the customer should look for before we look into having the clock sent back in to be repaired again.

First, when the clock is first connected to power, do they see any part of the display turn on at all?

Second, look at where the rear board connects to the display to see if any of the pins are disconnected. If they are unsure about this, please have them send a picture of this connector and we can verify this for them.

Third, do they see any network activity from the clock? If the clock is active on the network, and they are able to access the web interface, they can check the **Display Settings** page. It is possible that the clock's display may have been set to "off" by mistake

Sapling Repair pricing

2 year warranty

RMA REQUEST - RMA number requested from Amy O'Brien – she will email an RMA form to us to forward to our customer – customer will complete form and return with the equipment to Spectracom at Sapling address.

After 2 year warranty – repairs are usually less than 50% of purchase price unless there is cosmetic damage. Repairs are priced according to what is needed to fix them. No eval fees are applied.

Note: Web-based transmitter, web-based repeaters started shipping to our customers around 11/2009. The newer analog displays on two hour receive intervals (instead of the original 4 hour interval) apparently started shipping a little earlier than this, but don't know exact cut-in of this change.

Tech Support issues:

John Karatka
P: 215.322.6063 ext. 1133   Toll-Free: 888.809.6063
F: 215.322.8498
E: johnk@sapling-inc.com

Michael Pregler

Toll-Free: 888.809.6063
P: 215.322.6063 ext. 1111
MichaelP@sapling-inc.com

Tom (Working with Brian)
215-322-6063 ext 1156

Lars Jorgensone
215-322-6063
 Larsj@sapling-inc.com

Brendan Anderson
215-322-6063 ext 1149

brendana@sapling-inc.com

Sales

Brian White No longer with Sapling

==**Sapling Clock online instruction manuals**==

➤ Here is a link to a list of online manuals for Sapling clocks. https://sapling-inc.com/manuals/

IP/POE display clocks

"About the middle of the page, you'll see the links for IP-PoE clocks

---

Outdoor use of display clocks

➤ Display clocks are not designed/intended for outdoor use. Digits are hard to see when clocks are installed outdoors. See Salesforce case 5461.

Email from Amy O'Brien (5/15/12) I talked with both my Engineering Department and my Marketing Department. I was told that our clocks are not designed or tested for outdoor use. They are for indoor use only unless there was some type of weatherproof enclosure. However, as of right now, since they are not designed for outdoors, we have no different filters.

CE/UL agency approval

As of at least 10/3/11, Sapling products are not CE approved, per Natalie.

➤ (~Sept 2015) The Sapling IP clocks are apparently **now** UL approved. They are in the process of adding the UL stickers to at least the IP clocks

(2/21/12 KW) not sure when this actually occurred. The Sapling SMA 2000 (SMA-2000) manual shows the web-based transmitter as being CE certified. Refer to the very end of their manual (in the customer service folder for Sapling).

Wireless clock system / signal

Links

Data sheet: link to datasheets in SharePoint

Online manuals

> Here is a link to a list of online manuals for Sapling clocks: https://sapling-inc.com/manuals/

FCC ID Number

Email from Brian White from Sapling (9 Jan 2013)
According to the individual in charge of FCC here, there is a different FCC ID code for each product. The "Grantee Code" is **R73**. On the silver sticker on each product, you will find the FCC ID and it starts with R73xxxx… Do you have a specific product you need it for? I will be more than happy to find it for you. It is strange that an overseas customer is asking for FCC info… I thought (and I could be wrong) that FCC was not internationally recognized?

Wireless clock system coverage

(1/26/12) Great email from Norm West to Florise
Regarding the wireless mesh network, each clock within the transmitter's range (about 1,980 m) will receive the time synchronization signal. However, the best feature of the system is that each clock also transmits or rebroadcasts the signal to other clocks around it. This means that the critical factor is not the signal path from the transmitter to the most distant clock, it is the distance from one clock to another. More clocks in the mesh network means greater signal strength throughout the facility. The signal within the network is best repeated among the clocks when they are no more than 50-100 feet apart. This ensures that the maximum signal is transmitted from clock to clock. If the distance between the clocks appears to be too great, an affordable repeater can always be installed to boost the signal within a certain area. Please let me know if you need any additional information.

Interface of Sapling transmission with other signals/frequencies

Email from Will Hickey on 7/19/11 to Brian Handrigan
Our 900MHz wireless system is designed to operate in public space without a license, suggesting there will be no interference to other wireless signals such as below. It is frequency-hopping and a low power signal, further reducing any chance of impact/interference up at those levels. Finally, its harmonics also would not match up to these either.

Competitor comparison

	Sapling	Others
Wireless freq range	900MHz	70 and 400 MHz
License required for frequency	No	Yes
Frequency Hopping	Yes	No
Secondary clocks	Receive/transmit	Receive only
Time sync capability	GPS or Internet	Most- GPS
Self-diagnostics	On Transmitter and Every secondary	N/A
Interface with other clock systems	Yes	No
Transmitter output power	1 Watt only	5, 30 and 270 watts

Transmission information for Transmitters, Repeaters and display clocks

Transmitter/Repeater output power	1 Watt (27dBm)
Transmit distance from transmitter or repeater to clock	~ 2000 meters open space ~ 70 yds inside a typical school building.
Transmit distance from clock to clock	~ 1000 meters open space ~ 70 yds inside a typical school building.
Wireless transmit interval for the transmitter/repeater	Once-a-minute
Transmit interval for displays	Once every four hours (4:00 8:00 12:00 16:00 20:00 24:00).
"Listen" interval for displays	Analog clocks- Once every four hours but clocks expand the size of the receive window each time that it doesn't receive the signal. Digital clocks- AC powered so they can listen every minute.
Frequency range	915 to 928 MHz
Number of frequencies transmitted (from clock and transmitter)	51 (sent for 1 millisecond each for a total transmission period of 51 ms).
Display clock install transmit mode (hold bottom button to place second hand at 8)	minutes straight.

Transmitter programming:

Top button- Sets the hours
Bottom button- Sets the minutes
Press both at same time- Program mode.
* See manual for the different program modes.

DST Correction/ Time Zone Offset

If DST is enabled in the transmitter, the transmitter will adjust for DST about 10 seconds prior to 2:00:00 AM on the DST date to ensure it has updated prior to the 2:00:00 AM burst (this ensure that the clocks will get the DST corrected time at the 2:00 AM schedules burst).

DST and Time Zone Offset are configured in the transmitter using the menu selections. DST is currently enable/disable (enabled is default) but will have in the future, a selection for old and new rules. (later software release added old and new rules to all transmitters).

(Clocks sold prior to ~Feb 2007 only) Because the wireless displays only listen every four hours for the transmission (12PM, 4AM, 8M etc), the display clocks won't hear the 2AM local time DST rollover until 4AM (as long as they can "hear" it). DST rollover will be delayed until 4AM at the earliest. They don't rollover by calendar date.

(Clocks sold sometime after ~Feb 2007 and for sure, post Jan 2008 only) With the new schedule (2, 6, 10, 20) the analog clocks should adjust for DST right at 2AM local time.

Wireless transmitters

*1st generation (Non-web based) transmitter interface with NetClock (TCVR-NTP-1000)

- ➢ Time Sync status character is ignored. Transmitter will sync even if we are not synced. Won't lose time sync if we lose time sync.
- ➢ Use DS Manager to configure Tibbo device in the transmitter
- A. Must disable DHCP if the network doesn't support DHCP or if a direct-connect to the NetClock.

Transmitter power consumption/specifications

(2/21/12 KW – I'm not positive, but I believe these may be the specs for the earlier non-web based xmitter)

Input power range: 110VAC or 220VAC
    Power -35 watts
    Current 319mA at 110VAC
    Heat dissipation- 119.42 BTU/Hour

Holdover capability

- ➢ The transmitter will lose Time Sync status about 1min 15 seconds after losing the NTP data.

DS Manager software

- ➢ Used to configure the network settings of the old wireless transmitter.
- ➢ This software is not a web browser. It's not for configuring other settings of the transmitter and can't be used to monitor the transmitter (if it's desired to remotely monitor the transmitter, it should be replaced with the newer Model which has a browser included.
- ➢ To download latest version of the program, refer to "Tibbo Device Server Toolkit" at http://tibbo.com/downloads.html (direct link: http://tibbo.com/downloads/soi/tdst.html)
- ➢ Info on this software program is available online at: http://tibbo.com/downloads/soi/docs.html and http://tibbo.com/soi/tdst/dsm.html
- ➢ For info on using DS Manager, refer to the "NetClock wireless transmitter Ap note" at: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Transmitters-repeaters\old transmitter (no web browser)

Auto-discovery of the transmitter

- ➢ The software uses auto-discovery to try to find the transmitter (I'm not sure what port it uses for auto-discovery .
- ➢ PC running DS Manager and the transmitter need to be on the same subnet
- ➢ From the DS Manager link above (refer to the text in red)
- ➢ Auto-discovery access mode is selected by choosing "Local Device Servers (Auto-discovery by broadcast)" from the *access mode drop-down box*, located at the top of the *DS Manager's main window*.

"In this mode the *DS Manager* finds all local Device Servers* automatically. Device Servers located behind the routers (remote Device Servers) cannot be auto-discovered by the *DS Manager* because broadcast UDP datagrams used to find the Device Servers on the network cannot pass through routers. Address book access mode (http://docs.tibbo.com/soism/index.html?ds_manager.htm) should be used to work with remote Device Servers."

Newer style Web-based 900 MHz transmitters (TCVR-NTP-2000 and TCVR-NTP-2001)

Two 900 MHz transmitter variants available:

A) TCVR-NTP-2000 (rack-mount transmitter)

B) TCVR-NTP-2001 (wall-mount transmitter)

➢ **Shortcut to Wireless digital/analog data sheet** (1168-5001-0050): link to datasheets in SharePoint

➢ **Shortcut to Wireless Digital/Analog clock system manual (1168-5001-0050):** I:\New Released\Manuals\1168-xxxx-xxxx

➢ **Shortcut to transmitters in CustomerService drive:** I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Transmitters-repeaters

- **Sapling P/N:** SMA 2000

- **Spectracom P/Ns:** TCVR-NTP-2000 (rack-mount) and TCVR-NTP-2001 (wall-mount)

Note: The newer Web-based transmitter, web-based repeaters started shipping to our customers around 11/2009.

Physical dimensions

(From datasheet)
        11" L x 17.5'" W x 1.75" D `
        6.5 lbs

Input power/specs

Transmitter: 85 – 265 VAC, 50 – 60 Hz
(power cord supplied)

Transmit range: 6500ft, open space

Supported web servers for the web browser

Email from Amy on 8/2/11
"The SMA browser is compatible with Microsoft Internet Explorer, Mozilla Firefox, Safari, Opera and Chrome.   It can work on all versions of Explorer."

Note: The transmitter cannot sync to NTP time server with a crossover cable while in the crossover mode. The transmitter needs to be taken out of the crossover mode in order for it to be able to sync to the NTP server directly.

According to Sapling tech support, unlike the older "non web-based" transmitters, the Time Sync status character is no longer ignored. Transmitter will not sync if the NetClock is not synced.   Not sure at this time if this is true with NTP input or just RS-485 input.

External time sync of web-based transmitter (RS-485 input)

> Refer also to the wireless clock install-troubleshooting guide: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Transmitters-repeaters\web-based transmitter\wireless clock install-troubleshooting guide

The newer web-based transmitter is FMT 01, 1200 baud only

(Note: the earlier, non web-based transmitter is FMT 00, 1200 baud only. The new web-based transmitter is not the same settings as the older model)

The wiring connection between the NetClock and the transmitter(s) is as follows:
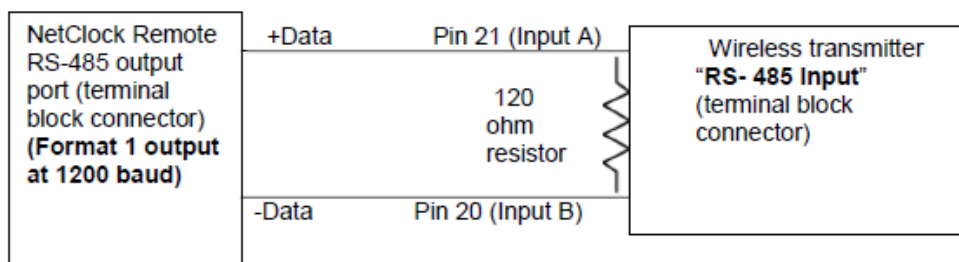
When using RS-485 input, the transmitter needs to be configured to receive RS-485 as its selected input reference. This can be performed using either the web browser or via the front panel setup menu. If a network connection to the transmitter is available, refer to **Error! Reference source not found.** for using the web browser to configure the t ransmitter to sync to RS-485 input (select RS485 in the drop-down). If the transmitter is not connected to a network, perform the following setup procedure to configure the transmitter to sync to RS-485 input (via a setup menu).

> Momentarily Press both the Set Hours and Set Minutes buttons simultaneously (the two push-buttons located to the right of the time display).

> Press the top button (Set Hours) consecutively until "10" is displayed in the Hours portion of the display. Press the bottom button (set Minutes) until "8" is displayed in the seconds' portion of the display.

> Press the top button (Set Hours) consecutively until "12" is displayed in the Hours portion of the display (this is the DST setup menu). To configure the transmitter to automatically adjust for DST, press the bottom button until the seconds shows a value of "2". If you don't want the transmitter to adjust for DST "set the seconds to "d" instead.

> Press the top button (Set Hours) to change to "13" being displayed in the Hours portion of the display (this is the 12/24 hour display menu). Set the seconds to either 12 or 24, based on how you want the time to be displayed (options 1 and 2 described in the beginning of this document).

> Press the top button (Set Hours) consecutively to change to "30" being displayed in the Hours portion of the display (this is the input reference configuration menu). Using the bottom button to "01" if you are syncing the transmitter to the NetClock over the network or set it to "13" if connecting the transmitter to the NetClock via a dedicated RS-485 cable.

> To exit the setup menu, press the top button (Set Hours) consecutively until a normal time display of hours, minutes and seconds is present.

Network settings

➢ **Default static IP address:** 192.168.0.123 while in **CR mode** (network crossover mode)

➢ **Default password**: 6063

To set the transmitter to the default static IP address

The first configuration process is to configure the transmitter with either an automatic DHCP address or to use the temporary static address of **192.168.0.123** to be able to access the web browser.

Turn on CR Mode to temporary assign static address 192.168.0.123/24 (255.255.255.0)

A) Simultaneously **press both buttons** near the time display to access the setup menus.

B) **Press the** t**op "Set Hours" button** consecutively until "**45**" is displayed.

C) Then, **press the bottom "Set Minutes"** button to display "**CR**" (Cross-Over cable mode).

D) **Wait 20 seconds and then power cycle the transmitter.** DHCP is now disabled and the IP address is now temporarily set to 192.168.0.123

E) Next, connect a network cross-over cable to the transmitter and to the network port of a PC that has a manually configured static address of 192.168.0.x (where x is a number between 0 and 254, and a number other than 123) and a host mask of 255.255.255.0.

F) Open the web browser by starting Internet Explorer or Firefox and entering either the DHCP assigned or the temporary static address of the transmitter into the address line. This will open the login screen. The default password is 6063. The IP address can now be configured with a desired IP address.

   Note: The transmitter cannot sync to an NTP time server while the CR (Cross-Over) mode is still enabled. After using the web browser to configure a desired IP address, or to re-enable DHCP mode, the CR mode should then be turned off.

To turn off the CR mode

A) simultaneously push both buttons near the time display and then use the Set Hours button to sequence to mode 45.

B) hit the bottom "Set Minutes" button to display "**off"** for this mode.

C) **Wait 20 seconds and power cycle the transmitter**.

D) If DHCP is enabled in the web browser, the IP address will be assigned by the DHCP server on the network. If DHCP is disabled, it will use the assigned static IP address instead.

12/24 hour time display of transmitter (and display clocks)

The transmitter and wireless display clocks can be individually configured to display 12 hour or 24 hour mode, as desired. The transmitter does not determine if the display clocks show the 12 hour or 24 hour format. This configuration is performed on each display clock itself.

Page 4 of the attached wireless clock user manual discusses how to change each display clocks to show either 12 hour of 24 hour mode. In summary of this document, the four digit display clocks should have three jumpers on the back of each display clock. To configure each display clock to show the time as either 12 hour mode or 24 hour mode, just change the position of jumper JP1. Page 4 of the manual shows where this jumper is located (Refer to Figure 2-10).

Password configuration

➤ The web-based transmitter has two inherent login modes – (User Level) and (Technician Level)

A) User Level

  ➤ The default User Level password for user is "1111"

  ➤ The User Level password can be changed in the System Settings page of the browser.

➤ The User password can be up to 19 characters long and can consist of any combination of letters and/or numbers.

➤ When the password is manually changed as desired, you can access the user mode using this new password. This user mode just displays the date and time that the transmitter is sending out to the displays. When logged in with this custom password into user mode, the "Technician Menu" is no longer displayed. Log back in with "6063" to get to the Technician menu again.

B) Technician Level

  ➤ The default password for Technician Level is "6063".

  ➤ The Technician Level password cannot be changed. It is hard-coded.

Flashing dot/decimal/LEDs on the front panel

(Transmitter front panel indicators)

The transmitter's time display contains three circular LED indicators that may be present during operation. These indicators will be lit to show PM time 9in 12 hour mode), a problem with the network connection or a problem with network synchronization of the transmitter is occurring.
The circular LED indicators are located above and on the left-side of the numbers, as shown below.
                    . . .
Time display: 12   34   56

The reasons for these LEDs to be flashing or lit solid are as follows:
LED above and to the left of the tens of hours digit (The "1" in the example above):
This is the PM indicator for 12 hour display mode. It is lit solid (not flashing) after 12:00PM while in 12 hour mode (12/24 hour mode selection is configured in the Clock Features page of the browser).

LED above and to the left of the units of minute's digit (The "4" in the example above):
This LED indicates that the Ethernet cable has not been connected to the transmitter (or a network issue has existed) since power-up. Verify a network cable is attached to both the transmitter and a network Hub/switch. When connecting the transmitter to a PC, a network cross-over cable needs to be used. Try connecting using a different network cable or connect the cable to a different hub/switch if this LED continues to flash.

LED above and to the left of the tens of second's digit (The "5" in the example above):

Page | 434

This LED indicates the transmitter is configured in the System Setting page of the browser to synchronize via "SNTP" as either the primary or backup Input selection (as needed for it to sync to an NTP server), but it is not obtaining any NTP time stamps from any of the configured Network NTP time servers.

Reasons for this include:

1. An Ethernet cable is not connected to the transmitter's network port.

2. A network issue exists.

3. Port 123 (the NTP port) is being blocked by a firewall.

4. Bad SNTP servers or wrong IP addresses for the NTP server(s) are configured in the list of available NTP servers in the transmitter (Page 2 of the IP Settings browser page).

5. An issue exists with resolving "DNS configured" NTP time servers (instead of using IP addresses to define the NTP servers).

"Diagnostics" (shown at the bottom of the Technican Level Menu page of web browser):

These tests are reserved for propietaty use by Sapling. These diagnostic tests are for their wired analog display clocks.
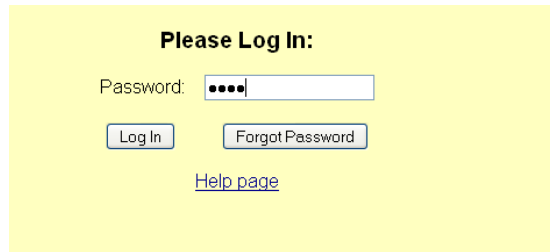
From the Sapling SMA 200 manual:

Diagnostic: This drop-down list allows the user to send the appropriate diagnostics to the analog clocks via RS485 (SRM) or 2 wire digital communications (SAM). See the analog clock's manual for descriptions of each diagnostic.
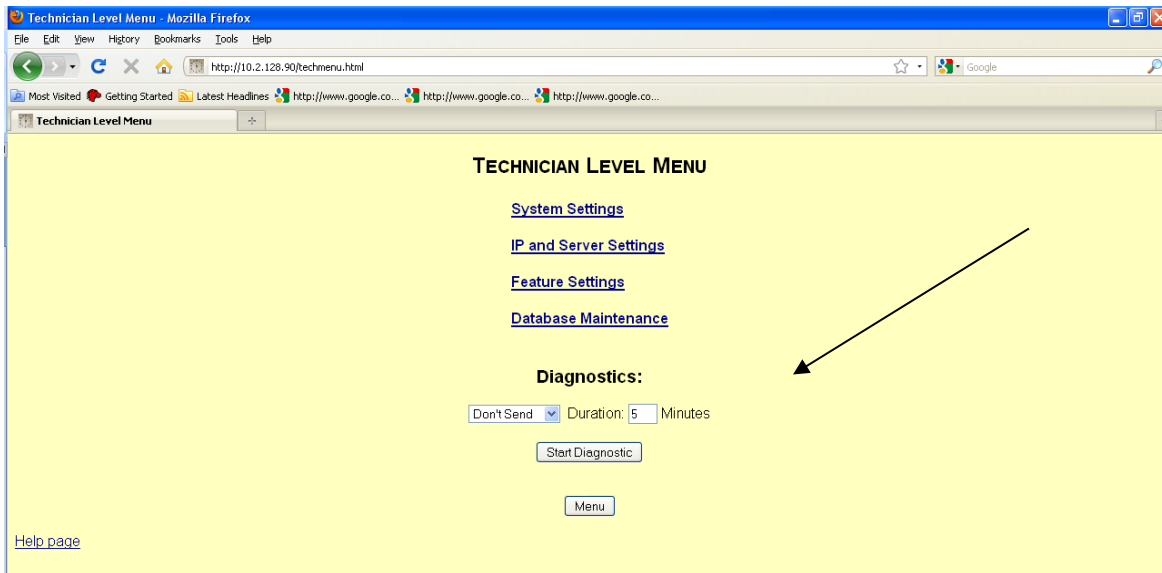
Web-based NetClock wireless transmitter screenshots (as of 1/29/2010)

SMA Master Clock Login screen
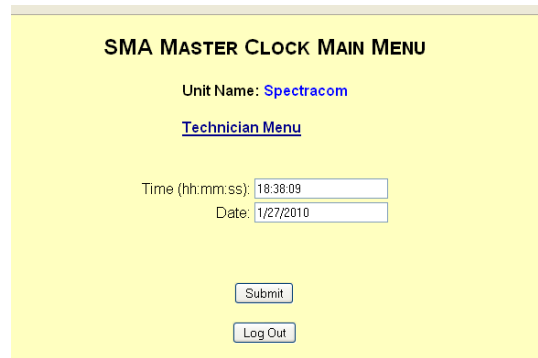
Main Menu screen (displayed after hitting "**Log In**" button)

Technician Menu screen (displayed after hitting "**Technician Menu**" on the Main Menu)

"Diagnostics" (shown at the bottom of the Technican Level Menu):

Note: These tests are reserved for propietaty use .

Technician Menu Sub-forms: System Settings, Page 1 screen (displayed after hitting "**System Settings**"

Technician Menu Sub-forms: System Settings Page 2 screen (displayed after hitting "**System Settings**")

Technician Menu Sub-forms: IP Settings and Server Settings)"

Page 1 (displayed after hitting "IP

Technician Menu Sub-forms: IP Settings Page 2

IP SETTINGS

Page 2

Retry Failed Server After: 2   Updates
1st Server Address: ○ 192.168.1.29
2nd Server Address: ○ 192.168.1.29
3rd Server Address: ○ 192.168.1.29
4th Server Address: ○ 192.168.1.29
5th Server Address: ● 192.168.1.29
6th Server Address: ○ 192.168.1.29
7th Server Address: ○ 192.168.1.29
8th Server Address: ○ 192.168.1.29
9th Server Address: ○ 192.168.1.29
10th Server Address: ○ 192.168.1.29
Rotate Servers: ☐

Submit   Cancel

Page **1**, **2**, **3**

Menu

Technician Menu Sub-forms: IP Settings, Page 3

IP SETTINGS

Page 3

Status

MAC Address :   00:31:76:80:04:27
IP Address :   10.2.128.90
Processor Serial Number :   1063
Unit Build Date :   May 6 200910:43:45
Device Name :   Spectracom
Paid Provisioned Features :   (Web,0 Zones,SNTP Server,SNTP Client,Spectracom 485)

Page **1**, **2**, **3**

Menu

Technician Menu Sub-forms: Feature Settings screen (displayed after hitting "**Feature Settings**")

CLOCK FEATURES

Display Format: 12 Hour Mode   Daylight Savings Time: 2 - Post-2007
                                           d - Disabled
                                           1 - Pre-2007
                                           2 - Post-2007

Submit   Cancel

Menu

Technician Menu Sub-forms: Database Maintenance screen (displayed after hitting "**Database Maintenance**")

Note: This screen is reserved for propietaty use .

Clock 1 and Clock 2 relay activation:

The wireless RF transmitter has two available relays that can be programmed to activate once-per-day for a specified duration. Each of the two relays ("Clock 1 Sync" and "Clock 2 Sync") can be configured to be activated at only one time each day (such as at Clock 1 activation at 3PM each day for 3 seconds). The time that the relay is activated is programmed into the transmitter and the length of time that the relay is activated for is also programmed in.

The time that the relays are activated and the duration of the relay activation are programmed using the two front panel push-button switches (located to the right-side of the LED time display). To access the transmitter's programming mode, push both buttons simultaneously. The Hours value will show the menu number and the seconds value will show the selection for that menu. Pressing the top button scrolls through the menus and pressing the bottom button scrolls through the selection for each menu. Follow the specific instructions, depending on whether your PA system is connected to Clock 1 or Clock 2 on the transmitter.

To configure Clock 1 output:

1. Press the top button until "20" is displayed in the hours value of the display. Verify this value is set to "8". If it's not, press the bottom button to set it to "8".

    Note: This value must be set to "8" for the once per-day relay activation. Values other than 8 are used for proprietary use and will result in different types of relay activation patterns, such as multiple repeating cycles at various times.

2. Press the top button and scroll to "21". This will show the hour that this relay is activated. To change this value, press the bottom button.

3. Press the top button and scroll to "22". This will show the minutes that this relay is activated. To change this value, press the bottom button.

4. Press the top button and scroll to "22". This will show the seconds that the relay is activated. To change this value, press the bottom button.

5. Press the top button and scroll to "23". This will show the hour that the relay is activated. To change this value, press the bottom button.

6. Press the top button and scroll to "24". This will show the duration (in seconds from 00-99) that the relay is activated for. To change this value, press the bottom button.

To configure Clock 2 output:

1. Press the top button until "25" is displayed in the hours value of the display. Verify this value is set to "8". If it's not, press the bottom button to set it to "8".

    Note: This value must be set to "8" for the once per-day relay activation. Values other than 8 are used for proprietary use and will result in different types of relay activation patterns, such as multiple repeating cycles at various times.

2. Press the top button and scroll to "26". This will show the hour that this relay is activated. To change this value, press the bottom button.

3. Press the top button and scroll to "27". This will show the minutes that this relay is activated. To change this value, press the bottom button.

4. Press the top button and scroll to "28". This will show the seconds that the relay is activated. To change this value, press the bottom button.

5. Press the top button and scroll to "29". This will show the duration (in seconds from 00-99) that the relay is activated for. To change this value, press the bottom button.

Troubleshooting the wireless web-based transmitters

A) **Transmitter is not syncing to NTP (over the network)**

➤ Refer to transmitter tech note: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Transmitters-repeaters\web-based transmitter

Make sure the transmitter is not still set to the default static IP address of **192.168.0.123**. Even if the NTP server is on the same subnet and everything else is good, for some reason the transmitter cannot sync via NTP if it's set to the default static address. The transmitter must be configured with either a DHCP address or custom static IP address that is not the same as the default address of 192.168.0.123.

If it's still set to this static address, either enable DHCP or disable DHCP/Assign any other desired static address. Then turn off the CR mode (cross-over mode) to disable the default static address.

B) **Transmitter does not seem to be sending out the RF message at the top of every minute (no wireless displays can sync to the transmitter)**

Per Brian White (1/5/12)
➤ Make sure the transmitter is not configured in the web browser to use "**repeater**" as one of its two possible sources of time synchronization (this will prevent the transmitter from sending a burst). This may be on the Technician menu, page 2 (or it may change once our transmitter is updated with new software).

➤ With the rack-mount transmitters, verify the wiring between the transmitter and remote antenna is correct. (See picture further below in the Remote antenna section)

C) **Transmitter is displaying all "8's".**

Remove the top cover from around the LEDs. Make sure the front panel assembly ribbon cable is connected to J3 (more towards the center of the main board), instead of to connector J7 (in the corner of the main board).

D) **Transmitter is free-running (not synced) and has excessive time drift**

➤ Refer to transmitter tech note: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Transmitters-repeaters\web-based transmitter

Customer was reporting the transmitter was drifting about 3 minutes per day with no time source connected.

Email from Brian White (5/29/13) We have a solution to the drifting issue. I am willing to bet these clocks are somewhat older. We have added a capacitor and resistor across the RTC, and also have SW upgrades since these clocks have been released. I have attached an RMA with both units on them. I suggest having both sent in for and upgrade. The field clocks will keep good time. If you choose not to send in both, just change the quantity to 1 on the attached paper. Let me know your thoughts. Thanks!

E) Transmitter's front panel is displaying "1n17" (an initialization error code)

  ➢ Refer to Salesforce case 23553 (picture and email below are associated with this case)

Email from John Karatka W/Sapling Tech support (7 Nov 16) The problem you are seeing is known as an Initialization error, this is caused by some faulty components in the master clock. They would be able to send the clock in for repair and because this is a fault with the board it would be covered under warranty and there would be no charge for it.

Remote antenna (rack-mount transmitters only)

> The remote transmitter box connects to the rack mounted clock unit via a 6 wire terminal block connection. CAT5 can be used or multi-strand 18 gauge for longer lengths. The terminal block is similar to our TV400 terminal block style.

Distance between the transmitter to the remote antenna

> The remote antenna can be located up to 50 feet from the transmitter, using CAT5 or CAT6 cable.

Brian White informed Will Hickey that they are including a 25ft cable with the rack-mount transmitter: "25 foot, 5 conductor 18AWG cable". The user has the option to use this, or use their own cable of similar specifications, to a total length of no more than 50 ft.

Wiring the remote antenna to the Rack-mount transmitter
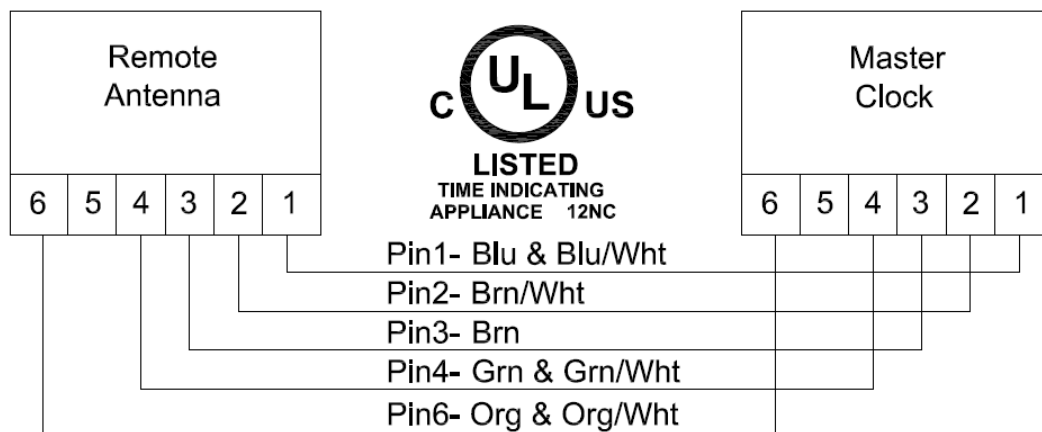
Q. The cable that connects the remote Antenna to the Transmitter requires CAT5 Ethernet cable but there are so many types of CAT 5 out there. What is the Amps and Voltage requirement for this connection?
A Standard CAT5 or CAT6 cable can be used for the connection between the RF transmitter and the antenna. The voltage and current of the transmitter to the antenna is low voltage (12vdc). Even class 2 twisted-pair cabling can be used for this low voltage connection.

**Web-based Repeaters (NTP 2000 and SMA 1000)/ (NTP-2000 and SMA-1000)

Note: though I believe this is info correct, this section should be confirmed with the manuals.

➢ **Link to CustAssistance drive for manuals, etc** : I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Transmitters-repeaters\web-based Repeater

Two different Models of repeaters available:

- **NTP 2000 Network Repeater**: Syncs its time to the main transmitter via a network connection. Note that it can't sync to an NTP server via NTP. (Refer to "**A**" below for more info).

- **SMA 1000 /Wireless Repeater**: Syncs it's time via the wireless signal transmitted from the nearby main transmitter or via a nearby display clock (needs to be located within range of a nearby transmitter in order to repeat the signal) (refer to "**B"** below for more info)

A) NTP 2000 Network Repeater
➢ **Network Repeater for 900MHz Wireless Clocks.**
➢ **Synchronization:** Requires a network connection to a model TCVR-NTP-2000 transmitter (can't sync to ntp server)
➢ **Advantage over the SMA 1000 Wireless Repeater:** doesn't need to be within the wireless range of the main transmitter or a nearby wireless display clock.

Sapling P/N NTP-2000
Spectracom P/N: RPTR-NTP-2000

Input power/specs

➢ Repeater: 85 – 230 VAC, 50 – 60 Hz, hardwired (power cord not supplied)

Time syncing a repeater

- This Repeater will not sync via NTP to an NTP server. Instead, it syncs to the main transmitter via a network connection.
- Refer to "**server Addresses**" on page 9 of the Network Repeater manual (v1) (Excerpted below)

-

Server Addresses - This field is where the user will enter what IP address that the SMA Series Master Clock is located for synchronization. The Network Repeater will NOT synchronize to any other time servers but the SMA Series Master Clock.

Rotate Servers - Not applicable.

Submit - This button, when clicked, will save all changes on the Network Settings page.

B) **SMA 1000 Wireless repeater**

Radio Signal Repeater for 900 MHz Wireless Clocks. Receives wireless signal from a transmitter or another clock and can transmit it the signal up to one mile in open space.

- **For its Synchronization, it needs to be located within wireless range of the main transmitter or a nearby wireless display clock.**

    Sapling P/N: SMA-1SR-0000-1
Spectracom P/N: REPEATER, RPTR-RS-2000

Troubleshooting repeaters

A) Not time syncing to NetClock/SecureSync/customer's NTP time server

- Repeaters don't sync to an NTP server.

B) Repeater's front panel is displaying "1n17"

- **Refer to Salesforce case 23553 (this condition was with a transmitter- not a repeater- but may also apply to repeaters???)**

Email from John Karatka W/Sapling Tech support (7 Nov 16) The problem you are seeing is known as an Initialization error, this is caused by some faulty components in the master clock. They would be able to send the clock in for repair and because this is a fault with the board it would be covered under warranty and there would be no charge for it.

Wireless Analog and digital display clocks

Links to manuals

NetClock Wireless Clock manual (includes wireless transmitter as well as analog/digital display clocks)

   A) **Newer rev manual for newer transmitter and newer displays**

      (1168-5001-0050, Rev F and higher) I:\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx

   B) **Earlier rev manual for original transmitters and original display clocks**

      (1168-5001-0050, Rev E and below) I:\New Released\Archived Documents\Manuals\1168-xxxx-xxxx

SBL 3000 series- Temporary link to new manual for new rev of PCB (24 Sept 2013)
I:\Company Wide\ECN's\New ECN's Complete\ECN 3166

Two different variants of the Analog display clocks (Based on purchase date):

A) Newer rev

   ➢ Has one push-button switch on the rear panel

   ➢ Syncs once every two hours by default (can be reconfigured to sync once every four hours)

B) Earlier rev

   ➢ Has two push-button switches on the rear panel

   ➢ Syncs once every four hours

**Known issues with both digital/analog clocks

A) Displays periodically displaying either all zeroes or "12:00" when it's not really 12:00

   ➢ Refer to Salesforce case 1947 (Anne Arundel Medical Center)

   ➢ Applicable to displays that were sold back with the non-web browser transmitters

   ➢ the wireless display clocks should not normally ever show all zeroes (00:00) at any time with the exception of at midnight and noon (when in 12 hour display mode)

   ➢ Issue was with the clocks themselves- not the transmitters.

   ➢ Software update was released to prevent this issue from happening (it was created for Anne Arundel and appears to have been provided to them in 2007. I don't think Sapling cut it in right away, so clocks sold in 2008 may not have this fix applied.

**Wireless Analog Displays

➢ **Shortcut to Wireless Digital/Analog clock system manual** (1168-5001-0050): I:\New Released\Manuals\1168-xxxx-xxxx

Important Note about the use of the wireless clocks outside of the US

Email from John Westwood (3/14/11) regarding 915-928MHz in the UK The frequency band of 915 to 928 MHz are military reserved frequencies in the UK, so these clocks should not be sold for use here. I would suggest the wired IP clocks, unless there is a wireless IP version of the clock that could be used on the LAN??

New plastic enclosure for digital and analog display clocks

Email from Natalie (5/24/11)
The plastic housing will be available for Sapling's full analog and digital product line starting June 15th, 2011. Any orders placed on June 15th and after will receive Sapling's new housing.

➢ Analog displays have the **receiver open for 10 minutes** after the batteries are first installed (or if batteries are momentarily removed/reinstalled).

➢ After batteries are installed, the receiver is first only opened for a couple of seconds, then closes again. If it misses the transmitter. The receiver opens again four hours later for a little longer (exact length of times that the receiver is opened for is not published data).

****Battery Information

Battery versions: 2 "D" cell (included), 5-yr normal mode, 8-yr economy mode, provided good reception.
We have been using D cell alkaline batteries in our evaluation units, so it doesn't appear to be anything exotic.

****Analog clock sync schedules

- **Older analog clocks** sync to the transmitter every 4 hour-

- Newer Analogs sync every 2 hours (see Notes below)

Note: The old schedule for the analogs was 12, 4, 8, 12. The new schedule is 2, 6, 10, 2. This change occurred somewhere between Feb 2007 and Jan 2008. It is believed to have occurred shortly after Feb 2007, but the exact date is not known. However, it is confirmed to have been cut-in before Brian White started working there late Dec 2007/Jan 2008 time frame. Any analogs that shipped after Jan 08 will have the new schedule of: 2, 6, 10 and 2).

Note: The newer Web-based transmitter, web-based repeaters started shipping to our customers around 11/2009. The newer analog displays on two hour receive intervals (instead of the original 4 hour interval) apparently started shipping a little earlier than this, but don't know exact cut-in of this change.

****Analog display clock repair

Gearbox issues

➢ The second hand had stopped moving but the minutes and hour hand is still moving. Is it possible that we change the assembly here?

A Reply from Dave Lorah (23 Apr 2013) The gearbox is not replicable in the field. Special tools and procedures are required to prevent damage when the hands are attached. It would be best to repair or replace the clock.

Wireless Analog Clock FAQs

Q. Many of the clocks will go into clean rooms. Would you say our displays would be suitable?
A. We have never had an issue with putting our clocks in hospitals all over the country (operating rooms and such). A clean room installation should present no issues at all.

Q. Are there any specs for the estimated clock-to-clock signal re-transmission range in a building?
A. Estimated 2-3 classrooms/offices

Q. Are there any specs for the estimated transmitter and clock-to-clock signal re-transmission range between two buildings?
A. We recommend instead of counting on clocks to go from one building to another, use a network repeater. There is really no way to give an accurate answer on how far between buildings you can go.

Q. What is the weight of a NWC-1212-BAT clock? (For earthquake specifications)
A. 2 lbs. 8 oz.

**Wireless digital display clocks

Shortcut to Wireless Digital/Analog clock system manual (1168-5001-0050): **idrivedata\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx**

- ➢ Digital display clocks power–up with only the center segments lit, until they receive the time from the wireless transmitter (they do not show the time counting up).
- ➢ The digital displays will flash the PM indicator if they lose sync (top-left corner. AM indicator is on bottom-left).
- ➢ The timeout for loss of sync is either 5 minutes or 1 hour which is defined by a jumper on the back panel.
- ➢ Digital display contains two digits for hours and two digits for minutes – no second's indication.
- ➢ Display intensity is based on a jumper on the rear panel.
- ➢ Digital clocks have no Mode/Set switches on the rear panel.

****Input power

SBL 3000 series (~Sept 2013)

Note: When setting up the jumpers, Pin 1 & Pin 2 must be jumpered together OR Pin 2 & Pin 3 must be jumpered together. Below are the Jumper Positions and what function each corresponds with.

Jumper Position	Pin 1 & Pin 2	Pin 2 & Pin 3
JP 1	12 Hour Time	24 Hour Time
JP 2	Bright	Dim
JP 3	Time Display Only	Alternating Date/Time Display
JP 4	Normal	Configuration
JP 5	Real Time Clock	60Hz
JP 6	Sync	RS485 Select

Previous 2000 series

The digital clocks will run from either 120 VAC, 24 VAC or 24 VDC. There are different connections on the power connector for each. If using 24 VAC power please remember to use an isolated transformer if stepping down from 110 VAC to 24 VAC.

If using 24 VDC make sure you have the polarity correct. The Orange wire in the power input cable is +24 VDC and the yellow is common.

Digital Clocks have new design now (using SMA 2000 PCB board) – You can tell an old design because the PCB has a 6 pin header and the new design has a 8 pin header

FAQs

Q In the box it has 3 sets of wire. 1 is for the ground, 1 is for the power (I think), and 1 set for unknown (it has red female socket). Questions are: 1 Where do I connect these 3 sets of wire into the clock
Keith's reply- Our records indicate you purchased the four digit, 110VAC digital display clocks. Either 110VAC OR 24VDc input power is supplied to each display clock via the 5 pin connector located on the back of the display clock. As shown in the figure below (excerpted from the wireless clock system user manual), three of the five wires are used for supplying 110VAC input (if desired) and the other two wires are for supplying 24vdc, instead (if desired).

Q. Are these wires for 110V or DC 24V ?
Keith's reply- As shown above, three of the five wires (black, white and green)are for supplying 110VAC power to the display clock, if you want to power the clocks on 110VAC building power. The other two wires (orange and yellow) are for supplying 24vdc in case you wish to power the clocks via 24vdc, instead of using AC power. When using AC input, the orange and yellow wires are not used.

Q. I like to power the clock with 110 V and how do I connect the power line to these clock?
A. To power the clocks using AC, connect 110VAC building power to the "110VAC Power", "110VAC Neutral" and "Earth ground" connections of the five pin wire harness.

The black wire of the building power is "hot" so it should connect to the "110VAC Power" line on the display clock (black wire), is "neutral" so it should connect to the "110VAC neutral" line (white wire) on the display clock

Green is ground, so it connects to the "Earth ground" connection (green wire)" on the back of the display clock.
Other wires/connectors may be included with the digital display clocks, but are not typically used. These other wires are for functions such as back-to-back mounting, or using a control box to operate the special "down counter" clock.

****12/24 hour display selection

Four digit displays: As shown on page 7 of the Wireless clock system (1168-5001-0050 Rev G), there is an internal jumper JP1 that needs to be installed for 12 hour mode.
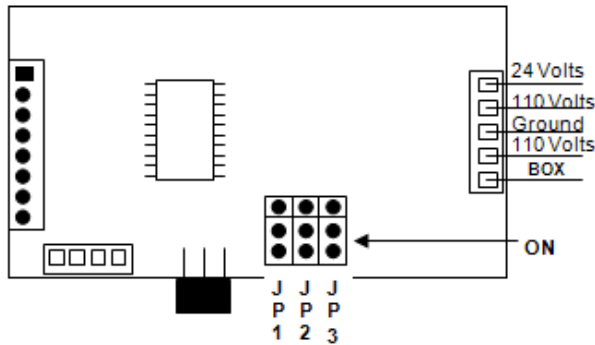
JP1	JP2	JP3
12/24 Hour Mode	Brightness	Loss of Comm. Alert
ON: 12 hour mode OFF: 24 hour mode	ON: Brightest OFF: Less Bright	ON: 5 minutes OFF: 30 minutes

The transmitter and wireless display clocks can be individually configured to display 12 hour or 24 hour mode, as desired. The transmitter does not determine if the display clocks show the 12 hour or 24 hour format. This configuration is performed on each display clock itself.

Page 4 of the attached wireless clock user manual discusses how to change each display clocks to show either 12 hour of 24 hour mode. In summary of this document, the four digit display clocks should have three jumpers on the back of each display clock. To configure each display clock to show the time as either 12 hour mode or 24 hour mode, just change the position of jumper JP1. Page 4 of the manual shows where this jumper is located (Refer to Figured 2-10

Six digit displays: Mode 13 defines the 12 hour or 24 hour display.

SBL 3000 series (~Sept 2013) Looks like there is a new rev of the PCB, which now has 6 jumpers (JP1 through JP6, instead of just 3). Unlike the earlier Models, the clock has to be power cycled for the change to take effect (it reads the pins on startup). Even with 6 jumpers now, JP1 is still for 12/24 hour mode.

JP1 (12/24 hour) **Must power cycle to take effect**
Pins **1 and 2** = 12 hour
Pins **2 and 2** = 24 hour

AC/DC Com

Elapsed Timer

1 2 3 4 5 6 7 8 9   1 2 3 4 5 6 7 8 9

P1 - Sync Inputs   P2 - User Inputs
*Refer to pages 18-21 for
further installation instructions.

per Position

Pin
1 2 3

JP 1
JP 2
JP 3
JP 4
JP 5
JP 6

P3 - Relay Output

4 — *Relay 2 N.O.
3
2 — *Relay 1 N.O.
1

Elapsed Timer
1 No Connection
2 TXD (Blue&Blue/White)
3 Common (Green&Green/White)
4 RXD (Orange&Orange/White)
5 3.3V @0.1A (Brown&Brown/White)

Power Settings
1 24VAC @ 0.35A (ORG)
2 120VAC or 240VAC @ 0.1
3 No Connection
4 120VAC or 240VAC @ 0.1
5 24VAC @ 0.35A (YEL)

P7 - RS485

1 2 3 4
Input A | Output A
Input B | Output B

Note: When setting up the jumpers, Pin 1 & Pin 2 must be jumpered together OR Pin 2 & Pin 3 must be jumpered together. Below are the Jumper Positions and what function each corresponds with.

*Contact Rating
0.3A @ 120VAC
0.5A @ 24 VAC

Jumper Position	Pin 1 & Pin 2	Pin 2 & Pin 3
JP 1	12 Hour Time	24 Hour Time
JP 2	Bright	Dim
JP 3	Time Display Only	Alternating Date/Time Display
JP 4	Normal	Configuration
JP 5	Real Time Clock	60Hz
JP 6	Sync	RS485 Select

.
****Brightness

A) SBL 3000 series (~Sept 2013)

➤ JP2 is for brightness control

JP2 (Bright) **Must power cycle to take effect**
Pins **1 and 2** = Bright
Pins **2 and 3** = Dim

1 2 3 4 5 6 7 8 9   1 2 3 4 5 6 7 8 9

Elapsed Timer

P1 - Sync Inputs   P2 - User Inputs
*Refer to pages 18-21 for
further installation instructions.

per Position

Pin
1 2 3

JP 1
JP 2
JP 3
JP 4
JP 5
JP 6

P3 - Relay Output

4 — *Relay 2 N.O.
3
2 — *Relay 1 N.O.
1

Elapsed Timer
1 No Connection
2 TXD (Blue&Blue/White)
3 Common (Green&Green/White)
4 RXD (Orange&Orange/White)
5 3.3V @0.1A (Brown&Brown/White)

Power Settings
1 24VAC @ 0.35A (ORG)
2 120VAC or 240VAC @ 0.1
3 No Connection
4 120VAC or 240VAC @ 0.1
5 24VAC @ 0.35A (YEL)

P7 - RS485

1 2 3 4
Input A | Output A
Input B | Output B

Note: When setting up the jumpers, Pin 1 & Pin 2 must be jumpered together OR Pin 2 & Pin 3 must be jumpered together. Below are the Jumper Positions and what function each corresponds with.

*Contact Rating
0.3A @ 120VAC
0.5A @ 24 VAC

Jumper Position	Pin 1 & Pin 2	Pin 2 & Pin 3
JP 1	12 Hour Time	24 Hour Time
JP 2	Bright	Dim
JP 3	Time Display Only	Alternating Date/Time Display
JP 4	Normal	Configuration
JP 5	Real Time Clock	60Hz
JP 6	Sync	RS485 Select

B) SBD 2000 series (prior to ~Sept 2013)

➢ JP2 is for brightness control

JP1	JP2	JP3
12/24 Hour Mode	Brightness	Loss of Comm. Alert
ON: 12 hour mode OFF: 24 hour mode	ON: Brightest OFF: Less Bright	ON: 5 minutes OFF: 30 minutes

****Back to Back display clocks:

Per Dave Lorah's notes:
One display clock is the "Transmitter clock" (the RF board which has the antenna attached to it remains installed/attached in this clock). The other display clock becomes the "Disconnected transmitter clock" (the RF board needs to be internally disconnected from the main board in this display clock)

"Need to use the RS-485 cables that come with the digital clocks- these have connectors on one end (for P2) and bare wires on the other end. Need to connect the RS-485 cabling for the two clocks together as follows:

Transmitter clock (RF board is still connected)   Disconnected transmitter clock
Brown   --   Red
Purple   --   Blue

****6 digit wired display clock input power frequency

The display clock can be configured for either 50 Hz or 60Hz operation. With free-run, the clock is updated based on the frequency of the input power. It needs to be configured for the correct input frequency:

The unit most likely needs its setting change via the front panel push-buttons. There should be two - for setting HH's and MM's. By pressing both simultaneously, you get into "programming mode". Step thru to the various choices with the HH button until you reach program mode #12. There are only two setting choices in this mode, and we believe it was not changed for 50Hz operation. Change its setting by pressing the MM button (believe the choice you need is "quartz" - but it should be the only other choice available to you). Once changed, step through balance of program selections until you are back out of program mode and displaying time. The unit should now track properly in 50Hz environment.

Elapsed timer controller/ Control Box (ETC, ETCB)

➢ New Series of ETC/ETCB started shipping ~Oct 2013

Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Display Clocks\Elapsed timer counter clocks

NWT-ETCB (Previous series, before ~Oct 2013)
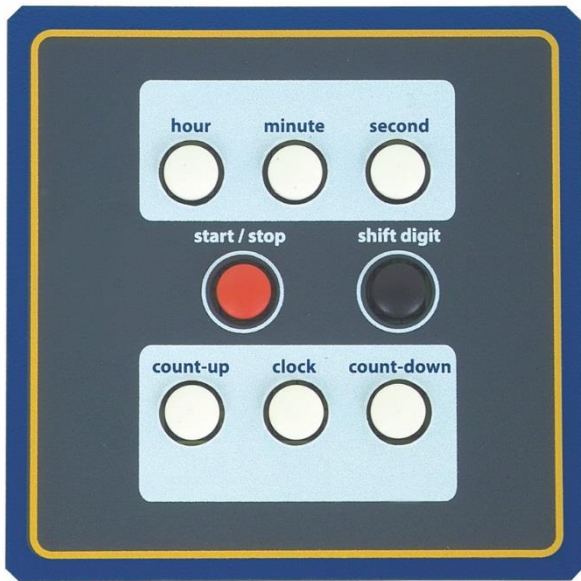
NWT-ETCB-2 (New Series, starting ~Oct 2013)

This connector plugs into the back of the elapsed timer
1 2 3 4 5

Customer-supplied CAT-5 or CAT-6 cable (up to 100 feet long).

WiSync Digital Clock – Timer

U1
1 2 3 4 5

Cat5 cable up to 100 ft long

Pin1- Brn & Brn/Wht
Pin2- Org & Org/Wht
Pin3- Grn & Grn/Wht
Pin4- Blu & Blu/Wht
Pin5- No Connection

Cat5 Cable Notes:
Use 8 conductor 24AWG Cat5 cable, up to 100 feet long, and use the wire colors as shown above. Pin1, Pin2, Pin3 and Pin4 use a wire pair. Both 5 Pin connectors are wired the same.

Strip the insulation back 1/4 inch on all wires and twist the 2 wires together of each pair. Insert wires into the connector and tighten the screws.

The NetClock WiSync Control Box is designed for use with the NWT-DxxRxP Series Digital Clocks. The control box can perform all programming commands for the digital clock, as well as additional functions using the display as a timer. The chronograph functions of the digital clock includes count up and count down modes in Hour:Minute (HH:MM) mode or Minute:Second (MM:SS) mode on 4 digit clocks and Hour:Minute:Second (HH:MM:SS) mode on 6 digit clocks. Counting up and down can be interrupted and resumed, or reset. The Control Box also allows the digital clock to display the time as either hours, minutes, and seconds, hours and minutes, or minutes and seconds.

Specifications

Count up: From 00:00:00 up to 99:59:59

Count down: Start point programmable from maximum of 99:59:59

Display format: Hour:Minute (HH:MM) or Minute:Second (MM:SS) on 4 digit clocks. Hour:Minute:Second (HH:MM:SS) on 6 digit clocks

Time display: Hour:Minute (HH:MM) or Minute:Second(MM:SS) on 4 digit clocks. Hour:Minute:Second (HH:MM:SS) on 6 digit clocks

Functions: Fully programmable Start/Stop button, interchangable buttons, green ans red LED backlit

Color: White frame with gray buttons

Dimensions: 4.88" x 3.15" x 1.28" (12.4 cm x 8 cm x 3.26 cm)

Mounting: Standard single gang box

Ordering Information

NWT-ETCB

NWT-ETCB-2 Controller (newer elapsed timer, starting ~Oct 2013)

➢ The actual functions performed AND the LED operation for each of the four buttons is configured in the ETC display clock's web browser.

Setting up the Elapsed timer interface

- Wireless display clocks – Refer to "A" below

- IP display clocks – Refer to "B" below

A) Wired – Wireless – TalkBack Clock Systems

➢ Uses the sbdconfig.exe software to configure the display clock in conjunction with USB to RS-485 converter. (Connect to J7 on back of the clock).

Open the sbdconfig.exe software. This will load the Elapsed Timer interface utility.

- **No Action**: Choosing this option will perform no functions on the digital clock.

- **Return to Time Display**: This option will cause the digital clock to return to the current time display, regardless of what function it is currently displaying.

- **Briefly Display Date**: This option will change the clock's display to briefly show the date when the current time is on display. This option will not work in count up or count down mode.

- **Go to Count Up and Hold**: This option will cause the digital clock to hold at zero and wait for the count up to start. Pressing the Count Up and Hold button a second time will begin the count up from zero.

- **Go to Count Up and Start**: This option will make the clock display the count up function and begin counting up from zero, as soon as the button is pushed.

- **Go to Count Down and Hold**: This option will cause the digital clock to hold at the specified count down start time and wait for the function to start. Pressing the Count Down and Hold button a second time will begin the count down.

- **Go to Count Down and Start**: This option will make the clock display the count down function and begin counting down from a specified time, as soon as the button is pushed.

- **Start/Stop**: This option will cause the timer to start or stop its counting functions.

- **Shift Digits**: This option will cause the digits to shift from a Minutes/Seconds display to an Hour/Minutes display 4 digit digital clocks only).

- **Relay 1**: This option will cause the relay contact closure to close for a specified number of seconds (3300 Series Only).

- **Relay 2**: This option will cause the relay contact closure to close for a specified number of seconds (3300 Series Only).

Configuring the operation of LEDs when each of the four buttons of the controller is pushed (in the "Elapsed Timer" tab of web browser)

- **No Change**: When selected, a particular button's settings will remain unaltered from its previous selected state.

- **Off**: This option will turn off the lights on a particular Elapsed Timer button.

- **Green / Red:** This option allows the user to choose either green or red backlighting on the Elapsed Timer when the button is pressed.

- **Blink On / Off**: This option will allow the user to turn on or off the light blinking function. When this is set to Off, the backlight will

- **stay on:** When this is set to On, the backlight will flash.

- **Submit**: This button saves all of the options that were entered.

- **Close**: This button will close the Light Changes window.

Once the Elapsed Timer is connected to the back of the digital clock (see page 3), press any button on the Elapsed Timer.

Close out of and reload the sbdconfig software page. The Elapsed Timer tab will appear in the taskbar. After this step is done once, the digital clock will always recognize the Elapsed Timer.

B) IP display clock

1. Type the IP address of the IP clock into a web browser such as Internet Explorer or Firefox. This will load the IP clock's web interface. Type in the password for the IP clock (see the specific IP clock's user manual for more information).

2. Once the Elapsed Timer is connected to the back of the digital IP clock (see page 3), press any button on the Elapsed Timer.

3. Refresh the web interface page. The Elapsed Timer tab will appear in the menu bar. After this step is done once, the IP clock will always recognize the Elapsed Timer.

- **No Action**: Choosing this option will perform no functions on the digital clock.

- **Return to Time Display**: This option will cause the digital clock to return to the current time display, regardless of what function it is currently displaying.

- **Briefly Display Date:** This option will change the clock's display to briefly show the date when the current time is on display. This option will not work in count up or count down mode.

- **Go to Count Up and Hold**: This option will cause the digital clock to hold at zero and wait for the count up to start. Pressing the Count Up and Hold button a second time will begin the count up from zero.

- **Go to Count Up and Start:** This option will make the clock display the count up function and begin counting up from zero, as soon as the button is pushed.

- **Go to Count Down and Hold**: This option will cause the digital clock to hold at the specified count down start time and wait for the function to start. Pressing the Count Down and Hold button a second time will begin the count down.

- **Go to Count Down and Start**: This option will make the clock display the count down function and begin counting down from a specified time, as soon as the button is pushed.

- **Start/Stop**: This option will cause the timer to start or stop its counting functions.

- **Shift Digits:** This option will cause the digits to shift from a Minutes/Seconds display to an Hour/Minutes display (4 digit digital clocks only).

- **Relay 1:** This option will cause the relay contact closure to close for a specified number of seconds (3300 Series Only).

- **Relay 2**: This option will cause the relay contact closure to close for a specified number of seconds (3300 Series Only).

Configuring the operation of LEDs when each of the four buttons of the controller is pushed (in the "Elapsed Timer" tab of web browser)

• **No Change:** When selected, a particular button's settings will remain unaltered from its previous selected state.
• **Off:** This option will turn off the lights on a particular Elapsed Timer button.
• **Green / Red:** This option allows the user to choose either green or red backlighting on the Elapsed Timer when the button is pressed.
• **Blink On / Off:** This option will allow the user to turn on or off the light blinking function. When this is set to Off, the backlight will stay on. When this is set to On, the backlight will flash.
• **Submit:** This button saves all of the options that were entered.
• **Close:** This button will close the Light Changes window.

Elapsed timer digital display clock Specs

➢ Count-up range: 00:00:00 to 99:59:59

➢ Count-down: start point programmable from max of 99:59:59

➢ Display: four digit or six digit

➢ Dimensions 4.88" x 3.15" x 1.28" (12.4cm x 8cm 3.26cm)

➢ Mounting: single gang outlet

Setting up Count-up and Count-down

➢ Refer to the "ETC manual" for procedures

NWT-ETCB (original elapsed timer controller/ time display clocks)
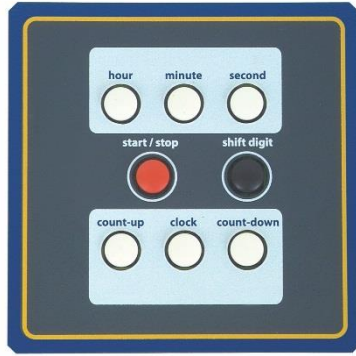
Manual for elapsed timer controller: **I:\New Released\Manuals\1168-xxxx-xxxx**   (It is the P/N **1168-5001-0052** document). This document is specific to the elapsed timer controller and the associated display clock.

In summary:
The wiring between the display clock and the Elapsed timer controller connects three switches inside the control box and 5vdc to the back of the display clock. The switch closures in the control box are sent to the display clock to toggle the different software functions inside of the display clock. No other power or data is sent through this cable harness.

Desire to switch the ETC display between 12 and 24 hour mode
The display board for the elapsed timer controller uses an SMA-2000 board (same as the 6 digit clocks described above). The 12/24 hour display selection is via programming, using the set hours and set minutes buttons (like the transmitters are programmed). The 12/24 hour selection is mode 4. After cycling to mode 4 using the Set Hours button, the Set Minutes button toggles between 12 and 24 hour display modes.

Desire to change the brightness of the ETC display
The display board for the elapsed timer controller uses an SMA-2000 board (same as the 6 digit clocks described above). The 12/24 hour display selection is via programming, using the set hours and set minutes buttons (like the transmitters are programmed). The 12/24 hour selection is mode 8. After cycling to mode 4 using the Set Hours button, the Set Minutes button allows the value to be set to either 0 for standard brightness or 1 for brightest.

Distance limitation of the elapsed timer clock to the controller box

> A) **ETCB-2 (Starting ~Oct 2013) up to 100 feet**

> B) **ETCB (prior to ~Oct 2013) (KW 12/5/11) no more than 15 to 20 feet**

"The interconnect cable between the digital timer unit and its control box cannot be longer than 15 to 20 feet. This cable must be provided by the customer and is not included with your Spectracom equipment."

After asking Sapling if this distance could be extended, Brian White from Sapling responded: "Unfortunately, we have not been able to come up with a better solution. Until the next control box is released, we will have to stand with the current distance limitations. Sorry for the inconvenience."

Recommended wiring to use between the elapsed timer clock and the controller box

Email from Brian White (11/2/12)
I typically don't recommend anything thicker than 18AWG stranded. I have found that thicker wire picks up noise or something that causes a decrease in distance. I really look forward to the new elapsed timer. We will not have such a short distance limitation.

Email from Keith (11/2/12) For your information, we recommend using stranded wire, no thicker than 18AWG, between the digital timer clock and its Elapsed Timer Control Box (using wirer thicker than 18AWG can result in the cable lengths needing to be shorter, due to noise induced into the cable).

Time sync while elapsed time clock is counting up or down

Q. (email from Sylvain) Even if you set a countdown (for example 00:05:00 to 00:00:00…..) is the clock still synchronized through NTP input (is the clocking still coming from the NTP reference or does the display use its internal oscillator)?

A (from Brian W at Sapling 10/31/12) The IP Clock always retrieves time from the time server, unless the server is down. If the server fails, the clock will keep time internally via a crystal oscillator.

Sapling's wired displays

Transmitter or repeater sends RS-485 into a converter box. Other input to converter box is 110VAC. Data and power are modulated for a two wire output into the display clock. Polarity does not matter.

Analog IP and Digital IP clocks (NIPC)

Link to data sheet: (IPSync_NetClock) [link to datasheets in SharePoint](#)

Sapling Online manuals

Here is a link to a list of online manuals for Sapling clocks: https://sapling-inc.com/manuals/

For instance, IP clocks:

IP-POE SYSTEM

Product Category	Product Name	Version Number	Date Modified	Installation Manuals (PDF)
Analog				
	SAP Series	10.3	03/01/22	SAP Series Installation Manual
Digital				
	SBP 3000 Series	7.4	03/01/22	SBP 3000 Series Installation Manual

Links to our earlier IP Clock user manuals (no longer provided with Sapling clocks)

A) Link to Digital IP clock manual (P/N 1168-5001-0053):

➢ 2.5 inch or 4 inch Digital IP display clocks (four or six digit):

➢ Not yet in Arena (as of at least Aug, 2016): [I:\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx](#)

B) 12 inch/16 inch Analog IP display clocks

➢ Link to Analog IP clock manual (P/N 1168-5001-0054) Not yet in Arena: [I:\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx](#)

Analog clock Part Numbers

- **12 inch analog clocks**: NIPC-A1224-POE (24 hr) and NIPC-A1212-POE: (12 hr)
- **16 inch analog clocks**: NIPC-A1624-POE (24 hr) and NIPC-A1612-POE (12 hr)

Analog and Digital IP clock Specifications:

➢ Max Ethernet cable length for POE/injected power: 8 feet is the maximum supported Ethernet cable length from clock to hub/switch

➢ IP clock drift accuracy while in free-run mode: Bob Giovanni (Sapling Engineer) told Will Hickey that the drift of the IP clocks is about 2.5 seconds per day.

Power consumption

(Email from Norm, after checking with Sapling, 27 Aug 2013)
Please see below the power consumption specs for our Digital and Analog IP Clocks:

Digital PoE Clocks:

Average current consumption (at maximum brightness):

2.5" (6.35 cm) 4 and 6 Digit Clock: 125 mA @ 48 VDC via PoE = 6 W
4.0" (10.16 cm) 4 and 6 Digit Clock 175 mA @ 48 VDC via PoE = 8.4 W

Analog PoE Clocks:

Average current consumption (at maximum brightness):

12" and 16" Clocks: 70mA @ 48 VDC via PoE = 3.36 W

Design Change incorporated (new software/hardware)

A) **Per Michael Pregler, 20 Jan 2020 "We have redesigned the digital clocks recently"**

- Changes the header the Static address jumper is placed on.

B) **New IP clock platform released ~1/17/2012**

- Switched from metal to plastic enclosure

Network port on Analog and Digital IP clocks

➢ Network port is 10/100-base T only (not GB/1000 base-T).

Note: Users cannot hard-set any switches to 1000 base-T for GB operation).

IP Clock Installation

**Ceiling Wall Mount hardware

Email from Will Hickey to Tony Diflorio (16 Mar 16) digital clocks have thru holes in their housing to run 4 screws thru to the wall you're mounting them to. They also offer a mounting bracket for double-mount clocks – dropping down from the ceiling or from a side-wall. You add 2 clocks per mtg for this arrangement. Analog clocks come with a simple wall bracket with a 1-screw interface. There is also a security bracket option too.

Reply from Tony D I assume this option below is needed if they want to drop mount two digital clocks from the ceiling or side-wall? Otherwise, hardware is included for surface mounting to a wall only – correct?

MDDP-UNIV	Universal Digital Clock Double Mount Pole	USD 90

Reply from Will to Tony- Yes and no – yes for the mtg, it's a 4" drop arm, no hardware, ie. screws included, with the display.

Another reply from Will- checking with Sapling they did confirm they send 4 x mtg screws for a double-gang electrical box with each digital display.

Email from Randy Fowler with SMA – please confirm the Sapling kits include hardware for both **flush mounting** (part number D-MK-3-IP-F) and **Surface Mounting (**D-MK-WLL-PLTC-1).

**Input power

- ➢ **PoE Input Power requirements**: 110VAC, 220VAC, 24VDC or POE (48vdc nominal) (48vdc at 320mA) Note: input voltage must be spec'd at purchase. (Note that the minimum to power the clocks is 36VDC).
- ➢ **Current draw**: approx current draw is 250 - 300mA

**PoE input power (48vdc)

- ➢ **POE power requirements**: The nominal voltage output from a PoE is 48V and we need a minimum of 36V input.
- ➢ PoE can be provided to the IP clocks in one of two ways (each described below)
- • Via one or more PoE switches on the network (see A below)
- • Via a PoE power injector for each IP clock (see B below)

A) One (or more) PoE switches are installed on the network

Maximum network cable ("network segment") lengths (distance from POE switch to IP clock)

- ➢ Maximum distance without PoE Repeater installed: 100 meters (328 feet).
- ➢ Exceeding the max cable distance may cause the clock to keep resetting or not power-up at all.

Customer email

Though the clocks do not normally appear to draw too much current, we were thinking the switch was shutting down ports for that reason.
I changed the brightness level to medium (they were all originally on high) on all clocks. I have not had a switch port go down or a clock reset for 2 days. This appears to be power related though I can't tell if it is a switch issue or a clock issue. All of the cable runs have been tested and none are extremely long compared to the others.

The following info is from http://en.wikipedia.org/wiki/Category_5_cable
According to the ANSI/TIA/EIA standard for category 5e copper cable (TIA/EIA 568-5-A), the maximum length for a cable segment is 100 meters (328 feet). If longer runs are required, the use of active hardware such as a repeater, or a switch, is necessary.

B) PoE Repeaters

Max cable distances

If the network segment distance (network cable length between the IP clock and its PoE switch) is near or greater than 100 meters (328 ft), a PoE repeater should be installed.

> **Note**: BlackBox offers PoE repeaters. Refer to http://www.blackbox.com/Store/Detail.aspx/PoE-Repeater/LPR110 for more information (according to BlackBox, this device can extend network cable segments up to 300 meters).

Example "real world" customer scenario (with POE switch located near the NetClock)

(Green= clock synced, orange=partial operation, red= not even powered-up)
- ➢ Location 1(approximate distance from the NetClock is 30m)
- ➢ Location 2 (approximate distance from the NetClock is 50m)
- ➢ Location 3(approximate distance from the NetClock is 100m)

(**Note**: This IP clock synced but IP Monitor was not detecting it)

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- Location 4 (approximate distance from the NetClock is 60m)
- Workshop 1 (approximate distance from the NetClock is 60m)
- Workshop 2 (approximate distance from the NetClock is 125m)
- Workshop 3 (approximate distance from the NetClock is 150m)
- Workshop 4 (approximate distance from the NetClock is 160m)

Email Keith sent to this customer to explain the issue
As shown in the color coding above, the IP clock located at about 100 meters from the POE switch aren't operating normally and the ones that are exceeding 100 meters aren't operating at all. As mentioned above, this is highly likely due to their distances from the POE switch. Exceeding this distance limitation can affect network packets and also causes decreases in the POE voltage, so that it becomes too low for the IP clocks to operate normally, or even at all. As long as the clocks above which aren't shown in green can operate normally when they are temporarily swapped out with one of the clocks that are operating normally, this confirms the issue is with the POE power distribution of the network (and not an issue with the IP clocks themselves).

Email Keith sent to this customer to resolve the issue of the network segments being 100 meters or greater: Some suggestions for the network administrators to resolve this issue with the clocks include any of the following:

Relocating the POE switch to a location that allows all of the network cable distances to the clocks be less than 100 meters long.

Install one or more POE Repeaters (as necessary) on the network cables that are close to, or exceeding, 100 meters from the POE switch to each of the IP clocks.
Note: Spectracom does not offer PoE switches or repeaters, but they should be readily available locally (or online) for purchase. For example, BlackBox offers PoE repeaters. Please refer to http://www.blackbox.com/Store/Detail.aspx/PoE-Repeater/LPR110 for more information (according to BlackBox, this device can extend network cable segments up to 300 meters.

Install an individual PoE power injector at the location of EACH IP clock that is not currently operating normally (one PoE injector would be required for each clock that is too far from the PoE switch). The power injector uses building power (instead of network PoE devices) to inject 48vdc PoE power into each IP clock. Spectracom does offer PoE injectors. Please contact our Sales team for more information.

Likely the least two desirable approaches would be to either relocate the remaining clocks closer to the PoE switch so they are no longer at, or exceeding, 100 meters OR to add one or more PoE switches to the network, thereby allowing all network segments to be less than 100 meters.
Other solutions may also be available, but these are the only ones I am aware of.

POE Power Injector (if no PoE switches are on the network)

- **Our P/N**: NIPC-INJEC-POE
- **In Arena**: https://app.bom.com/items/detail-spec-redline?item_id=1203165895&version_id=10217105868&&redirect_seqno=6176137281
- **Sapling P/N**: E-PSA16U-480POE

(Order our P/N NIPC-INJEC-POE Our P/N: 1168-0001-00010, Sapling P/N: E-PSA16U-480POE) 110-220V 50-60 Hz. Required for EACH display clock if the network does not provide PoE power to each display clock.

Note: We buy the PoE Injector from Sapling. The following website appears to the same part (based on the Sapling P/N): http://www.doubleradius.com/Phihong-POE-Adapter-802-3AF-48V-15-4W-Single-Port

Refer to [I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Display Clocks\IP display clocks](I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Display Clocks\IP display clocks) for a copy of the MFG data sheet.

Notes from the Manufacturer's data sheet:

Phihong POE Adapter, 802.3AF 48V 15.4W, Single Port.

- **Input Voltage**: 100-240VAC@50-60Hz (via standard AC IEC line cord)

- **Output Voltage**: 48VDC

- **Output Current**: 0.4A

- **Output Power**: 15.4W

- **Case Style**: Desktop, black

- **Dimensions**: 140 x 65 x 36mm

- **Operating Temperature**: 0 degrees C to +40 degrees C

- **Agency Approvals**: UL, cUL, CE, TUV, RoHS-compliant

- **Weight**: 200g

- PSA16U-480(POE)-R

Note: AC Cord (PC-US3C14K) not included.

Note: For information on network-wide PoE (instead of using individual injectors for each clock), refer to: http://www.cisco.com/en/US/docs/wireless/technology/poe/technical/reference/Power.html

Each IP display clock has only one available connector on it and that connector is an Ethernet port, which allows each IP clock to be connected to the network (via a hub or switch). There are no separate AC power cords or DC input plugs on the IP display clocks. The operating power for each clock is always provided through its Ethernet jack. If the network that each clock is connected to has a 48vdc PoE power source for the entire network, this voltage goes directly into each display clock, through its Ethernet cable, without the need for an additional power injector to be used.

However, if the network does not have a network-wide PoE power source, and it's not desired to add one to the entire network, Spectracom offers individual PoE injectors that can be connected between the network and the Ethernet port of each IP clock. Each power injector needs to be connected to 110-240VAC (50-60Hz) in order to provide 48vdc to each IP display clock. These individual power injectors allow the IP clocks to be able to indirectly run off the building's AC power, via a line cord attached to each power injector. The PoE power injector has an AC line cord input one end and two Ethernet jacks on the other (one Ethernet jack connects to the network and the other Ethernet jack connects to the back of the IP clock).

Note: If the network does not have a PoE power source available, one Power Injector needs to be ordered for each IP clock. The Power injectors cannot be shared between two or more IP clocks.

To Ethernet jack on one IP Clock using network cable

110-240VAC (50-60Hz) input

Network Hub or switch using network cable

Network cabling when using a power injector

A) Connecting IP Clock to a network (with power injector in between)

Use two straight-thru cables (one between the display clock and the injector and the other between the injector and the hub/switch).

B) Connecting IP Clock directly to a PC (with power injector in between)

Use **one** crossover cable and **one** straight-thru cable

- Use the cross-over cable between the stand-alone PC and the Power injector.

- Use the straight cable between the power injector and the display clock

| PC | | Power injector | | Display Clock |

Cross-over cable   Straight cable
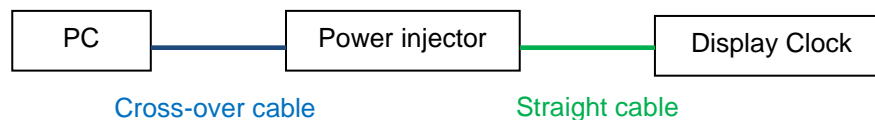
802.3af compliancy of injector

Q. Are the IPSync clock power injectors compliant with the 802.3af standard?
A. (Reply from Dave Lorah 12/6/12) Here is the data sheet for the POE Injector we sell. It is indeed compliant to 802.3af standard.

Power-related issues (such as clocks resetting themselves

1. IP Clock keeps resetting (Powered from a POE switch - not a power injector)

Email from Danny Patterson with Gately to Dave: Though the clocks do not normally appear to draw too much current, we were thinking the switch was shutting down ports for that reason.

I changed the brightness level to medium (they were all originally on high) on all clocks. I have not had a switch port go down or a clock reset for 2 days. This appears to be power related though I can't tell if it is a switch issue or a clock issue. All of the cable runs have been tested and none are extremely long compared to the others.

2. **(Feb 2020) change to IP clock design results in clocks keep resetting/erratic display when using earlier Model POE injector (need to change to a different injector).**

Q Our report to Sapling (Sapling RMA# 5098): The customer reported the IP clock was working for 2 weeks then suddenly cycles between 38:04 and dark. Appears to be rebooting. Tried to power cycle but no change.

A Initial reply from MichaelIP@sapling-inc.com (5 Feb 2020) So there is no issue with the clock itself. The issue is with the POE injector that is being used. I will be sending out a new working POE injector to be used with the clock.

> **Follow-up email from Michael (Feb 2020)** The issue itself isn't that the POE injector failed or went bad. We recently released a new board for the POE digital clocks. Due to making the board more efficient, we ran into an issue where the clocks would draw so little power from the POE injector during initial power up that the POE injector would determine there was an issue, and restart itself. This would lead to an unending loop of the clocks powering up, and then restarting.
>
> We have fixed this by purchasing new POE injectors that do not have this minimum threshold, and so do not go into this restart loop.

**Clock Mounting

Back to Back: Digital Clock Double Mount

(Email from Will Hickey) Hi Florise – see this link: https://na8.salesforce.com/01tC000000397ah?srPos=2&srKp=01t @ $99 global list. So that's the double-mount housing, then you add 2 @ NWC-D25R6P-024 units to make a two-sided display

---

**Default settings

- **Default static IP address** (with jumper already moved) **192.168.0.123/24 (255.255.255.0)**
- **Default password**: **6063**

**Network port settings

- Port **123** must be open if the clock is accessing a time server outside of the network.
- Port **80** must be open if access to the web interface from outside the network is desired.
- Port **25** must be open to use the "**Email Alerts**" feature
- **10/100 base-T only** (not 1GB) to work

Analog IP clocks

A) New design (no rear panel jumper) starting ~ Oct/Nov 2012

Notice: The new design has a cover over the PCB board (The earlier design had no cover over the PCB, so the PCB board was exposed to gain access to the jumper).

The only purpose for this design change was to integrate the separate IP and main boards into one single board for ease of production (it was initially designed for us by adding a daughterboard to their existing design).   Now that it's working and selling, it was redesigned for better production
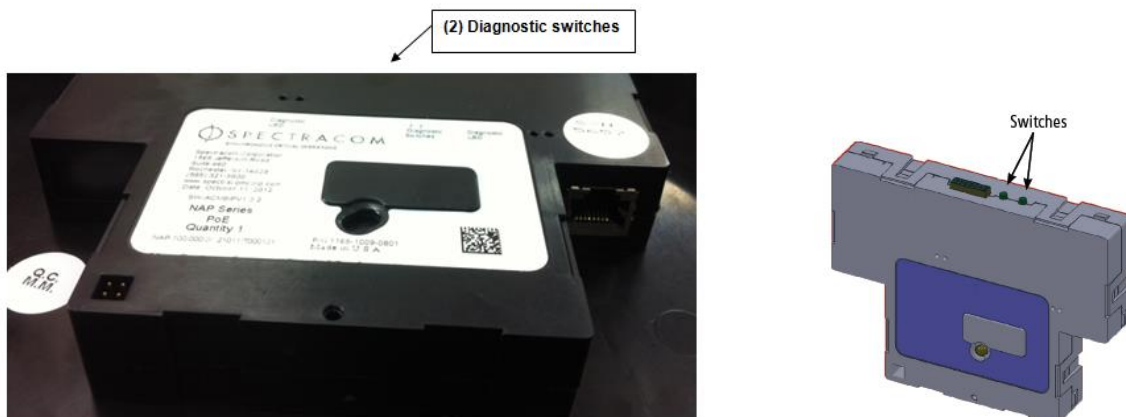
> As of at least Nov 2012, Analog IP clocks no longer have a jumper to set the clock to a static address.

> Analog clocks now use the two Diagnostic switches on the rear of the clock.

> The factory default setting is DHCP enabled (Jumper J7 not installed)

> The Default static IP address is **192.168.0.123.**

> Refer to the "**Keith modified**" email below from Sapling for the improved setting of a pre-defined static address.

Email from Brian White (2 Nov 2012)
Hi Dave,
We did improve the design of the IP analog movement. I apologize that you guys were unaware. Please find the attached email string.   I am working with the person that rights the manuals now. I need them to add something about static IP crossover address. We no longer use a jumper. What needs to be done now is as follows:
   1. Press and hold both buttons on the rear panel BEFORE powering the clock.
   2. Release the buttons once power has been supplied.
   3 The display clock now has a default IP address of **192.168.0.123.**
   4 Open the displays clock's web browser via a PC on the **192.168** subnet via a network cross-over cable.
   5 Login with the password "**6063**".
   6. Configure the desired Network settings via the "**Clock Settings**" page of the web browser. Then power cycle the clock.
   7 Plug the display clock into the network.
   8 The display clock's web browser should now be accessible from the network. To sync the clock to an NTP server, configure the IP address of the NTP Server in the "**Network Servers**" page of the browser and make any other desired changes via the browser connection, as discussed in the manual.

Restoring DHCP from rear panel

Note (KW 11/21/12) per Brian White: The analog IP clock can be set to the pre-defined static address via the rear panel, as described above. However, it cannot be reset to DHCP via the back panel, once DHCP has been disabled. This can only be done via the web browser

To restore DHCP functionality, login to the browser and navigate to the **Network Settings** page. Turn "DHCP" to "On". Then hit Submit and power cycle the clock. It should now be assigned a DHCP address.

B) Earlier design (rear panel has jumper for static IP address) prior to ~ Oct/Nov 2012 time-frame

Notice: The earlier design had no cover over the PCB (The new design now has a cover over the PCB).

Place jumper in middle position to set IP address to **192.168.0.123**

Jumper to configure the default static address (for all Analog IP clocks shipped before at least Nov 2012)

➢ The factory default setting is DHCP enabled (Jumper J7 not installed)

➢ The Default static IP address is **192.168.0.123**

Place jumper in middle position to set IP address to **192.168.0.123**
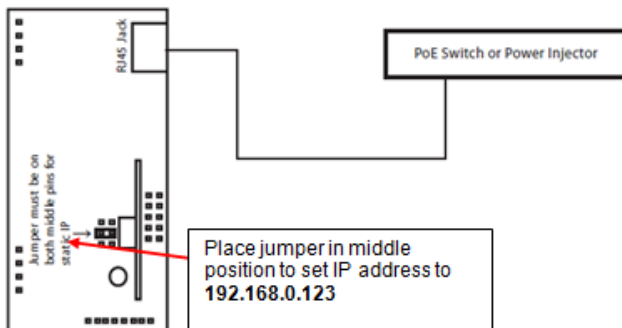
NOTE: Place jumper back in starting position after setting desired address via the Web browser.

Clock Monitor software: Refer to Clock Monitor (IP Clock Monitor software)

Digital IP clocks

Jumper/header setting

A) IP clocks starting around Jan 2020

Email from Michael Pregler with Sapling to Dave L (20 Jan 2020) We have redesigned the digital clocks recently. The newest version of the manual is V7.0. On the new boards, the jumper is shipped on an 8 pin header. This is the most secure place on the board that we can put the jumper so that it does not fall off during shipping.

Page 9 of the attached manual shows the setup instructions for the new board. Please ignore the image that shows the shipping position, as that is the wrong image. The setup position is the correct image for setting the clock to the default address though.

In the image below:

- the **red** arrow points to the **8 pin** connector that is the **storage position** of the jumper.

- The **green** arrow points to the **6 pin** connector (The 6 pin header is located in the corner of the board, closest to the buttons on the front of the display) where the pin is used to **set the clock to** the default IP.
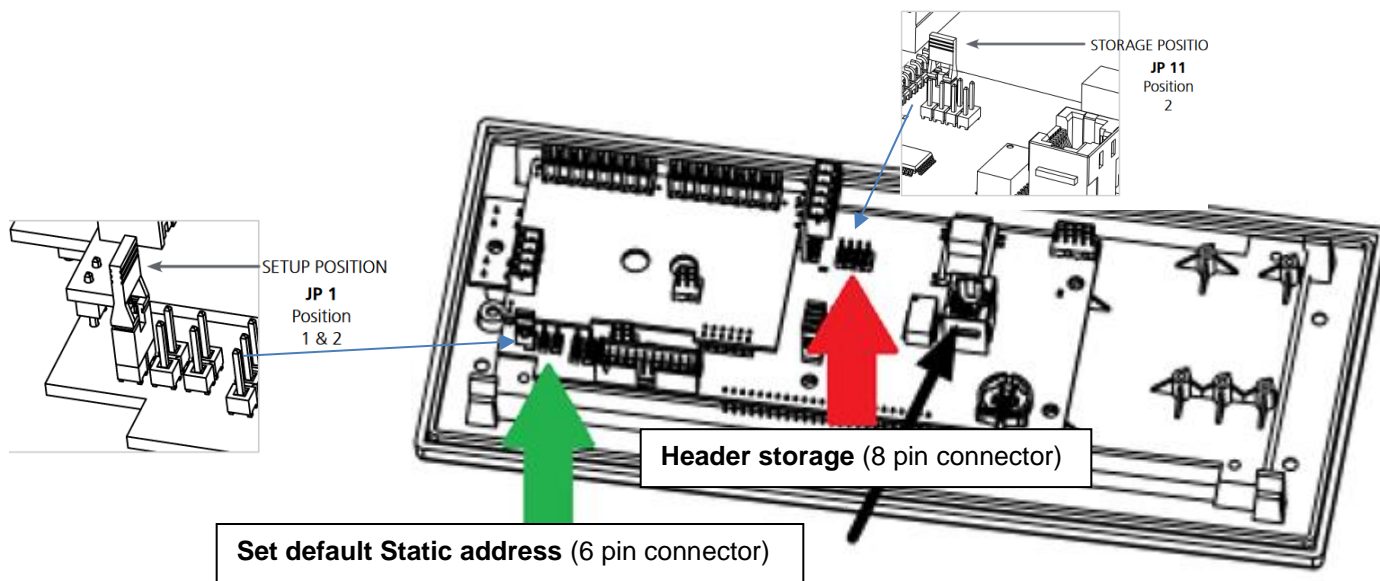
Reply from Dave L to Michael Pregler: "I get it now. We move the jumper from the 8 pin to the 6 pin header for setup. Then back to the 8 pin for storage."

Network cable requirements (IP clock connected directly to a PC with the power injector in between)

➢ Apparently, **two** (2) network cross-over cables are required (one on each side of the power injector)

• Per the Sapling user manual (in blue) "Use a crossover cable to attach the clock to a PoE injector, and ALSO the injector to your computer"

The subnet mask with the jumper installed is **255.255.255.0**

Note: the web browser uses Port 80.

Note: The web browser login password is 6063.

B) IP clocks shipped prior to about Jan 2020

To configure the IPSync display clock for static IP addressing:

1. Remove the supplied jumper from its factory set position and place it in the following orienta
   on the circuit board:

Place jumper J7 in middle position to set IP address to 192.168.0.123

Place jumper on these two terminals
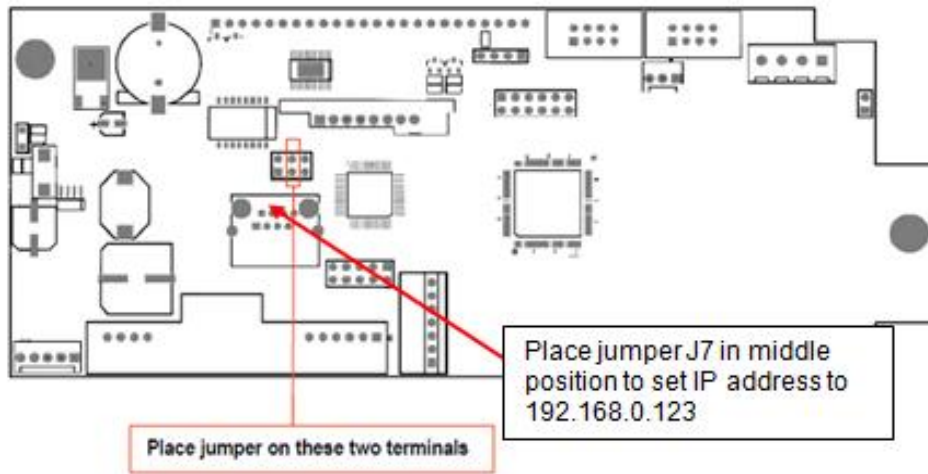
NOTE: Place jumper back in starting position (far left, I believe) after setting desired address via the Web browser.

(5-21-12) With the new IP clock design released Spring 2012, the DHCP address is displayed, when assigned.

(10/27/10) apparently, after plugging clock into network, the DHCP address is assigned (but not displayed at the clock itself). The user will run IP Clock Monitor software from Sapling on a network PC. The software finds the IP clocks and lists each by serial number and indicates the assigned IP address.

As of at least 9/20/10, the IP clocks can be assigned a DHCP address, but only if the DHCP server is on the same subnet as the DHCP server. The IP clocks do not currently support "IP helper", so they can't go through a router to communicate with the DHCP server.

If the DHCP server is on a different subnet, they have to manually configure them with the default static IP address and then manually configure the desired IP address using the web browser connection to that default static address. Excerpt from the IP clock manual:

If your clock is not shipped f/rom the factory with a static IP address set already, disconnect the clock face, unscrew the unit's inner housing, and attach a jumper to the middle two pins on the middle set of jumper posts on the clock's IP board. This sets the clock's IP address to **192.168.0.123**

Note: Jumper to configure static IP address is labeled as **J7** (it's located between jumpers **J6** and **J8**).

Note: subnet mask with the jumper installed is **255.255.255.0**

IP Digital display clock Jumper   **IP Analog display clock Jumper**
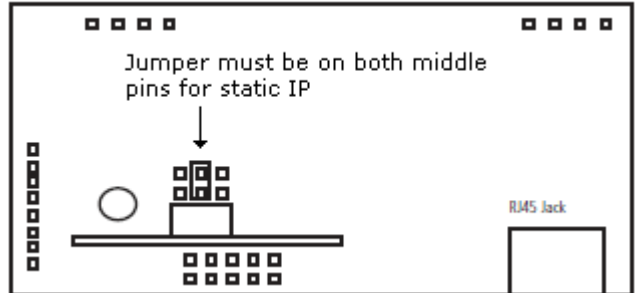
- When digital IP clock is powered-up with J7 installed (for static IP address *192.168.0.123)*, the segments cycle, then "P 21" is displayed, and then the time is displayed (no IP address is shown).

- When digital IP clock is powered-up with J7 not installed (for DHCP), but no DHCP server is detected, the segments cycle, then "P 21" is displayed, and then the time is displayed (no IP address is ever shown).

- When digital IP clock is powered-up with J7 not installed (for DHCP) and the DHCP server is detected, the segments cycle, then "P 21" is displayed, then time is displayed and then the DHCP address is displayed (IP address is cycled through 2x around 13 to 19 seconds after the time is first displayed).

Static IP: If using a static IP, the default IP address will be **192.168.0.123**. Go to a web browser and type in 192.168.0.123 to load the web interface. Once this is done, navigate to the Network Settings page. Turn off DHCP and enter the new IP address and click submit. Then power down the IP Clock, remove the jumper, and reboot the Network Repeater. To access the web interface, type in the new IP address in the web browser.

- Jumper J7 inadvertently left installed after setting desired static address - When digital IP clock is powered-up with J7 installed (for static IP address *192.168.0.123)*, the segments cycle, then "P 21" is displayed, and then the time is displayed (no IP address is shown). This will cause it to revert to this address after each power cycle (instead of using the static address programmed in the clock's web browser)

Note (5/31/11): The displayed "P" value (such as P20 or P21) at power-up indicates the firmware version installed in the IP clock. The current manual shows "P20" but the current shipping version is "P21". Per Brian White, there are no customer-noticeable differences between P20 and P21.

Proxy command to get DHCP requests through a router

(email from Kent Franken 6/8/11) We are working now between subnets. The following command on the routing switch allows it to "proxy" dhcp broadcast requests between subnets to the main DHCP server at IP address x.x.x.x:

ip helper-address x.x.x.x

IP Clock Serial Number

➢ Serial Number is reported in the **Clock Status** page of the browser ("IP xxxx")

Display Settings | Clock Settings | Network Settings | Network Servers | Clock Status | DST | Log Out
Email Alerts

Clock Status   IP 2052
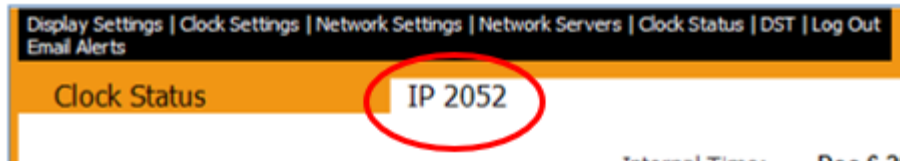
IP Clock version info/software updates

➢ Code build date (and time of build) is reported in the **Clock Status** page of the browser

Display Settings | Clock Settings | Network Settings | Network Servers | Clock Status | DST | Log Out
Email Alerts
                 IP Dig

Clock Status   IP 2052

Internal Time: Dec 6 2011 12:00:37
Code build Date and Time: Mar 18 2010 10:05:32
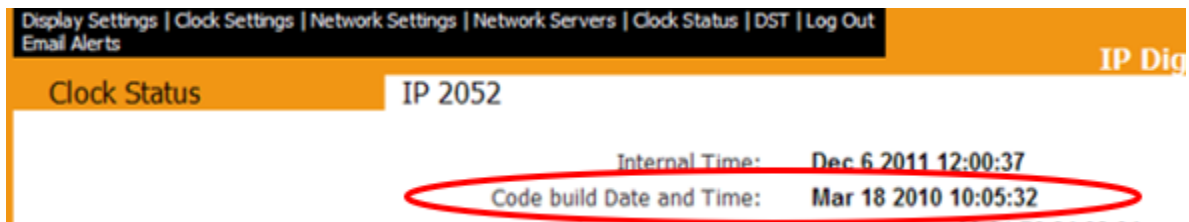
Version information

➢ IP Clocks can't be software updated in the field. They would need to be returned to the factory for any software updates to be applied.

➢ Sapling does not maintain/provide software version update" Release Notes.

Software versions P20 and P21 (P21 is the latest version as of 6/29/11)
(**Email from Brian White on 6/29/11**)
The difference has something to do with messaging. Instead of only taking fire and bell, it can take all letters of alphabet

(**Email sent to Kent Franken on 6/29/11**) Software version P21 is the latest version of the IP clock software. Many of the IP clocks have also been shipped with version P20 installed. The only difference between P20 and P21 was for a proprietary function for one specific customer application. There is no need to update version P20 to version P21. (FYI-updating from version P20 to P21, if it need to be applied, would require the IP clocks to be returned for the software update to be performed).

Internal time/date of IP clock

➢ Internal time/date of IP clock is reported in the **Clock Status** page of the browser

Display Settings | Clock Settings | Network Settings | Network Servers | Clock Status | DST | Log Out
Email Alerts
                 IP Digital

Clock Status   IP 2052

Internal Time: Dec 6 2011 12:00:37
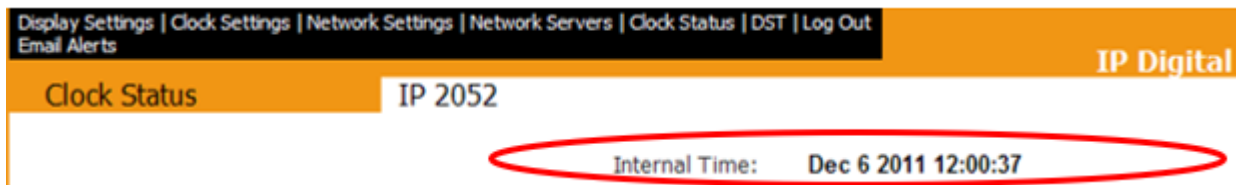
IP CLOCK CONFIGURATIONS

**Login user passwords/Changing user password

- ➢ Default password: "**6063**" (then press Submit, not Enter key)

  Note: After entering password, need to press the **Submit** button in the browser to login- not the Enter key on the keyboard. pressing the Enter key will cause the browser to just remain at the login page.

- ➢ The factory default password cannot be changed. But one new user password can also be created (in addition to the master password of "6063)?

- ➢ Once one new password has been created, either this or the default password can be used to login.

- ➢ The custom user password can be overwritten by entering a new value in the "**User Password**" field.

- ➢ While typing a desired password in the "**User Password**", the typed characters are not displayed in this field

(Email KW sent on 3/28/12) One additional user password can be added in the "**Clock Settings**" page of the IP clock' web browser. However, the default user password of "**6063**" will always remain as an available master password that can be used at any time. There is no way to "change" the default password of 6063 to any other value. Once a new password has been entered, either password can then be used.

Note that for security reasons, the new user password characters are not displayed as you enter the desired passwords in the "User Password" field. When you press Submit, this new password is available. If this password is ever forgotten or unknown, a user can login using the default "**6063**" factory password and replace the existing user-defined password by entering a new value in this field (and pressing "Submit").

User gets to login page, enters 6063, hits <enter> key, but stays on login page

- ➢ Per Sapling Tech Support- need to press the "**Submit**" button in the browser- not the Enter key on the keyboard – to successfully login.

****"Clock Settings" page (User password, unique clock identifiers, Sync interval)**

(Digital IP clock only)

(Analog IP clock only)

****Network Settings" page (Network and Clock Monitor settings)

"Monitor" fields

> **Broadcast to Monitors** -This setting allows the clock to send out its data in broadcast mode.

> **Send Specific Monitor IP** - This setting allows the clock to send the IP address to the monitor program through a gateway (if the clock and PC running on a different subnet).

> **Email from Brian White**- I believe they do not see all the clocks because they are on different subnets. They have to tell the clock itself to point to a specific IP address that the IP Monitor is installed on if they are on a different subnet.

> **Monitor IP Address** - This is the read only option of the monitor IP address.

> Q. **From Sam Otto to Brian White (17 Apr 13)** Is it possible to add more than one Monitor IP Address so that a Sapling clock on a different subnet may be monitored by more than one PC running Clock Monitor? Would this require a software update?
> **A Reply from Sapling** As it is now, only one IP address can be entered. This would in fact require a software revision.

****"Display Settings" (12/24 hour mode selection/Date display format) (Digital IP clock only)

> ➤ 12/24 hour time display is configured in the "Display Settings" page of the browser

**Alternating Date/Time display (Digital IP clocks only)

➢ Alternating Time/Date display and the date display format are configured in the "**Display Settings**" page of the browser.

**Time Zone Offset and DST adjustment:

The Spectracom IP clocks can also be configured for local time display. With IP Clocks, because the NTP time stamps are always UTC time, the adjustments for local time display are made in each display clock, instead of in the NTP time server.

Each IP display clock is assigned its own IP address. The configuration of each display is via its web browser pages. After entering the IP address of the desired clock to configure into Internet Explorer or Firefox, you will access the web browser. After logging in with the default password of "**6063**", you can access all the other web pages.

Software issue: IP clocks are exactly one hour off the correct time.

➢ Brian White w/Sapling mentioned a possible software issue for International customers (May 2013)

➢ Brian mentioned the possible need to set the DST in and DST out settings to the exact same values for countries that do not adjust for DST (I suspect this may also affect US states that don't observe DST).

(Aug 2013) firmware update is available to address this issue.

Local Time configuration (Time Zone Offset and DST adjustment)

Step 1: Configure the Time Zone Offset (GMT Offset)

Select "**Clock Settings**" page of the browser and then change the **"GMT Offset" (based on Standard Time)**

Example offset values:
"-5" for Eastern
"-6" for Central
"-7" for Mountain
"-8" for Pacific

Step 2: Configure the DST rules as appropriate in the "DST" page of the web browser.

DST: If your region adjusts for Daylight Saving Time change, DST correction is configured in the "**DST**" page of the browser. DST can be configured by manually configuring times and dates for adjustment or by selecting a desired Country (many, but not all Countries are listed).

"**DST**" selected

DST page
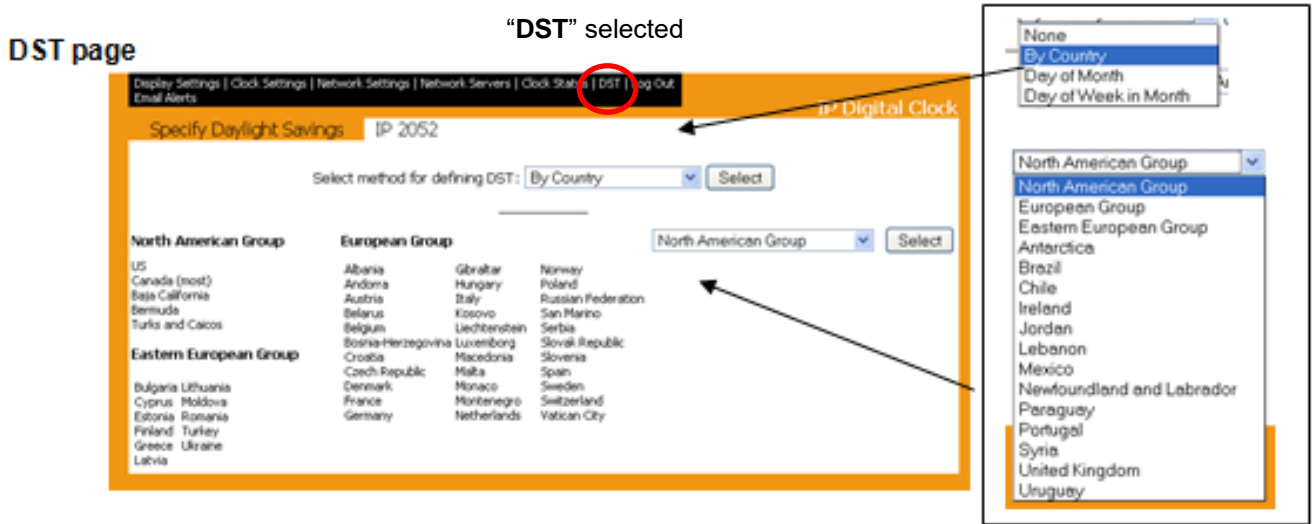
Normal "DST" configuration for North America
Can either:
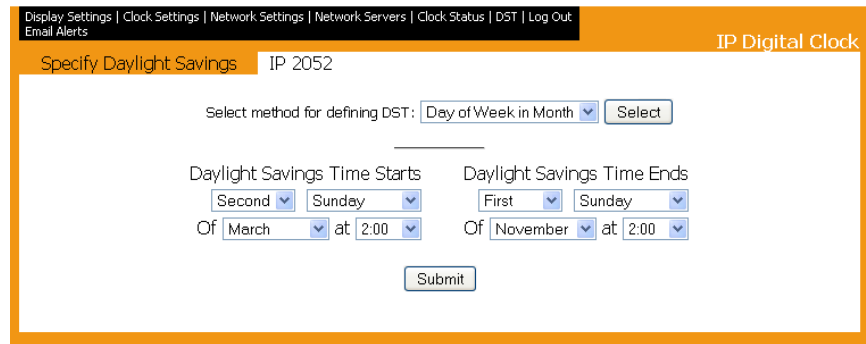
1) **Use pre-configured on/out dates by selecting the "North American Group"**

   "**Select Method" dropdown field**: Select "**By Country**"
      "**Group" dropdown field:** Select "**North American Group**"

2) **Manually configure in/out dates using the "Define DST by Day of Month" page**

   Select **DST -> "Define DST by Day of Month" (**Configure using values shown below)"

"**DST**" selected
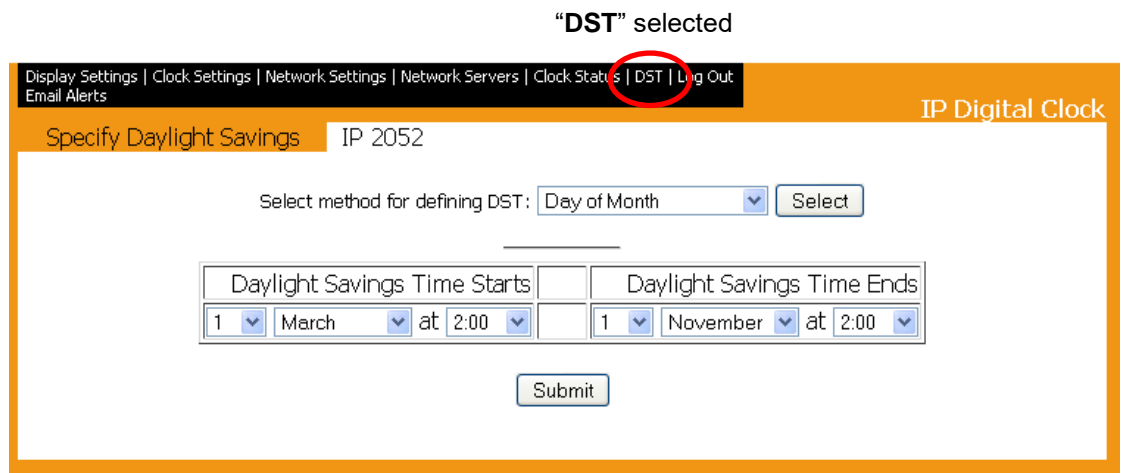
DST page if you instead select "Define DST by Day of week in Month"

> **Note: T**his particular page seldom used (this page sets specific calendar dates to adjust for DST -such as March 3rd– instead of a "more generic" week number which is useable every year)

PROBLEM: IP Clock was in sync, but time was 6 hours off.

After verifying the time zone, DST and sync status was all OK the time was still off 7 hours. We found the pushbuttons had been played with and the setting on #35 was set to 07. We set it to 00 and the time came up correct.

Manual time sync (no external input from NTP time server)

➢ To set the clock's time display with push buttons, the user must first connect to the IP Clock's web interface and from the "Clock Settings" page, change the "Network Sync" option to "Never" sync.

Set Hour - To set the hour on the IP clock, press the top button and the hour selection will appear (HR). Using the top button, scroll through numbers 01-23. After the selection is made, press the bottom button to move on to set the minute.

Set Minute - To set the minute, press the bottom button after making the hour selection and the minute selection will appear (MM). Using the top button, scroll through numbers 01-59. After the selection is made, press the bottom button to move on to the set second.

Set Second - To set the second, press the bottom button after making the minute selection and the second selection will appear (SC). Using the top button, scroll through numbers 01-59. After the selection is made, press the bottom button to move on to the next option.

Save Settings - To save the time settings that were chosen, press the bottom button after the second is selected and the "save settings" option will appear (SET). Press the top button to save the settings and then press the bottom button to move on to the next option or just press the bottom button to not save and move on to the next option.

Clear Settings - To clear the time settings that were chosen, press the bottom button after "saving settings" are selected and the "clear option" will appear (CLR). Press the top button to clear all hour, minute, and second settings. After this selection, the clock will return to its normal time display.

Questions

Q In case the NTP server fall down and there is no synchronization, is there any way to manually set the time? The IP clock has two external buttons but when we tried to change the time, the time did not change, even if we had select "Never'' at NTP synchronization – update.
A The current version of our IP Digital Display Clock cannot be set manually. The new release will be able to have the time set from the two buttons on the front. This new model will be available in late Q3 2011.

Q Can the seconds be changed or not? If yes, how this is possible.
A Seconds can be offset from the reference time received by using the Bias Seconds feature. See the answer to #3 above for details.

Q Is there any display indication that declares that the unit is connected- synchronized from the NTP server?
A Not on the current release. On the new release of the IP Clock, the colons will flash when sync is lost.

Q The attached user manual has little information. Is there anyone with more details? When we tried to change time from the two external buttons, we pushed simultaneously the two buttons and the IP clock was displaying unclear images, ex 1-12 etc… Is there any guide providing information about what you can change and in what way?
A There is an update planned for the Digital IP Clock manual. However, the new manual will coincide with the release of the new IP Clock model in Q3 2011. In the meantime, please feel free to contact me with any questions you may have. There are no usable functions that can be performed by pressing both buttons simultaneously. In the currently released IP clock, the only instance in which you would press a button is to retrieve the IP address of a particular clock. Press the top button once to complete this function
.
Q How can **the user change the date?**
A There is no way to change the date. Please keep in mind that this product is not meant to be a stand-alone clock. The date information is provided through the NTP Time Server/time reference.

NTP Time Sync / Sync Status (Clock Status page of the browser)

A) Configuration for NTP sync

IP Clock sync FAQs

Q What is the time difference between the NTP server and IP clock in order IP clock time to be corrected-synchronized to NTP time? To be more specific, in case the NTP time is 13:05:45 and the IP clock time is 22:35:58, can it be corrected or there is a maximum difference time between the two time values in order synchronization to be achieved

A There is no maximum value or limitation on the clocks' time synchronization. Once a clock receives time from the NTP server over the network, it will update to the provided time.

Q Is it possible to set the time through the software interface or not? We have not found such capability and the customer requires it. Actually, in case the IP clock is situated in a remote place, such a capability is a must.

A The time can be set through the Clock Settings page in the software.

Network Servers page
Note: Fields turn red if the NTP server is not responding to NTP requests

❶ **Retry Failed Server After** - This field will allow the user to set how often it attempts to connect to a server that has not communicated with the clock.

❷ **Server Addresses** - These fields allow for the (S)NTP servers to be set.

❸ **Rotate Servers** - This option lets the clock rotate through all ten (S)NTP servers instead of being locked to one (S)NTP server.

❹ **Submit** - This button, when pressed, will save all the settings that were entered.

"Retry Failed Server After" field

Q When accessing the "**Network Server**" settings, the first tab is "**Retry Failed Server after: 12 Updates**" (page 4 user manual). Please advise what is that parameter and which is the appropriate value

A This value determines how many times a clock will attempt to get time from the other servers selected before returning to the failed server for time. If the servers you have selected are generally reliable, the number can be low. If you feel that when a server stops serving time, it is probably out for good, set the number high so that the clocks on your network will not continue to re-ping a bad server for time.

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Possible issues that can prevent the clock from syncing, resulting in its time drifting

- Firewall in between IP clock and NTP time server has port 123 closed

- Problem with the NTP time server

- IP clock is not routable to its NTP time server(s).

- Network settings/ configuration issue

Suggestions to troubleshoot IP clock not syncing to NTP server/ clock is drifting

Note: The IP clocks initially sync to the configured NTP server upon boot-up on the network. Then, they sync every 15 minutes thereafter. They don't have to wait up to 15 minutes for the first sync to occur (Dave Lorah confirmed this on 9/18/12).

FYI: The sync interval can be changed from 15 minutes to 15 seconds in the **Clock Settings** page ("**Network Sync every**" drop-down)

Email from Dave L to a customer (10 Nov 17) (Note that Dave L also included a copy of the Sapling manual with the email below):

An IP Clock losing sync could be due to One of the following:

- Network issues – Check the network configuration and IP settings of the Master Clock and The IP clock. Make sure the IP of the master clock is entered in the NTP Servers configuration.

- Master Clock losing sync – check the sync status of the master clock

- Connection issues – check the connection to the switch and master clock

- Firmware problems in older IP Clocks – if the IP clock was sold prior to 2012 it may need a firmware update

Do you know the age of these IP Clocks?

1. Review the Clock Status page of the Display clock's browser (see info on this page further below)
   - Reports measurements such as drift per hour, server syncs, etc.
2. If NTP time server is a Spectracom time server (such as NetClock/SecureSync), is it in sync and Stratum 1?
3. Run Automachron (W32Time, PresenTense, etc) on a Windows PC on the same subnet as the IP clock.
4. With a NetClock Model 9483/9489 or SecureSync, try pinging out to the IP clock using the CLI interface
   - See if the IP address of the IP clock is listed in the NTP clients list (Management-> NTP Setup page of a NetClock Model 9483/9489 or SecureSync)
5. With a NetClock Model 9483/9489 or SecureSync, use tcpdump to look for handshaking and NTP time stamps when the IP clock powers-up

   Note: The IP clocks initially sync to the configured NTP server upon boot-up on the network. Then, If you open the web browser for any of the IP clocks that are drifting (enter its IP address into Internet Explorer, Firefox, etc), first go to the "Network Servers" tab. Make sure the correct IP address of the NTP server is listed in the first field:
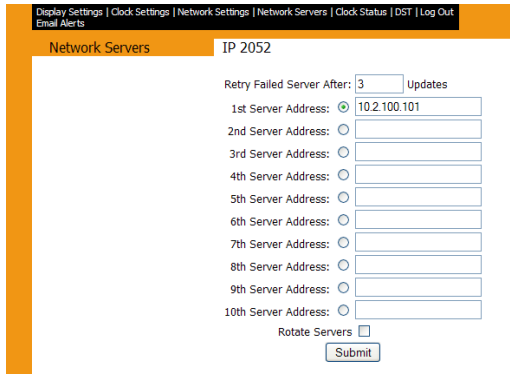
Next, click on the "**Clock Status**" tab. It will look similar to the screenshot below:
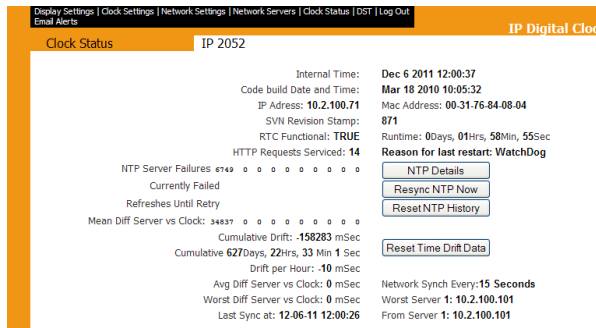
The "**Last Sync at**" (at the very bottom of this page) will indicate the last time it was synced to one of the values shown in the "Network Servers" page of the browser.

Each time you press "**Resync NTP Now",** the values on this page should change. The "**Last Sync at**" value should become the time that this button was pushed. Also, there is historical data on the NTP synchronization, (clock on "NTP details").
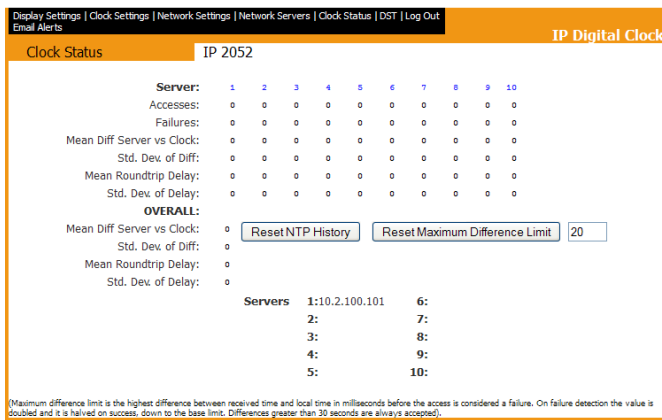
The "**Accesses**" count indicates the number of times the clock was able to sync to one of its configured time servers.

The "**Failures**" count indicates the number of times it tried to sync to one of its configured time servers, but was unable to.

If you "**Reset NTP History**" (just to start from scratch) and then repetitively press "**Resync NTP Now",** the "**Accesses**" counter should increment by one, each time the button is pushed, as long as the clock can sync to its NTP time server.

If the "**Failures**" counter increments instead of the "**Accesses**" counter, port 123 of a firewall may be blocking the NTP server. Or, there may be a problem with the NTP server.

**Email Alerts for IP clocks

When enabled in the web browser, the IP clocks can send email alerts to a mail server.

The alerts are sent out on **TCP port 25** (the standard SMTP port).

Below is an example screenshot of the "Email Alerts" page of the browser. It shows what types of conditions can cause email alerts to be sent.

A) "Email Alert Configuration"

Email Recipient: Defines the email address of the email recipient. Do not enter the domain and suffix (correct: **johnsmith**) (incorrect: **johnsmith@domain.com**).

Email Domain: Defines the domain name of the email server. (i.e.,**domain.com**).

Email Server: Defines the email server address (i.e., **server.domain.com**).

Email from Dave L (9 Oct 13) referencing screenshot above My email address is dave.lorah@spectracom.orolia.com and our email server is 10.7.0.7.

To test the email function, I just power cycled the IP Clock and received this message:
Clock IP 3629 restarted at 2013-10-08 12:47:36 GMT-4. Reason: Power Up.

The Clock Monitor software was setup similarly:
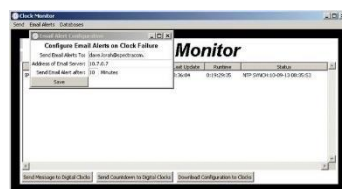
My entire email address is inserted in the Send Email Alerts To field.

Send Test Email results in this email message: This is a test email from the task 'monitor' at IP address: 10.2.100.42 (hostname: pm-lorah)

B) "Send Email Alerts On":

NTP Synchronization Timeout: Allows the user to define the time period after which an email alert is sent when the clock hasn't received time synchronization.

Time Sync Change: Allows the user to define when an email alert will be sent when the time that is synchronized is greater than **x** seconds.

Restart: Sends an alert when the clock has been reset.

Email from Sapling Engineering (do not send this out as-is) SMTP uses port 25, I think universally. You probably won't see this on a wireshark capture because most switches will only pass data to ports involved in the message – IE, if the masterclock tries to contact the mail server or DNS server directly, those messages won't get passed to other connections on the switch, such as where your computer running wireshark is connected (That's caused me no end of grief trying to debug this :-o)

The "powerguardian" messages are actually our UDP status broadcast transmissions for the monitor program. We accidentally used a port also used by powerguardian, but I did some research and don't believe this will ever cause a conflict, and so didn't go through the agony of moving everything to a different UDP port. Because these are broadcasts, they get sent through to every connection.

**Count-up/Coutdown functions (Digital IP display clocks only)

Note: Not applicable to the analog IP clocks.

(10/26/12) Apparently, all newer digital IP clocks (plastic enclosure that started shipping mid-2012) IP clocks have count-up/count-down capabilities. There is no special configuration necessary in the IP clocks themselves. the IP Monitor software handles this function remotely.

Count-up/Count-down in the IP Clock Monitor software

The IP Monitor software can remotely set the starting time for one or more clocks that are configured as count-up/count-down displays. It can also remotely start

(**Note**: This menu is displayed by navigating to the **Send** -> **Send Countdown** menu in the main page of the Monitor software).
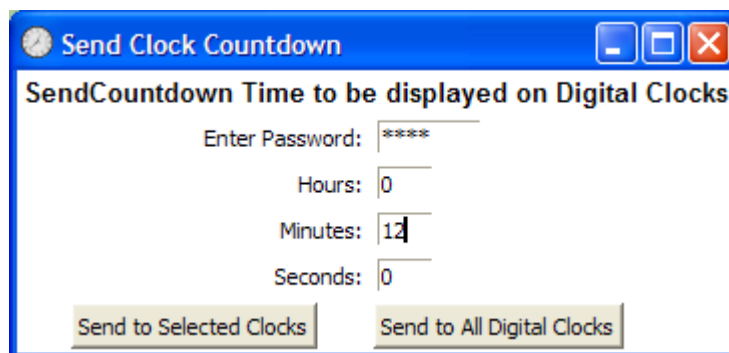
** Loss of sync indication ("Loss of Communication")

Note: (2/1/11) Correction to the note and information below, received as an email from Amy O'Brien at Sapling:
Just as an added note, what Natalie stated below is correct for the newest version of the IP that Engineering has and is testing, but that version isn't released yet. Engineering inadvertently gave Natalie the information for the new. For the current version which you have been purchasing and what we are currently selling, see below:

With the currently released IP clock, there is no "loss of communication" alert unless you are on the web interface.

Note: (this note and alert schedule below is superseded by the note above) As of 12/15/10, our manual states there is no loss of sync indication. However, according to Brian Dortch w/Sapling, there is one, but it needs to be enabled in each IP clock. The colons will blink after a user configurable amount of time, if the clock can't sync to an NTP server.
Option 13 should be set to "E" to enable loss of communication

Option 14 - Set the Loss of Communication Alert:
Use the bottom button to scroll between "01-10".
This option allows the user to set when the colons will flash after the clock loses data to indicate loss of communication.
Press the "Set Minute" button to scroll between "01-10".

01 - Data is lost after 5 minutes	06 - Data is lost after 60 minutes
02 - Data is lost after 10 minutes	07 - Data is lost after 90 minutes
03 - Data is lost after 15 minutes	08 - Data is lost after 120 minutes
04- Data is lost after 30 minutes	09 - Data is lost after 180 minutes
05- Data is lost after 45 minutes	10 - Data is lost after 240 minutes

Clock Monitor (Sapling IP Clock Monitor software)

Refer to the IP clock manual for more information (1168-5001-0053): \\rocfnp02\idrive\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx

- ➤ This is an available program for the IP clocks.
- ➤ Refer to: \\rocfnp02\idrive\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Display Clocks\IP display clocks\IP Clock Monitor software
- ➤ Just run the monitor.exe program (it is not actually installed on the computer)
- ➤ Below is a screenshot of this program (**Note**: I can't seem to find any version info in this program).
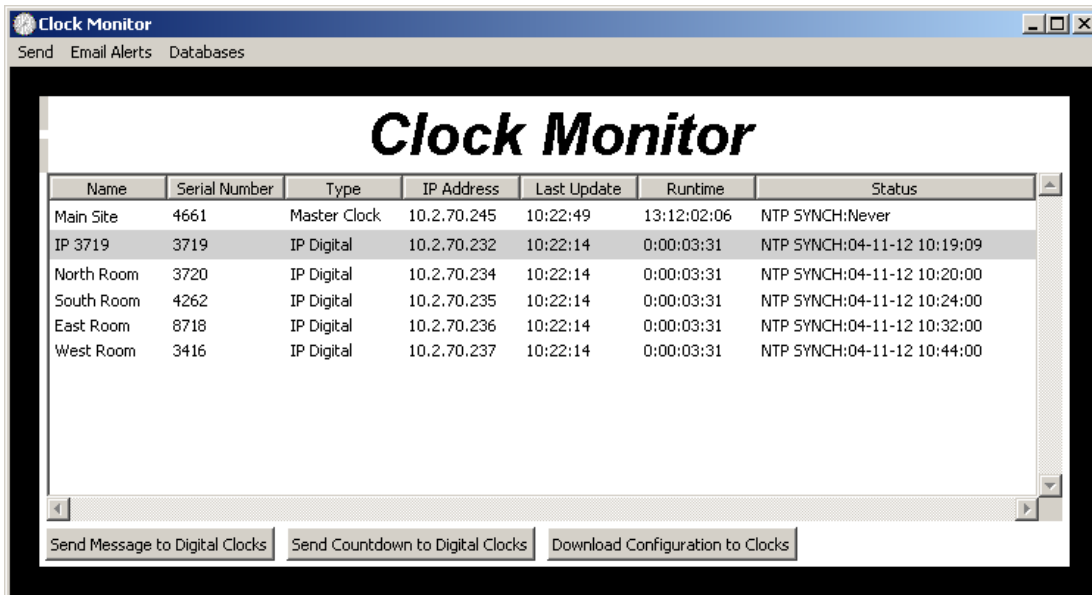
Ports used: Not yet confirmed by Sapling, but Clock Monitor software appears to use **Ports 80, 445 and 4721**. May also use ports **1050 and 3478** (Power Guardian)?

Each clock needs to have the **Clock Monitor** capability enabled via the browser via "**Broadcast to Monitors**"

- ➤ As shown below, "**Broadcast to Monitors**" needs to be enabled in the "**Network Settings**" tab for the Clock Monitor software to interface with the IP clock.
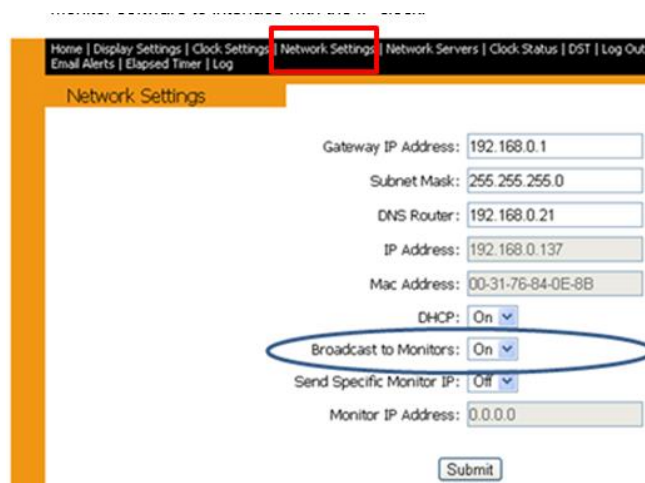
Clock Monitor software email

As you mentioned, there is no way to remotely monitor the wireless digital and wireless analog display clocks. However, there is a way to remotely and centrally monitor the status of the IP-based digital and IP-based analog display clocks, using a provided Windows-based program called simply "Clock Monitor".

Each IP clock has its own web browser interface, but this is primarily just used for initial configuration of the IP-based display clocks. However, the Clock Monitor program is provided at no cost and can be run on any Windows PC on the network with the IP clocks. This program, when run, automatically searches the network for any installed IP clocks and then adds them to the list that is shown in the "Clock Monitor" display window.

Once listed, this display windows shows the IP clocks that are installed, the Serial Number of each clock, whether each device is the NTP time server - digital - analog display clock, the last time it was resynchronized to the NTP server, how longs it's been up and running and if it's currently in sync.

If a listed display clock is clicked-on with the mouse, its web browser is automatically opened to allow communication with that clock.
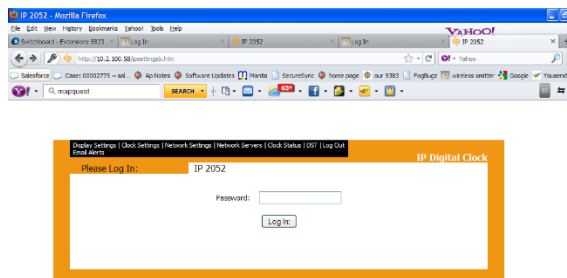
If the display clock is no longer connected to the network or can't be reached for any reason, the text will change to red (you can configure how often the program polls the clocks to make sure they are still connected to the network).

Below is a screenshot of this display window. In this screenshot, the first item in this list is a wireless transmitter this is currently connected to our network and the second listed item is a digital IP clock that has been temporarily disconnected from the network (so its text is now in red instead of being white text, to indicate it can n longer be reached on the network).

➢ The "Clock Monitor" program also has the capability to send automatic email alerts to an email address. As part of this configuration, you can even send a test email to make sure the emails can get through to the email server.

Below is an example of the test email:

    This is a test email from the task 'monitor' at IP address: 10.2.100.29 (hostname: pm-wing2)

An example email that was sent because a digital clock was no longer reachable on the network (I configured the program to poll every minute. So this same email is sent every minute, until the display clock has been placed back on the network)

    No data received from clock at IP address 10.2.100.58 within the last 1 Minutes
    Last Valid Data:

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```
Name: IP 2052
Serial Number: 2052
Type: IP Digital
IP Address: 10.2.100.58
Last Update: 08:58:27
Runtime: 1:15:37:45
Status: SNTP SYNCH:08-26-11 08:58:31
```

The follow-up email that was sent, once the clock was once again located on the network"

```
Clock at IP address 10.2.70.245 returned from failure
Data:
Name: Spectracom
Serial Number: 1063
Type: Master Clock
IP Address: 10.2.70.245
Last Update: 08:58:41
Runtime: 5:02:59:02
Status: SNTP SYNCH:08-26-11 08:58:38
```

➢ Another unique capability is the ability to **send up to four characters** to be displayed on one or all digital IP clocks. Below is an example of the configuration to display "Fire" on all display clocks, if it was desired:
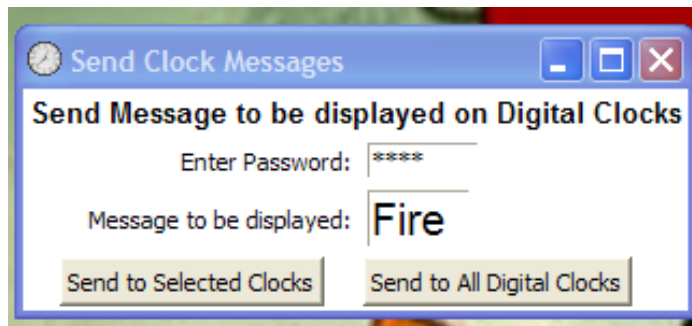
➢ If it's desired to **display a scrolling message** instead of four static characters, you can send a looping message and configure how many times this message is then displayed. Below is an example of this configuration:
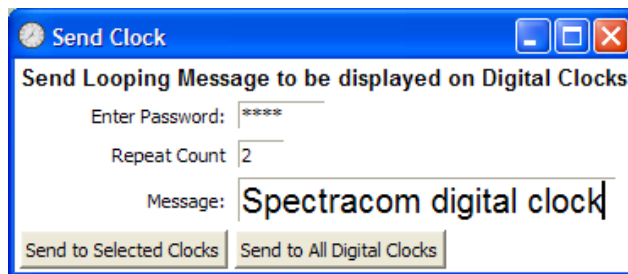
➢ Yet another unique capability of this program is the ability to **display a count-down time** on one or all clocks. You can pre-set a starting time and have one on all clocks start displaying a time that is counting down.
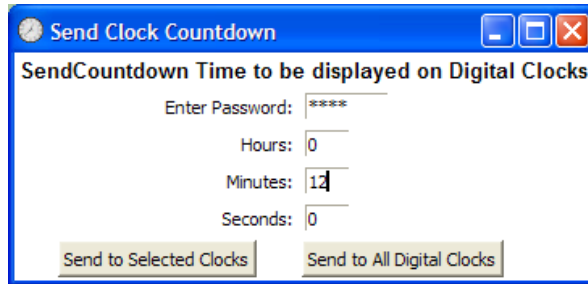
(**Note**: This menu is displayed by navigating to the **Send**-> **Send Countdown** menu in the main page of the Monitor software).

**Remote configuration of IP clocks using Clock Monitor software

Note: May require newer version of the Clock Monitor software (Refer to 4-18-2013 folder, or newer).

Refer to the following link for the "attached file" referenced below (open the file using WordPad):
\\rocfnp02\idrive\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Display Clocks\IP display clocks\IP Clock Monitor software\Remote config using Clock monitor

Simplifying multiple clock installation

Email from Sam Otto to Jeremy (2 May 13) My recommendation is configuring everything with Dynamic IP Addresses using Clock Monitor. Once you have one clock configuration set the way the customer wants it, save the configuration and then push it to the others then make minor changes such as clock name or location. If the customer wants Static addresses, configure them using dynamic then switch to static after they configuration has been pushed down to them this will save time dealing with opening the unit and playing with the jumper settings.

Earlier email from Sam Otto to Dick Fox (17 Apr 2013)
I figured out how to remotely configure the Sapling IP Clocks using the clock monitor tool. I stumbled through it because I didn't hear back from Brian White. Dave Lorah mentioned his associate Amy is out on maternity leave and he typically gets back to us sooner than a week.

(Second email Sam also sent to Dick about this topic)
I just met with Adam and gave him a copy of the Clock Monitor Software and talked him through the steps to remotely configure the sapling clocks.

I also recommended adding a warning or note during the configuration to rename the config file because the config file name does not change, if the customer is not careful they could overwrite their config file that they intended to use as the master).

To verify the remote configuration worked I performed the following:

I changed the subnet mask from **255.255.0.0** to **255.255.255.0** to one of the clocks within the Clock Monitor software. Uploaded the file then changed subnet mask back to 255.255.0.0 and downloaded the file to the clocks, toggled menus and confirmed the subnet mask changed.

I added a comment line to the attached file which is viewable using notepad and changing the file format to all.

Please note the subnet, dnsServer and gateway have some type of encryption incorporated.
Copied from attached file
#Network Settings; Gateway: 10.2.1.1 Subnet Mask 255.255.255.0 DNS Router 10.1.1.20
subnet=4294967040
dnsServer=167837972
gateway=167903489

Screen shot of IP Clock

Whereas the Time Servers IP Addresses are not encrypted.

Copied from attached file
server0=10.2.100.20
server1=ca.pool.ntp.org
server2=mx.pool.ntp.org
server3=fr.pool.ntp.org
server4=de.pool.ntp.org
server5=uk.pool.ntp.org
server6=jp.pool.ntp.org
server7=au.pool.ntp.org
server8=tw.pool.ntp.org
server9=br.pool.ntp.org

Screenshot of IP Clock
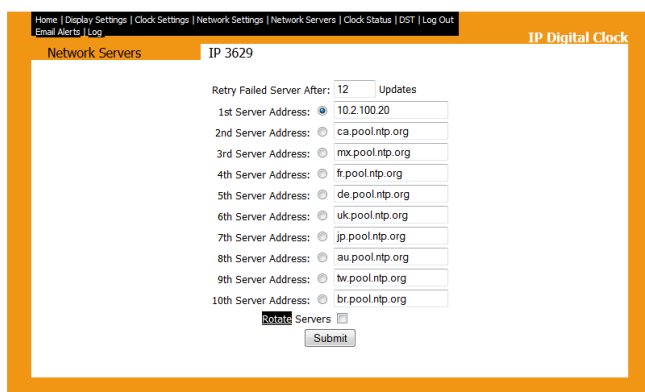
TROUBLESHOOTING IP CLOCKS / Known issues

General troubleshooting/tips

➢ Refer to the "**Event Log**" page of the browser
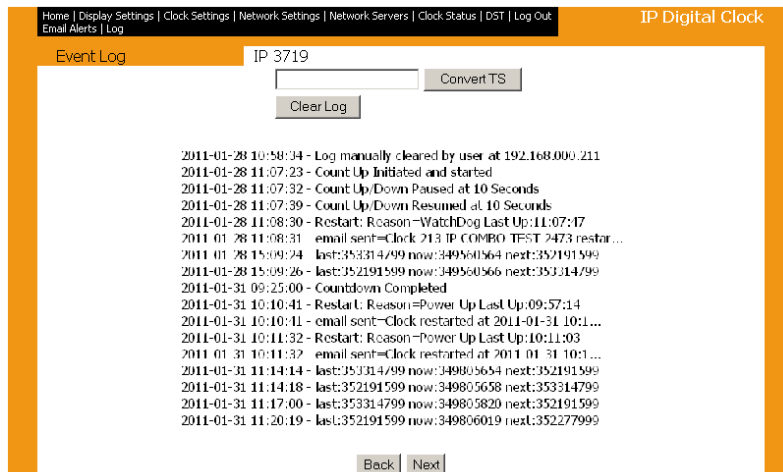
Specific conditions

A) Minutes/seconds not correct (IP clock not synced to the correct time)

- Are the NTP server and the IP display clock on the same subnet?

- Verify access to the IP clock's web browser/ Make sure the time server is listed in the **NTP Servers** page of the display clock's web browser.

- If the time server is a SecureSync/NetClock 9400, see if the clock's IP address is in the NTP Server's Client List. If it's not listed, the clock isn't configured correctly or the NTP request isn't making it to the time server

- Is the NTP time server in sync and not Stratum 16?

- Can use wireshark packet captures (and/or **tcpdump** on NetClock 9400s /SecureSyncs starting in version 5.2.1) to find out what is going on with the NTP packets being exchanged.

  ✓ Refer to the tcpdump section of the SecureSyncCustAsssist doc for more info/examples: ..\CustomerServiceAssistance.pdf

  ✓ To see only NTP packets (port 123) - in CLI, type: **sudo tcpdump port 123** (example capture below)

     Note: don't type "sudo" in more recent versions of software.

- **Capture should show an NTP packet from the IP clock to Server followed by Server to IP clock**

  ✓ **To stop the capture**: ctrl c

```
HTTPS Service             enabled
spadmin@custservice177 ~/log $ sudo tcpdump port 123
error : ret -1
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 262144 bytes
17:02:49.595125 IP 10.2.100.177.ntp > 216.229.0.179.ntp: NTPv4, Client, length 48
17:02:49.648947 IP 216.229.0.179.ntp > 10.2.100.177.ntp: NTPv4, Server, length 48
17:02:50.595125 IP 10.2.100.177.ntp > 216.228.192.69.ntp: NTPv4, Client, length 48
17:02:50.697055 IP 216.228.192.69.ntp > 10.2.100.177.ntp: NTPv4, Server, length 48
17:02:52.143787 IP 10.2.100.146.ntp > 10.2.100.177.ntp: NTPv4, symmetric active, length 48
17:02:52.144021 IP 10.2.100.177.ntp > 10.2.100.146.ntp: NTPv4, symmetric passive, length 48
17:02:54.427601 IP 10.2.100.124.ntp > 10.2.100.177.ntp: NTPv4, Client, length 48
17:02:54.427866 IP 10.2.100.177.ntp > 10.2.100.124.ntp: NTPv4, Server, length 48
^C
8 packets captured
9 packets received by filter
0 packets dropped by kernel
spadmin@custservice177 ~/log $
```

B) IP address is displayed every 60 seconds

➤ Refer to Salesforce case 18499 ("we have a wall clock that is POE and keeps flashing the IP every 60 seconds").

➤ This clock was purchased several years ago (2008).

➤ **Case Resolution**: Clock was sent back to Sapling on RMA, after recommended power cycle didn't help.

C) Static Network settings are lost after power cycle/reboot of digital/analog IP clock

• Make sure jumper **J7** has been removed. It should be installed only temporarily while configuring an address. If it's not removed once the address was configured, the network settings will revert back to the default static address after each power cycle (making it look like the values were "lost" instead of just changed.

• Because it's set to a static address, the default address is not displayed at power-up. So, you can't tell it's still the default address.

**Watchdog timer/Solarwinds monitor tool

➤ Refer to John Pierce with Ansaldo (Case 12377)
https://na8.salesforce.com/500C000000UgWOw?srPos=0&srKp=500

Watchdog timer

Email from Dave Lorah to John Pierce (14 Nov 2013) The Watchdog reset is invoked if changing from a DHCP to Static IP address. If you see this reported in the Clock Status page of the web UI, you can look at the Runtime to see how long ago this Watchdog reset occurred. Maybe this is left over from when the clocks were originally configured?

I suggest power cycling one of these clock, and then wait and see if the "**Reason for Last Restart**" remains permanently at "Power Up". This will take some time but at least it will tell us if the Watchdog reset is occurring in normal operation.

**Analog clock Diagnostics

****Diagnostic LED on rear panel

Two variants of the wireless analog clocks

➢ There are two variants of the wireless Analog clocks

- The newer design has only one Diagnostic switch on the rear panel (Refer to "A" below).

- The earlier/original design has two Diagnostic switches on the rear panel (Refer to "B" further below).

A) **Newer version Analog clocks (only one Diagnostic switch on rear panel- not just one)**

Note: If there are two diagnostic switches, refer to "B" further below, instead of this section.
The photo below is of the rear panel of the newer design

➢ Refer to the newer rev wireless clock manual for info on newer display clock Diagnostics (1168-5001-0050, Rev F and higher) I:\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx

- **During normal operation:** The Diagnostic LED is normally lit constantly red (blinking/solid red at a random rate). This LED is indicating communication between components inside the clock.

- **During diagnostic tests:** The Diagnostic LED is normally lit blinking green

Diagnostic tests 1, 2 and 3

Diagnostic Mode	Primary Function	Method to enter mode (Press diagnostic button) The LED between the two switches will start flashing green. The number of flashes corresponds to the diagnostic number.	Affects / Test results
1	Elapsed Time since last sync Determines how long (in number of hours) it has been since the clock last received the communication signal	Press Diagnostic button 1 time	The Diagnostic LED should indicate green and flash once every three seconds. While in diagnostic modes, the clock's hour and minute hands will continue to run normally. 1. The second hand will display how long it has been since the clock received a time signal After three minutes, the clock will resume normal operation.
2	Signal Quality Determines the quality of the time signal.	Press Diagnostic button 2 times	The LED should indicate green and flash twice every three seconds. 1. While in diagnostic modes, the clock's hour and minute hands will continue to run normally. 2. The second hand will display the quality of the time signal as a percentage on the dial of the clock. It will move from 1 to 10, with 1 being the best signal and 10 being the weakest signal. After three minutes, the clock will resume normal operation
3	Tests the mechanical portion and some of the electronic components of the clock Then Sets hands at "12"	Press Diagnostic button 3 times	The Diagnostic LED should indicate green and flash three times every three seconds. If an error occurs, the clock will flash the red LED to signal the error code number (Refer to the table further below) While in Diagnostic 3, the clock will perform the following steps: 1. Clock moves second hand to numeral 12. 2. Clock moves second hand again to numeral 12, to verify that the hands arrived after 60 pulses. 3. Clock moves minute and hour hands to the next known position. 4. Clock moves minute and hour hands again to the same known position in order to verify that the hands reach the position after 720 pulses. 5. Clock moves the hour and minute hands to numeral 12.

****Diagnostic 1- Elapsed Time since last sync

Note: Refer to "Analog Diagnostic 1" in the wireless clock manual.

****Diagnostic 2- Transmit for 10 Minutes.

Note: Refer to "Analog Diagnostic 2" in the wireless clock manual.

Analog clocks can be placed into transmit mode for 10 minutes. As long as the clock was synced within the last 12 hours, it will transmit its internal time even if it the transmitter is not working. If it has been >12 hours since it last synced, the seconds hand goes to 12.   If it has been <12 hours since it last synced, the clock will burst once-a-second for 10 seconds, pause for 20 seconds, and then burst once-a-second for 10 seconds again. This continues for 10 minutes.

During the first sync after power-up, the Analog clock hands keep spinning past the correct time, before stopping at the correct time:

As for noticing the clocks sometimes spinning around past the correct time before they eventually stop at the correct time, this is a factor of not only setting the time, but also verification of the hand positioning in relation to the electronics controlling the hands. Whether or not the hands stop at the right tine the first time around, or keep spinning a couple of time before stopping at the right time depends on the position of the hands when the clock is first powered up.

****Diagnostic 3: Analog clock hands not correctly aligned/Setting the hands back to "12:00" / Pin for hand alignment during shipping

Diagnostics 3 Error table

Red Flashes	Diagnosis of Error Code
1, 2	Problem with the second hand. Check to see if the hands are striking each other. Repeat the test.
3, 4, 5	Problem with the hour and/or minute hands. Check to see if the hands are striking each other. Repeat the test.
6	Get RMA from Sapling

Note (KW as of at least Nov 21, 2012): The **Diagnostics** screen is no longer available.   It has been replaced by the "**Dial State**" field in the **Clock Settings** page. I'm not sure when this change was incorporated.

A) **Original version Analog clocks (two diagnostic switches on the rear panel- not just one)**

➢ Refer to the earlier rev wireless clock manual for info on original display clock diagnostics (1168-5001-0050, Rev E and below) I:\Engineering\Archive\New Released\Manuals\1168-xxxx-xxxx

Note: If there is only one diagnostic switch on the rear panel, refer to "**A**" further above, instead of this section. The diagram below is of the rear panel of the original design
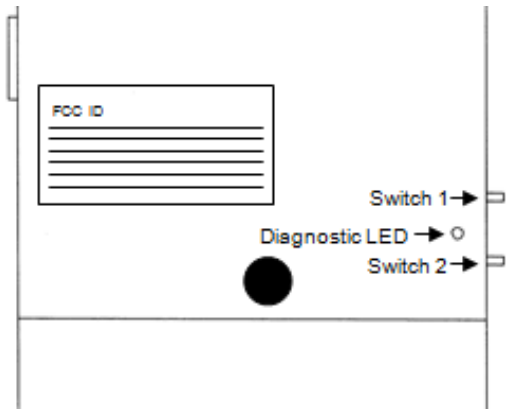
FCC ID

Switch 1 →
Diagnostic LED → ○
Switch 2 →

Diagnostic tests 1, 2 and 3

Diagnostic Mode	Primary function	Method to enter mode (Press diagnostic Switch 1)	Affects / Test results
1	**Elapsed Time since last sync** Determines how long (in number of hours) it has been since the clock last received the communication signal.	Press Switch #1 for 1 second The LED should indicate green and flash once every three seconds.	While in diagnostic modes, the clock's hour and minute hands will continue to run normally. The **second hand** will display how long (number of hours) it has been since the clock received a time signal. After three minutes, the clock will resume normal operation
2	**Signal Quality** Determines the quality of the time signal.	Press Switch #1 for 3 seconds The LED should indicate green and flash twice every three seconds	1. While in diagnostic modes, the clock's hour and minute hands will continue to run normally. 2. The second hand will display the quality of the time signal as a percentage on the dial of the clock. It will move from 12 to 8. If the second hand is on 12, this indicates no signal. If the second hand is on 8, this indicates the best possible signal. 3. After three minutes, the clock will resume normal operation.
3	**Tests the mechanical portion and some of the electronic components of the clock Then sets the hands to "12"**	Hold Switch #1 for 5 seconds The LED should indicate green and flash three times every three seconds	If an error occurs, the clock will flash the red LED to signal the error code number (Refer to the Error table further below). While in Diagnostic 3, the clock will perform the following steps: 1. Clock moves second hand to 12. 2. Clock moves second hand again to 12, to verify that the hands arrived after 60 pulses. 3. Clock moves minute and hour hands to the next known position. 4. Clock moves minute and hour hands again to the same known position in order to verify that the hands reach the position after 720 pulses. 5. Clock moves the hour and minute hands to 12.

Diagnostics 3 Error table

Red Flashes	Diagnosis of Error Code
1, 2	Problem with the second hand. Check to see if the hands are striking each other. Repeat the test.
3, 4, 5	Problem with the hour and/or minute hands. Check to see if the hands are striking each other. Repeat the test.
6	Get RMA from Sapling

Specified tolerance for hand alignment/ Hands do not appear to be correctly aligned to exactly indicate the correct time:

Analog clock hand alignment

➢ Need to calibrate the hands when replacing clock motor

After you replace the motor, there is a button on the back of the clock that sets the motor to 12:00. Then, when the hands are re-installed, they will also be at the12:00 position.

There are two styles of these Model display clocks. The earlier style has two buttons on the back, while the newer style only has only one button on the back.

- If it has only one push-button on the back (newer Model), press and hold this button for about 10 seconds, and then let go.

- If it has two push-buttons on the back (earlier Model), press and hold Switch 1 (top button) for 5 seconds. Refer to "Analog Clock Diagnostic 3", the earlier rev of the wireless clock manual.

This will cause the motor to go to the 12:00 position. Then the hands can be re-installed.

Important Note: Do not manually spin the hands, as this will likely strip the gears in the motor.

Pin installed when clocks are shipped out

"Diagnostics" or "Dial State" page of the browser

A) For newer IP Analog clocks with "Diagnostics" page not listed at top of the screen ("Dial State" is listed, instead).

1. Login to the browser and navigate to the **Clock Settings** page of the browser.
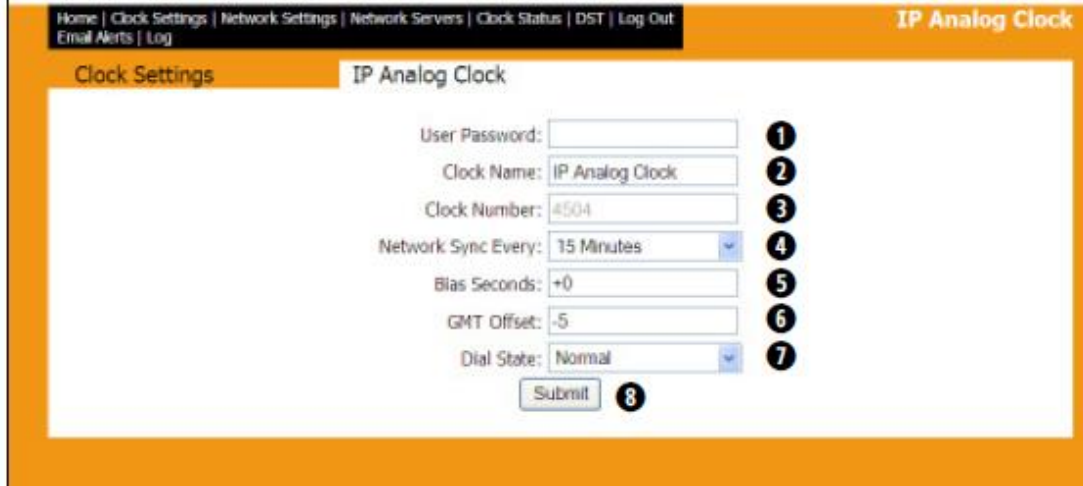
- **Dial State**: This setting allows the user to correct the clock. There are 3 options:

- **Normal mode**: The clock will run in normal mode.

- **Find Hands mode**: If the clock is off by a few minutes, the clock will locate the hands and reset to correct time.

- **Set Hands to 12 mode:** If the Find Hands option does correct the time, this option will set the clock back to 12. The clock must be power cycled to resume normal operation.

B) For earlier IP Analog clocks with the "Diagnostics" page available (listed in the top menus) ("Dial State" is not listed)

1. Login to the browser and navigate to the Diagnostics page to select the diagnostics tests

Diagnostic List: Allows the selection of any of the following diagnostic options:

- **Don't Send**: No diagnostics are sent.

- **Diagnostic**: Resets the clock back to factory default configuration.

- **Diagnostic 9:** This option overrides the diagnostic that is currently running and puts it back to normal operation.

Duration: Allows the user to define how long the information from the performed diagnostic will stay on the

face of the clock before it returns to normal operation.

Start Diagnostic: Sends the desired diagnostic to the clock.
Overview

To enter diagnostic testing, press the diagnostic switch located on the right-hand side of the movement, or use a Spectracom IP clock web interface.

Diagnostic #3 – Manufacturer's Default

Purpose: To bring the clock to 12:00:00 and reset to manufacturer's default.

Holding the switch for 5 seconds will enable you to enter into Diagnostic #3. This can be verified by the green diagnostic LED flashing 3 times with a five (5) second break between flashes.

While the clock is performing the diagnostic, the diagnostic LED will continue to flash green. If a problem is diagnosed by the clock, the flashing green LED will turn into a flashing red LED. In this case, please refer to Table 2 for diagnostic error codes. The LED changing to solid green at the end of a diagnostic indicates the test completed successfully.

At the end of Diagnostic #3 the hands will all be set to 12:00:00. The clock will not resume normal operation until the power has been recycled.
Table 2

Number of Red Flashes	Diagnosis of Error Code
1, 2	Movement detected problem with second hand. Check hands to see if they are hitting each other. Repeat test.
3, 4, 5	Movement detected problem with hour / minute hand. Check to see if they are hitting each other. Repeat test.
6, 7, 8	Call Tech Support.

Q. I'm still having an issue with one of the analog clocks being 1 second off. They are moving in sync, however if I force a time update by removing power the second hand remains 1 second fast. Even when you force an update and the second hand is supposed to stop at 12 while the hour and minute hands adjust, the second-hand points at 1 second rather than straight at 12. Same if you press Switch 2 twice and the second had is supposed to point to 20, it points to 21. Looks like a mechanical error to me. Are there any methods for fixing this?

A **(from Dave Lorah 18 Mar 2013)** I believe you are right, there is a mechanical problem with the second-hand alignment. It could be the clock took a mechanical shock during shipment causing the hand to spin on the gearbox shaft. If that is the case, there is no fix in the field.

You could try doing a mechanical alignment diagnostic on the gearbox. Press the diagnostic switch (the upper pushbutton) three times. The hands should all move to the 12:00 position and the Diagnostic LED should be green when the hands stop at 12:00. If this does not fix the alignment problem the clock is damaged and needs factory service.

(Follow-up email to email above) If the hand is not aligned with the pin in place the hand has shipped on the shaft. You might have a slight chance of fixing it if you want to insert the pin and remove the lenses and try moving the hand back into alignment. This could potentially damage the gearbox though. But there is nothing else you can do in the field.

***Hands are 4 hours off after performing diagnostics 3 (Hands go to 8 or 4, instead of 12)

➢ Likely due to misalignment of the photo sensor taped onto the back of the clock.

➢ If the photo sensor or tape is even partially lifted, this can happen.

➢ Refer to EQUIPMENT\SPECTRACOM EQUIPMENT\Sapling display clocks\Display Clocks\IP display clocks\Clock hands 4 hrs off for additional pictures

This is how the tape should be placed on the gearbox.

**IP clock can't sync to NTP server

If the IP clock can't sync to an NTP time server, perform the following:

➢ If the IP clock shipped before Apr 2012, the IP clock may need a firmware update from Sapling

(**Note**: Older versions of firmware had setup menus present when both front panel buttons are simultaneously pushed. These menus are not present in IP clocks shipped after ~March 2012).

➢ Verify the NTP server is Stratum 1.

➢ Verify no firewalls in between are blocking port 123.

➢ Look at the "**Clock Status**" page in the IP Clock and verify the "Internal Time" (top of this page) is correct.

Maximum network cable ("network segment") lengths (distance from POE switch to IP clock)

➢ Maximum distance without PoE Repeater installed: 100 meters (328 feet).

The following info is from http://en.wikipedia.org/wiki/Category_5_cable

• According to the ANSI/TIA/EIA standard for category 5e copper cable (TIA/EIA 568-5-A), the maximum length for a cable segment is 100 meters (328 feet). If longer runs are required, the use of active hardware such as a repeater, or a switch, is necessary.

PoE Repeaters

If the network segment distance (network cable length between the IP clock and its PoE switch) is near or greater than 100 meters (328 ft), a PoE repeater should be installed.

Note: BlackBox offers PoE repeaters. Refer to http://www.blackbox.com/Store/Detail.aspx/PoE-Repeater/LPR110 for more information (according to BlackBox, this device can extend network cable segments up to 300 meters).

Example "real world" customer scenario (with POE switch located near the NetClock)

(Green= clock synced, orange=partial operation, red= not even powered-up)

➢ Location 1(approximate distance from the NetClock is 30m)

➢ Location 2 (approximate distance from the NetClock is 50m)

➢ Location 3(approximate distance from the NetClock is 100m)

(Note: This IP clock synced but IP Monitor was not detecting it)

➢ Location 4 (approximate distance from the NetClock is 60m)

➢ Workshop 1 (approximate distance from the NetClock is 60m)

➢ Workshop 2 (approximate distance from the NetClock is 125m)

➢ Workshop 3 (approximate distance from the NetClock is 150m)

➢ Workshop 4 (approximate distance from the NetClock is 160m)

Email Keith sent to this customer to explain the issue
As shown in the color coding above, the IP clock located at about 100 meters from the POE switch aren't operating normally and the ones that are exceeding 100 meters aren't operating at all. As mentioned above, this is highly likely due to their distances from the POE switch. Exceeding this distance limitation can affect network packets and also causes a decrease in the POE voltage, so that it becomes too low for the IP clocks to operate normally, or even at all. As long as the clocks above which aren't shown in green can operate normally when they are temporarily swapped out with one of the clocks that are operating normally, this confirms the issue is with the POE power distribution of the network (and not an issue with the IP clocks themselves).

Email Keith sent to this customer to resolve the issue of the network segments being 100 meters or greater:
Some suggestions for the network administrators to resolve this issue with the clocks include any of the following: Relocating the POE switch to a location that allows all of the network cable distances to the clocks be less than 100 meters long. Install one or more POE Repeaters (as necessary) on the network cables that are close to, or exceeding, 100 meters from the POE switch to each of the IP clocks.

Note: Spectracom does not offer PoE switches or repeaters, but they should be readily available locally (or online) for purchase. For example, BlackBox offers PoE repeaters. Please refer to http://www.blackbox.com/Store/Detail.aspx/PoE-Repeater/LPR110 for more information (according to BlackBox, this device can extend network cable segments up to 300 meters.

Install an individual PoE power injector at the location of EACH IP clock that is not currently operating normally (one PoE injector would be required for each clock that is too far from the PoE switch). The power injector uses building power (instead of network PoE devices) to inject 48vdc PoE power into each IP clock. Spectracom does offer PoE injectors. Please contact our Sales team for more information.

Likely the least two desirable approaches would be to either relocate the remaining clocks closer to the PoE switch so they are no longer at, or exceeding, 100 meters OR to add one or more PoE switches to the network, thereby allowing all network segments to be less than 100 meters.

Other solutions may also be available, but these are the only ones I am aware of.

**IP Clock is in sync but time is x hours off of the correct time

A) **PROBLEM: IP Clock was in sync, but time was 6 hours off.**

After verifying the time zone, DST and sync status was all OK the time was still off 7 hours. We found the pushbuttons had been played with and the setting on #35 was set to 07. We set it to 00 and the time came up correct.

B) **PROBLEM: IP clocks are exactly one hour off the correct time.**

Brian White w/Sapling mentioned a possible software issue for International customers (May 2013)

Brian mentioned the possible need to set the DST in and DST out settings to the exact same values for countries that do not adjust for DST (I suspect this may also affect US states that don't observe DST).
 (Aug 2013) firmware update is available to address this issue.

*Clock is set to a static address and don't recall what its set to

- ➢ Refer to Salesforce case 11257
- ➢ Use Clock monitor software program to find the clocks in the system.

**Clock Monitor can't find an IP Clock

➢ Each IP clock needs to have the Clock Monitor capability enabled via the browser

➢ As shown below, "Broadcast to Monitors" needs to be enabled in the "Network Settings" tab in order for the Clock Monitor software to interface with the IP clock.

"Monitor" fields

Broadcast to Monitors -This setting allows the clock to send out its data in broadcast mode.

Send Specific Monitor IP - This setting allows the clock to send the IP address to the monitor program through a gateway.

Monitor IP Address - This is the read only option of the monitor IP address

Maximum network cable ("network segment") lengths (distance from POE switch to IP clock)

➢ Maximum distance without PoE Repeater installed: 100 meters (328 feet).

(The following info is from http://en.wikipedia.org/wiki/Category_5_cable)
According to the ANSI/TIA/EIA standard for category 5e copper cable (TIA/EIA 568-5-A), the maximum length for a cable segment is 100 meters (328 feet). If longer runs are required, the use of active hardware such as a repeater, or a switch, is necessary.

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Example "real world" customer scenario (with POE switch located near the NetClock)
   (Green= clock synced, orange=partial operation, red= not even powered-up)

- ➢ Location 1(approximate distance from the NetClock is 30m)
- ➢ Location 2 (approximate distance from the NetClock is 50m)
- ➢ Location 3(approximate distance from the NetClock is 100m)

C) (Note: This IP clock synced but IP Monitor was not detecting it)

- ➢ Location 4 (approximate distance from the NetClock is 60m)
- ➢ Workshop 1 (approximate distance from the NetClock is 60m)
- ➢ Workshop 2 (approximate distance from the NetClock is 125m)
- ➢ Workshop 3 (approximate distance from the NetClock is 150m)
- ➢ Workshop 4 (approximate distance from the NetClock is 160m)

Email Keith sent to this customer to explain the issue
As shown in the color coding above, the IP clock located at about 100 meters from the POE switch aren't operating normally and the ones that are exceeding 100 meters aren't operating at all. As mentioned above, this is highly likely due to their distances from the POE switch. Exceeding this distance limitation can affect network packets and also causes decreases in the POE voltage, so that it becomes too low for the IP clocks to operate normally, or even at all. As long as the clocks above which aren't shown in green can operate normally when they are temporarily swapped out with one of the clocks that are operating normally, this confirms the issue is with the POE power distribution of the network (and not an issue with the IP clocks themselves).

Email Keith sent to this customer to resolve the issue of the network segments being 100 meters or greater:
Some suggestions for the network administrators to resolve this issue with the clocks include any of the following:
- ➢ Relocating the POE switch to a location that allows all of the network cable distances to the clocks be less than 100 meters long.

- ➢ Install one or more POE Repeaters (as necessary) on the network cables that are close to, or exceeding, 100 meters from the POE switch to each of the IP clocks.

Note: Spectracom does not offer PoE switches or repeaters, but they should be readily available locally (or online) for purchase. For example, BlackBox offers PoE repeaters. Please refer to http://www.blackbox.com/Store/Detail.aspx/PoE-Repeater/LPR110 for more information (according to BlackBox, this device can extend network cable segments up to 300 meters.
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- ➢ Likely the least two desirable approaches would be to either relocate the remaining clocks closer to the PoE switch so they are no longer at, or exceeding, 100 meters OR to add one or more PoE switches to the network, thereby allowing all network segments to be less than 100 meters.

Other solutions may also be available, but these are the only ones I am aware of.

Network Settings page

A) Newer Network Settings page

B) Earlier Network Settings page

1. **User Password:** This field allows for the password for entering the web interface to be changed, however, 6063 will always be a master password. This password cannot exceed 16 characters.

2. **Clock Name**: Allows the user to set a unique name for the clock such as its location. This name cannot exceed 20 characters.

3. **Clock Number**: This read-only option displays the unique serial number for the clock.

4. **Network Sync** Every: Sets how often the clock attempts to synchronize with the server.

5. **Bias Seconds**: Allows the user to offset the synchronized time (range is from -9999 to +9999 seconds).

6. **GMT Offset:** Allows the GMT offset to be configured for time zones.

7. **Submit**: Saves all of the settings that were entered.

"Monitor" fields

Broadcast to Monitors: This setting allows the clock to send out its data in broadcast mode.

Send Specific Monitor IP: This setting allows the clock to send the IP address to the monitor program through a gateway.

Monitor IP Address - This is the read only option of the monitor IP address

PresenTense software

BYTEFUSION CONTACTS

Technical support/Logistics and contract type issues

Mark Robertson: His phone is their main line for US/Canada Sales 011 441624613419.   mark@bytefusion.com

Tech Support team: I believe support@bytefusion.com but not positive (couldn't find any earlier emails from them Iin my putlook to confirm and didn't see their email address on bytefusion.com)

HS code

From Mark Robertson 1/28/10- Looks like the Schedule B code (which is for export whereas the HS codes are the same but for import) should be 8523402010.

Desire for changes to the EULA (End User License agreement)

> ➢ Some customers may desire for changes to the EULA (such as "Isle of Man" being changed to "New York", for example). Mark said due to legal ramifications, they are not entertaining any changes be made to their EULA:

Email from Mark Robertson
I guess they mean the clause:

GOVERNING LAW. This License Agreement is governed by the laws of the Isle of Man. You hereto irrevocably attorn to the jurisdiction of the courts of the Isle of Man.

I'm afraid we would not agree to change the jurisdiction to anywhere in the US with the way lawyers there work. We sometimes get a request to change to a neutral jurisdiction and the one most agree to is Sweden with a clause similar to:

In the event of an irresolvable dispute, both parties hereby agree to attorn to the Stockholm Chamber of Commerce and abide by the ruling. The language of the proceedings is to be English.

The reason this is a good option is that Sweden's laws don't allow for punitive settlement. If any party has damaged the other, only real costs are ever awarded.

Software updates

Upgrading to version 5.0 series (5.1, 5.2 etc) from the earlier 4.x series

Links for us to download from Bytefusion website

➢ The Spectracom software directories on www.bfdownload.com have been updated with the demo and commercial versions of these products.

1. PresenTense Server (PTS)

? Demo Server software: http://www.bytefusion.com/download/bin/ptdemo.exe

? PresenTense Server: http://www.bfdownload.com/akd86/ptsvrsetup.exe

2. PresenTense Client (PTC)

3. PresenTense Client NT

- http://www.bfdownload.com/akd86/ptsetup.exe
- http://www.bfdownload.com/akd86/ptsetup20.exe
- http://www.bfdownload.com/akd86/ptsetupsite.exe

4. LanTime Analyzer (LTA)

```
http://www.bfdownload.com/akd86/lantimedemo.exe
http://www.bfdownload.com/akd86/lantimeenterprise.exe
http://www.bfdownload.com/akd86/lantimesetup.exe
```

5. Auditor (PTA)

http://www.bfdownload.com/akd86/ptasetup.exe

From the Bytefusion website (http://www.bytefusion.com/products/ntm/ptnt/whatispresentense.htm)"

"**If you purchased PresenTense Time Client after midnight (GMT), 28th June 2015, then this is a free upgrade. Contact support for details:**

A) **Free software upgrades for PresenTense software purchased after July 2006**

➢ A customer reported Bytefusion advertises on their website that software purchased after July 2006 can obtain free software updates

Question from Dave Lorah to Mark Robertson (12 Jan 2016) One of our customers purchased PresenTense in March 2007. They have rev 3.9. They happened to see on your website that Bytefusion would cover free updates if purchased after July 2006. Would this apply to Spectracom PresenTense as well, so I can give this customer the update without charge? I just need to know either way.

Mark replied to Dave (12 Jan 16) It's not a problem to give them the update as we advertise an upgrade guarantee for the software. Two issues you may however come across:

1. Is "the day before" good enough. For us, we take the exact time (which is why our web site states the time and time zone from which the guarantee is valid).

2. For customers who want a zero invoice so that they can fulfill their software audit requirements, we take

an invoice fee.

Apart from that, it usually runs pretty smoothly once the customers understand that there really isn't a catch or any fine print anywhere :)

B) Major software upgrade pricing

Upgrades pertain to individual software items. Specify customer's current version and the version they are upgrading to. Major upgrades to a new version number (example: v3.x to v4.x) are 40% of the original purchase price if it has been more than one year since purchase (free if less than one year), and the upgrade comes with a 1-year warranty. Minor upgrades to a version number (example: v3.0 to v3.1) are free during the life of the product. The upgrade process will retain user data, however, backups should be done.

Note (From Bytefusion website page http://www.bytefusion.com/products/ntm/ntm.htm) As long as the PresenTense client software was purchased after July 19th, 2006 and PresenTense Server was purchased after March 5th 2006, version 4.1 is available as a free upgrade.

C) One year guarantee

From Mark Robertson- Our upgrade guarantee is based on the day a major release goes on sale to the general public. Anyone who purchases the upgrade one year before that date will receive the updates for the next major version for free. In our case, it's published on the main page for the product, in this case: http://www.bytefusion.com/products/ntm/ptnt/whatispresentense.htm

The issue here is that Spectracom probably did not start shipping version 4.0 the same day we did so if you are to offer the same upgrade guarantee, it more or less needs to be based on the same date as us otherwise somebody will look at the date you publish and compare it to ours and we'll end up in the same situation.

If you choose to adopt the same policy as us, naturally royalties do not apply to upgrades send under the terms of the guarantee however you can naturally choose to charge a reasonable charge for the CD and shipping. We only provide updates via a download link unless the customer wants a CD and is willing to pay $10 for it plus shipping so this would again be in line with our policies.

The upgrade guarantee is provided to separate us from companies who release updates every other week as a method of generating income. Our business idea is you pay up front and that's it. Major version numbers usually involve new features and the choice is the customer's as to upgrade or not.

I think in the case of this customer, it is better that he gets the update from Spectracom so he continues turning to you for his future synchronization requirements.

NTP4 Query Tool

➢ Free tool included with the Client Software install

Ports that need to be opened:

➢ Need to enable firewall (network) ports 37, 123 and administration port 6001.

Install issues on Win 10 and Server 2008

Installation Error 0 Running bfsetup.exe

This seems to be caused by security software preventing the WinZip Self-Extractor from running/creating output.

There are two workarounds.

If the person has file extensions turned on then you can change the extension from .EXE to .ZIP which will enable you to right click on the file and select 'Extract All' and follow the wizard. It will create a folder with Setup.exe in it which can be used to install the software. You may need to right click on Setup.exe , select properties and at the bottom of the properties windows select unblock (depending on what version of Windows they are using).

The .EXE file can also be opened in a third party unzip utility, such as WinZip, WinRar, or 7-Zip and extracted

PresenTense Client (PTC) / PresenTense Server (PTS) software

Links:

➢ Good overview document for PresenTense Client and Server (on the Bytefusion website): http://www.bytefusion.com/products/ntm/ptnt/info.pdf.

- This document discusses items such as the various GUI tabs, NTP4 Query Command Line tool (used with LANTime Analyzer), DHCP configuration, Remote installation, NTP timestamps, etc.

Software versions of PresenTense Client software

➢ Refer to: ..\..\Software\ByteFusion\Spectracom Software\Current revs and Version Changes to the PresenTense software suite.doc

Desire to upgrade from 4.x to 5.x series (excerpt from Bytefusion website)

"**Upgrading to versions 5.0 (or above)/ from v4.x series**
If you purchased PresenTense Time Client **after midnight (GMT), 28th June 2015**, then this is a free upgrade. Contact support for details."

A) Client versions 5.x

Note: Client v4.2 and earlier is further below

B) Client NT versions 4.2 and below

Note: All of the following client software information below is referring to Client NT 4.x series (not the newer 5.x series).

**"not a valid win32 application" on XP" error message displayed

Email from Mark Robertson (17 Nov 16) A quick note that may help... Although XP is discontinued, it is still in use and the embedded systems based on it are also still around. Microsoft is trying to eradicate XP so new compilers generate code which gives an error "not a valid win32 application" on XP. We have a special build of PTC 5.1 for XP and XP embedded systems but it's not something we advertise. If you need it, we can provide it :)

Supported versions of Windows

A) Windows 2012

Email from Mark Robertson (26 Sept 13) Windows 2012 however we have not heard of any problems either. There are rarely problems with new versions of Windows as PresenTense products are true system services and with the exception of delayed start for a bug in Windows 7 64-bit systems, no changes have been needed since Windows NT 3.51.

B) Windows 8

Email from Dave Lorah (13 Sept 13) Looks like PT Client is working on a Windows 8 VM here.

Email from Mark Robertson (11 Sept 13) To be honest, we've not tried Windows 8 but we have a couple of machines here so I'll try it and see.

If you get a hold of one, you will need to run windows update on it and it will take a while. Last I saw it downloaded a couple of hundred updates however when it gets to so many updates, Microsoft usually rolls them in to the OEM install packages.

**Permissions needed (admin rights versus user rights)

The Client and Server software will continue to sync the Windows time whether nobody is logged in, someone with user/Power user rights is logged in or if someone with administrator rights is logged in.

Reported from the field- if someone logs in with only user rights, they won't see the normal settings in the PresenTense GUI. They will instead only see the default settings. I spoke to Mark Robertson about this – he says it's likely due to the Windows "Registry Redirector" not allowing a user to be able to read the System Registry settings. But this has no effect on the operation of the software.

**GUI interface for Client/Server

Per Mark Robertson, the PresenTense Client NT and Server GUI interface does not need to be installed in order for the software to operate normally. Everything can be configured directly in System Registry. He did not mention details on how to remove the GUI interface, but he said that he has customers that remove it so that users can't even tell the software is installed.

Settings/Configuration of the client/server software

Note: Refer to the "Configuration" section of the PresenTense "Help" document for good info!

- **Client:** Start-> All Programs -> PresenTense Client -> PresenTense Client Help
- **Server:** Start-> All Programs -> PresenTense Server -> PresenTense Server Help

A) SNTP Time Source tab

Maximum NTP Root Dispersion

➢ Found online – "Root dispersion: "Represents the maximum error of the local clock relative to the reference clock""

Q. In the SNTP Time source menu, what is the meaning of Max NTP root dispersion?
A From the PresenTense Help document: This option can be used to validate time stamps received from NTP time sources. Use it to reject time stamps which exceed a certain nominal error.

Default secondary NTP server ("ntp2.sp.se") automatically added to the GUI, if one has not been entered

A) Factory default configuration for NTP Time Source mode (before configuring the Primary and redundant time servers in the NTP Time Source tab (notice bonehead.ics.mit.edu and ntp2sp.se are listed)
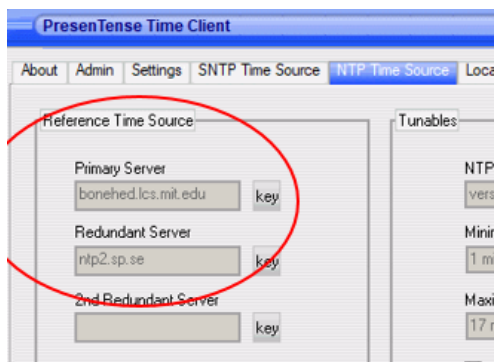
B) Factory default configuration of the SNTP Time source mode (before configuring the Primary and redundant Servers in the SNTP Time Source tab) (notice bonehead.ics.mit.edu and ntp2sp.se are listed)
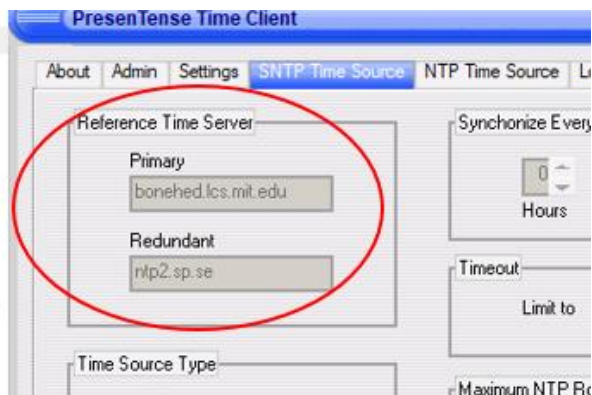
A) Client versions 4.2 and above

➢ Client NT v4.2 has a checkbox available which overrides the need to have a secondary server

"No default NTP Server" checkbox

Info below is from PresenTense Help

No Default NTP Server
By default if you choose NTP Time Source or GPS Clock without setting a Fallback, PresenTense Time Client will enter a default server for you. Sometimes this is not desirable and can cause alarm messages when operated behind a firewall. Choose this option to stop a default server being entered.

Settings tab -> Advanced Settings button
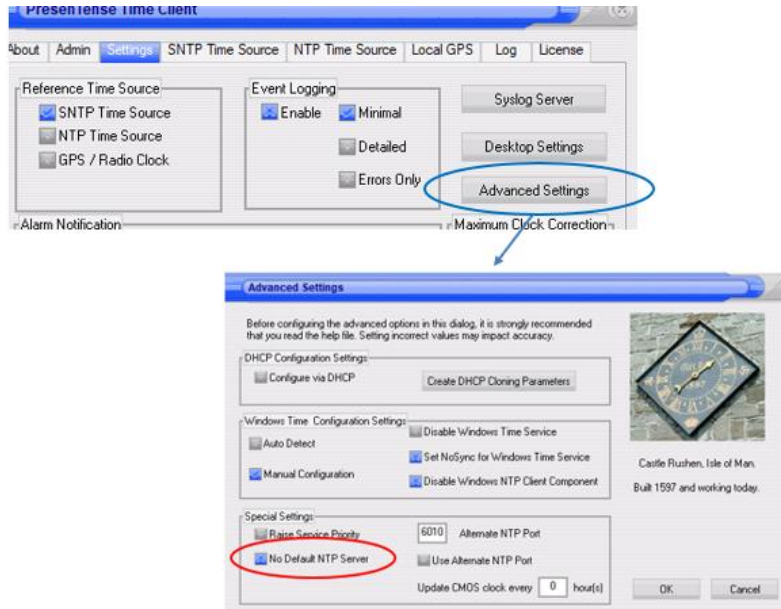
B) Client 4.1

➢ V5.4.0 couldn't delete the secondary IP address in the NTP4 tab. ntp2.sp.se will reappear after deleting it, causing errors being sent if the first reference is lost.

➢ Client NT v4.1 added a registry key which will stop the addition of a default NTP server

Email from Mark R: …we had some issues which we decided to roll into the next release build 8680). The new build is out, Spectracom directories are updates and we are now shipping the new version as default.
The changes which are in this build are:

1. The ability to add a registry key which will stop the addition of a default NTP server as discussed.
2. Detection of USB GPS removal and restarting of the service according to the COM Port Retry options as documented in version 4.0. Basically the scenario is that upon detection of cable removal, the server sends an alarm message saying it will either restart the service or that simply informing the recipients of what has happened. If restart is configured, the service is restarted after a timeout and then the com port is retried according to the COM Port Retry options.
3. The order of the tabs has been changed to the same as the client as that is much more logical.
So far features 1 and 2 require registry key editing but I believe they will be added to the user interface with version 4.1.

I reviewed the screenshots that you sent and have some information for you that I hope will help.

The software has a default value time reference that automatically gets added to the GUI if a value isn't added to the Redundant Server field (Internet Time Server tab). The default value is for an Internet Time Server. If the network has no access to the Internet, it won't be able to connect to this redundant time reference.

Ideally, the network would have two Spectracom NTP time servers for redundant failover protection. If one of the servers wasn't available, the software would automatically switch to using the alternate reference. However, the network may have only one Spectracom Time server available. If this is the case, and because it is likely desired to not have an Internet connection to the network, there is a way to remove and prevent the software from adding the redundant Internet Time Server web address. This involves an edit of the system registry values for PresenTense.

A) PresenTense Server software

To edit the registry value as shown below, in the Windows Start/Run line, type: regedit <enter:> Then navigate to the following location in the System registry.

```
HKEY_LOCAL_MACHINE\SOFTWARE\Bytefusion\PresenTenseServer\Parameters\
```

```
Right mouse-click in the right column and select "New" and "DWORD value".
Rename this new value as: bNoDefaultSrv
```
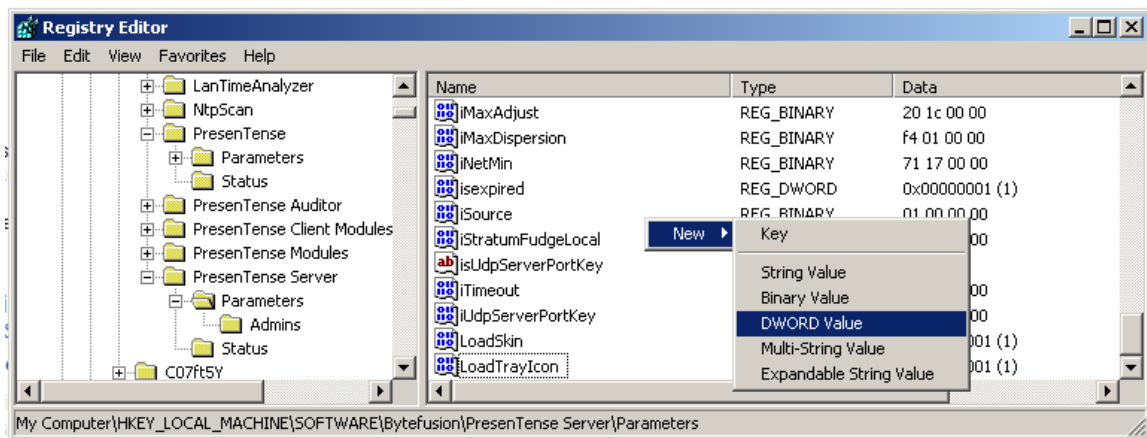


```
When adding the value, set the type as DWORD (which will show up as REG_DWORD)
and set the value:
    A) to Hex 1 to not add a default server or
    B) to Hex 0 to return to the default value of adding ntp2.sp.se as the
       redundant time server.
```
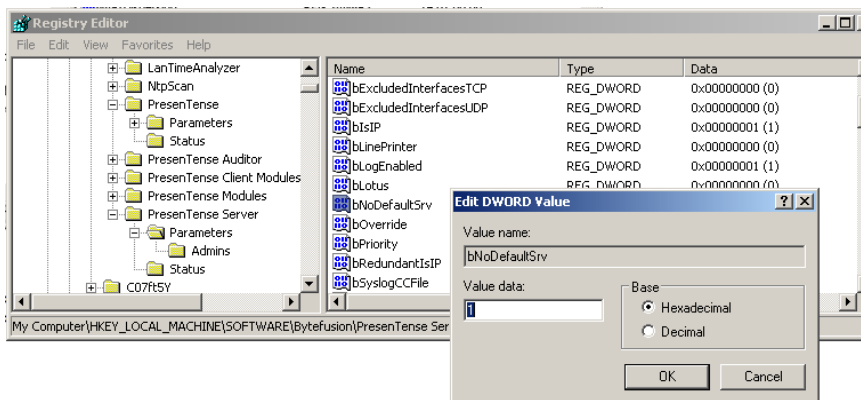
C) PresenTense Client software:

Use the same process as PresenTense Server, with the only difference being the system registry path is slightly different:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Bytefusion\PresenTense\Parameters\

The rest of the process is the same.
```

Email from Keith (31 Aug 17) Note that by default, the PresenTense Client program will automatically populate a second time server of "ntp2.sp.se" (as shown in the screenshot further above) if you only configure the GUI to point to just one time server. If you have only one time server available (or only one that you wish to sync the client with) there is a setting which can be selected in another tab of the GUI, which will prevent this secondary time source from being automatically entered when only one server has been configured. This is the "No default NTP Server" checkbox in the **Settings** tab -> **Advanced settings** button (as shown below):
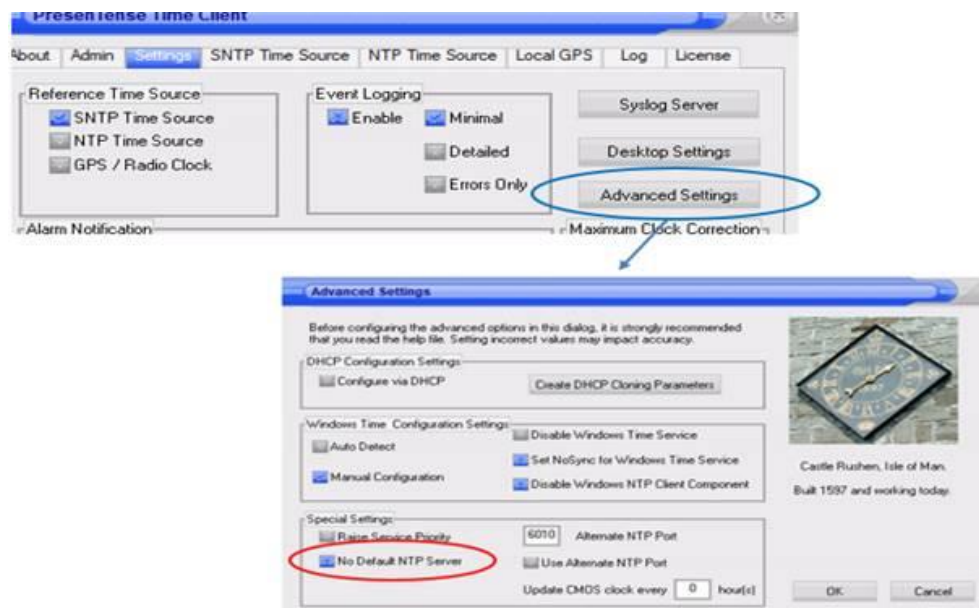
Select this box and apply the change. The only effect is it will no longer automatically populate a secondary NTP server with a default Internet time server.

Remote installer Module and DHCP configuration (bfoptions file)

- ➤ Refer to tech note in Customer Service folder: I:\Customer Service\Software\Bytefusion\remote install and configuration

Remote installation

- ➤ Refer to http://www.bytefusion.com/products/ntm/ptnt/remoteinstallation.htm)

- • I copied this document for "safe-keeping" into: I:\Customer Service\Software\ByteFusion\remote install and configuration

- ➤ Per Bytefusion- "Remote installer packages are available only for customers who have purchased site licenses unless otherwise agreed"

- ➤ See questions/answers further below for additional information.

- ➤ This is a "service" that Bytefusion offers to Site license customers at no charge to provide "unique/custom" files to help simplify configuration distribution to all the clients running PresenTense client software.

- ➤ PresenTense Time Client can be remotely installed in one of four ways: (listed below - when site license is purchased)

Remote Installer Module, Pre-Configured
Two files are distributed to each PC on which PresenTense Time Client is to be installed. One file PTC-Remote.exe is the software load and the other file bfoptions.dat is the configuration file. Once PTC-Remote.exe is executed on the remote computer, PresenTense Time Client is silently installed and configured as determined by the configuration file. No user interaction is required on the remote computer and the user does not have to log off or reboot. The software is simply installed and starts running.

Remote Installer Module, not Pre-Configured
Similar to above but only one file is distributed (PTC-Remote.exe) which when executed will install PresenTense Time Client with the default settings. No reboot or log off required. Configuration of PresenTense Time Client must be accomplished via some other method. All settings are stored as registry keys so these can be modified using Microsoft Systems Management Server (SMS) or an ADM template and Group Policy. PresenTense Time Clients can be centrally configured via DHCP once they start for the first time.

Windows Installer (.msi), Pre-Configured
One file, PTCRemote.msi is provided which is pre-configured. Via Active Directory (AD) and Group Policy (GP), PTCRemote.msi is assigned to the required computers on your network and it will be automatically installed and configured when the computer next reboots.

Windows Installer (.msi), not Pre-Configured
Same as above but the file PTCRemote.msi file does not contain network specific configuration. Configuration of PresenTense Time Client must be accomplished via some other method. All settings are stored as registry keys so these can be modified using Microsoft Systems Management Server (SMS) or an ADM template and Group Policy. PresenTense Time Clients can be centrally configured via DHCP once they start for the first time.

Question from Keith to Mark Robertson Just to summarize/clarify with remote installer- customers who purchase the site license set up client as desired and then send you a file. In return, you send them a config file and an exe file that they can run silently on all other machines?
(Modified reply from Mark (15 Sept 2008) It's a bit more complicated than that :) They can choose four different ways but that can be broken down to two methods.

A) **Remote executable (our own)**

   The first one is an executable and an optional config file. Without the config file, the default install will be carried out. With the config file, you can have the client installed and configured in one go.

B) **MSI installer**

With the MSI installer, it's one file only. There is a config file but it's wrapped inside the MSI installer. People have been asking for this so they can use it with active directory and group policy so we had to make one. There is a version available which will install the default settings but then they need to use group policy and an ADM template or Systems Management Server to modify the registry settings in order to configure the clients.

Question from Keith to Mark Robertson If this is basically correct, is the file generation something that we can also do here so that we don't have to keep telling our customers to contact you for this service, alleviating the need for you to support our customers with this? If not, I'll keep telling them to contact you for this service- but if we can do this for our customers and not have to have your company do it, this makes sense.

The tricky one is the MSI installer. It requires a Microsoft installer build environment. I set it up on my workstation so I can make these but it wasn't the easiest to piece it all together and I used to be a programmer! I would suggest that the pre-configured MSI installers be done by us. Customers are spending nearly $800 per site license on each of these so it can be good to give them some support. The MSI installer which installs the default settings is something you can have in stock but I don't know how many people are going to want it as it involves ADM template editing.

When it comes to the remote executable with config file, you can certainly make those yourself. It's a bit of work though as you have to find out what changes they've made and then modify the config file to suit. Most people just change to NTP and set the primary server. I usually modify the log level for them and the setup wizard needs to be stopped. One of your customer's configs looked like this:
REGSTRING   PresenTense Client
Modules;ntpv4<ntp4plugin-primary-server:10.254.254.254
REGSTRING   cEngineType:ntptime
REGSTRING   event_last_message:PTC remote installed.
REGBOOL   bWatchdog:false
REGBOOL   bDHCPEnable:false
REGBOOL   bLogEnabled:true
REGINT   iLogLevel:1
REGINT   iSource:4

The first line is often the one you will change. You then simply save the file (bfoptions.dat) and send this to them along with the PTC-Remote.exe file.

If demand for remote install increases at the same rate it has been, I would like to see a simple application that can build a config file and/or an ADM template from a configured workstation. In other words, the customer installs PTC, configures it the way they want it and then runs the config generator. It creates a config and an ADM template and they can choose which to use from there.

You can always send customers to the following URL and ask them to choose which method they want to use:
http://www.bytefusion.com/products/ntm/ptnt/remoteinstallation.htm

DHCP configuration (bfoptions file)

- ➢ Document on Bytefusion's website: http://www.bytefusion.com/products/ntm/ptnt/configuring_via_dhcp.htm

- • I copied this document for "safe-keeping" into: I:\Customer Service\Software\ByteFusion\remote install and configuration

- ➢ Uses DHCP Option 43 (vendor specific information)

- ➢ I believe DHCP configuration was initially added in PresenTense Client version 4.0

- • Ability to export configurations from a Client was added in version 4.2?

- ➢ Can either export the DHCP Server String (bfoptions file) from a PresenTense Client or can also manually create it, as desired.

Email from Bytefusion several years ago

The DHCP stuff is probably the most powerful option ever added to PTC. It allows you to centralize the configuration of time clients on a network. At this point I'd like to use you as a tester and point you to the documentation. If you can't understand the documentation, then we have a problem. The online version is:
http://www.bytefusion.com/products/ntm/ptnt/configuring_via_dhcp.htm
Click on Next (top right hand corner) to see a list of the actual option numbers and what they configure within PTC.

I don't want to say anything more until you've read it so I can see how good the documentation is :)

The document on the Bytefusion website discusses how to either export the file AND how to manually create it:

Copying the Windows system registry

Q. I don't really want to go through all the trouble of running a DHCP server on the network. Is there not a config file I can take from an existing installation and place in a directory after a new installation completes to update the configuration?
A (**from Mark Roberson 6/25/12**) If the software is actually installed on another machine but you just want to clone the settings then you could export the appropriate part of the registry and copy over the ntp.conf file. I don't see any reason this would not work.

 If the software is not installed, then a remote installer would be the best option.

———————————————————————————

**Windows System Tray Icon

Install message: Tray ICON disabled due to 64-Bit

Q. During installation on a Win7 x64 machine, we had during installation the following warning :
« **Tray Icon disabled due to 64-bit** « (and I confirm we do not see the tray icon we do need). But, it has installed correctly on another machine with Windows 2008 R2 x64 Server with tray icon (see below).So the tray icon disabling is not linked to 64bit OS. How to make it work with Win7 x64? (if it works on Win20008 R2 x64, it should work also with a Win7 x64).
A Reply from Dave Lorah (19 Apr 13) Try going into the Settings/Desktop Configuration and check both the "**Load Skin At Startup**" and the "**Show Taskbar icon at login**" boxed. Restart the program from the Admin tab. Do you see the Icon in the taskbar now?

The reason for this observation, as explained by Mark Robertson (15 May 13)
The answer to the question about the task bar icon and skins loading is basically "because it's Windows".
On my machine (Win 7, 64-bit), the taskbar icon and skins run without any problems. On other machines one or the other will fail after installation but will later work.
This is one of the reasons we never do an update until a major OS release has stabilized. Windows 7 is becoming more stable now, especially if you compare it to Windows 8.

Did they have a demo installed and then purchased the software and installed over the demo or was this a demo installed on a clean machine? Was the machine (Windows) updated before they installed the demo?

———————————————

Q. We don't want the icon in the system tray visible to our users running the client. I know there is a "Hide Me Now" option for the icon in the system tray...is there a setting in the application to remove the icon from the sys tray? Or do we do this through Windows?
A. In the PresenTense GUI, navigate to the **Settings** tab -> **Desktop button** -> uncheck "**Show taskbar icon at login**" and remove the file ptsystray.exe. The service does not need this file to be present in order to operate. Even the user interface can be removed by deleting the ".cpl" file in the directory where PresenTense Time Server and Client are installed. This adds security as users are not able to modify the settings unless they have access to the registry and are able to stop and start services.

**Polling interval/ "Synchronize every" log messages:

Under the hood PresenTense (PTC and PTS) keep a high resolution clock for every time source which they have configured as a reference source. Normally this is the primary, redundant and secondary redundant sources however more can be manually added. These clocks have a theoretical 7 nanosecond granularity. It is these clocks which produce the "synchronized to" messages and the timing of these is totally independent of polling. The sequence of events is roughly as follows.

1) Polling (according to the Min/Max settings and the automatically determined "best polling" time) Collection of polling results.
2) Initial filtering of polling results.
3) Statistical analysis of polling results.
4) Addition of polling results to each individual reference clock's queue.
5) Back to polling.

Independent of the above, each reference clock regularly checks its pool of polling results and when enough time stamps are present, it updates itself and synchronized the internal reference clock using the data. It's at this point that the "**synchronized to**" message occurs.

At regular intervals, the values of the internal reference clocks are evaluated and depending on the prefer and weighting due to high or low jitter etc, the actual Windows clock is either adjusted or the frequency is skewed to steer it closer to the true time.

In a perfect world, all samples returned by every true time source would make it into the reference clock samples but that is usually not the case. The sample pool required by the reference clocks is also larger than one sample so quite a few polling intervals have to go by before any calculations are made. As a result, the "synchronized to" messages appear rather randomly but they should in no way be interpreted as being the polling interval.

Note: To see the actual NTP polling interval, use wireshark on the same subnet as the PC to capture the NTP packets.

**Leap Second (Client and Server)

Q. **(Morgan sent to Mark Robertson**) I assume that PresenTense will request the Leap Second information from the SecureSync and then update all the work stations at the correct time. Can you confirm?
A Reply from Mark Robertson (25 Apr 15) You can reply to them as follows:
 PresenTense Time Client/Servers handle leap seconds without issues, provided their upstream time sources set the leap second notification and the NTP protocol is used. If not, the time will be corrected anyway however it will take a little longer except in the case of SNTP where the correction will be immediate.

 Although it has been a while since the IERS introduced a leap second, there have been many over the years and the NTP protocol handles them well. We are getting swamped with questions about it as well.

**PresenTense Client in VLANS and VMWare (virtual machine)

VLANs

Q One of our potential customers in Asia inquired about using PresenTense software on a Windows VLAN network. My guess was there is no detrimental effect to the software itself in this environment, other than any inherent latencies of the NTP packet through the switches. I just wanted to confirm my suspicions with you.
A. From Mark Robertson (4 Nov 2015) You are right. VLANs are considered by many to be the substitute for multiple physical network adapters. If this were plumbing in an apartment building, all showers would be sharing the same hot water pipe. This works fine until everybody wants to shower at the same time! With some implementations of VLAN equipment, I believe it's possible to prioritize traffic to certain servers so this should be considered if there are issues.

 At the end of the day, VLAN technology will introduce delays compared to a normal LAN and will most likely degrade the quality of time synchronization however whether this is significant or not depends on the equipment used and the timing requirements of the application. Two low usage VLANS and an accuracy requirement of 100ms would work. Scale that model up to a datacenter with a few hundred VLANS and the answer will probably not be the same.

VMWare/Virtual machines

Q. Email from Sylvain- I have a customer who wants to use Presentence with a WMARE environment. Is it working? did you find some limitations?

A. Reply from Dave Lorah (20 Mar 2013) I have some information from Mark Robertson at Bytefusion:
"I know we have had people get it working on VMWARE but don't recommend it. I also think it would be impossible to say what the accuracy would be in such a system.

When running on normal Windows, PresenTense at least has it's "feet on the ground" via the very fast API to the high resolution hardware timers on the motherboard. When you virtualize this then I don't know what the result would be. I think the only way to tell would be to test it in the environment." Regards, Mark

So I would not make any guarantees to the customer that Presentense will operate as designed. They could try the 30 Day free trial and see what results they get I suppose.

Concerns about a user being able to manually change the Windows time

Email Dave Lorah sent to Danny.Scott@arlingtontx.gov I have some more information on the question concerning manually setting the time in PresenTense Client.

PresenTense is designed to automatically keep the time as accurate as possible on a system of computers. Under normal conditions it will keep all computers within a second of the correct time. If the time is manually changed due to user interaction the NTP component will recognize the time difference and initiate a resynchronization with the Time Server. This does take a couple minutes so the computer time will be incorrect until it resynchronizes.

There is no setting in PresenTense Client to prevent a client from manually changing the time. PresenTense does not control these settings directly. The Time zone and Date/Time on the Admin tab bring up the Windows Date and Time Properties. To prevent a user from manually changing the Date and Time Properties permissions must be set for this in Windows. You would need a way to prevent the Date and Time Properties from being changed when logged in as the user.
I am not sure exactly how this is best accomplished. I would have to refer you to Microsoft for support on this topic.

Alternatively, you could also hide the Time display and PresenTense Client Icons in the Taskbar. This may prevent users from being tempted to play with the time settings and will not affect PresenTense operation. In the SETTINGS tab select Desktop Settings and uncheck the "**Show taskbar icon at login**".

_____
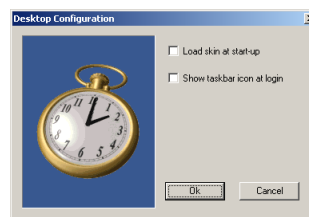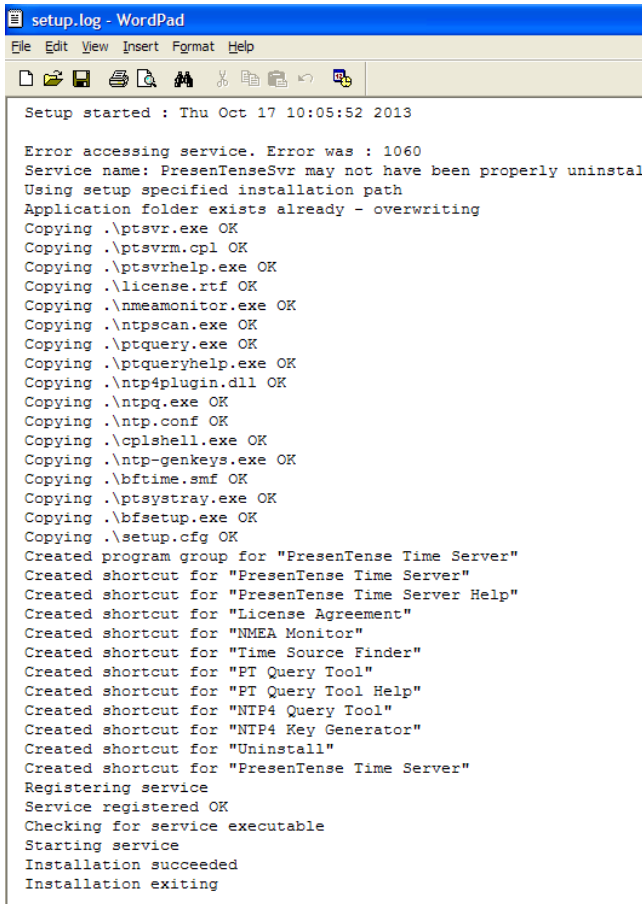
**Logs/Troubleshooting/ known issues with PresenTense Client/Server

****Install Log/error messages/issues (such as 64 bit install)

Get Install log

Generates a "**setup.log**" log file in the **C:\Temp** directory (example log from a Server version 4.1 re-install_

```
setup.log - WordPad
File  Edit  View  Insert  Format  Help

Setup started : Thu Oct 17 10:05:52 2013

Error accessing service. Error was : 1060
Service name: PresenTenseSvr may not have been properly uninstal
Using setup specified installation path
Application folder exists already - overwriting
Copying .\ptsvr.exe OK
Copying .\ptsvrm.cpl OK
Copying .\ptsvrhelp.exe OK
Copying .\license.rtf OK
Copying .\nmeamonitor.exe OK
Copying .\ntpscan.exe OK
Copying .\ptquery.exe OK
Copying .\ptqueryhelp.exe OK
Copying .\ntp4plugin.dll OK
Copying .\ntpq.exe OK
Copying .\ntp.conf OK
Copying .\cplshell.exe OK
Copying .\ntp-genkeys.exe OK
Copying .\bftime.smf OK
Copying .\ptsystray.exe OK
Copying .\bfsetup.exe OK
Copying .\setup.cfg OK
Created program group for "PresenTense Time Server"
Created shortcut for "PresenTense Time Server"
Created shortcut for "PresenTense Time Server Help"
Created shortcut for "License Agreement"
Created shortcut for "NMEA Monitor"
Created shortcut for "Time Source Finder"
Created shortcut for "PT Query Tool"
Created shortcut for "PT Query Tool Help"
Created shortcut for "NTP4 Query Tool"
Created shortcut for "NTP4 Key Generator"
Created shortcut for "Uninstall"
Created shortcut for "PresenTense Time Server"
Registering service
Service registered OK
Checking for service executable
Starting service
Installation succeeded
Installation exiting
```

Specific log entries

No previous versions of the software were detected (clean install)
No previous installation found.
Using setup specified installation path
Successfully created application folder

** Client and Server Logs/logging/export last 50 log entries

> **Important**: request that the customer use the export last 100 events button on the **Log** tab and send us the log so we can further inspect what is happening.

No entries in export

Email from Bytefusion: If PresenTense Time Client logs were completely empty, then it was either not started or started under a different account than the default system account and had no permission to write to the log.

Even if the lowest log level is chosen, it reports errors.

He said all Presentense logs were empty. I only have the fact that the error on the home screen was there and that there now are no NTP sources configured.

If it has no NTP sources configured then it is even more pointing at a different account, one which is unable to access the registry. Another possibility is an over-active anti-virus which is blocking. If any Norton product is installed. then this is a strong possibility.

Sync messages

SNTP Time Source mode:

   ➢ Shows time corrections but not the time source that it was synced with.
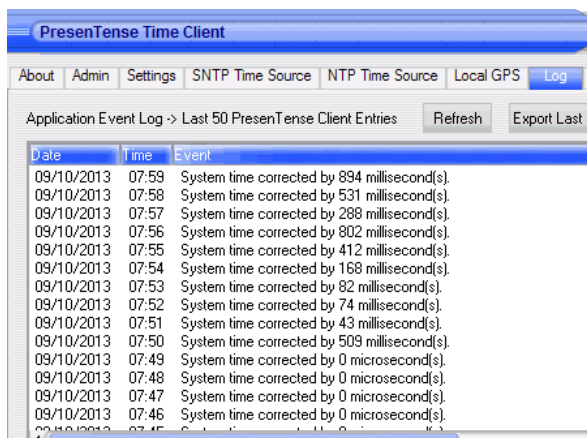
- **NTP Time Source** tab
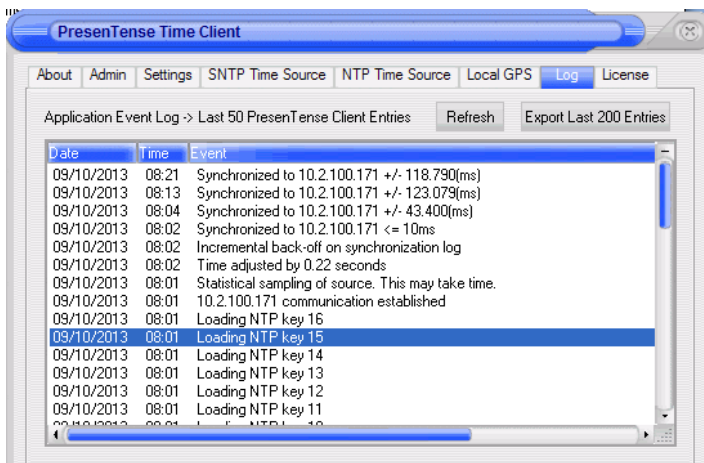
NTP Resynchronization" log entry

Email from Dave Lorah to a customer (based on info from Mark Robertson)
Here is some information on your "What causes a NTP Resynchronization" question:
PresenTense Time Server maintains an internal clock (separate from the windows clock) for each external source it's synchronizing to. If you have a primary and secondary time source, there will be two internal clocks. It is these which are

From these clocks, one is chosen as the most accurate and after more checks and statistical filtering and so on, the Windows clock is synchronized to the chosen internal clock.

When there is a large time difference between the internal reference clocks and the true time sources, a resync is initiated. Basically PTC has to decide whether the true time source has become corrupt or the local windows time needs adjusting by a large amount. I believe a resync message will also occur if the true time sources have been offline for a short while.

This message is not considered to be a problem, it's simply PTC doing its job. Something has occurred and it's handling the situation. It may however give some clues as to when trouble is starting to occur.

Shut down the admin server: PresenTense software was stopped in the Admin tab

He would like to get information about the way to record/store the "loss of synchronization" event.
Keith's response: The PresenTense Client NT software has log files that are sent to and stored in the Windows Event Viewer.

The « **Settings** » tab in the Client NT software GUI allows Logging to be enabled and provides three different levels of available logging to choose from:
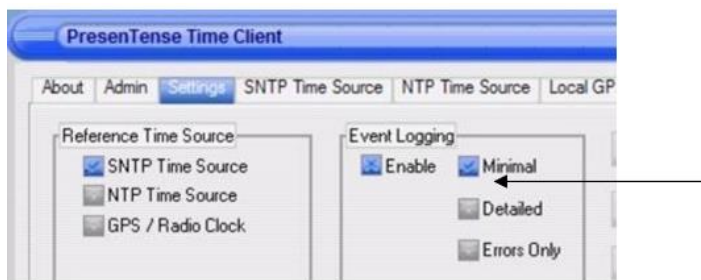
The **Log** tab of the ClientNT GUI allows the logs to viewed, or exported to a log file
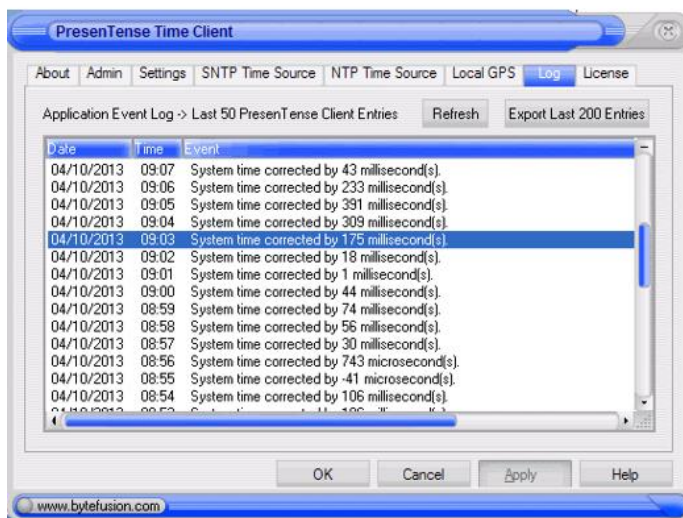
These logs can be viewed from the Client NT GUI, but they are actually stored in the Windows Event Viewer. These Windows Event logs can be viewed/archived as desired from the Windows **Control Panel** -> **Administrative Tools** -> **Event Viewer**. They are placed in the Application log file (as shown below):

Administrative Tools

File   Edit   View   Favorites   Tools   Help

Back   »   Address   Administrative Tools

File and Folder Tasks

Other Places

Details

Event Viewer
Shortcut
Date Modified: Thursday

Component Services
Shortcut
2 KB

Computer Management
Shortcut
2 KB

Data Sources (ODBC)
Shortcut
2 KB

Event Viewer
Shortcut
2 KB

Local Security Policy
Shortcut
2 KB

Performance
Shortcut
2 KB

Event Viewer

File   Action   View   Help

Event Viewer (Local)
Application
Security
System
Internet Explorer
Microsoft Office Diagnostics
Microsoft Office Sessions

Application   2,545 event(s)

Type	Date	Time	Source	Ca
Information	4/10/2013	9:17:09 AM	PresenTense	No
Information	4/10/2013	9:16:09 AM	PresenTense	No
Information	4/10/2013	9:15:09 AM	PresenTense	No
Information	4/10/2013	9:14:09 AM	PresenTense	No
Information	4/10/2013	9:13:09 AM	PresenTense	No
Information	4/10/2013	9:12:09 AM	P	
Information	4/10/2013	9:11:09 AM	P	
Information	4/10/2013	9:10:09 AM	P	
Information	4/10/2013	9:09:09 AM	P	
Information	4/10/2013	9:08:09 AM	P	
Information	4/10/2013	9:07:09 AM	P	
Information	4/10/2013	9:06:09 AM	P	
Information	4/10/2013	9:05:08 AM	P	
Information	4/10/2013	9:04:08 AM	P	
Information	4/10/2013	9:03:08 AM	P	
Information	4/10/2013	9:02:07 AM	P	
Information	4/10/2013	9:01:07 AM	P	

Event Properties

Event

Date: 4/10/2013   Source: PresenTense
Time: 9:04:08 AM   Category: None
Type: Information   Event ID: 0
User: NT AUTHORITY\SYSTEM
Computer: PM-WING2

Description:
System time corrected by 309 millisecond(s).

Below is an example log showing the Client software starting up, but not able to sync to an NTP server. Since it could not sync to the configured Primary time reference, it then tried syncing to the redundant NTP server. The log indicates it was not able to sync to the backup reference either (I intentionally configured this to happen, so that you could see the associated log entries). These logs are located in the Windows Event Viewer, but are being displayed in the PresenTense GUI):
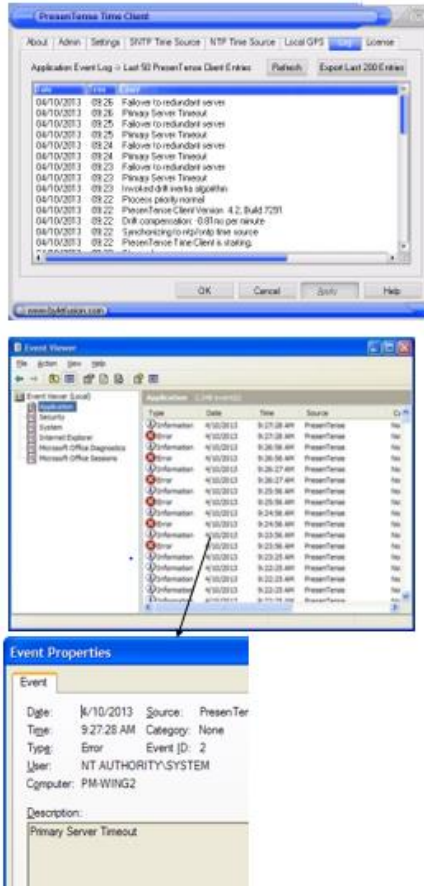
Logs stop being entered in PresenTense Client GUI

A) Verify Logging is enabled in the Settings tab of the GUI
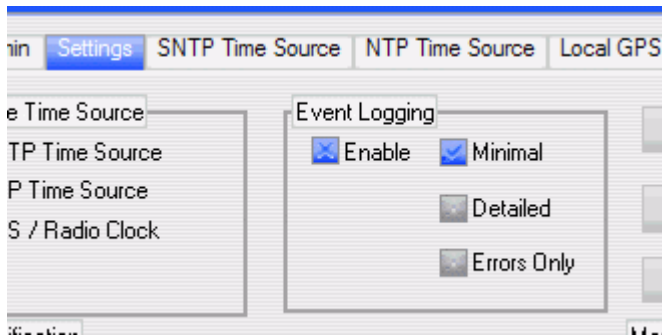
Note that if "**Minimal**" is selected, logs will back off after the program has been started and running. To obtain the most log entries, "**Detailed**" should be selected.

B) Make sure the Event Viewer logs aren't full.

PresenTense Client logs are stored in Windows Event Viewer. Depending on how the Application Log in Event Viewer is configured, it's possible for this log to become too full of logs. To prevent this from happening, this log should be configured to "**Overwrite as needed**". When its configured instead as "**Do not overwrite events**" or "**Overwrite events older than"** a specified number of days, the log may become full and will prevent new logs PresenTense logs from being stored, until the log has been cleared.

To verify the settings of the Application log, go to **Control Panel** -> **Administrative Tools**. Then select **Event Viewer**. In Event Viewer, right click on **Application** and select **Properties**. Select "Overwrite events as needed", if it's not already selected.
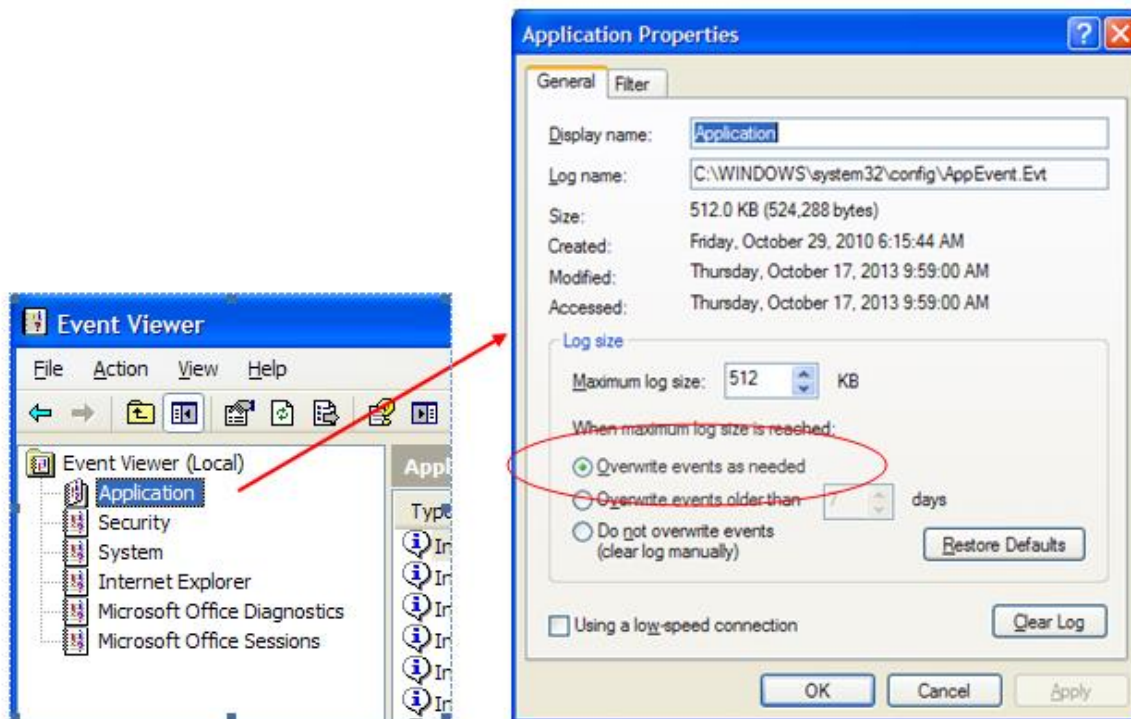
**** PresenTense not syncing to Time server, though time server is fine/Log file

Important: request that the customer use the export last 100 events button on the **Log** tab and send us the log so we can further inspect what is happening.

1. If using NTP mode, try syncing computer using SNTP mode.

2. If the PC syncs, see if there is more than one reference listed in the NTP Servers tab.

3. If there is more than one reference, see if the times of all references are at least fairly similar.

4. If they aren't NTP may not select any reference and won't sync. Remove any references that aren't at least fairly accurate.

falseticker

Per Salesforce Case 250326

Steve reported his PT Clients are no longer synchronizing after a long network outage. He has three Time Servers used as NTP Sources. They are not using PT Server, the PT Clients go to the Time Servers directly. The network has been restored but the PT Clients will not sync until the PT Client is restarted.

Before restarting, the NTP Information shows Current Stratum = (-) and Sync = (-) with an error message something like "format incompatible.." I am sorry I did not copy down the exact verbiage. You may recognize this.

Q The Presentense client was not able to get to the NTP appliance for about 3 days. Could this be due to the NTP Sources becoming disqualified after being unreachable for so long?

A There is a period after which the client gives up and declares the time source as "false ticker". PresenTense Time Client will then restart itself to try to overcome the problem. When this event occurs, it is written to the event log.

Do they need to restart all PT Clients to regain sync?

I would suggest looking at the account under which the service is running as there is something unusual here. PTC always writes something to the event log - as soon as it gets path of execution from the Service Control Manager (upon startup).

Q I sent some info to the customer and he replied with this question. I am wondering also about the re-establishment of the Time Server. Will PT Client eventually give up on a "falseticker" or keep checking periodically?
A per Bytefusion It gives up on a false ticker but when there are no upstream time sources left, it restarts and all counters are set to zero so it will try to establish connection with all configured time sources from new.

"If there is a prolonged network outage, there is a period after which the client gives up and declares the time source as "false ticker". PresenTense Time Client will then restart itself to try to overcomethe problem. When this event occurs, it is written to the event log."

Q What happens with a "false ticker"? Does it ever re-try again? And is the restarting of the software handled by the> OS in the services area, or a different way?

A per Bytefusion A false ticker is not retried again but it takes quite some time to be declared as such. Once all upstream time sources are unreachable, PresenTense Time Client (PTC) will signal that it requires restarting and all counters are reset, meaning all upstream time sources get a clean slate and will be contacted.

The restarting is handled by the thread which communicates with the Windows Service Control Manager (SCM). The exact details of how a service communicates with the SCM can be found in the Microsoft documentation for system services however a short summary is here:

Q I am also getting more info from my Windows logs. How does the client become corrupt?:

A per Bytefusion Please be more specific with this question. All executable files are signed with a code signing certificate issued to Bytefusion Ltd. If the executable is showing as signed and valid then it is not corrupt. Once loaded and executed in an operating environment, corruption can be caused by faulty memory, viruses and many many other reasons hence the need to be more specific.

PresenTense Server software "Access Denied error-"

Access Denied error- "Error Copy .\ptsvr.exe to C:\Program Files\PTServer\ptsvr.exe. Error number: 32"

Email from Mark Robertson to Dave Lorah
It looks like an "access denied" error which is probably caused by the service being in a running state. The installer found a previous installation. I would suggest stopping the PresenTense Time Server service and then try deleting the PresenTense folder and if he gets an access denied error, reboot windows and repeat the process. Once he can delete the folder, the problems should disappear.

Follow-up from Dave L to Mark The customer was able to get it working by rebooting Windows.

PresenTense Client software

**** Windows 64 bit install issues

Error 32, access denied

➢ Towards the beginning of the install log: Files\PresenTense\presentense.exe. Error number: 32.

➢ Then further down at the log:

Created shortcut for "PresenTense Time Client"
 Registering service
 Error registering service
 Unable to start the service
 Installation error
Installation exiting

Fix: Either update to PresenTense Client v5.0.1 OR use the newer version 4.2 installer for 64 bit OS

From Bytefusion Tech Support (Salesforce Case 10737) From the log I can see that the problem is that the windows service control **manager** has not released the service executable after stopping it. This is unfortunately a problem which occurs on various builds of Windows. The solution is to manually uninstall the service (if it is installed) and then try to delete the PresenTense Time Client directory. If Windows will not allow you to do this, make sure the service is set as disabled and then reboot the machine. Repeat the process until Windows will allow you to delete the directory.

After this is complete, install PresenTense Time Client and you will not receive this error (Error 32, access denied).

Good draft to send regarding 64 bit install

Regarding PresenTense software not able to enter the "running" state on Windows 64 bit OS, I have some information for you that I hope will help!

To begin, all versions of PresenTense Client software are compatible with Window 7/64 bit OS, as PresenTense is a true System Service. However, Windows 64 bit can be a bit of "finicky" at letting the PresenTense software (and other services) start-up after its been installed. If the software isn't able to enter the "running" state after its been installed, the information below may be able to help the software start-up.

First, a couple of questions for you:
What is the version of the PresenTense Client software that is installed (as reported in the "About" tab in the PresenTense GUI)?
If the current version of software is version 4.2, about how long ago did you receive this program?
Has a newer version of software been installed over an earlier version, or over the 30 day demo program.

For your information, version 4.2 is the latest version of software and has been the latest version since Sep 2009. However, there was a change to the installer for version 4.2 back in Dec 2011 to make the installation of the software on 64 bit Windows much simpler. The change that was incorporated in Dec 2011 was just to the installer portion of the program and did not have any effects on the Client program itself. So the version remained version 4.2 at that time.

If version 4.2 installed, and you aren't sure when the software was received, to verify which version 4.2 file it is (either the older or newer), just look at the "Properties" of the install file (.exe) itself. The file size with the newer installer is 4.50MB, instead of 4.08MB as it was before this installer change was incorporated back in Dec 2011.

If the current version of software has been installed over an earlier version, or the 30 day demo software, try complete uninstalling the PresenTense folder and then install only the latest version of the program.

As reported in the **About** Tab:
1. If the current version is version 4.2 and you received the software in or after Dec 2011 time-frame, just make sure that in Windows Services, PresenTense Client is set to "Delayed Start". It should be able to install and run with no problems on a 64-bit machine. If it can't even install, let alone run, try temporarily disabling any installed anti-virus software, as it can affect its ability to be installed. aggressive anti-virus programs will sometimes stop an application from starting, and will generate a pop-up box asking if the application should be allowed to start, but the message box does not make it to the desktop.

2. If the current version is version 4.2 and you received the software before Dec 2011 time-frame, let me know and I can send you the new installer that was released, which makes the software easier to be able to run on 64 bit machines.

3. If the current version is versions 4.1 or 4.0, upgrading to version 4.2 is considered a minor upgrade and is therefore a free upgrade. Let me know and I can send you the latest version 4.2 install file.

4. If the current version is version 3.9 or below, and you would like to consider upgrading to version 4.2 (this is considered a Major upgrade and a fee applies), please contact Matt Loomis with our Sales team. He can be reached at (585) 321-5869 or via email at matt.loomis@spectracom.orolia.com.

Note that in order to send free updates to the latest copy of the version 4.2 software (as mentioned above), we just need to confirm the original purchase of the Client software. This can be verified by the name of the organization that originally purchased the software, the original customer PO Number, Spectracom Order Number, etc.

Otherwise, the information below is likely to ease the installation and operation of the software on Windows 64 bit, if it was shipped prior to Dec 2011:

The first step to try if the software isn't able to start-up is to reboot the PC. Then, try starting the software again. If it still isn't allowed to start-up, next it's important to verify that all Windows Updates have been applied to the PC. If not, the OS should be updated with All Windows Updates.

After verifying Windows has been updated, perform the following steps:

As shown below, in the PresenTense GUI, Click on the "Settings" tab, "Advanced Settings" button. Disable "Configure via DHCP" by un-checking this box.
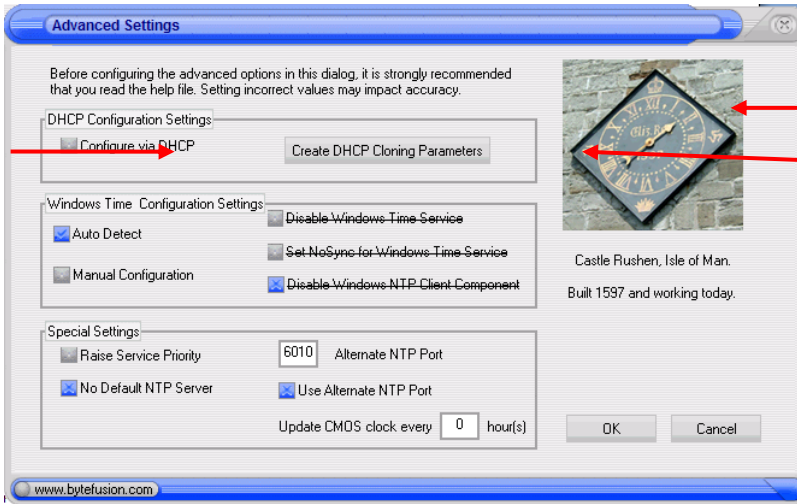
Then try starting the Service in the "Admin tab".
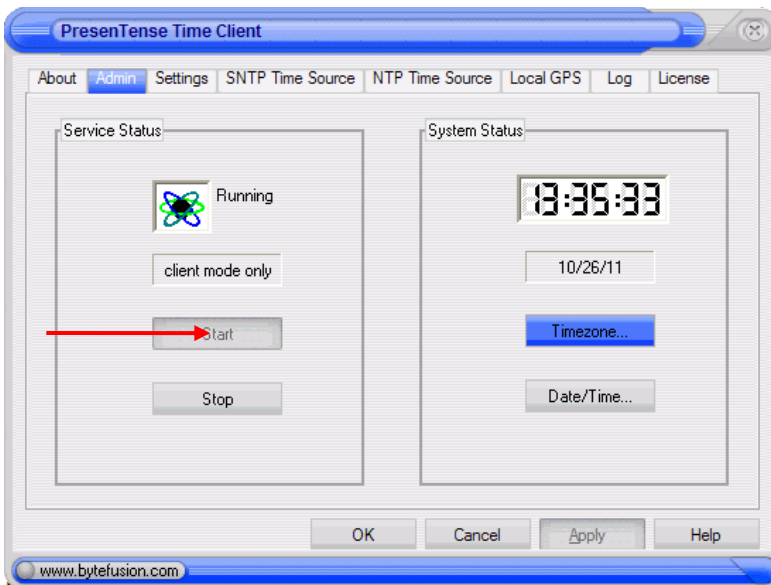
If the PresenTense software still can't be started, click on the "**Settings**" tab, "**Advanced Settings**" button again. As shown below, in the "Windows Time Configuration Settings" section, select "Manual Configuration" and then select "Disable Windows Time".
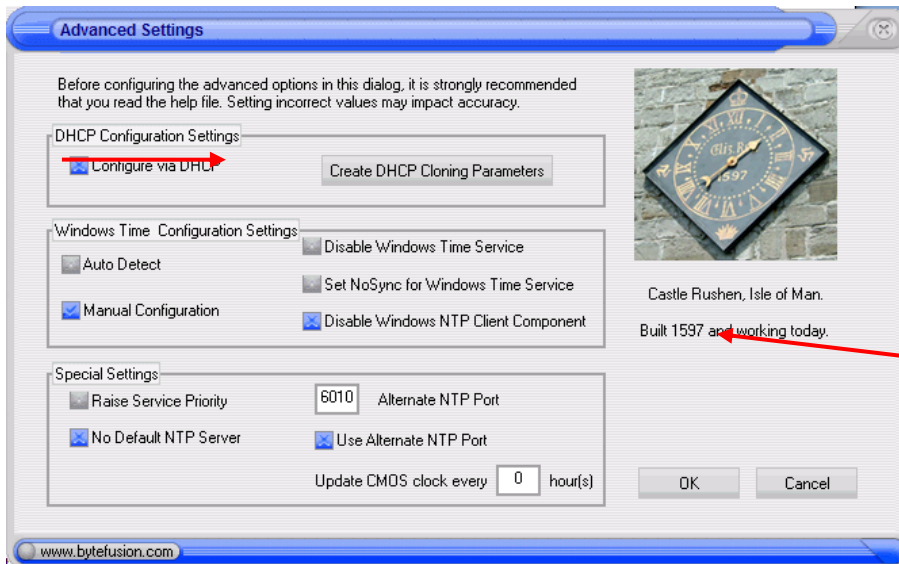
Note: If this step allows the PresenTense service to start up, but you then get issues with other Windows services failing (due to a dependency on Windows Time) please let us know and we'll assist you with manual configuration to avoid these failures.

If none of the steps above work, "delay service start". In Windows Services, set the PresenTense Time Client service to a startup type of "Automatic (Delayed Start)" which causes the service to wait approximately 2 minutes after boot-up before it tries to start that service. This is due to the registry translator service being slow to start on some 64-bit systems. The reason is unknown and it's rare, but if that service does not start before PresenTense then it causes problems with the PresenTense software.

If PresenTense is still not running, reboot the PC again.

Note: In order to reset the status of the Microsoft Service Control Manager (SCM). The setting of the PresenTense service to "delayed start" gives Windows enough time to get its registry reflector/redirector running, as it often reports itself as running, when it's really not. If the service is in an unknown state (the SCM is "confused") then setting it to delayed start only helps after a reboot.

If PresenTense is still not running, uninstall and reinstall the PresenTense Client program.

Note: We've had one customer who kept putting the computer into "hibernate": instead of shutting down, the service control manager (SCM) never "sorted itself out". At this point, we recommend you uninstall the PresenTense software and try again. Make sure the PresenTense service no longer appears in the list of services, after it has been uninstalled.

At that point, install PresenTense and then perform all of the recommended changes above (delayed service start, disable DHCP, auto detection of Windows Time dependencies etc) and restart again. If this still fails, please let us know!

****Operational issues with PresenTense Client/Server

- ➤ GET LOGS from the LOG tab

    1. Copy/paste from the Log tab,

    2. Send a Screenshot of Log tab

    3. Use the Export button for the last 200 entries

Note: The Export Button generates an AEL-Export.txt file in the **C:\Program Files\PresenTense** folder

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PC not syncing to reference

Log entries show "Starting GPS Reference" and "No contact with GPS receiver"

> ➢ Cause: "GPS / Radio Clock" is selected in the "Settings" tab. Change this to instead to either "SNTP Time Source" or to "NTP Time Source. This selection is not used for SNTP/NTP time sync.

"1053 error" message

On a Windows XP 64 bit machine: PresenTense service is set to Automatic but does not start on startup. When I attempt to start manually, I get an Error 1053 error.

Based on email from Mark Robertson-Please look for the PresenTense registry entries in the following registry locations.
HKEY_LOCAL_MACHINE\SOFTWARE\Bytefusion\PresenTense\Parameters
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Bytefusion\PresenTense
\Parameters

Another Time Service (such as the Windows Time Service) is also running in the background, along

with PresenTense

    Log entries in the PresenTense log

Send to(IP address)
Can't add socket to i/o completion port . The parameter is incorrect
Another process is blocking the port. Probaly Window Time Service
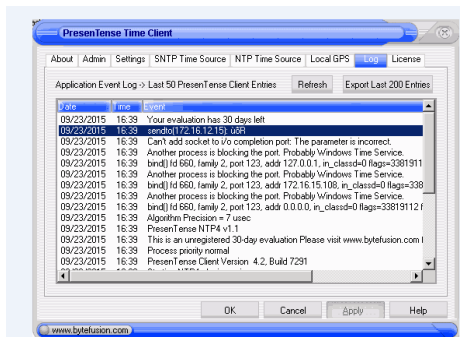
Email Keith sent to Eric Girard (based on the screenshot above) 23 Sept 15 I started trying to duplicate what they are doing, to determine the cause of the logs. But as I was starting to configure the software, I noticed the reason for these entries. This is actually a simple solution.

Note that more than one time service can't "share" the NTP port (port 123).   One time service will prevent another time service from using this port. The logs show that the default Windows Time Service is still running on this PC, which is preventing Presentense from being able to use the port.

The PresenTense software disables the Windows Time Service when it's enabled. It appears they turned Windows Time back on, after they installed the demo software. I recommend they disable the Windows Time Service (in Windows Services) while they perform their evaluation testing of the PresenTense software. Then as long as the IP address is reachable through port 123 from this PC (I assume that it is), the PC should sync to the time server.

Note that if they need to keep Windows Time running due to it being a dependency for another program that needs it to be running, there is a special setting in PresenTense to allow it to remain running while the PresenTense software is also running.

In the Settings tab, click Advanced Settings. As shown below select "**Manual Configuration**" and then select "**Set NoSync for Windows Time Service**". Windows Time can then run. But it will no longer be able to set the time of the computer, allowing PresenTense to be able to sync the computer, instead of Windows Time.

Known software issues:

Right side (or left side, possibly) of GUI is getting cut off from the display/ GUI too small or too large

Email from a customer: In the interim, I downloaded your 30 day demo package yesterday afternoon and have a question. Please see the below screen capture which shows that the PresenTense application window does not open completely or permit resizing to see the full contents of the program options.   Notice there is no Minimize/Maximize icons and when positioning the mouse over the sides or corners, there is no option to manually resize. It would appear that I cannot test the functionality because I can't get to all the settings.
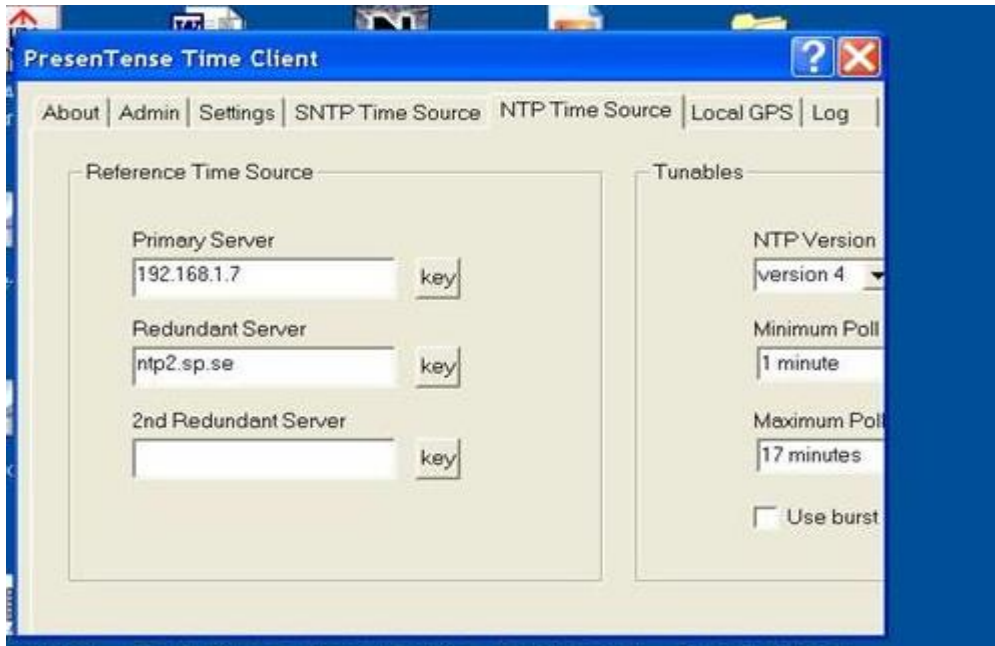
This potential issue is not a factor of the PresenTense software itself. It's an issue between Windows and the installed video card driver.

Two Emails from Mark at Bytefusion about this issue:
Hi Keith,
We've had it reported before but the problem has been a screen driver or that the user was using remote desktop. Setting the correct screen card driver usually fixes it. If not, the other thing that I can think of is that another window has had the same name and the Windows Size/Location Cache has stored that incorrectly. To delete the cache, the temporary internet files must be deleted as follows:

Close all programs, including Web browsers.
Click the "Start" tab and click "Control Panel."
Double-click "Internet Options" and go to the "General" tab.
Select "Delete Files" under "Temporary Internet Files" and click "OK."
The process can take several minutes.

And second email (I had asked him if "screen driver" referred to the video card driver")
Yes, I mean the video card driver. Windows has a habit of taking Microsoft developed drivers above manufacturer supplied drivers. The best way for the customer is to go to the web site of the manufacturer of the card and download their driver installer. This normally overrides the Microsoft driver and then everything works as it should. There are nastier methods of changing the driver but a manufacturer supplied installer is always best.

Ptsver.exe- Entry point Not found

Error message displayed while installing on a Windows NT PC. Below this error message title, is the phrase "**the procedure entry point GetWindowInfo could not be located in the dynamic link library**. **USER32.dll**"
Two replies from Mark Robertson about this condition:

Can you ask him what Service Pack he has on that machine?   I think the problem is caused by the skin so he could try to reinstall and choose the option without skins or he could install SP6 on the computer. I'm not sure of this but nowhere in our code do we call GetWindowInfo (just ran a search) so I suspect it's in the DLL we have from a 3rd party to provide the skin look. It's imported in our space so GetWindowInfo will be reported as being called by PresenTense.

The issue comes up every now and again when somebody has had a demo installed and then installs the full version over the top of it. The installer shuts down the existing service and waits until the Service Control Manager reports it as stopped and then copies over the new version.

The problem is that although the SCM reports the service as stopped, the SCM still has the file open and when the installer tries to overwrite it, you get access denied. In the log file you can see "Error number: 32".

Ask them to check the log on PTC to see that they don't still have the demo service installed as this has also happened a couple of times where all files except the service executable are full version but the service itself is still a demo as the overwrite failed.

The only way to avoid this is to uninstall first and reboot the machine before installing the full version but this will annoy too many customers and the problem is not so common so we've decided not to take any action.

****All fields of the GUI are grayed-out in Windows 64 bit
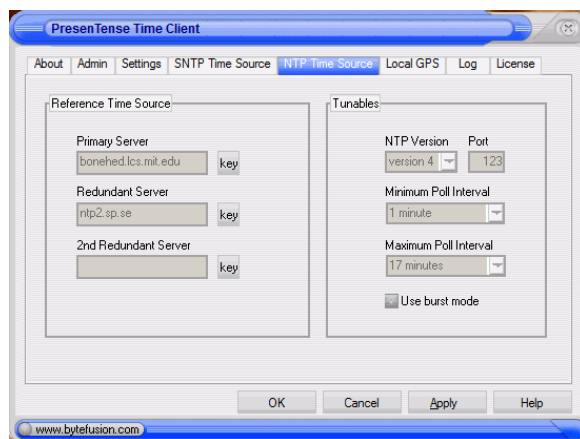
This issue is most likely due to installing the Client NT program using the older executable file (The registered/purchase software or the 30 day trial software).

1. Make sure you are logged in with administrator rights.
2. If the program was installed using the earlier .exe file, obtain the later version of the .exe file, uninstall the current software and install the newer software.

- The change to the registered (purchased) software was back in Nov 2011.
- The 30 day demo software was changed back in December 2012.

Link to download the latest 30 day trial software:
(http://www.spectracomcorp.com/ProductsServices/TimingSynchronization/SynchronizationSoftware/PresenTenseNTP WindowsSoftware/tabid/1426/Default.aspx

Anti-virus software affecting PresenTense Client and Server software:

PresenTense Time Server and Client report communication established with their true time source, followed by collecting samples, this may take time.
It does: in fact the service does not hang but never goes any further. Some samples are collected as ntpq -> peer does report some stats.

After three hours of working with a remote desktop, the culprit was Trend Micro Office Scan. If the directory where PTS or PTC lives is added to the exclusions, everything works as expected.

This is the first case we've seen this so I'd appreciate being notified if anybody else comes across a similar situation. Norton Virus (rather than
anti-virus) is a known issue and I'm hoping that other anti-virus software is not becoming as aggressive. In this particular case, the firewalling facility in Trend Micro was turned off.

W32Time (Windows Time) co-running with PresenTense client or Server/ "Command.com" displayed when closing the PresenTense GUI

Q Email I sent to Mark Robertson about a customer: One question he asked was why Windows Time was still running/enabled after installing PresenTense, unlike with the earlier versions of Presentense. He wanted to know why this was the case. I noticed this too (just installed the software on a new PC). But now I notice its disabled/not running.

A **Email from Mark Robertson (4 Dec 2019)** When it comes to Win32Time, please ask them to check the Settings -> Advanced Settings dialog. There are three settings there of interest:

Disable Windows Time Service (seems this is not checked) Set NoSync ... (this is probably enabled, or at least should be) Disable Windows NTP Client component (this should be enabled)

If there is a dependency on Win32Time, it is often left running (first unchecked) but essentially completely disabled (last two checked). This way the dependency is met but Win32Time is not able to do any harm.

Command.com" displayed when closing the PresenTense GUI

Q. I installed PresenTense Time Client NT Site License S-NTP-PTC-10-4.2 (Build 7291) on a Windows 2003R2 Enterprise x64 server. I am using the 'NTP Time Source' configuration tab to configure a Spectracom 9389 as the source for the PresenTense Time Client (screen shot: ss1.jpg). During the PresenTense Time Client installation, around the 'starting service' step, I saw an error dialog '..Windows cannot find command.com...' (screen shot: ss4.jpg). Whenever I make change to the configuration using the PresenTense Manager GUI and then click 'OK' or 'Apply' to save the change, I first see the 'Restart now?' dialog (screen shot: ss3.jpg), then click OK, then the same error dialog '..Windows cannot find command.com...' appears. This same error dialog also appears whenever I use Administrative Tools | Services to start the PresenTense Time Client service. In all cases, once I click 'OK' in the error dialog, the service _does_ start. And, once it has been configured, the PresenTense Time Client is successfully obtaining time from the Spectracom 9389.

I tried the PresenTense Time Client install on two other servers, one is another 2003R2 Enterprise x64, the other is 2003R2 Standard x86. On the other x64 server, I see the same error dialog in the same situations. On the x86 server, I never see the error dialog.

A The problem is with the auto-detection of Win32Time dependencies (other applications may "require" W32time to also be running, while PresenTense normally disables W32Time so as not to interfere with its operation). This runs a command line program provided by Microsoft. The way to avoid this error is in PresenTense; turn off auto-detection for Win32Time. I would recommend disabling the client part of Win32Time but leave the actual service running so as to satisfy any dependencies. To make this change, perform the following:

In the PresenTense Client software, Click on the **Settings** tab, **Advanced Settings** button.

1. Select "**Manual Configuration**" for Windows Time Configuration Settings.

2. Select "Set NoSync for Windows Time Client"

3. Select "Disable Windows NTP Client Component"

These settings will stop the launch of any command window and will also leave Win32Time running. But at the same time, configure it so that it actually does not due to anything to affect the PresenTense software. This should fix the issues you are seeing.

Client NT 4.0 running on a Windows NT PC:

➢   Due to vulnerability in a .dll file, the 4.0 client may not be able to be started when running on an NT PC. At this point (10/24/07) need to go back to 3.9. Bytefusion may be able to resolve in the future.

Memory issue (using excessive memory)

Denise Herron reported that the software was using excessive memory on their Server. Wanted to know why and how to resolve.
The following email is from Mark and Bytefusion.
Hi Keith,
The PTSTray might be leaking memory. It's a nice feature that looks good but really doesn't have any place on a server. I was against it in the first place as I believe that server software should not interact with the desktop. In this case it's a separate application which reads registry settings set by the server so it is in fact isolated but at any rate, unnecessary.

Easy solution is to disable it. It's not required by the service and is easy to disable. Click settings, Desktop Settings and uncheck Show Taskbar Icon at Login. If it's running already, they can right-click on the icon and choose "Hide me now". That will cause any running instances to stop and after the desktop settings configuration, not start again.

Logs are no longer updating

➢   The Event Viewer may be full. In the Event Viewer screen, Select Application log, go to Action/ Properties   and verify the setting of the "when maximum log is reached".

➢   In PresenTense GUI "Settings tab", you can configure the amount of logging that can occur. If desired, change to "Minimal" or "Errors only".

MD5 operation (Symmetric key generation)

> ➤ Refer to the MD5 Tech note for PresenTense: Software\ByteFusion\PresenTense Documentation\PresenTense MD5 authentication.doc

The PresenTense software (Client or Server) can use either one of two NTP modes of operation to synchronize to the Time Server. The first is SNTP (Simple Network Time protocol) which allows for a primary and a backup time server's IP addressed. The other is NTP (Network Time protocol) which utilizes the NTP plug-in module for one primary and two redundant time servers.

The NTP4 module is the only one of these two modes that supports MD5 authentication. To enable the NTP mode, in the main page of the GUI, select NTP from the tabs on the top of the screen. To generate the keys, use the NTP key generator included with PresenTense Server software. Then, manually add these generated keys to the Model 9189 and then also move the generated key file to each of the PresenTense clients.

To use the key generator included with PresenTense Server, start by opening the MD5 key generator. Go to Start/Programs/PresenTense Server and then select the MD5 Key generator.
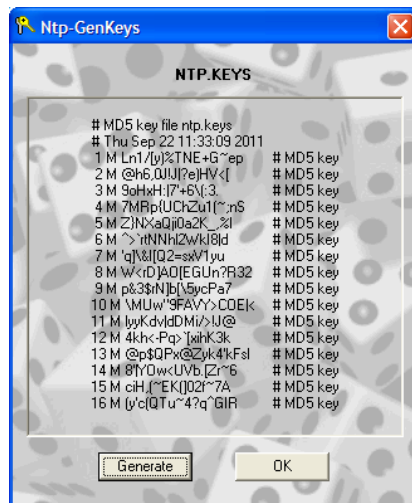
Press the "Generate" button. This will generate a list of keys that will be used in the NTP module for PresenTense Server and can be manually entered into the Spectracom NTP Time Server (The NTP time server doesn't have a key generator so the keys have to be generated off of the Spectracom NTP time server) and then placed into the NTP time server via its web browser).

Once the key file has been generated in the PresenTense Server software, this file should also be placed in the Application folder for all other PresenTense Client PCs. As shown below. Copy the "**ntp.keys"** file from "**C:\Program Files\PT Server**" folder into the "**C: Program Files\PresenTense**" folder located in each PresenTense client PC.
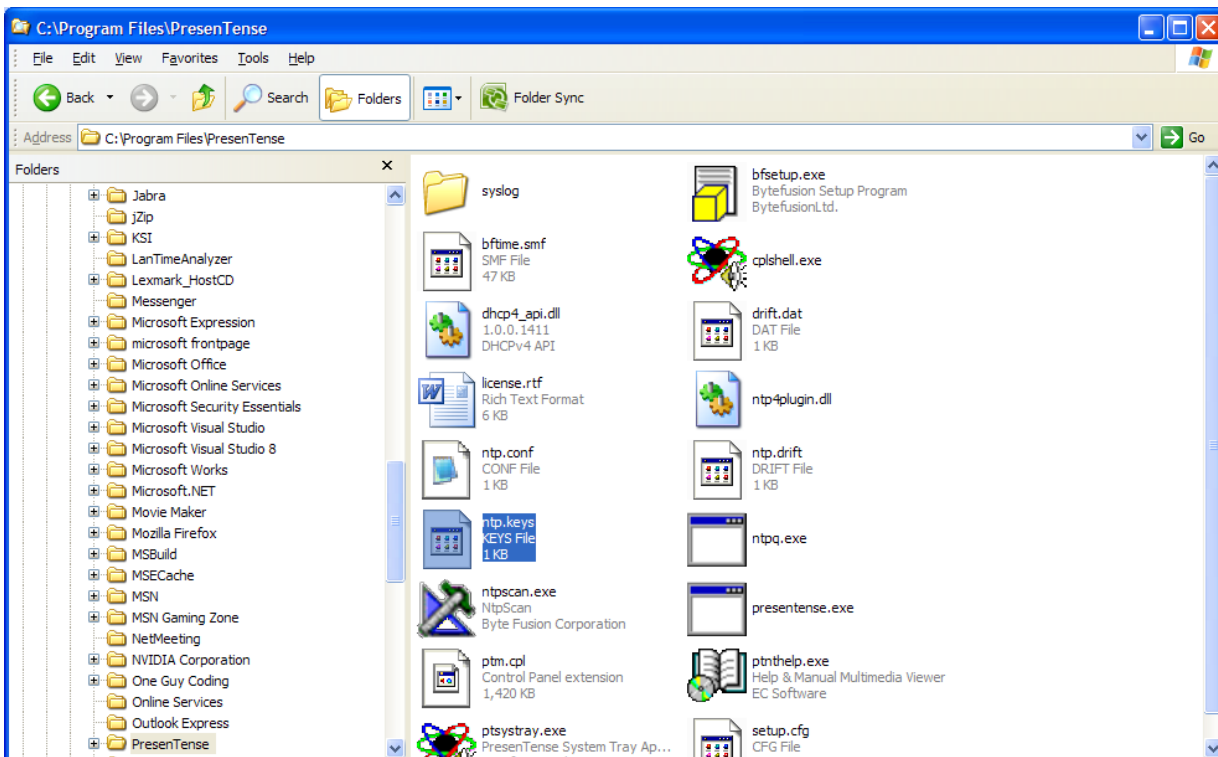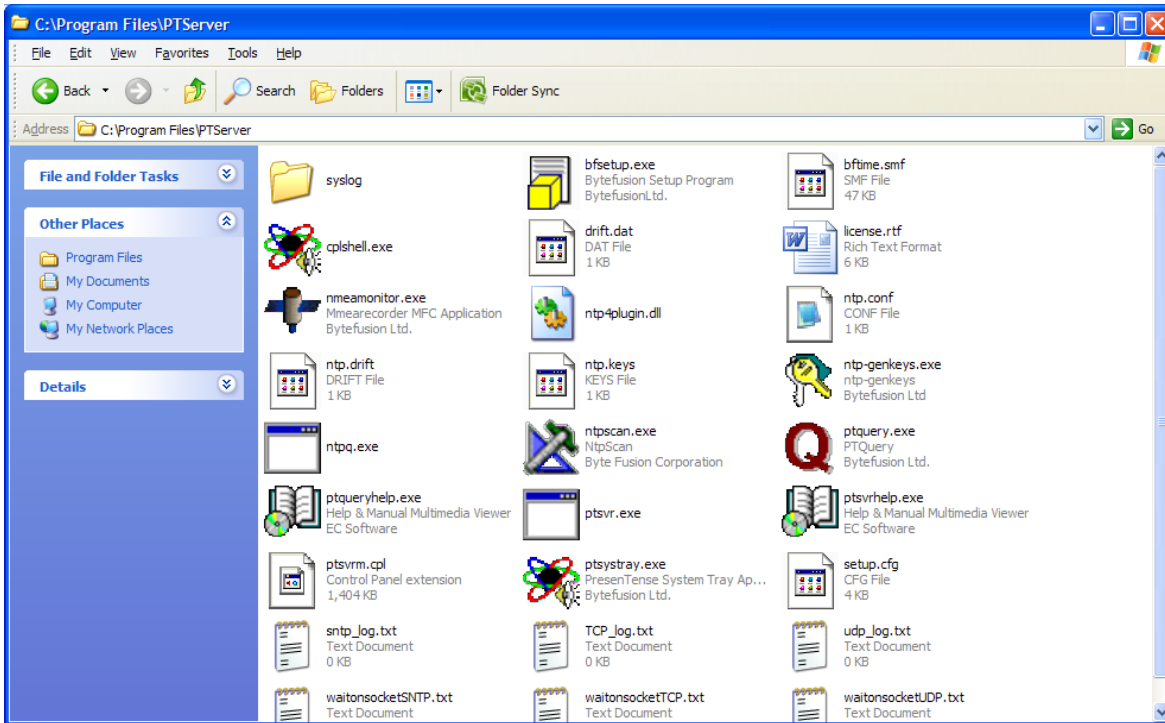
Restart the PresenTense Client software, which will automatically read in the key file when it restarts. This saves you from having to go in and manually enter the NTP config file to enter the keys one at a time. Once the key file has been placed in the client software and the software restarted, when you click on "key" next to the Time Server's IP address, the key file will now open up and be displayed.

From the Help screens in PresenTense Server software:

Starting with version 3.5, PresenTense Time Server includes a plug-in which supports NTP version 3 & 4 according to RFC 1305. This plug-in is distributed with PresenTense Server free of charge. If you require the newest, industry standard version of NTP, the use of the NTP version 4 plug-in is recommended. It ships with all versions of PresenTense Time Server, including the evaluation version.

PresenTense Time Server generates the configuration file NTP.CONF for the NTP4 plug-In automatically from the settings you specify or you can edit this configuration file directly. The latter is only recommended for advanced users. Please refer to the parameter list shown below for a detailed explanation of each parameter / setting.
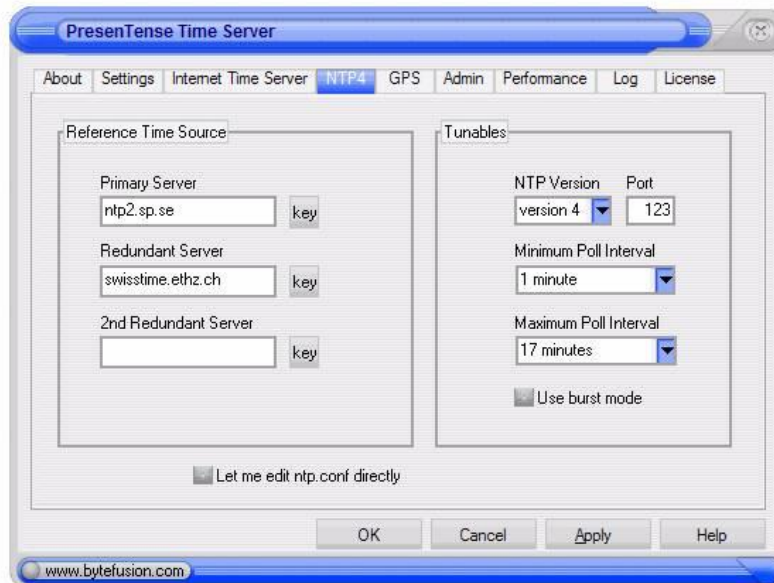
- **Reference Time Source**

This option allows you to specify one primary and two redundant time servers from which the NTP4 plug-in derives its own time. You may specify either an IP address, hostname, or DNS name for each server. If you elect to specify a hostname or DNS name, please ensure that name resolution is properly configured on your TCP/IP network. If you decide to synchronize to a time server on the internet rather than a corporate time server, ensure also that firewall rules permit the network traffic for the protocol you select. Time servers specified here should support version 3 or 4 of the NTP protocol. Click the key icon to select an encryption key to be used to authenticate each server if you require secure NTP. Authentication uses the MD5 secure hash algorithm. See also NTP4 Key Generator.

Bug/Issue with keygen / ntp.keys in PresenTense Server 5.1

Report from Dave L to Mark Roberson `I have installed Presentense Server v5.1 on my Windows 10 PC and I cannot find the MD5 Key Generator in the PTServer file in Programs. My customer is also having the same issue. Am I missing something or looking in the wrong place?`

Reply from Mark to Dave L (18 Sept 2020) This surprised me a lot. The file is simply not there and it looks like it has not been there since the build scripts got revamped with version 5.0.
The file is not even checked for in the scripts!

The fastest way to fix this is to download the NTP key generator from the following URL:

bfdownload.com/jf85siyvz5/programmers/NTPKeyGen/ntp-genkeys.exe

You may need to manually navigate to the install directory and launch it from there if the link in the start menu is missing.

This will be updated in the next version.

Windows system memory usage of PresenTense software

Q. The memory usage is running at 5248K on the client and 4432K on the server. Is this correct?

A When PresenTense Server and Client software are doing statistical calculations, this is a reasonable memory footprint. However, as time goes on, the memory usage normally drops off as the service releases used memory. If you have a lot of NTP time sources however, the memory usage can be higher as an internal reference clock is kept for each NTP source and calculations are carried out for each of these. Please confirm however that this is the service and not the tray icon you are referring to. These should not use so much memory under normal circumstances.

Maximum Clock Correction (Settings tab in both Client and Server software)

No limit on startup: Should normally be enabled so if the PC has not been running and sync lately, having this checked makes sure that the software will sync, no matter how much error is present.

"Seconds" field: Amount of allowed error (while software has been running) before the time stamp is rejected. If a time stamp is too large to be accepted, an entry of "Maximum allowed clock adjustment exceeded" is shown in the Log tab and can also be found in Windows Event Viewer, as shown below:
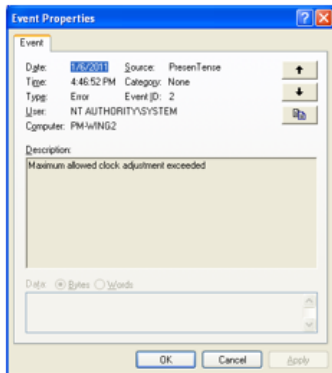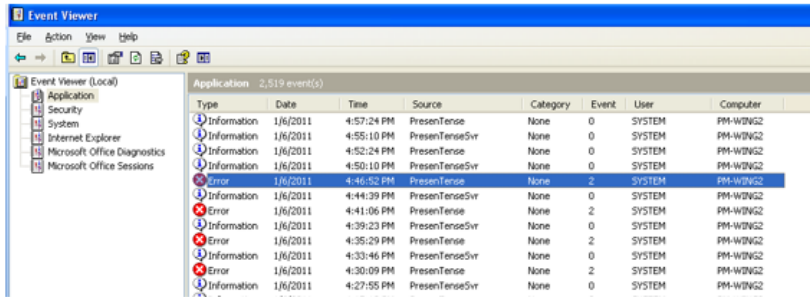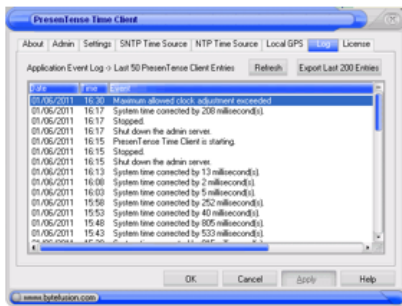
Our Software version updates with PresenTense:

```
PresenTense Client NT
```
 http://www.bfdownload.com/akd86/ptsetup.exe
 http://www.bfdownload.com/akd86/ptsetup20.exe
 http://www.bfdownload.com/akd86/ptsetupsite.exe

Demo: http://www.bytefusion.com/download/bin/ptdemo.exe

PresenTense Server: http://www.bfdownload.com/akd86/ptsvrsetup.exe

INSTALLATION ERROR ON 2003 SERVER:

Setup started : Mon Oct 11 12:58:57 2010
Uninstalling service
Using setup specified installation path
Application folder exists already - overwriting
Copy .\ptsvr.exe to C:\Program Files\PTServer\ptsvr.exe. Error number: 32
Copying .\ptsvrm.cpl OK
Copying .\ptsvrhelp.exe OK
Copying .\license.rtf OK
Copying .\nmeamonitor.exe OK
Copying .\ntpscan.exe OK
Copying .\ptquery.exe OK
Copying .\ptqueryhelp.exe OK
Copying .\ntp4plugin.dll OK
Copying .\ntpq.exe OK
Copying .\ntp.conf OK
Copying .\cplshell.exe OK
Copying .\ntp-genkeys.exe OK
Copying .\bftime.smf OK
Copying .\ptsystray.exe OK
Copying .\bfsetup.exe OK
Copying .\setup.cfg OK
Created shortcut for "PresenTense Time Server"
Created shortcut for "PresenTense Time Server Help"
Created shortcut for "License Agreement"
Created shortcut for "NMEA Monitor"
Created shortcut for "Time Source Finder"
Created shortcut for "PT Query Tool"
Created shortcut for "PT Query Tool Help"
Created shortcut for "NTP4 Query Tool"
Created shortcut for "NTP4 Key Generator"
Created shortcut for "Uninstall"
Created shortcut for "PresenTense Time Server"
Registering service
Error registering service
Unable to start the service
Installation error
Installation exiting

This is a copy of the install data showing the Errors. Rebooting the server solved the problem.

ERROR MESSAGES

 (Applicable to all PresenTense packages)
"**Primary Server Name lookup failure**"- Means NTP Address hasn't been entered yet.

Windows 2003 compatibility

(From Glenn to Mark Robertson)
Q: I have a question: do Auditor and LTA both work on all the operating
systems?
A: Auditor runs as a service so it will not run on 95/98/ME. In other words, only the NT derivatives.

Q: LTA: NT/2000/XP/2003 ... 95/98/ME   ?
A: LTA runs as an application so it will work on all.

Windows NT compatibility

Version 4.0 added DHCP capability that requires a DLL file not located in Windows NT. This MAY cause a problem that can be resolved by using version 3.9 instead:

Q I have a customer trying to install Client NT 4.0 onto a Windows NT 4.0 Server (It is an older PC). She is getting the following error message and she is saying the service is just "hafec20snging":
 "The procedure entry point DHCP request params could not be located in the Dynamic Link Library DHCPCFVC.dll"

A Reply from Bytefusion We've seen this once before with a customer in the Arab Emirates. It should not happen if DHCP is turned off (Settings, Advanced Settings button and then uncheck "Configure via DHCP") but sometimes windows tries to load the dll even though it's not needed. The particular dll is not present on NT systems.

With the customer in the Emirates they were happy to go back to 3.9 which solved their problems. Programmatically it can be solved if necessary by compiling a special version but this should be avoided if possible. Can you talk with the customer and see if they are OK with going back to 3.9. If they're not, let me know and we'll have to get a special build to you. I think the hope here is that NT will disappear :)

Q Is Client NT 4.0 still compatible with Windows NT?
A. Yes, if it's got all service packs and this strange windows problem is not present then it's compatible.

She says it has installed just fine on other XP boxes so I don't think she received a bad disk image or anything like that. It seems like it is a factor of the new "DHCP stuff" that has been added.

Yes, the Microsoft dhpc dll is being loaded. It should not try to load if DHCP is not configured but Windows does what it likes sometimes.

Windows Vista/ Windows 7 (64 bit OS installation issues)

NOTE (11/30/11): ECN 2784 is implementing three new Client NT installer (exe) files, which Mark at Bytefusion reported as is significantly improving the 64 bit installs (they haven't had any reports of 64 bit install issues since they started shipping this new "version". This new "variation" of version 4.2 software should be cut-in to begin shipping around the

first part of December 2011. If a customer is having trouble with install on 64 bit, send them the appropriate client NT file (single, 20 pack or site license).

To begin, the PresenTense software is compatible with, and can definitely run on Windows 7, 64 bit. We have had other customers that have successfully run the software on this particular OS. However, sometimes Windows 64 bit can be a bit more "finicky" than the earlier 32 bit systems.

Email from Mark Robertson
The only thing we know about Vista is don't install it :) We had a customer who called in with a panic situation. He'd loaded Visa and it did not work with his RAID system and he lost everything. From us he just needed a new download image.

I see no reason that PresenTense products would not run on Vista as they are true system services and Microsoft has not changed anything there since Windows NT 3.5. We've also not had any customers report issues and there are many using Vista. I'd say just answer yes, it's compatible and sort out any minor issues.

(As of 5/23/07)   From Mark- "We've not tested any of our products on a 64-bit platform so I really can't answer that question. I know we have hardware that's 64-bit but a 32-bit OS go installed on it as far as I'm aware."

Response from a customer about this recommendation:
6/11/10 from Tim Klotz- "I have resolved this issue by setting the PresenTense Time Client service to a startup type of Automatic (Delayed Start) which causes the service to wait approximately 2 minutes after boot up before it tries to start that service.

Note: I first tried the recommended steps below but they did not work." (this was referring to the recommendation above).

From Mark Robertson:
Many are using it in the Windows 64-bit environment however we have had two cases where problems occurred.

1. The issue was that the registry translator in Windows was failing to find the registry keys for PresenTense Time Client. Windows moves the registry keys for 32-bit programs to a new location and the registry translator service is supposed to detect and translates the calls but in this case it was not.
   The problem is not with PTC but rather Windows and the customer never got back to us so we assumed he ran Windows Updates (as was recommended by our support) and that the issue resolved itself.

2. SC.exe (a former resource pack utility but now standard system file) is used by PresenTense Time Client to detect Win32Time dependencies. On the 64-bit version, this is located in a different location than the 32-bit version however translation should occur. It does not.

To verify if this is the case, set "Manual Configuration" for Windows Time Configuration Setting on the Settings -> Advanced Settings dialog. I would also recommend setting "Disable Windows Time Service" to test and then if the customer knows they need the Win32Time service running, we can assist further with that.

If the service now starts and is operational then this was the case. If the issue is registry translation (issue 1) then I'd recommend running updates.

Should all of the above fail, it would be good if they could set detailed logging and then export the log entries (Export Last 200 Entries button on the Log tab) and we can work further with the results of that.

Additional Info 8-3-2010 from Mark:

Click on the **Settings** tab, **Advanced Settings** button.
1. Disable "Configure via DHCP"
2. If the above does not work, on the same dialog select "Manual Configuration" for Windows Time Configuration Settings and select "Disable Windows Time".

3. Delay service start. Set the PresenTense Time Client service to a startup type of Automatic (Delayed Start) which causes the service to wait approximately 2 minutes after boot up before it tries to start that service. This is due to the registry translator service being slow to start on some 64-bit systems. The reason is unknown and it's rare but if that service does not start before PresenTense then it causes problems.
Bad install on 64 bit (windows Vista/ Windows 7)
(Service doesn't start after install)

A. Make sure all of the Windows Updates have been applied to the PC.

Email from Mark Robertson (12/14/10):
If rebooting doesn't work for him, you could send him the following:

Click on the Settings tab, Advanced Settings button.

1. Disable "Configure via DHCP" by unchecking this box. Then try starting the Service in the "Admin tab".

2. If the above does not work, on the same dialog select "Manual Configuration" for Windows Time Configuration Settings and select "Disable Windows Time".

If this works but you then get issues with other services failing due to a dependency on Windows Time, please let us know and we'll assist you with manual configuration to avoid these failures.

If none of the above work, delay service start. Set the PresenTense Time Client service to a startup type of Automatic (Delayed Start) which causes the service to wait approximately 2 minutes after boot up before it tries to start that service. This is due to the registry translator service being slow to start on some 64-bit systems. The reason is unknown and it's rare but if that service does not start before PresenTense then it causes problems.

If PresenTense is still not running, reboot the PC again (see another email from Mark, below)

After reviewing your emails, it appears likely that the PC needs be rebooted again, in order to reset the status of the Microsoft Service Control Manager (SCM). The setting of the PresenTense service to "delayed start" gives Windows enough time to get its registry reflector/redirector running, as it often reports itself as running, when it's really not. If the service is in an unknown state (the SCM is confused) then setting it to delayed start only helps after a reboot.

If PresenTense is still not running, uninstall and reinstall the PresenTense software   (see another email from Mark, below)
I've had one customer who kept putting the computer into hibernate instead of shutting down so of course the service control manager never sorted itself out. The best approach might be to get her to uninstall and restart. Make sure the service no longer appears in the list of services.

At that point, install PresenTense and then do all the normal changes (delayed service start, disable DHCP, auto detection of Windows Time dependencies etc) and restart again. If that still fails then we may have to do a remote session to find out what is happening.

NTP4 Plug-in module

➢ MUST Stop and start service when the program is initially configured for NTP4 plug-in and Serial port is connected. Otherwise, it will show an error of "Clock no reply"

**RS-232 input (PresenTense Server only- not available in Client NT software)

Accepts INTERROGATION Data Format 0 or 3 only, any baud rate. Request character "T". Configure TZO as 0 with no DST rule. Otherwise there will be an error message of bad timestamp and offset is too great to sync.

Also, need to select "**GPS/Radio Clock**" in Settings tab and need to select "**Spectracom NetClock**" in the "**GPS Clock**" tab
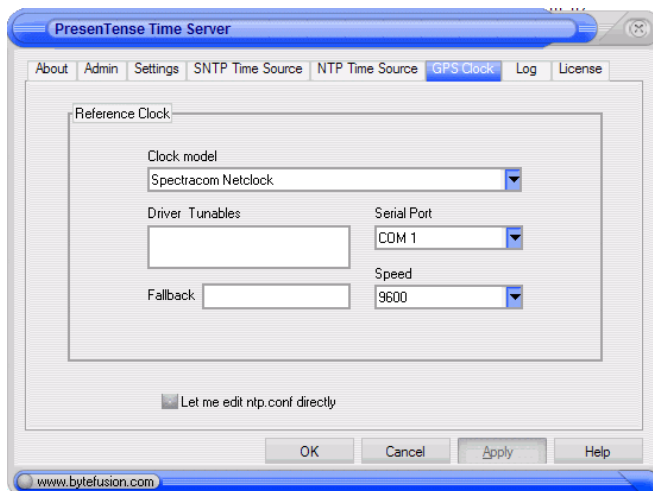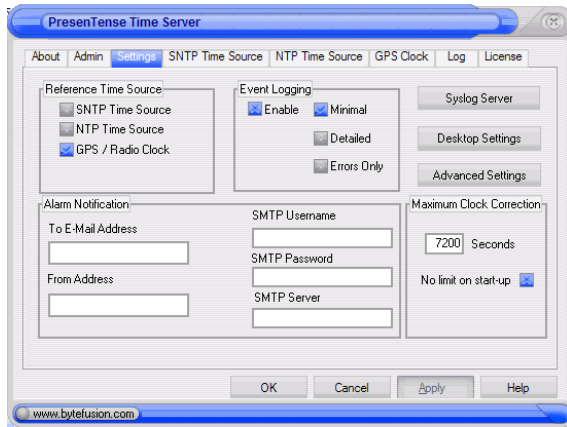
Cluster Services

Cluster services keeps 2-3 Windows Servers with identical services running and switches over to the backup to run the service if any failures on the primary. With PresenTense, the Cluster software requires W32Time to be running. It is a service dependency. Need to go into Services and turn-on W32Time but steer W32Time to either itself or to the same reference to keep them from competing. Then, make sure that W32time starts first, then PresenTense.
Statistical filter: bad timing sample!

The error message that you are seeing on occasion basically means that particular's sample period (Time between normal poll intervals) was discarded because it exceeded the maximum allowable correction.

This is usually caused by the client syncing to a PresenTense Server that is busier than normal running other tasks (other than PresenTense) at the moment that the poll interval occurred (The time request is received by the Server from the client and the outgoing time stamp was delayed because the Server had higher priorities at that particular moment). Therefore, that particular time stamp won't agree with the algorithm's prediction of what the Time Stamp should have been.

Because of the delay/error in the time stamp, the filter that is determining the correct time and calculating the PC's time drift receives a time stamp that it doesn't believe, so instead of throwing out all of the data to date based on one time stamp that doesn't match the others, it just discards the erroneous one. This prevents any possible miscalculation of the drift rate of the PC at that particular moment.

This is not an indication of a problem with either the software or the Time reference unless you are receiving this alarm often and it is accompanied by a lot of "resynchronizing" messages as well. If these messages aren't present, all is well.

PC Permissions requirements:

Q. If I install PresenTense as an administrator will it automatically apply itself and its service to other profiles on XP workstation?
A. PresenTense installs itself as a system service which always starts. The user interface can be started by all users but changes can only be made if the user has admin privileges.

BIOS synchronization

Q: IF we are doing a 10 minute update for PresenTense, what is the recommended BIOS update interval, if any, or is the recommendation not to update the BIOS periodically?
A: Unless you have a high drift problem, updating once every 24 hours should suffice.

Ghosting in the PresenTense GUI

Q. When moving through the tabs of the application, there is ghosting of say, of the Admin tab, where the Running Icon and the time is seen over the information on another tab. I've seen this on both the server and client. We had an instance on the client where the application was locked up with this ghosting occurring.
A. Never been reported before. Could you please let us know what OS and version you are running? Is this a local screen or remote desktop? Is the graphics card driver updated or perhaps something unusual (two monitors connected etc). Have you tried running without the skins being loaded (Settings tab -> Desktop button -> uncheck "Load skin at startup")

**NTP4 Plug-in Burst Mode

➢ Not recommended for LAN/WAN use.

➢ NTP assumes round trip delays from client to server and server to client are exactly the same. This mode is used when this is not the case. It sends several requests in a row to the server to calculate round trip delay for more accuracy. Examples he gave were related to the use of RF or Satellite comms to a remote location. Using it on a LAN/WAN won't increase accuracy and increases risks of collisions.

**NTP vulnerabilities for PresenTense

A) Mode 7 (NTPQ/NTPDC) potential vulnerabilities in the NTP tab

➢ (2 Dec 2013) PresenTense Server v4.2 is being released to address this potential condition

➢ Refer to Salesforce case 1388

   Update: Jan 2014, Bytefusion has released Server 4.2 (Build 8710).

Nov 2015 report of 13 potential NTP vulnerabilities

Q. With the recent report of several NTP potential vulnerabilities in NTP4.2.8p3 and below, we have received one or two inquires so far as to whether the PresenTense software Server 4.1 and Client 4.2) is susceptible to these new vulnerabilities. And if it is, what is the fix (as expected, we are getting lots of these questions about our time servers.
A **Reply from Mark Robertson (4 Nov 15)** As far as I am aware, the vulnerabilities are primarily if keys are being used and also one related to IP6. Most people do not even use keys! We find that most customers are operating within
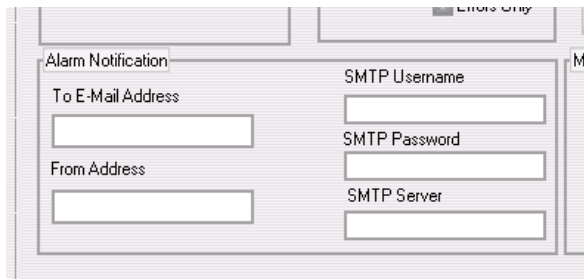
their own network and don't allow outside clients to synchronize with their servers so these so called vulnerabilities are not really an issue.

The Security Notices section of the NTP support site (shown below) does explain the known exploits and ways to protect an installation from them.   http://support.ntp.org/bin/view/Main/SecurityNotice

---

**SMTP/Email Alerts

- ➢ Configured in the "**Settings**" tab
- ➢ Username and password fields need to be completely blank if email server does not use authentication or both values have to be correct if it does.

If you wish to be notified via email if PresenTense Time Client is unable to contact the time source, set the parameters as follows:

>   **To E-Mail address:** the email address to which the messages should be sent.

>   **From Address**: the email address for sending the messages.

>   **SMTP User Name**: user name if SMTP Auth is required. On many servers, this is your email address.

>   **SMTP Password:** password for the above user name.

>   **SMTP Server**: IP address, NetBIOS or DNS name of the mail server.

Note: Refer to: Troubleshooting Email alerts further below for additional info if emails aren't being received.

A) **LTA Software versions 5.0 and above (started shipping ~March, 2018)**

Note: info specific to earlier LTA versions 1.2 and 1.3 is further below
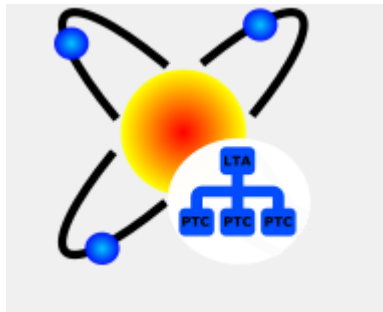
Compatibility of LTA 5.0 (and above) with PresenTense Client/Server software (per Bytefusion website)

➢ LTA Version 5.0 (and above) requires PTC (Client) Version 5.2 as a minimum

• Newer versions of LTA are not compatible with earlier versions of Client/Server

Important: Please note that LanTimeAnalyzer is designed to work specifically with PresenTense Time Clients (version 5.2 or later) which have been designed from the ground up to be administered over the network. In order to use this product for network time analysis, you will need to download and install PresenTense for Windows on your PC's. You also need access to an NTP time server or GPS, either on your local area network or on the public internet.

Per Mark Robertson (24 Jan 18) Wanted to give you all a heads-up about some changes that will happen with our products in the next few weeks as a result of the new LanTimeAnalyzer release.

Essentially PresenTense Client and LanTimeAnalyzer need to be updated in order to function which means that if you have a customer who wants to upgrade to LanTimeAnalyzer 5.0 then they will also need to upgrade PresenTense Time Client to 5.2.

The reason for the forced upgrade of the client is that more information about the clients is sent to LanTimeAnalyzer (see screenshots) and a lot more can be managed centrally from LanTimeAnalyzer (protocol, upstream source etc can be set). This means that both products have been upgraded simultaneously here and clients will need to do the same.

In short: LTA Version 5.0 requires PTC Version 5.2 as a minimum.

Desire to install LANTime Analyzer on a Virtual Machine (not a Physical PC)

➢ Refer to Salesforce case 270070 for DOITT

LANTime Menu ICONS at top of GUI (versions 5.x and above)

  Home

  Add a new PresenTense Client

  Delete the selected/highlighted PresenTense client

  Change polling interval of selected client(s)

  Change Time source of selected client(s)

  Change Time Protocol of selected client(s)

  Fetch Client times

  Remote synchronize Clients to their configured time source

  Restart clients.

  Query PresenTense Time Client

  Autofetch settings

  Alarm settings

  LanTime Analyzer Help

A) Home Screen
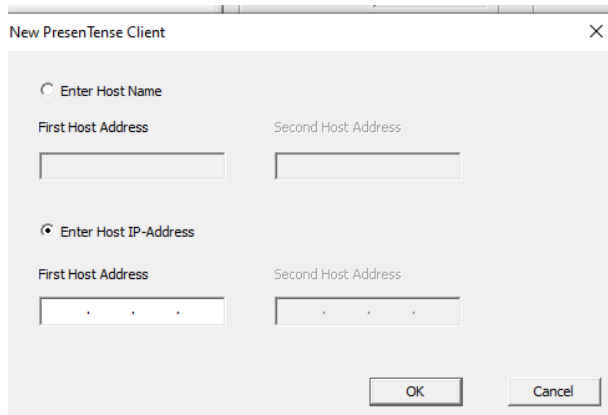
"Copy Settings to Non-Elevated Users" Section (**"Copy Clients and Settings" button)**

Copy Settings to Non-Elevated Users

Copy Clients and Settings

If LanTimeAnalyzer is run in non-elevated mode, clients and settings need to first be added by an elevated user and then copied by clicking above.

Note: Right-click and choose Run as Administrator to run in elevated mode. See Help for more details.
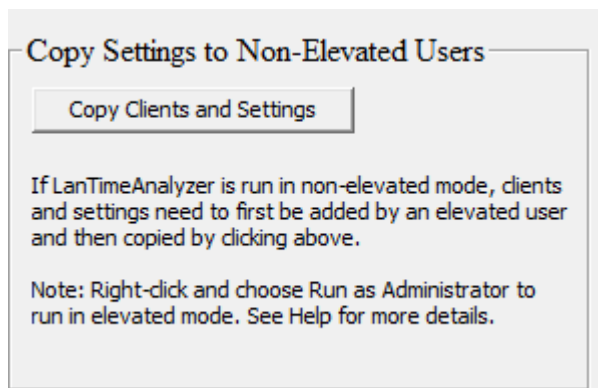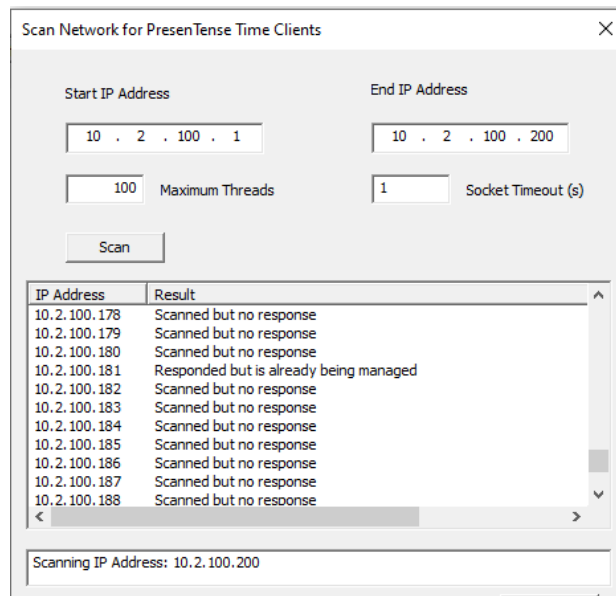
Adding new PresenTense Clients/Servers to LTA

Either:

1. Press the "+" ICON at the top of the page to individually add a new client   OR

2. Go to **Advanced** -> **Scan (or Home -> "Scan Network button")** to scan the network for new Clients/Servers

"Responded but is already being managed": this PC has already been added as a Client/Server

Wireshark capture/Network Ports used for LAN Time Analyzer (UDP ports 123 and 6001_)

Per Mark at Bytefusion- UDP Port 6001 is used for the communication between LTA and PTC/PTS (including scans) so this port will also need to be available (in addition to Port 123). The port can be changed by a registry key if necessary.

It is UDP traffic- not TCP traffic.

Wireshark captures of udp port 6001

  ➢ **Wireshark filter to apply to see just these packets**: udp.port == 6001

Note before starting a wireshark capture of LANTime Analyzer: For PresenTense Client/LANTime Analyzer wireshark captures (if both programs installed on same PC): need to select a Capture "**loopback**" interface (such as "**Adapter for loopback traffic capture**") because the traffic remains inside the same PC.

SCAN function/Ports used

➢   (Applicable to Class C networks only) = LTA can scan the network for clients that are running PresenTense software. However, according to Mark at Bytefusion, it can only scan Class C networks. Other class networks will not find the clients. They will need to be manually entered.

➢   Scans on port 6001

```
⊞ Header checksum: 0x0000 [validation disabled]
  Source: 10.2.100.124 (10.2.100.124)
  Destination: 10.2.100.123 (10.2.100.123)
  [Source GeoIP: Unknown]
  [Destination GeoIP: Unknown]
⊟ User Datagram Protocol, Src Port: 51563 (51563), Dst Port: x11 (6001)
  Source port: 51563 (51563)
  Destination port: x11 (6001)
  Length: 263
⊞ Checksum: 0xde13 [incorrect, should be 0xa932 (maybe caused by "UDP checksum offload"
⊟ Data (255 bytes)
  Data: 66656b73257679776b6f2b2c2d2e2f303132333420202020...
  [Length: 255]
```

```
0020  64 7b c9 6b 17 71 01 07  de 13 66 65 6b 73 25 76    d{.k.q.. ..feks%v
0030  79 77 6b 6f 2b 2c 2d 2e  2f 30 31 32 33 34 20 20    ywko+,-. /01234
```

Example scan

Scan Network for Clients

Scan starting address:

10 . 2 . 100 . 120

Scan ending address: Scan

10 . 2 . 100 . 125

Delay   1 ⬍ second(s) between IP addresses.

OK   Cancel

Software hangs when it tries to scan the network for clients

Q During the scanning, the software seems to hang when it tries to scan an IP that doesn't respond to a ping. This is random as sometimes it would just time out/pass that IP and sometimes it would freeze on a different unpingable IP.

We are able to retrieve timing information on a client if we manually put in the IP of the client but we have several large subnets and it will be impractical to manually enter all the IPs. Are there anything we should be aware of when we do a subnet scan? (such as UDP ports that are being used etc..)

A (per Dave, from Bytefusion, 9 May 16) For the problem where LAN Time Analyzer stalls during a scan, here are some suggestions

Is the program stalling after running for a specific amount of time or always when you click on the screen? I find when I click on the screen or change screens it will interrupt the scan window refresh and I have to restart the program if I want to immediately cancel the scan. The scan will complete by itself if you just let it run. It is best to just click on the SCAN button and walk away and let it complete the scan.

1) Are there any anti-virus software programs running on the PC? If so, the scanning for clients can be perceived by some anti-virus programs as a "port scanner" running. So, the anti-virus software may be "disabling it" from running. To determine if the anti-virus software is causing this issue, temporarily disable the anti-virus software and run the LANTime scan again to see if it proceeds all the way through this time.

2) Another possibility is that the server that the LANTime software is running on is very busy and has run out of ports or handles.

3) Can you check the Windows System and Event Log at the time when this error occurs? If it's an issue being caused handles or some other socket error, then this should be reported there.

4) There is a setting to extend the Timeouts in the Lan Time Analyzer settings. Extending these a small amount may help. The default is one second. Try setting to three seconds and see it that helps.

Please let me know if disabling the anti-virus software resolves the issue, or if appears to be the PC is too busy to run the scan.

Viewing status of PresenTense clients via LTA

Automatic View

When you click on a PresenTense Time Client in the list of managed clients, LanTime Analyzer will contact the individual time client to get more detailed information from it. Depending on the time source used by the PresenTense Time Client, LanTime Analyzer will automatically change to one of the following views:

SNTP Time Client View

Email alerts/Alarm Settings menu (LTA version 5.x and above. Not for LTA versions 1.2/1.3)
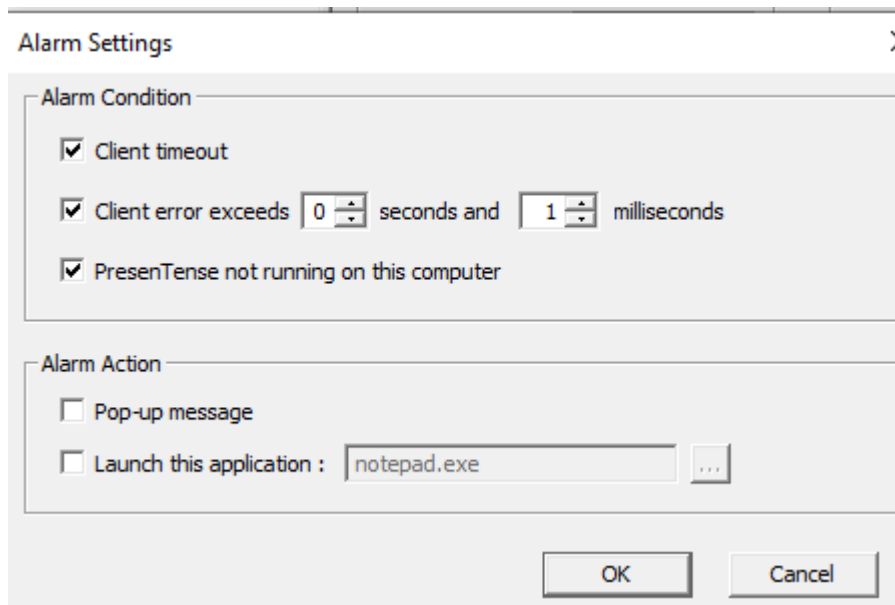
Email alerts

➢ LANTime Analyzer **does not support email alerts**

Keith's response: To begin, the LANTime Analyzer program does not support Email alerts. This functionality is available in the PresenTense ClientNT software running on each of the network clients. Each client PC running the PresenTense Client NT software can send an email if it is not able to obtain a useable time stamp from its NTP references.   LANTime, if it has email alert capability, would provide the same emails. So this would duplicate the emails that are also being sent out from the NTP clients.

So instead of sending email alerts, the LANTime Analyzer has two other forms of available notifications that can be enabled. If a Client PC running PresenTense Client NT software has a time error greater than the user-specified alert threshold, such as 3 seconds for example (as configured in the « **Client Error exceeds** » fields shown in the screenshot above) :

- The LANTime Analyser program can open a screen on the Windows PC running the LANTime Analyser program. The window indicates a PC has exceeded the allotted amount of time error (as compared to a reference NTP time server on the network). When this window has opened, you can then look at the main page of the LANTime Analyser program to find which listed client(s) that is exceeding its allotted time error.

- The LANTime Analyser program can run any .exe program, as selected in « Launch this application (as shown in the screenshot above), such as notepad.exe.   If you have a paging system or other exe program, it can automatically run that program by selecting the .exe file in this field.

➢ Alarm Settings page allows a Pop-Up message to be displayed or a specified .exe file to be run, if a PC's time error ever exceeds a user-specified error threshold (the PC must be running either Client NT or Server software for this functionality to occur).

(3) Alarm condition selections now available in LTA 5.0 (LTA versions 1.2 and 1.3 had only TWO alarm conditions)

- **"Client Timeout"**

- **"Client Error exceeds"**

- **"PresenTense not running on this computer"**

    Note: this is a new alarm option which wasn't available in earlier version of LTA (versions 1.2. and 1.3)

    Per LTA Help menu: "If PresenTense Time Client of PresenTense Time Server is not running on the PC where LanTimeAnalyzer is installed, an alarm will be triggered if this option is chosen."

    ➢ Alarm displayed (if enabled): "Neither PresenTense TimeClient nor PresenTense Time Server were found to be run"

    Fix: If PresenTense Client or Server program is not installed/running on the same PC as the LTA software is installed on, unselect "**PresenTense not running on ths computer**" in the "**Alarm Settings**" menu.

    NOTE (Per the LTA Help Menu): "The PC on which LanTimeAnalyzer is running must have PresenTense Time Client installed in order to act as an accurate reference point."

    Per Keith- Bytefusion removed "True Time Server" in LTA 5.x. I suspect they now rely on the LTA's PC being synced for reporting purporses, instead of querying an NTP server for time comparisons.

_____

**Fetch Remote Times- "Timeout / "No Reply" issues with individual/all PresenTense clients/servers

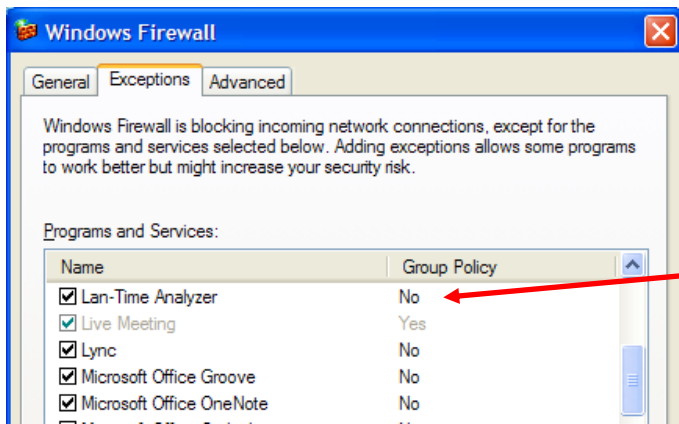As shown below, LTA may report "timeout" and "no reply" for one or more PresenTense clients:
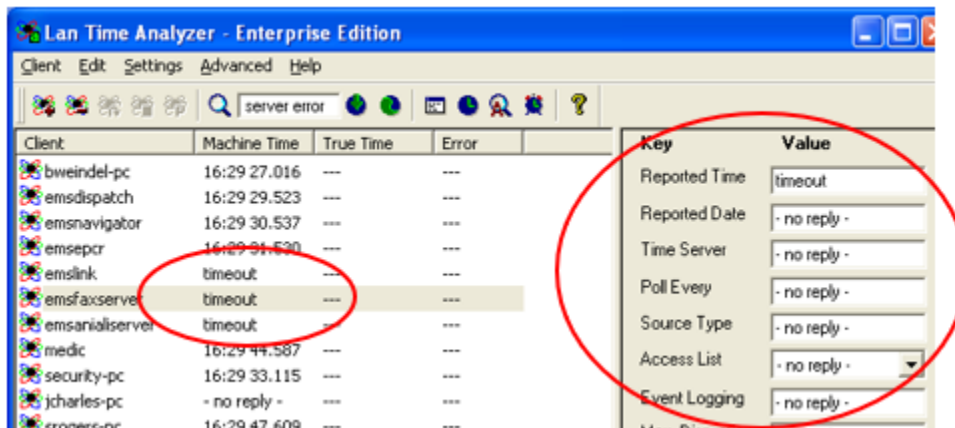
1. Not likely for customers to have happen (I noticed this condition on MY PC) but having **BOTH** PresenTense Client AND PresenTense Server software installed/running on same PC (should have only one or the other running on same PC).

    Email from Mark Robertson (4 Dec 2019) In this case there is one obvious issue and that is you can never run PTC and PTS on the same machine as they fight over port 123 and 6001 - no guessing who binds first or who gets what data. You can have them both installed but not running.

2. Check all firewalls (on the PCs and on the network) to ensure PresenTense Client/PresenTense Server AND LAN-TIME are all included/allow ports 123 and 6001 to get through

3. Make sure PresenTense Client OR Server software is installed AND running on that particular PC. If not, restart the PC. "No reply" indicates the program is installed but not running.

4. If there are any firewalls in between the LTA computer and that particular PresenTense client Or if Windows Firewall is enabled on any PC, ports 123 (NTP) and 6001 (communications) need to be enabled. The ports need to be open on the PC running LANTime and the Clients.

5. Find out what anti-virus software is installed on the Client machine. Anti-virus software programs can block communications between LTA and the PresenTense Clients.

Note if ports 123 and 6001 are open: If possible, temporarily disable the anti-virus software on one PC that is reporting timeout and see if it can start communicating. If it does, use a different anti-virus program.

Perform a wireshark capture with following filter applied: udp.port == 6001

1. In the LANTime GUI, perform one **Client** -> **Fetch Remote Times**

2. With just one client or one server configured in LANTime, a succusful "Fetch" will result in four packets

- Notice the "Info" field shows "6001" as alternating back and forth between the first and second value in this field

Whereas a failed "Fetch" such as a firewall issue will result in only two packets

- Notice the "Info" field only shows "6001" as the first value and never the second value in this field

Cases 217075 and 216685

## B) Earlier LTA software (versions 1.2 and 1.3)

Note: see further above for info associated with LTA versions 5.x and above

'bonehead.lcs.mit.edu' reported as the "Time Server"

Customer report: There is an issue that I see: even when the NTP servers are properly setup on the application, when I check on the Lan Time Analyzer it shows *'bonehed.lcs.mit.edu'* and that is outside of our network.

LTA version 1.3 and below reports the values in the Client NTs SNTP mode settings, even if the client is configured to operate in NTP mode.

Client 4.2 program and below defaults to having In at least LTA 1.3 and below, LTA will report the Client is syncing to *'bonehed.lcs.mit.edu',* if the client is running in NTP mode, and its SNMP mode is still configured with its default settings
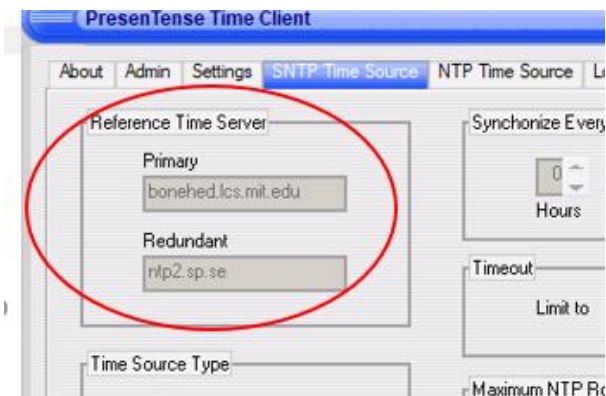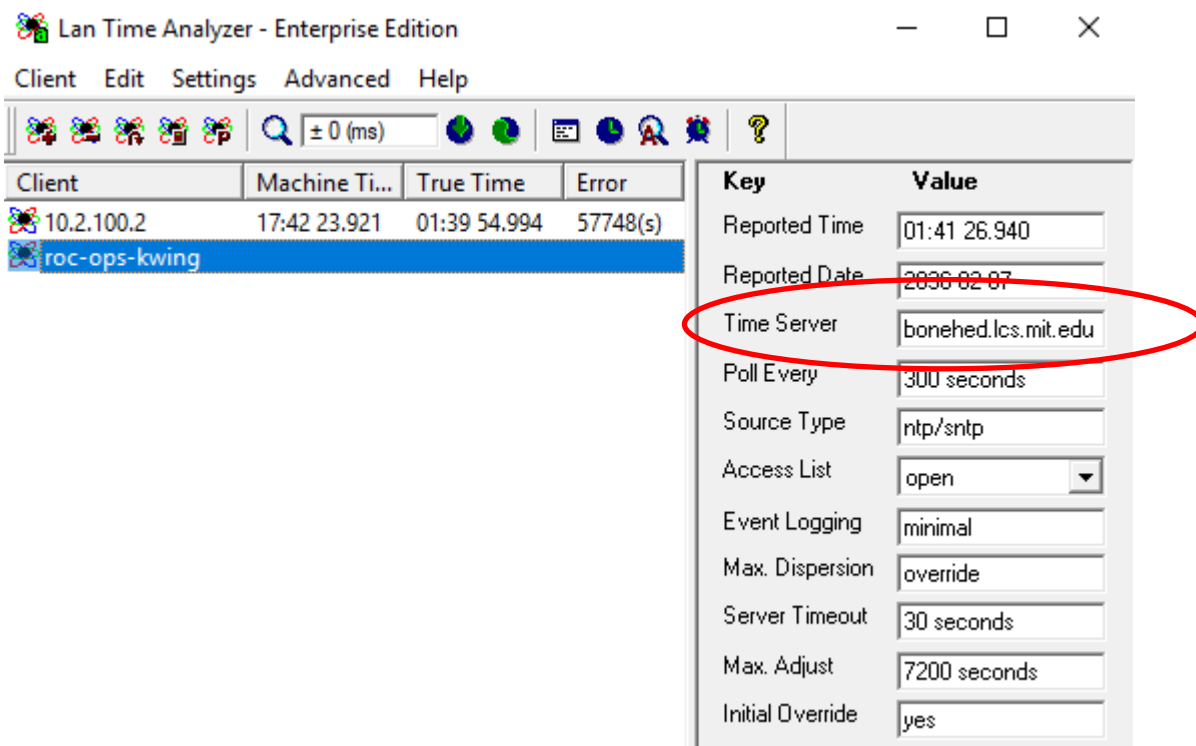
Work-around: configure the Primary and Secondary NTP severs fields in the SNTP mode the same as the first servers
Email Keith sent on 31 Aug 17: As for your earlier report to the Bytefusion support team that "when the NTP servers are properly setup on the application, when I check on the Lan Time Analyzer it shows> 'bonehed.lcs.mit.edu' and that is outside of our network", please be aware that this is just a minor reporting issue in the LANTime (AKA "LTA") software. As long as the PresenTense Client software is configured to be operating in the "NTP time source" mode (instead of the SNTP time source mode, there are no adverse effects on the operation of the Client or LTA programs with this display.

LANTime program currently reports the value of the "**Primary**" Time Server which is configured in the associated "**SNTP Time Source**" tab, even if the Client is running in "**NTP Time Source**" mode (it's just reporting the configured value from the alternate mode tab of the Client GUI). The reason its reporting 'bonehed.lcs.mit.edu' as shown in the example screenshot below, is because this is the default Primary Time server value entered into the Client's Primary Time Server field, in the **SNTP Time Source** tab.
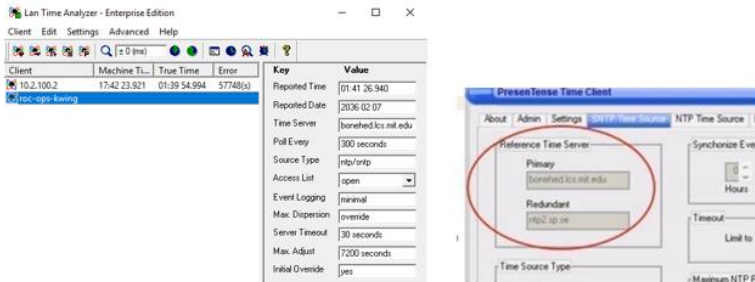

Configuring the PresenTense Client program to use **NTP Time Source** Mode (the recommended mode for optimal synchronization), without changing the default configuration of the NTP Time Source in the **SNTP Source tab** will continue to have the value of "bonehead…" reported as the "Time Server" in LANTime.   Again, this is just a minor reporting condition in LTA and has no adverse effects in either program's operation.

In this situation of having **NTP Time Source** being the selected mode for the Client, neither program is actually going out to the Internet to try to get time from the default "bonehead…" time server. LTA is just reporting this value. With the Client running in **NTP Time Source** mode, the Client will only try to get time from the one to three time severs which are configured in the "NTP **Time Source**" tab of the Client program (and no others). As long as the/these servers are valid and accessible time servers,the client can sync with just these server(s).

To see a quick verification test of this info above, and to see there is no adverse effects, go into the PresenTense software GUI and select the **SNTP Time source** tab. Select yes to temporarily switch operation to SNTP mode. Then change the **Primary Time Server** in the SNTP Time Source tab from "bonehead.." to just the number "1" for example (the field can't be left blank). Apply this change ad then go ahead and switch back to the NTP Time Source Mode in the Settings tab. This will restart the client software.

Now poll this PresenTense Client in the LANTime GUI again. This time, instead of it continuing to report the default value of "bonehead…" (like it has been) it will now report just the number "1" (since this is now the configured Primary server in the "SNTP Time source tab). The client isn't trying to reach "1" as a time server, because it's not using the SNTP time source mode, where this value has been configured. This example is shown below (SNTP tab on the left has a value of 1 and LTA on the right is reporting the Time server for this client is "1",
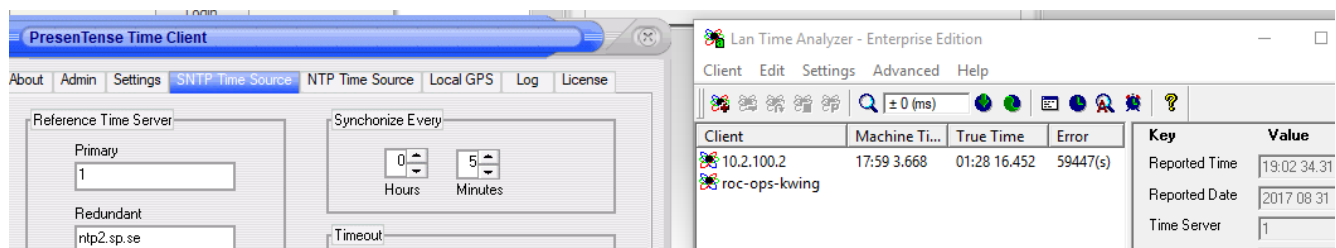
As a work-around to this minor reporting issue in the LTA program, you can optionally change the SNTP Time Source's "Primary time server" field to the same value of a Time server in the NTP time source tab. Then, LTA will report this

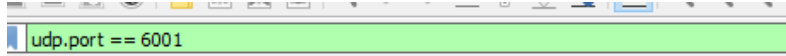value instead of the default value in the SNTP time source tab.

**Wireshark capture/Network Ports used for LAN Time Analyzer (UDP ports 123 and 6001)

Per Mark at Bytefusion- UDP Port 6001 is used for the communication between LTA and PTC/PTS (including scans) so this port will also need to be available (in addition to Port 123). The port can be changed by a registry key if necessary.

It is UDP traffic- not TCP traffic.

Wireshark captures of udp port 6001

> **Wireshark filter to apply to see just these packets**: **udp.port == 6001**

Note before starting a wireshark capture of LANTime Analyzer: For PresenTense Client/LANTime Analyzer wireshark captures (if both programs installed on same PC): need to select a Capture "**loopback**" interface (such as "**Adapter for loopback traffic capture**") because the traffic remains inside the same PC.

SCAN function/Ports used

➢ (Applicable to Class C networks only) = LTA can scan the network for clients that are running PresenTense software. However, according to Mark at Bytefusion, it can only scan Class C networks. Other class networks will not find the clients. They will need to be manually entered.

➢ Scans on port 6001

Example scan

Software hangs when it tries to scan the network for clients

Q During the scanning, the software seems to hang when it tries to scan an IP that doesn't respond to a ping. This is random as sometimes it would just time out/pass that IP and sometimes it would freeze on a different unpingable IP.

We are able to retrieve timing information on a client if we manually put in the IP of the client but we have several large subnets and it will be impractical to manually enter all the IPs. Are there anything we should be aware of when we do a subnet scan? (such as UDP ports that are being used etc..)

A (per Dave, from Bytefusion, 9 May 16) For the problem where LAN Time Analyzer stalls during a scan, here are some suggestions

Is the program stalling after running for a specific amount of time or always when you click on the screen? I find when I click on the screen or change screens it will interrupt the scan window refresh and I have to restart the program if I want to immediately cancel the scan. The scan will complete by itself if you just let it run. It is best to just click on the SCAN button and walk away and let it complete the scan.

1) Are there any anti-virus software programs running on the PC? If so, the scanning for clients can be perceived by some anti-virus programs as a "port scanner" running. So, the anti-virus software may be "disabling it" from running. To determine if the anti-virus software is causing this issue, temporarily disable the anti-virus software and run the LANTime scan again to see if it proceeds all the way through this time.

2) Another possibility is that the server that the LANTime software is running on is very busy and has run out of ports or handles.

3) Can you check the Windows System and Event Log at the time when this error occurs? If it's an issue being caused handles or some other socket error, then this should be reported there.

4) There is a setting to extend the Timeouts in the Lan Time Analyzer settings. Extending these a small amount may help. The default is one second. Try setting to three seconds and see it that helps.

Please let me know if disabling the anti-virus software resolves the issue, or if appears to be the PC is too busy to run the scan.

PresenTense clients won't delete (disappear from the list after deleting, but reappears after closing/reopening GUI)

- ➢ Refer to SF case 120522
- ➢ Observed in LTA Enterprise v1.3
- ➢ Tried finding where the list of clients is stored by searching the hard drive for the IP address, but got no hits.

Note (in summary of the emails below) Per the email below from Mark Robertson, the list of clients for LANTime is stored in Windows System Registry. Run "regedit" and perform a "find" for a client desired to be deleted. Delete the clients out of regedit and then restart LanTime!

Reply from Mark Robertson (26 Oct 17) The exact problem you have reported is not known, but similar issues were known to exist since Microsoft changed their security model with Vista.

When I try the same test, I can add clients and also remove them. But the information is not saved in the intended location. Instead, a new set of registry keys are created under the "VirtualStore" section of the registry which was created when Microsoft was forced to make Windows more secure.

If I open LanTime Analyzer with the "**Run as Administrator**" option, the story gets even more interesting as the settings end up exactly as intended.

Now we come to Keith and customer :) I would guess that permission to write to the registry is set by group policy but no permission

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to delete a key.

As a workaround, you could try to delete the keys manually and see what happens. You will probably find the clients listed here:

> HKEY_CURRENT_USER\Software\Classes\VirtualStore\MACHINE\SOFTWARE\Wow6432Node\Bytefusion\LanTimeAnalyzer\Parameters\Clients

Another situation that can arise (yes, it gets better) is if the original clients were added before the computer was upgraded or by somebody who opened LTA as administrator. In this case, the earlier clients are saved in the proper location but the newer clients are saved in the VirtualStore location.

If you now run LTA **as non-administrator**, it will check both locations and show old and new clients. but you will not be able to delete.

The proper location should be:

> HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Bytefusion\LanTimeAnalyzer\Parameters\Clients

I would recommend checking both locations and deleting the unwanted clients from both locations and that should solve the problem.

The discussion here is for the next version of LTA, we may for the first time, move away from the Windows standards and save these settings in a file due to just this problem. LTA is the type of software where companies may want certain users to be able to view the status of time clients on the network (but not change).

Please try this and let me know if there are any problems.

> **My initial response to the customer (11 Nov 17)** This email is pertaining to your earlier report to us that the PresenTense LanTime Analyzer software program was not allowing the "old" clients to be deleted from the list of clients on the network (Spectracom Case Number **120522**). I apologize for the long delay in being able to get back to you on this condition you observed. There are just never enough hours in the day, days in the week, weeks in the year ... ☹!!
>
> I reported this observation to the Bytefusion team (they are the company that created/maintain the PresenTense software). The summary of the response back to me is that variances with versions of Windows, and whether you are logged in as an administration or as a non-administrator, affects where the list of clients are stored. They are stored in one of two different System Registry locations.
>
> Their recommendation is to delete them directly from the System Registry (regedit), making sure the unwanted clients are removed from both of the following two locations:
>
> > **HKEY_CURRENT_USER\Software\Classes\VirtualStore\MACHINE\SOFTWARE\Wow6432Node\Bytefusion\LanTimeAnalyzer\Parameters\Clients**
> >
> > **HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Bytefusion\LanTimeAnalyzer\Parameters\Clients**
>
> Once the "unwanted" clients are no longer present in either of these locations, they should no longer be listed in the LANTime Analyzer software 😊!!

**Year jump to 2036

Q. email from a customer "I installed the Enterprise version of LANTime Analyzer and my date/time has jumped big time: Feb 6, 2036..."

A. (response from Mark Robertson)
We've seen this once before and it was on one of our machines. The particular date is the maximum date supported by the NTP protocol and it's caused when LTA remotely starts an older version of PTC. What version of PTC are they running?

This is the first reported case in the field as we caught it on a test bed and fixed it but not everybody updates.

Another email from Mark (11 Jun 2013) We need to make sure that he has the latest PTC installed and that he's not restarting the clients remotely. There was an old bug in PTC whereby if LTA restarted it remotely, it would reset the time to 2036.

Status Update (December 2019) per Keith- I installed new versions of PT Client and LANTime on my new PC and my PC went to year 2036

LAN Time Analyzer (LTA) 30 demo program supports monitoring of only one client at a time

Email from Dave L to Mark Robertson:
They are evaluating the 30 day free trial software and were disappointed with only being able to enter one client in LAN Time Analyzer. Is there a way we could get a revised copy of the 30 day eval that lets one enter 3 or 4 clients? That would be more useful. Or would it be OK to send him a regular copy to try?

Response from Mark: With regards to LTA, we don't have a more than one demo as far as I'm aware but it's OK to send him a full copy so long as he understands that he can only use it for 30 days.

Example Packet capture

```
10.2.100.29 is Keith's PC running LTA, 10.2.100.42 is Dave Lorah's PC running Client NT)
```


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*Email and other alerts

➤ LANTime Analyzer does not support email alerts

➤ Alarm Settings page allows a Pop-Up message to be displayed or a specified .exe file to be run, if a PC's time error ever exceeds a user-specified error threshold (the PC must be running either Client NT or Server software for this functionality to occur).
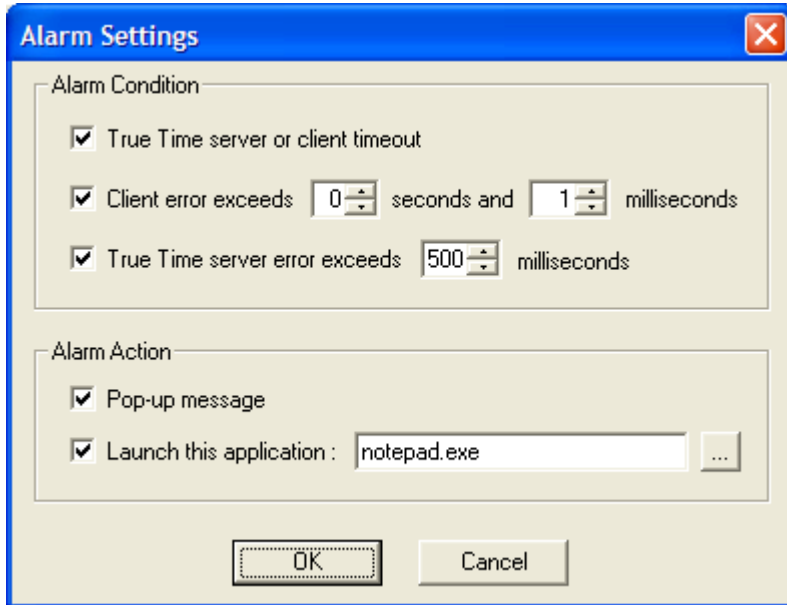
Example pop-up window when alert threshold has been exceeded

Keith's response: To begin, the LANTime Analyzer program does not support Email alerts. This functionality is available in the PresenTense ClientNT software running on each of the network clients. Each client PC running the PresenTense Client NT software can send an email if it is not able to obtain a useable time stamp from its NTP references. LANTime, if it has email alert capability, would provide the same emails. So this would duplicate the emails that are also being sent out from the NTP clients.

So instead of sending email alerts, the LANTime Analyzer has two other forms of available notifications that can be enabled. If a Client PC running PresenTense Client NT software has a time error greater than the user-specified alert threshold, such as 3 seconds for example (as configured in the « **Client Error exceeds** » fields shown in the screenshot above) :

➤ The LANTime Analyser program can open a screen on the Windows PC running the LANTime Analyser program. The window indicates a PC has exceeded the allotted amount of time error (as compared to a reference NTP time server on the network). When this window has opened, you can then look at the main page of the LANTime Analyser program to find which listed client(s) that is exceeding its allotted time error.

➤ The LANTime Analyser program can run any .exe program, as selected in « Launch this application (as shown in the screenshot above), such as notepad.exe. If you have a paging system or other exe program, it can automatically run that program by selecting the .exe file in this field.

Fetch Remote Times- "Timeout / "No Reply" issues with individual/all PresenTense clients/servers

As shown below, LTA may report "timeout" and "no reply" for one or more PresenTense clients:
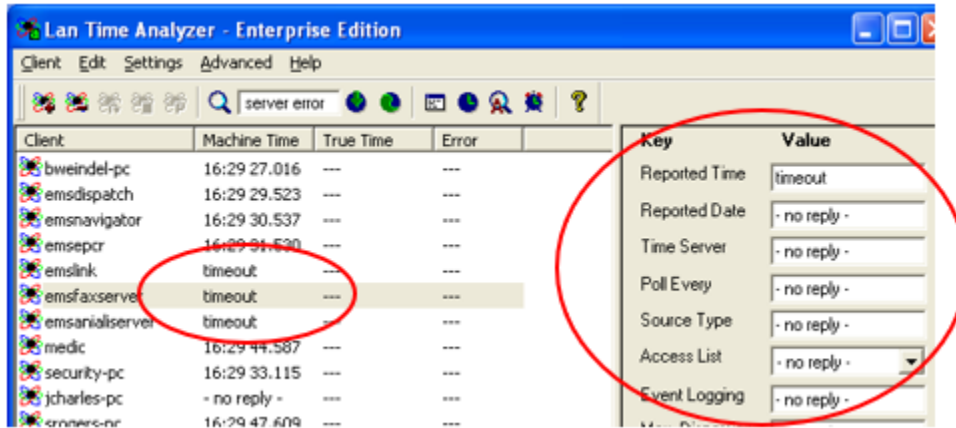
1. Not likely for customer to have happen (I noticed this condition on MY PC here at the factory) , but having **BOTH** PresenTense Client AND PresenTense Server software installed/running on same PC (should have only one or the other running on same PC

    Email from Mark Robertson (4 Dec 2019) In this case there is one obvious issue and that is you can never run PTC and PTS on the same machine as they fight over port 123 and 6001 - no guessing who binds first or who gets what data. You can have them both installed but not running

2. Check all firewalls (on the PCs and on the network) to ensure PresenTense Client/PresenTense Server AND LAN-TIME are all included/allow ports 123 and 6001 to get through

3. Make sure PresenTense Client OR Server software is installed AND running on that particular PC.

    *   If not, restart the PC. "No reply" indicates the program is installed but not running.

4. If there are any firewalls in between the LTA computer and that particular PresenTense client Or if Windows Firewall is enabled on any PC, ports 123 (NTP) and 6001 (communications) need to be enabled. The ports need to be open on the PC running LANTime and the Clients.

5. Find out what anti-virus software is installed on the Client machine. Anti-virus software programs can block communications between LTA and the PresenTense Clients.

> **Note if ports 123 and 6001 are open**: If possible, temporarily disable the anti-virus software on one PC that is reporting timeout and see if it can start communicating. If it does, use a different anti-virus program.

Perform a wireshark capture with following filter applied: udp.port == 6001

6. In the LANTime GUI, perform one **Client** -> **Fetch Remote Times**

7. With just one client or one server configured in LANTime, a succusful "Fetch" will result in four packets

- Notice the "Info" field shows "6001" as alternating back and forth between the first and second value in this field

Whereas a failed "Fetch" such as a firewall issue will result in only two packets

- Notice the "Info" field only shows "6001" as the first value and never the second value in this field

Cases 217075 and 216685

****"Server Error" reported (True Time Server not defined)**

Email from Keith to a customer (12 Jun 13) As for the "server error" and LTA no longer reporting information on the clients, LTA has to be configured with the IP address/DNS name of either a Spectracom NTP time server or a PC that is running PresenTense Server software (if one PC on the network is running this program). And, that NTP server or PC needs to be reachable on the network. The time of each PresenTense Client PC listed in LTA is compared to the time of the NTP server or Sever PC that is configured in True Time Server button towards the top of the LTA GUI.

The True Time Server value should be the address or DNS name of the Spectracom NTP server. If this is still the same value that was configured with earlier (when you were seeing information reported) something may have happened to it, preventing it from being available to the network. I Or, it may no longer be available for synchronization. Make sure

the Sync LED on the front of the NTP server is solid green. If it's not the same value, change it back to the original value and then make sure data is reported again.
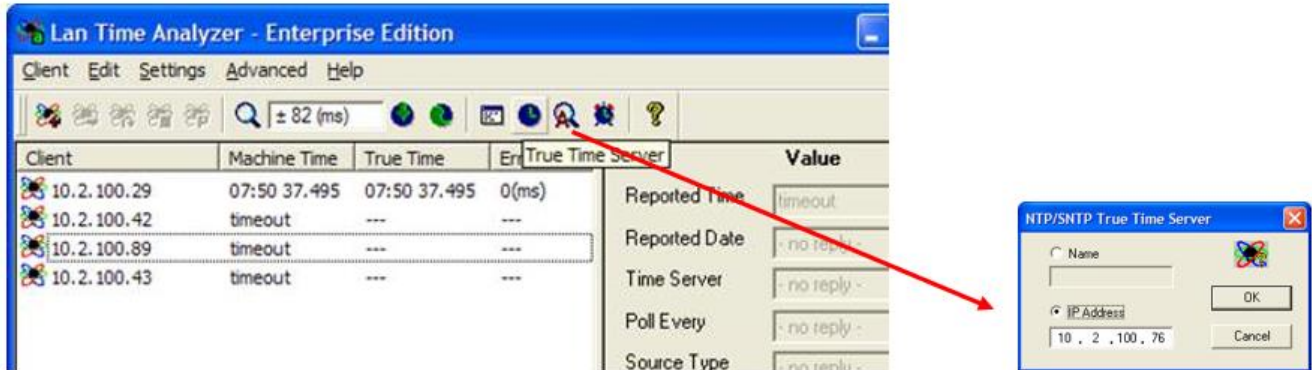
> ➢ Online help for NTP Auditor: Start /All Programs/PresenTense NTP Auditor/ PresenTense NTP Auditor Help).

**Audits/General info on the NTP Auditor program

Keith's response: The NTP Auditor program running on each Client PC creates three audit files (one for each of the three references that the PC's time can be automatically compare against). These three files are stored in each computer's hard drive (sorted by month and year). However, if a printer is connected to that PC (preferably a dot matrix printer so that the paper is one continuous length) the results of the audits can also be sent to the printer for a continuous, hard-copy print-out of the results of the audits. This would be in addition to the logs that are also stored in that PCs hard drive, as well.

Below is a quick example of the NTP Auditor showing the time error of my PC versus the Primary audit reference (it can also compare the time against up to two other references as well). When a dot matrix printer is optionally connected to the PC, it can print-out a continuous, scrolling hard-copy of these comparison results. So if you need to prove the time error of the PC (if any) at any given point in the past, you would go to the dot matrix paper stack for that time period and simply scroll to the date and time in question, to see how much time error was present at that particular moment.

Below is another screenshot which indicates the time of a computer had been changed (at 15:30 on 16 Nov 2005), but then the PC was corrected again, shortly thereafter:
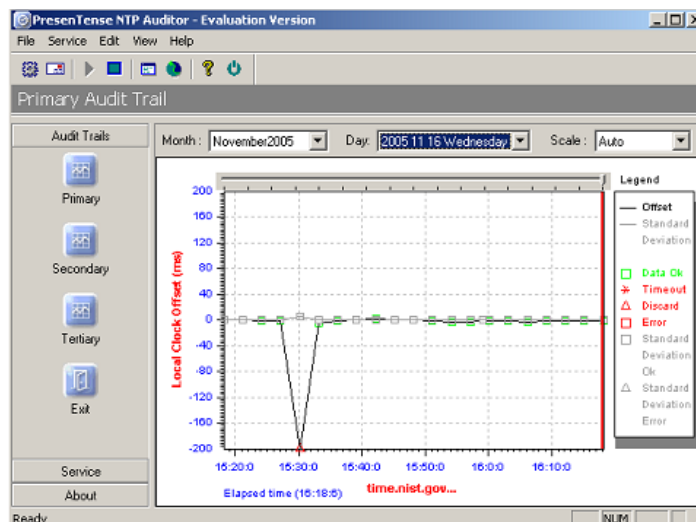
**Configuring up to three Audit references

➢ Up to three (3) Audit servers/Audit references can be configured

➢ Audit references are configured in the Service menu, Network Configuration page (as shown below).
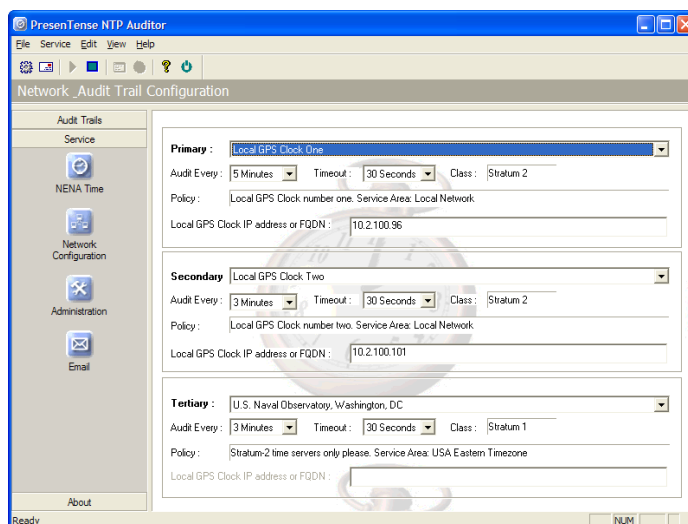
➢ Select "Local GPS Clock (one, two or three) to manually define the IP address of a specific NTP server (such as a Spectracom NTP server)

Note: in at least Auditor versions 3.8 or below, the software won't allow you to configure the same NTP "Local GPS Clock" (IP address) in more than one field. However, you can list the same NTP server by name in more than one field. If you try listing the same IP address in more than one field, the software removes the first two Local GPS Clocks but leaves the third (as shown below)
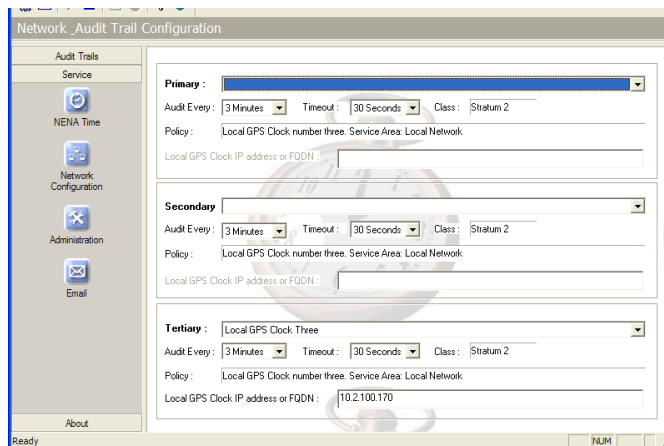
Potential need to configure Windows Firewall/ no successful Audits to external NTP servers after software install

➢ NTP port (UDP Port 123) needs to be open (both on the PC and to the Internet) for Auditor to work

1. **Start** -> **System** and type "**Firewall**" in the search field

2. Select "**Windows Firewall**" in the search drop-down

3. Select "**Advanced Settings**" (on the left side of the window)

4. For both Inbound and outbound rules, add New Rule to allow a "Program" Path of "**C:/Program Files/PTAuditor/PresenTenseAuditor.exe"**

_____

**NENA Time/viewing the current status of each of the configured Audit references

➢ In the Service menu on the left, select "NENA Time"

➢ Red "time" background indicates not all three audit references ("Source") are indicating "Synchronized" (as indicated towards the bottom of the page).

➢ The background turns blue when ALL THREE audit references ("Source") are indicating "synchronized" (as indicated towards the bottom of the page). If any of three is not synchronized, the background will be red.
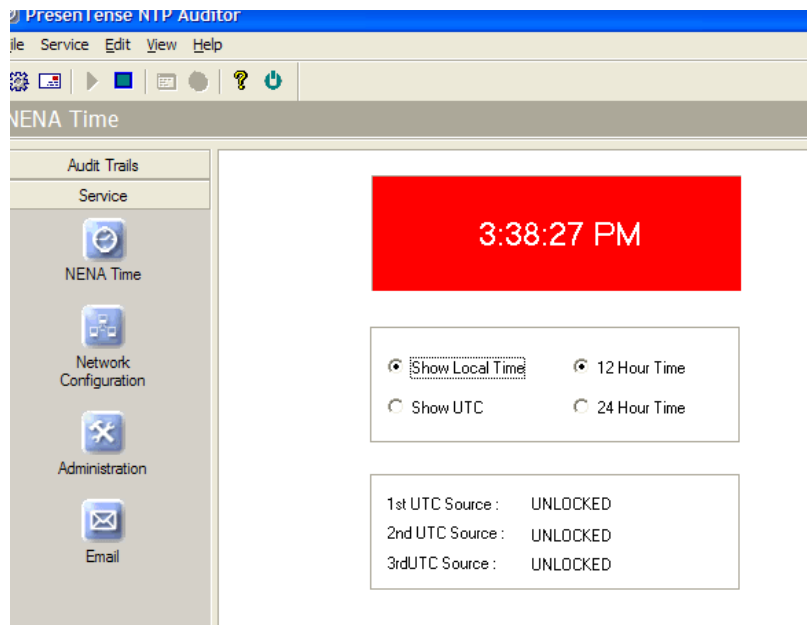
Status reports

Synchronized: PresenTense NTP Auditor is locked onto and synchronized to the respective UTC source.

Locked, Not in Sync: PresenTense NTP Auditor is locked onto the respective UTC source but the local clock is not synchronized to the respective UTC source. Statistical filters indicate that the network measurement is valid.

Locked: PresenTense NTP Auditor is locked onto the respective UTC source but the local clock may not be synchronized to the respective UTC source. A clock offset has been registered but has been discarded because of a large standard deviation value - network measurements are subject to excessive "white noise".

No Status: The respective status file "*nena_primary.txt*", "*nena_secondary.txt*" or "*nena_tertiary.txt*" was not found in the PresenTense NTP Auditor application folder or the file contents could not be read. (C:\Program Files\PTAuditor).

Disabled: The respective UTC source has been disabled on the network configuration screen.

Unlocked: PresenTense NTP Auditor is not locked onto the respective UTC source. Possible reasons for this are DNS lookup errors or network timeouts.

 No Service: The PresenTense NTP Auditor system service is not running.

**Viewing the Audit Trails (comparison results) for each of the 3 Audit references

➢ Audit trails are individually viewed in the Audit Trails menu

➢ There is one tab for each of the three Audit Trails (as shown below)
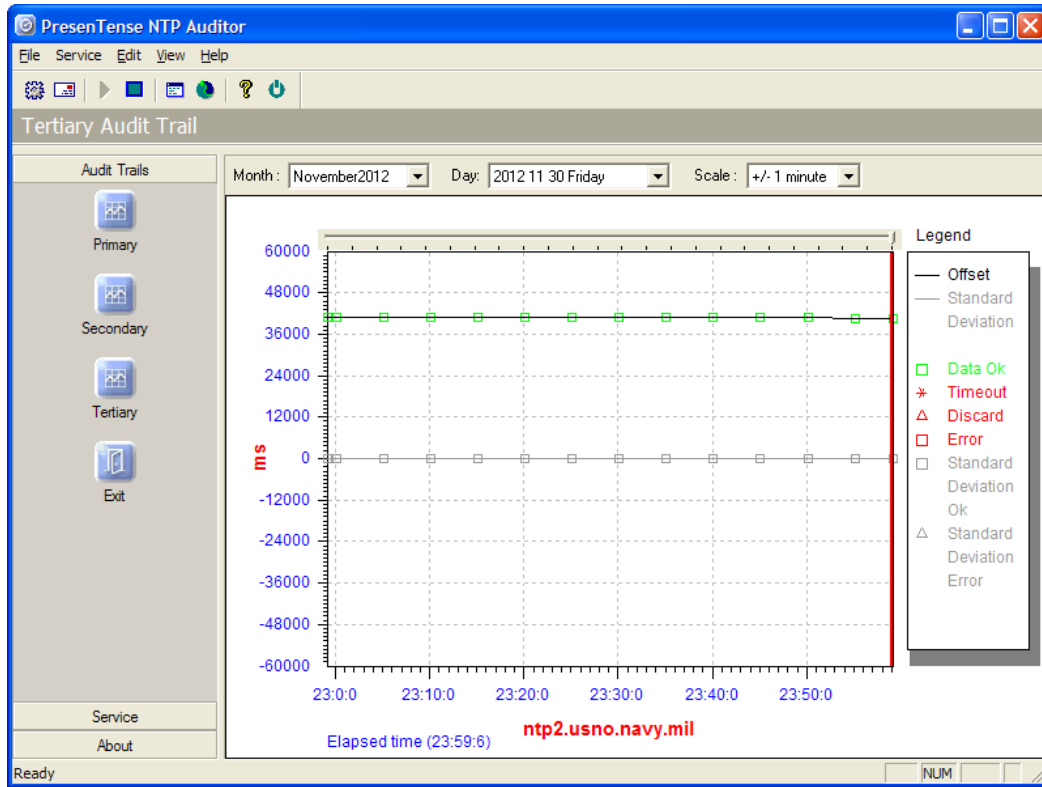
Audit logs

  ➢ Due to security reasons, logs cannot be sent to a central LOG server.

  A) Viewing the Audit logs

  ➢ To review the audit trails, click on "**Audit trails**" and select **Primary**, **Secondary**, or **Tertiary** as desired. This will open a graph of poll comparisons. To see past data, you can select the Month and day for the desired data range along the top of the page.

Audit log storage

  ➢ Audit log data files are stored in each computer, in one of three Audit folders (C:/Program files/PTAuditor)
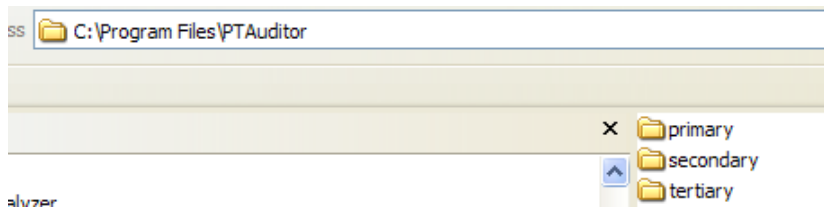
Each folder has sub-folders for sorting the Audits by Month and Year:
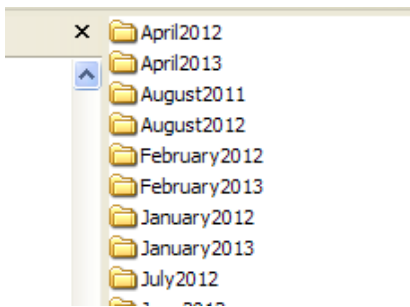
The Audit data for each of the three available Audit comparisons is also stored on the PC's hard drive, in .txt files. Below are screenshots and information indicating how these text files are organized on the hard drive.

Example Auditor Log (for 24 May 2013)

```
2013_05_24_Friday.txt - Notepad

File  Edit  Format  View  Help

00:00:05.389 -> DATE NOW 2013 May 24
00:00:05.389 -> AUDITOR NAME time.nist.gov
00:00:05.389 -> OFFSET 74.111418 STDDEV 0.000316
00:05:36.421 -> OFFSET 74.109950 STDDEV 0.000391
00:10:05.389 -> OFFSET 74.108607 STDDEV 0.000056
00:15:05.389 -> OFFSET 74.107632 STDDEV 0.000272
00:20:05.389 -> OFFSET 74.109713 STDDEV 0.000586
00:25:05.389 -> OFFSET 74.107130 STDDEV 0.000049
00:30:36.389 -> OFFSET 74.106437 STDDEV 0.000204
00:35:36.389 -> OFFSET 74.107149 STDDEV 0.000146
00:40:36.389 -> OFFSET 74.103576 STDDEV 0.000261
00:45:05.389 -> OFFSET 74.102773 STDDEV 0.000599
00:50:05.389 -> OFFSET 74.102356 STDDEV 0.000170
00:55:05.389 -> OFFSET 74.100725 STDDEV 0.000089
00:59:05.389 -> OFFSET 74.103036 STDDEV 0.000054
01:00:36.280 -> OFFSET 74.101707 STDDEV 0.000131
01:05:36.280 -> OFFSET 74.102105 STDDEV 0.000113
01:10:05.280 -> OFFSET 74.101805 STDDEV 0.000439
01:15:36.280 -> OFFSET 74.112279 STDDEV 0.000068
01:20:05.280 -> OFFSET 74.110627 STDDEV 0.000037
01:25:36.280 -> OFFSET 74.113106 STDDEV 0.000662
01:30:05.280 -> OFFSET 74.109252 STDDEV 0.000200
01:35:05.296 -> OFFSET 74.111176 STDDEV 0.000313
01:40:05.280 -> OFFSET 74.111731 STDDEV 0.000298
01:45:05.280 -> OFFSET 74.108602 STDDEV 0.000557
01:50:05.280 -> OFFSET 74.106268 STDDEV 0.000021
01:55:05.280 -> OFFSET 74.102480 STDDEV 0.000462
01:59:05.436 -> OFFSET 74.107219 STDDEV 0.000646
02:00:05.311 -> OFFSET 74.101171 STDDEV 0.000103
02:05:36.311 -> OFFSET 74.101078 STDDEV 0.000037
02:10:05.311 -> OFFSET 74.099336 STDDEV 0.000239
02:15:05.311 -> OFFSET 74.100309 STDDEV 0.000123
02:20:36.311 -> OFFSET 74.097206 STDDEV 0.000044
02:25:36.311 -> OFFSET 74.097502 STDDEV 0.000394
02:30:36.311 -> OFFSET 74.096529 STDDEV 0.000073
02:35:05.311 -> OFFSET 74.095840 STDDEV 0.000193
02:40:05.342 -> OFFSET 74.099919 STDDEV 0.000311
02:45:05.311 -> OFFSET 74.093476 STDDEV 0.000216
02:50:36.327 -> OFFSET 74.093457 STDDEV 0.000151
02:55:36.311 -> OFFSET 74.091337 STDDEV 0.000113
02:59:36.405 -> OFFSET 74.089987 STDDEV 0.000545
03:00:05.311 -> OFFSET 74.093308 STDDEV 0.000176
03:05:05.327 -> OFFSET 74.089042 STDDEV 0.000539
03:10:05.311 -> OFFSET 74.091109 STDDEV 0.000093
03:15:36.311 -> OFFSET 74.089295 STDDEV 0.000081
03:20:05.311 -> OFFSET 74.089170 STDDEV 0.000347
03:25:05.311 -> OFFSET 74.086289 STDDEV 0.000077
03:30:36.311 -> OFFSET 74.085557 STDDEV 0.000161
03:35:05.311 -> OFFSET 74.085146 STDDEV 0.000241
03:40:05.342 -> OFFSET 74.083832 STDDEV 0.000265
03:45:05.311 -> OFFSET 74.084573 STDDEV 0.000554
03:50:05.311 -> OFFSET 74.084095 STDDEV 0.000357
03:55:36.311 -> OFFSET 74.080295 STDDEV 0.000084
03:59:05.358 -> OFFSET 74.081627 STDDEV 0.000403
04:00:36.249 -> OFFSET 74.079560 STDDEV 0.000052
04:05:05.249 -> OFFSET 74.080261 STDDEV 0.000318
04:10:05.249 -> OFFSET 74.080198 STDDEV 0.000076
04:15:05.358 -> OFFSET 74.079154 STDDEV 0.000427
04:20:36.358 -> OFFSET 74.076952 STDDEV 0.000500
```

**Email alerts from NTP Auditor/Alarm conditions/troubleshooting alerts

- ➢ Email function configured in "Service" on the left side of the menu screen.
- ➢ When configured correctly, email alerts do work.

Alarm/Email conditions

- ➢ Alarm conditions can be enabled/disabled on the right side of the menu (as shown further below)

1. **Time synchronization watchdog fault :** This fault indicates that time PresenTense Server or PresenTense Client synchronization software is not operating.
2. **Measured local clock offset exceeds :** This fault indicates that the local clock offset to a configured source of Coordinated Universal Time exceeds the specified limit. Note that the NENA 911 standard requires accuracy to within 100ms.
3. **Ignore standard deviation :** Network measurements which are subject to excessively large standard deviation are marked as discarded in the audit trail display and no alarm notification takes place. However, you may chose to be notified of clock offsets which exceed the specified limit even where the standard deviation indicates network connectivity may have degraded the quality of the measurements.
4. **Cannot create log files :** This fault indicates that audit trails logs cannot be created as may be the case when insufficient disk space is available.

Email configuration

1. **Email :** Enter your administrator email address here.
2. **Mail-Server :** Enter your SMTP mail server DNS name or IP address here.
3. **Port :** If your SMTP server operates a non standard port, enter the port number here.
4. **Server requires user authentication :** Click this option is your mail server uses SMTP AUTH.
5. **User :** Where applicable, enter the SMTP authentication user name here.
6. **Password :** Where applicable, enter the SMTP authentication password here.

Troubleshooting email alerts not working

- ➢ Refer to: Troubleshooting Email alerts below for additional info if emails aren't received.

Alarm Conditions

Time synchronization watchdog fault: This fault indicates that time PresenTense Server or PresenTense Client synchronization software is not operating.

Measured local clock offset exceeds: This fault indicates that the local clock offset to a configured source of Coordinated Universal Time exceeds the specified limit. Note that the NENA 911 standard requires accuracy to within 100ms.

Ignore standard deviation: Network measurements which are subject to excessively large standard deviation are marked as discarded in the audit trail display and no alarm notification takes place. However, you may choose to be notified of clock offsets which exceed the specified limit even where the standard deviation indicates network connectivity may have degraded the quality of the measurements.

Cannot create log files: This fault indicates that audit trails logs cannot be created as may be the case when insufficient disk space is available.

**Optional use of a printer for hard-copy printout
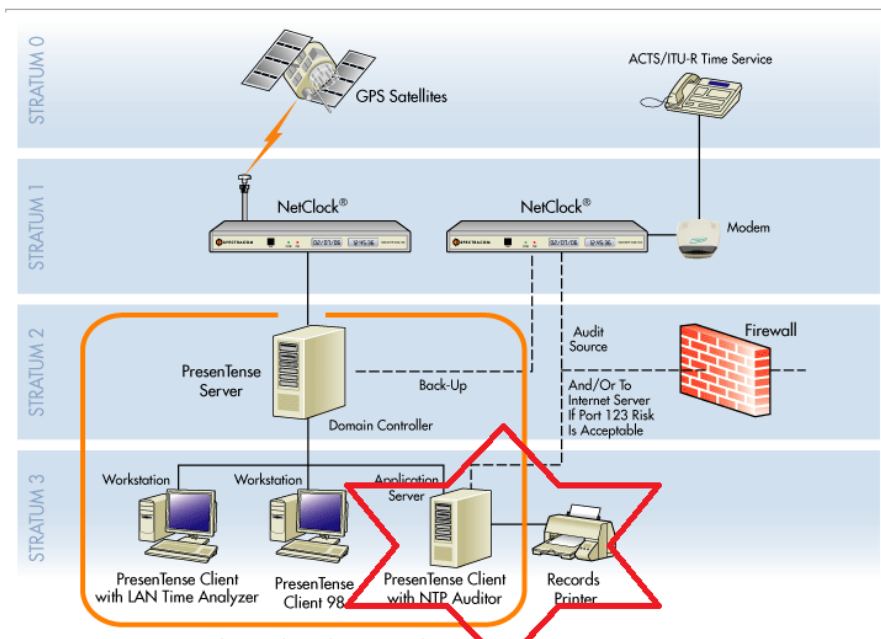
Q. How do Audit records get sent to a printer?

A Keith's response: The NTP Auditor program running on each Client PC creates three audit files (one for each of the three references that the PC's time can be automatically compare against). These three files are stored in each computer's hard drive (sorted by month and year). However, if a printer is connected to that PC (preferably a dot matrix printer so that the paper is one continuous length) the results of the audits can also be sent to the printer for a continuous, hard-copy print-out of the results of the audits. This would be in addition to the logs that are also stored in that PCs hard drive, as well.

Below is a quick example of the NTP Auditor showing the time error of my PC versus the Primary audit reference (it can also compare the time against up to two other references as well). When a dot matrix printer is optionally connected to the PC, it can print-out a continuous scrolling hard-copy of these comparison results. So if you need to prove the time error of the PC (if any) at any given point in the past, you would go to the dot matrix paper stack for that time period and simply scroll to the date and time in question, to see how much time error was present at that particular moment.

Troubleshooting Email alerts (Client, Server and NTP Auditor)

Specific issues

A) Change to Email Port Number doesn't persist

- ➤ Refer to Salesforce Case 260808
- ➤ Fixed by Bytefusion with Auditor version 5.1 update (May 2021)

General troubleshooting

Email from Mark Robertson (4 Dec 2019) With regards to PTC not being able to email, one or more .xml files are created in the install directory when the email module fails. Can you please ask the customer to send these files as they will shed more light on the errors. If there are no xml files then the module is receiving an OK from the mail server but the mail server may later discard the email due to its own policies, such as authorized sender list etc. Let's see what the log file says.

Has a file LOGINerrors.xml been created in the same directory as PTC/PTS/ LANTime Analyzer/Auditor is installed?

Default file locations:

- **Server** C:\Program Files\PTServer
- **Client** C:\Program Files\PresenTense
- **LANTme Analyzer:** C:\Program Files\LANTimeAnalyzer
- **Auditor**: C:\Program Files\PTAuditor

- ➤ Link to an example error log: I:\Customer Service\Software\ByteFusion\Spectracom Software\LTA and PTA errorlog

    This log file is only created in the Windows PC if the program attempted, but couldn't send email alert. Log indicates if authentication with mail server was attempted/successful, port number used, etc.

    Does email/exchange server require authentication?
    If Auth required, username and password must be entered correctly in the PresenTense program.
    If no characters are in either the username or password fields, authentication is not attempted.
    If ANY characters (even if not valid) are in either the username or password field, but not the other, authentication is attempted and will fail.

Suggestions if emails aren't being received:

1. Make sure there is nothing in either username or password field, if email server does not use authentication.

2. Make sure both username and password fields have the correct values entered, and there is nothing else in either field.

    Email from Bytefusion In general, we know that email alerts from the auditor software do work, when configured correctly to communicate with the email server. So we highly suspect this is a configuration issue. There was one earlier reported instance of email failing and it was due to the customer adding a value in one of these fields and then not completely removing it (as it wasn't required). So the email alert was failing. We recommend performing the following, to ensure the fields are completely empty if the email server doesn't require auth, or that no other value has been left behind and added to the values that are needed to be filled in:

    In the Auditor software:

1. One at a time, click in the username and password boxes.
2. Hit the delete ad backspace keys a couple of times to clear out any values that may still be remaining in these fields.
3. Save the settings.
   - If **no auth** is required, try sending the email alert again.
   - If **auth** is required, re-enter the required values, (being careful not to enter any additional characters or spaces to then entered values). Then save the settings,
4. Try sending the email alert again.
5. Perform a wireshark capture on same subnet as the Windows PC

Note: if by change the email is still not received, I highly recommend you use wireshark (on a PC that is on the same subnet as the PC) to perform a packet capture of the network traffic being exchanged with the PC. This will indicate if the PC is trying to communicate with your email server.

Software issues with Auditor

A) Change to Email Port Number doesn't persist

- ➢ Refer to Salesforce Case 260808
- ➢ Fixed by Bytefusion with version 5.1 update (May 2021)

B) Dec 1ˢᵗ of each year (such as 2019) name of the log folders became day of week and year- instead of month and year (makes it appear there are no folders for December)

Example Customer report: "Another issue we just realized. NTP is days old and we can not change the month." (stops in November)
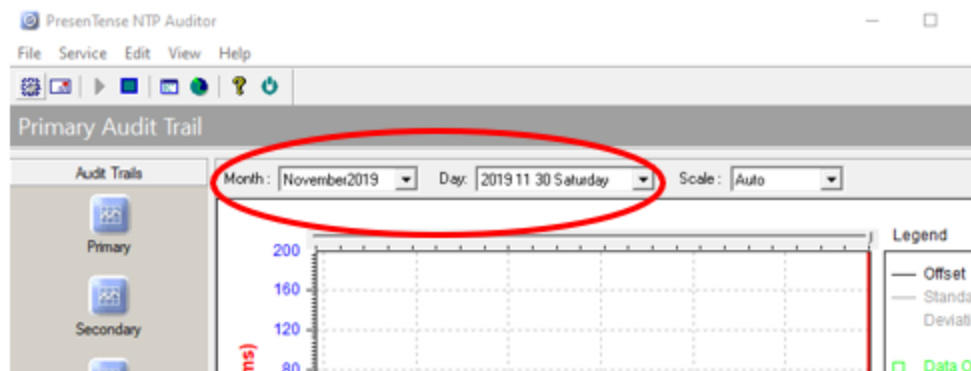
- ➢ Refer to salesforce cases such 16651

Fix/work-around to this issue (Dec, 2017)

- ➢ Simply rename the "**Sunday2019**" file to "**December2019**" (note these two file names are examples- the four digit year value at the end of each file name will vary every year)

Email from Dave L (14 Dec 17) We discovered the PresenTense Auditor software has a bug that saves the December data in a file called "Sunday" instead of "December".

We have a workaround for the problem. Simply rename the "Sunday2019" file to "December2019" and it will resolve the issue. This is found in the program file location for PresenTense Auditor. This will be corrected in a future release of the software. We will let you know when this is available and send you an updated software file.

We apologize for the error. Please let me know if you need any assistance.

    Reply from customer (14 Dec 17) I have renamed the file in all 3 areas, primary, secondary and tertiary and they **now** work fine. Thanks!

Below are four screenshots from my PC, showing the above description occurred. Simply rename the file in each of the three individual folders, located inside the "PTAuditor" folder (primary, secondary and tertiary)
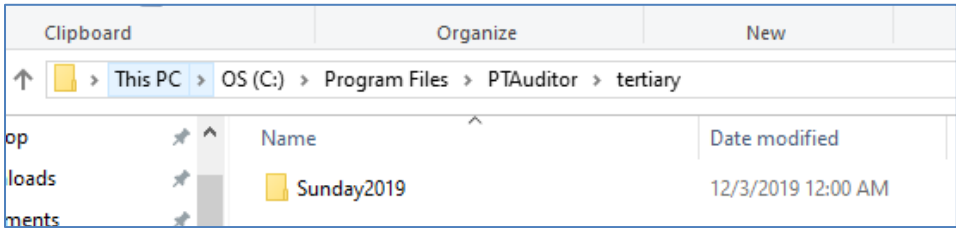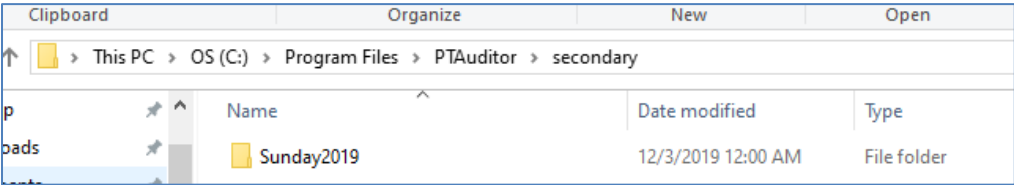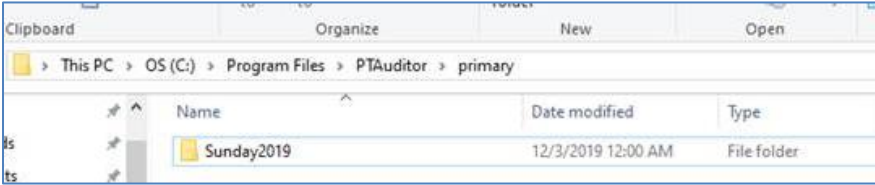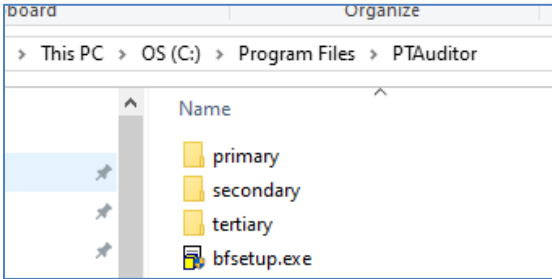
MODEL 9183/9188/9189/TTSXXX TIME SERVER PRODUCTS (DISCONTINUED)

Product Discontinuance

➢ Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9183-9188-9189-TTSxxx\Discontinuance

Shortcuts/links

Manuals

- **9183 manual:** I:\Engineering\Archive\Released\1120 - 9183\Manual

- **9189 manual:** I:\Engineering\Archive\Released\1109 - 9189\Manual

- **9188 manual:** I:\Engineering\Archive\Released\1130 - 9188\Manual

Input Power

➢ DC input is 9.5vdc to 30vdc, 10 Watts

- **Option 04 (not applicable to 9188):** Rb requires 24vdc nominal input for the osc to operate (T00061 power pack provided +22.5 to 30vdc @ 2.5 Amps)

login

Admin login
Username: admin
Password: admin123

Factory login (do not release to customers or dealers)

Username: factory
Password: yazjam10

Options

- **Option 01: Security (HTTPS)** ? (as I recall)
- **Option 02**: (9189s only) front panel LCD, along with a second RS-232 output (instead of just one)
- **Option 03**: Dial-out modem

Exit connection to the product button/Single user browser

- ➢ "**Enter the Main page**" button is present, but doesn't take you to the login prompt
- ➢ Refer to Salesforce Case 231240.
- ➢ Refer to Section 2.2 of the 9183 user manual for screenshots/info (excerpted below

The manner in which the GoAhead Web Server functions requires users to terminate Web UI sessions by clicking "Exit Connection to the Product". Clicking the "X" button on the browser does not end the session, but closes the window – which means the user cannot log in again until the session expires. In some versions of the software, this is 15 to 30 minutes, which some users find inconvenient.
Version 2.3.1 software includes new console commands that allow administrator-level to users to exit the current locked Web UI session using telnet or ssh. Also added is a command to set the timeout to a user-defined value, which means users may now dictate the length of time it takes for the session to expire.
Spectracom Corporation 9183 – v2.3.1
9183 v2.3.0 to v2.3.1 Addendum 2-3

Use the 'web help' command to see a list of net commands. These include **web exit** and **web timeout minutes** (to set the connection timeout).

2.2.1 web exit
This command allows the user to exit the current web session from telnet or ssh connections.

2.2.2 web timeout
This command allows the user to set the web session timeout to any value between 1 and 60 minutes (inclusive). Spectracom recommends selecting a timeout interval of 10 to 15 minutes.

Your report
I'm trying to access the 9183 via the web. I can log-in just fine using the serial port. When I try the web interface it keeps telling me to Enter The Main Page but I never see a login prompt.

My response (per Keith 11 May 2020)
Though the Model 9183 has been discontinued for SEVERAL years, I believe what you saw was an effect of the Model 9183's web browser being a single-user browser (only one user can be logged into its web browser at any given time).

If you just "x" out of the browser connection when you are done being in it, the NetClock is not signaled that the current user in the browser has now left. So, it doesn't allow another user to login, until the existing browser connection has timed-out (or unless the unit is rebooted/power cycled, which overrides the timeout period). If I recall correctly, the timeout period before resetting the connection is 20 minutes. So, if you wait 20 minutes, and then ty logging in again, you should be able to reach the login screen,

To be able to login again, right away after leaving the browser, there is an "Exit Connection to the Product" button at the top of the browser window. Pressing this button to exit the browser, instead of "x"ing out of the browser, signals the NetClock that you are now logged out, so another user is able to login right away.   If the browser is accessed right after, there is no one currently logged in, so a user is able to login again right away.

Attached for your reference is a copy of the Model 9183 user manual and addendum. Section 2-2 (starting on page 2-2) also discusses the browser logout.

Per page 3-11 of the user manual:

NOTE: Always **LOGOUT** and **EXIT CONNECTION TO THE PRODUCT** prior to closing the web browser user interface when you are finished viewing the NetClock settings. For security reasons, only one connection session is supported at any one time, so this ensures that a new session can be activated immediately. If you don't log out or exit the connection, you will have to wait a time-out period or reset the unit to begin a new session.

Connection Refused

➢ Refer to Salesforce Case 255325

Email from Keith (13 Jan 2021) I'm not sure why the NetClock would be reporting "connection refused", even after a power cycle and after entering the correct login credentials.

Perhaps it is somehow associated with "**HTTPS**" (which was, at least initially, only available on the Model 9183 as a purchased option, as I recall). Try connecting to the NetClock's interface by typing **HTTP**://xxx.xxx.xxx.xxx.into the browser (instead of "HTTPS"). Then, if that doesn't work, try the opposite, by typing **HTTPS**://xxx.xxx.xxx.x (instead of HTTP). It's possible this NetClock has the HTTPS option enabled, and HTTP is disabled.

The above info is a bit of a "reach" for this error message, but potentially related. It's the only reason I can think of (I even went through my old notes on this MUCH earlier product and didn't find anything related).

Last suggestion would be to try connecting with a different browser (if currently using Internet Explorer, try using either Firefox or Chrome, for example).

Customer responded back that this worked!!

Configuration via web browser

**Main tabs are located on bottom of web browser pages

Interface Setup   System Setup   Relay Setup   Status & Log   Set To Defaults   Customer Support

****"Set to Defaults" button (Restore settings back to factory default configurations)**

> ➤ Can't just "replace a CF card" to restore 918x configs (918x servers don't have a CF card- they have flash ICs soldered onto the board)

Interface Setup System Setup Relay Setup Status & Log Set To Defaults Customer Support

Reminder: Need to first login because everything is greyed-out (click "**login" button i**n top-right corner)

Note: excerpt below is from the Model 9183 user manual

3.7.2 "Set To Defaults" web browser user interface

The "Set To Defaults" web browser user interface screen is used to return the Serial Port 1, Serial Port 2, Remote Port 1, Remote Port 2, Front Panel Displays, IRIG and the Frequency Outputs back to their product defaults. To return these configurations back to the factory defaults values, login as the administrator mode, select "set to defaults" on the bottom blue bar, and the press the "Restore to factory defaults" button.

Wiping/sanitizing the Model 9100s for security

Email Keith sent (9/11/13) As you found, the Model 9188 doesn't have a CF card. Instead, they had two Flash ICs to perform the same function as the CF card added for us (CF cards gave us much more space later on, and were more practical).

As long you aren't planning on re-using the Model 9188, take a hammer to ICs U14 and U15 that are socketed to the PCB. This will "wipe" the flash memory for you (just like taking the CF card out).

Remote RS-485 and Serial RS-232 port configs

Option 02: Second RS-232 output (and front panel LCD display)

- 9189s with Option 02 installed have a second available RS-232 output (and a front panel LCD)
- 9189s without Option 02 have two RS-485 output ports, but only one RS-232 port ??

Per the 9189 manual
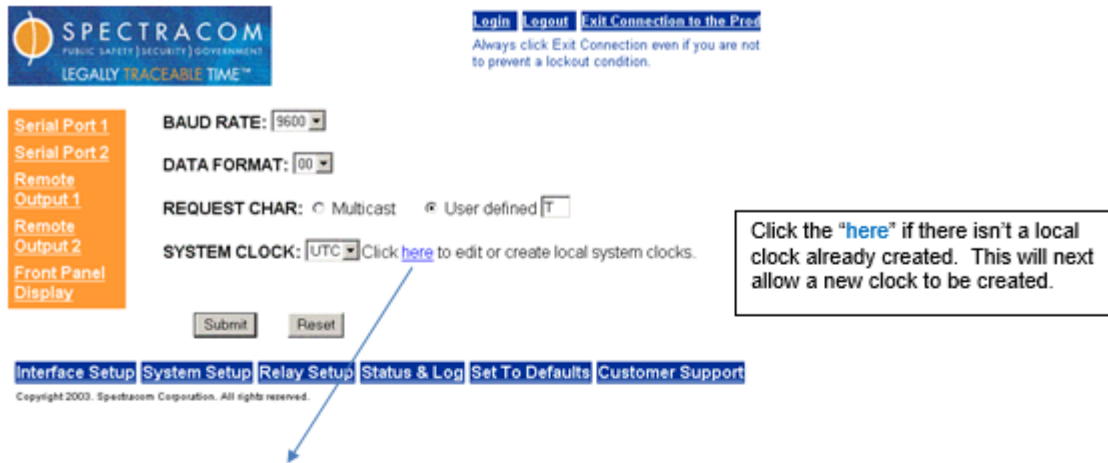
The two RS-485 connectors (**RS-485 ports 1 and 2**) provide an RS-485 data output for synchronizing devices that accept an RS-485 input, such as wall display clocks and add-on Time Servers.

Serial Comm 1 is a "DB9 female" connector that provides RS-232 data output to devices that can accept an RS-232 input for synchronization.

Serial Comm 2 (Optional- Installed with Option 2) is a second "DB9 female" connector that provides RS-232 data output to devices that can accept an RS-232 input for synchronization.

Interface Setup button on bottom of page -> Serial and Remote output on left side of page

> **Reminder**: Need to first login because everything is greyed-out (click **login** button in top-right corner)

Newer DST rules (after 2006)

  Use Manually defined by week and day

   DST In Date Second Sunday in March, hours 2, minutes

   DST Out Date: First Sunday in March, hours 2, minutes

Change amount 1 hr

Status and Logs -> System Status page

"Status & Log" -> "System Status" page of the browser

3.17.1 Dynamic System Information

Uptime: 0 years, 0 days, 1 hours, 54 minutes, 1 seconds
Current internal temperature: 27.75 C (81.95 F)
Major Alarm is (OFF)
Minor Alarm is (OFF)
Time Sync status: In Sync
Time Source: GPS

The **Dynamic System Information** section contains the elapsed time that the unit has been powered-up for, the internal temperature of the unit, the status of the major and minor alarms, the current Time Sync status and the current external reference identifier.

Time Source:
The Time source field contains the current source for time input. The possible inputs are as follows:

None – No Time Source has been found after startup.

GPS – The GPS receiver is the Primary Time Source for the Models 9183 and 9189.

Modem – When Option 3 is installed, the Modem maybe used as a Primary Time Source or Secondary (backup) Time Source to GPS for the Model 9183.

User – The Time Source is the result of the user setting the time from the System Setup/System Time web browser user interface page when no Time Source is present.

3.17.2 Static System Information

Product Name is Spectracom Corp. Model 9183
Application Name is 91XX
Application Rev is 2.3.0
Application Date is 07/28/2005
SSH Rev is OpenSSH_3.7.1p2, SSH protocols 1.5/2.0
SSL Rev is OpenSSL 0.9.7d 17 Mar 2004
Boot Monitor Rev is 2.3.0
Unit's Serial Number: 886
GPS Receiver Serial Number: P07ROY 2.1
MAC Address: 00:0c:ec:00:03:76

The **Static System Information** section of the System status page provides the software revisions, the NetClock's Serial Number and the MAC address.

System Test Results

PCB Test	PASSED (PCB rev: 5)
PCC Test	PASSED (PCC rev: 3)
CSL Test	PASSED (CSL rev: 14)
RTC Test	PASSED
GPS Startup Self-Test	FAILED (Antenna UC)
GPS Antenna Sense	PASSED
Modem Test	CONSOLE MODE
Temp Sensor	PASSED
IRIG Test	PASSED (1.02)
Serial Port 1	PASSED (2.03)
Serial Port 2	PASSED (2.03)
Remote Port 1	PASSED (2.03)
Remote Port 2	PASSED (2.03)
Front Panel LCD 1	PASSED
Front Panel LCD 2	PASSED

System Features and Options

Security	ENABLED
Modem	ENABLED
Serial Port 1	ENABLED
Serial Port 2	ENABLED
Remote Port 1	ENABLED
Remote Port 2	ENABLED
IRIG Output	ENABLED
Front Panel Display	ENABLED
Relays	ENABLED
Oscillator Disciplining	ENABLED
10 MHZ Frequency Output	ENABLED
NTP Server	ENABLED
TCXO Oscillator	ENABLED
Motorola Oncore M12+ Timing GPS	ENABLED

Error Messages

Rubidium Maintenance Required (1)(5)

This entry on the log indicates that there is a problem with the Rb health. The number in the first "( )" indicates the error message. The number in the second "( )" indicates the number of times that this error message has occurred. In this example, the Rb lost communications with the main board five different times.

The following are the values and alarm conditions:

Fault Number	Condition causing this error message
0	Heath OK
1	No communications between RB and logic board.
2	Elec_sup_volt error
4	Heat_Sup_volt error
8	RB lamp light error
10	Gate_Volt error
20	RF Synth error
40	Lamp_Temp error
80	Crystal_Temp error
100	Cell_Temp error
200	Case Temp error
400	b_FLL error
800	10 MHz_EFC error
1000	Analog_Cal error
2000	System Level error
4000	Lamp_det_ error
8000	Lamp_dead error

Time Sync flashes red 4 times, pauses, flashes red 5 times, it is failing loopback check of the Ethernet port and needs to come back for repair.

Time Sync flashes error codes if there is a problem after loading the bootload program. 12 = SDRAM, 23 = Timer, 34 = UART, 45 = ETHERNET, 55 = DEFAULT.

With these error codes, the unit WILL NOT boot-up into the boot monitor mode. The front panel display will be blank and no comms with Console port will be available and no data will be present with the REM and SER ports either.

Recommend plugging in Network cable prior to power-up. Auto Negotiate only occurs at power on. If cable connected afterwards- 10 Base/T and Half duplex only! If they are set to Auto-ok. If set to 100 Base /T –Causes problems.

MAC address not being retained through power cycle /error in EEPROM check.

The EEPROM (connects to the Ethernet port) stores the MAC address, IP configurations and Options file to tell the unit which Model it is and which ports/options to enable). If the MAC address is not being retained, replace this IC first.   If the options file can't be read from the EEPROM, there is a backup copy of the options file that can be read from a different location. An error message will be generated in the display generated when you login to the console port as admin mode.

_____

OpenSSL/OpenSSH information

1) From Paul Myers 11/11/05 - There is a known vulnerability is SSLv2. We are running OpenSSLV1 compiled in a way that prevents us from having this vulnerability.

"We Don't use OPENSSL V2 we compile it out of the version we use." . Refer to: http://www.openssl.org/news/secadv_20051011.txt for more information.

Current version software installed in units:
SSH: Open SSH_3.7.1p2   TLS 1.5/2.0
SSL: Open SSL 0.9.7d 17 March 2004

The SSH session is slow to be created due to processor speed and the security algorithms that occur.

The login session will timeout after 15 minutes.

If using pass-phrase to create SSH session, there is a 30 second time-out to enter the pass-phrase before the session times out.

_____

Known Bugs List

Version 2.3.0 (and possibly below):

1) **HTTPS Certificate doesn't error check to verify that at least one other field other than Pass-Phrase has been filled out.**

At least one other field has to have something in it to correctly generate the certificate. The screen will state "building certificate" but the "Certificate Authority" box will NEVER be filled in. HTTPS will not be a success. To remedy, fill in at least one box for the certificate. (See record for Mark Muir-Dept of Justice).

2) **HTTPS fails a vulnerability scan.**

Causes unit to lock-up (See Dept of Justice- Mark Muir for an example).

Tests that are known to fail (from Nessus):

Thttpd 2.04 buffer overflow
Too long POST command with enable dependencies at runtime.

➢ In modem as primary mode (Model 9183RB only), the unit will sync to ACTS with about a 300ms error and will slowly work it's way in (Slow correction due to" averaging" being on. Syncs correctly if it syncs to GPS initially, then syncs to modem. See example NTPSTATS from Bhanu Chesani's unit below: FIX – Turn off averaging with the RS-232 console port if they don't sync to GPS first. See below for example:

ntpq> pe

```
   remote        refid    st t when poll reach  delay  offset  jitter
==========================================================================
-10.10.2.1      .ACTS.     1 u  51  64  377   1.914  -2.610  6.239
+10.10.2.2      .GPS.      1 u  53  64  377   1.933   0.049  1.410
+10.10.2.3      .GPS.      1 u  62  64  377   1.939   0.059  9.191
-10.10.2.4      .ACTS.     1 u  52  64  377   1.907  -5.333  9.210
+10.10.2.5      .GPS.      1 u  60  64  377   1.911   0.090 10.293
+10.10.2.6      .STCI.     1 u  11  64  377   1.934   0.050  0.598
*10.10.2.7      .STCI.     1 u  11  64  377   1.870   0.089  0.788
x10.10.2.9      .GPS.      1 u  38  64  377   1.931 -294.94  1.960  ← HERE BAD OFFSET LIES
-time.miroge    .GPS.      1 u  48  64  377   1.705  -0.147  0.028
-tick.usno.navy. .USNO.    1 u  36  64  377  49.187  -3.400  3.520
xtick.usnogps.na .USNO.    1 u   6  64  377  92.618 -14.951  1.738
```

- ➤ In NTP Stats, the Reference value for the Model 9188 says GPS and models 9189 and 9183 always say GPS even if running on back-up modem.   If 2.3.1 is actually released, we are planning to change 9188 to indicate STCI and Modem to indicate ACTS as type of reference. (See example above. The 9183 was synced to modem/ GPS not even connected when this log was obtained).

- ➤ Data Format 1 was broken in version 2.3.0. Need to update to version 2.3.1 to correct this issue.

Model 9188 only (version 2.3.0 and 2.3.1 only)

There is a defect in which the 9188 when using Format 7 or Format 8 at 1200 Baud will fail to correctly generate a 1PPS from the incoming data message. This results in Format 7 and Format 8 being unusable at 1200 Baud ONLY.
This is fixed in Han Solo 3.1.1 I believe according to Mark. The root cause was that we lengthened the Format 7 and 8 messages and this required a change to the CSL which we did not make because I did not realize there was any timing impact there. I thought it would only look at the start of message and generate the 1PPS.
I also thought my coops tested all baud rates as I asked…
Workaround:
Format 7 & 8 do NOT use 1200 Baud for STC Input on a 9188.

Version 2.3.0 software update batch file

Manual FTP of files into the units.

  1. Reboot the unit to Bootloader:

> Version 2.2.0- check the box in the reboot screen and then reboot.
> Below Version 2.2.0 – Console port and stop at boot monitor.

  2. FTP the following files (From C:\spectracom\B003) to the Time Server:

File name	Directory in Time Server
bootlnx230.bin	/boot
linux.bin	/kernel
fsimg.jffs	/fs
All cfg files	/configs
All .net files	/net

  3. Reboot the unit to normal mode.

  4. In the PC, go to the C:\spectracom\B003 directory and rename the file called option.default to options.

  5. FTP this Options file to the /options folder in the Time Server:

  6. Reboot the unit to set the standard configuration for the unit being updated.

  Note: Cute FTP has a problem with sending the boot monitor. Recommend using CoreFTP instead.

Delta board Revisions

```
// 1109 Processor Board ID bits
//
// Read as an 8-bit register from U63 to identify the base board revision and
//  population revision.  ID controlled by populating 8 zero ohm resistors to
//  pull the bit low (zero).
//
//          For example: ID 5 is
// R119 - MSB -   installed = 0    \
// R120 - bit 6 - installed = 0        \ Product variation
// R121 - bit 5 - installed = 0       /
// R122 - bit 4 - installed = 0     /
// R123 - bit 3 - installed = 0       \
// R124 - bit 2 -   out    = 1         \ Base board Rev
// R125 - bit 1 - installed = 0        /
// R134 - LSB  -   out    = 1        /
//
// Least significant nibble (4 bits) corresponds to base board rev.  Most
//  significant nibble is the product variation.  This hasn't been followed
//  exactly, but as of 11/03/04, here is a brief (incomplete) board history:
//
// ID 0x15: PCB rev C, F002 BoM rev H per ECN ___ - Rubidium population
// ID 0x05: PCB rev C, F002 BoM rev H per ECN 867 - correction
// ID 0x05: PCB rev C, F002 BoM rev G per ECN 840 - removes unused phase parts
// ID 0x05: PCB rev C, F002 BoM rev F per ECN 816 - introduces Rev C
// ID 0x05: PCB rev B, F002 BoM rev E per ECN 772 - correction
// ID 0x04: PCB rev B, F002 BoM rev D per ECN 771 -  ?
// ID 0x03: PCB rev B, F002 BoM rev C per ECN 746 -  ?
```

RFC PAGES

Refer to: [Port assignments and RFCs (NTP, HTTP, HTTPS, SNMP, Syslog, etc) for all products](#)

Web Browser lock-up in 918x or TTSxxx

Rest of unit runs fine
Caused by issues with Go Ahead Web Browser.
Power cycle fixes it.

WS_FTP LE program to install software upgrade (Core FTP for GUI-based FTP transfers)
http://download.com.com/3000-2160-10252208.html?tag=lst-0-1

SNMP information only shows in ADMIN mode. Without being logged in, only enabled/disabled is shown.

Always get current version of all software prior to update.

If ACD (Antenna Cable delay) has been entered, the response in the log may change. This is a known issue with the GPS receiver and not with the unit. Once the current batch of receivers has been used up, the new ones will be ok.

When using Internet Explorer (Not Netscape), if the user tries doing File/New with the mouse, a second WebUI box will open. The data won't show up in the second box. We have no control over this condition.

SOFTWARE UPDATES/Versions

Desire to update to newer versions

- ➢ ~~Update files are on our website at:~~ ~~https://files.spectracom.com/client-downloads/5489~~

- • Files are also available at: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\9183-9188-9189-TTSxxx\Software updates

- ➢ Refer to case 123273 for the email below

Email from Dave Lorah (11 Dec 17)

The Model 9183 is an obsolete product that was discontinued over ten years ago.

I have not sent out a 9183 update in many years, so I am not sure it even works anymore. The update references Telnet which is not even a service in Windows anymore. You may have luck running an update with an old XP machine.

If you choose to perform an update, please note we do not support the update efforts on this product and you are on your own. There is some risk of damaging the unit permanently if the update goes wrong and we would not be able to recover it. I would recommend running the 9183 at the present level as long as there are no problems.

Here is a link to download the 9183 update and instructions if you wish to try. You will need a password: 9183081284811174

https://files.spectracom.com/client-downloads/5489

Please let me know if you need anything else.

Important Notes

Rev – boards: CSL Rev 5 is a REV – board and can't be upgraded past 1.0.0.   Can't update the software to ANY version. Must replace the entire unit if newer software is desired!!! Updating to 1.1.0 WILL result in erratic operation of the unit (browser worked, outputs ports didn't).

- o **Note**: Refer to ECN 0680 (in the earlier ECN database) for additional information.

"Rev A" PCB boards: DO NOT UPGRADE TO Application software 1.2.1 or higher.

Version 1.2.0 is last software version that can be placed on the 8 MB FLASH. TTS series software can only go on boards with double flash (16MB).

PCB rev and Flash size (8MB vs 16MB)
- ➢ reported at each startup, as shown below)

INTEL 16MB FLASH

Boot-Loader Program Version 2.1.0
To escape to shell mode, press the escape key within 2 seconds...
2
1

INTEL 16MB FLASH

Spectracom Corporation Model 9183

Application Name: D9183V121.bin
Revision: 1.2.1
Date: 08/16/2004
Boot Monitor Rev: 2.1.0

PCB Test -> PASSED (PCB rev: 5)
PCC test -> PASSED (PCC rev: 3)
CSL test -> PASSED (CSL rev: 14)

- **PCB Rev 4 or higher** already have 16MB flash.   As long as they are already at version 2.x.x, they can be updated in the field to a newer version of 2.x.x But some 9183s with rev 4 and 5 PCBs initially shipped with 1.x.x software installed.   I don't believe we have any method to update in the field any units from 1.x.x to 2.x.x (these had to be returned to the factory for programming- and we no longer accept these devices back.

- **PCB Rev 3 or lower** have only the 8M flash and need to be returned for flash update to go to 2.3.1 (these units are no longer accepted back for retrofit, so this change to 16MB is no longer available)

Email keith sent (7 Oct 2020) about updating an EBAY purchased 9183, from 1.2.1 to 2.x.x
➢ Refer to Salesforce Case 248656

➢ PCB Rev 5 (so it has 16 MB flash already)

Thanks for your email and inquiry pertaining to the desire to upgrade your newly purchased Spectracom NetClock Model 9183 to a newer version.

To begin, this product is, and has been for SEVERAL years (the last Model 9183s were sold back in 2006), a discontinued product. Its been discontinued for so long now, that its no longer even supported.

However, this in itself isn't a factor affecting software updates for this Model 9183. Software version 1.2.1 is already the highest software/firmware version available for this Model 9183 to be updated to.

Briefly, there were two different hardware/software "platforms" for the Model 9183s, when they were an available product, differentiated by the first number of their software version (either 1.x.x, or 2.x.x).

- **Version 1.2.1** was the last software version available for the 1st platform of the Model 9183s.

- **Version 2.3.1** was the last software version available for the 2nd platform of the Model 9183s.

Version 1.x.x NetClocks had to be updated at the factory, to the version 2.x.x software platform (Since it's a major change to the software, it had to be done at the factory- it couldn't be updated to the newer software platform in the field) whether or not a hardware mod was also required for the higher software versions. As the Model 9183s are no longer supported or accepted back for repair/retrofit, the highest version of software that can be applied is the version 1.2.1 its currently at.

Note that the NetClock Model 9183s have long been replaced by our NetClock Models 9483 and 9489s, as well as the SecureSync. Though you recently purchased the Model 9183, you may want to consider looking at one of our fully supported, MUCH more recent Models, for capabilities FAR beyond what was available in the Model 9183.

For more information on the Model 9400 series NetClocks, and SecureSyncs, please contact Matt Mang or Nick Haddad with our Sales team. Matt can be reached at Matthew.Mang@orolia.com and Nick can be reached at Nicholas.Haddad@orolia.com. I have copied them in on this response for you.

Various software changes incorporated

> **Note**: For additional information on changes incorporate in each software update release, refer to earlier ECN database (I:\Company Wide\access\ECN\ECN.mdb)

Version 2.3.1 software update (ECN 1026)

Changes from 2.3.0 to 2.3.1
- ➢ For 9183/9189 refer to: I:\Engineering\Archive\Released\1120 - 9183\Manual\Current Release\PDF Folder\9183 manual Rev H_Final_.pdf
- ➢ For 9188s refer to: I:\Engineering\Archive\Released\1120 - 9183\Manual

Fixed Format 0 year input

Version 2.3.0 software update (ECN 0970?)

Version 2.3.0 software update batch file

Manual FTP of files into the units.
- ➢ Reboot the unit to Bootloader:

    Version 2.2.0- check the box in the reboot screen and then reboot.
    Below Version 2.2.0 – Console port and stop at boot monitor.

> FTP the following files (From C:\spectracom\B003) to the Time Server:

File name	Directory in Time Server
bootlnx230.bin	/boot
linux.bin	/kernel
fsimg.jffs	/fs
All cfg files	/configs
All .net files	/net

> Reboot the unit to normal mode.

> In the PC, go to the C:\spectracom\B003 directory and rename the file called option.default to options.

> FTP this Options file to the /options folder in the Time Server:

> Reboot the unit to set the standard configuration for the unit being updated.

Note: Cute FTP has a problem with sending the bootmonitor. Recommend using CoreFTP instead.

Version 2.3.0 cut-in information

Serial Number 2388 is cut-in for 2.3.0 (9/23/05 is cut-in date)

Version 2.2.0 software update (ECN 0978?)

Version 2.2.0 cut-in information

9183-1421
9188-1360
9189-1295
TTS 200-1461
TTS-220- 0934
TTS-240-1559
TTS-240RB- 1526

Interface Setup Screen is blank after running v2.3.0 update file.

If the "Interface setup" screen is blank after running the update, the Options file did not get placed into the unit near the end of the update script. To recover from this, either re-run the update batch at same location as the time server or use FTP program to manually transfer by performing the following:

- ➢ Verify the config files were transferred back into the unit by opening /configs
- ➢ Verify the Network settings were transferred back into the unit by opening /net
- ➢ Verify if the options file got transferred back into the unit by opening /updates.
- ➢ If options file is present, just reboot the unit
- ➢ If options file is not present in the \updates folder, perform the following:
- ➢ On the PC, change to the directory of c:\ Spectracom\updates\b003\918 (Location of the extracted files).
- ➢ rename the option.default file name to just options.
- ➢ FTP this file into the \updates folder on the Time Server.
- ➢ Reboot the unit to accept the new options.

Note: if the conf files didn't get brought back in, they are stored in %temp%\spectracom\(ip address) als and can be moved to either \config or \net directories on the Time Server.

Can't log in to Browser

GoAhead WebBrowser has a potential lock-up where rest of unit continues to run but Web Browser doesn't respond.
RE-boot fixes.
Crossover cable?

Older version of the Web Browser IP Address doesn't match

MD5 information

Min password is 8 max password is 16.

// Maximum size for account name
#define SEC_ACCT_NAME_SIZE (16)

// Minimum size for account name#define SEC_ACCT_NAME_MIN (4)

// Maximum size for account password
#define SEC_ACCT_PASSWORD_SIZE (16)

// Minimum size for account password
#define SEC_ACCT_PASSWORD_MIN (8)

Network

10/100 Ethernet Port

➢ 10/100 Base T auto sensing LAN connection for NTP / SNTP and remote monitoring, diagnostics, configuration and upgrade.

IPv4 / IPv6

➢ Not designed for IPv6 (IPv4 only)

Email from Eric Bartholomew with Geauga County Sheriff's Office (17 Mar 2015)
We found some desktop PC's with buggy Intel NIC cards that were creating IPv6 multicast floods on the network. The 9189 & 9188 units would become unresponsive to Ethernet traffic (NTP and web configuration) and the configuration serial port stopped responding when this multicast traffic flooded the Spectracom Ethernet interfaces.

More info on bad Intel NIC drivers:
https://secure.www.upenn.edu/computing/resources/category/components/article/intel-i2xx825xx-network-card-network-flooding-issue-fix

HTTP/SSH WebUI BUG

There is a bug in the Network Web UI in which if the user selects HTTP disable AND SSH disable at the same time, the HTTP will be disabled THEN the the SSH will attempt to be disabled and it fails.

The Web UI thinks SSH is enabled, but the /etc/inetd.conf file contains a disabled SSH entry.
The user appears to NOT be able to re-enable the SSH code at that point.

There is a workaround for the bug. It does not happen all the time but it can happen. The bug is in all code releases with security before and including the TTS 2.2.0 release. The current baseline has this fixed.

The root cause is that the web ui and state of the /etc/inetd.conf file which contains the enable/disable Linux control data for the FTP, Telnet, and SSH daemon servers is confused as to the state of the SSH daemon. The Web UI thinks it's enabled while the inetd.conf file thinks it's disabled.

Thus the Web UI displays the SSH enabled state. BUT the inetd.conf state is ssh disabled and SSH will not work.

The workaround is to either do one of 2 things.

1. Select the SSH Enabled button and press submit. This forces SSH to be re-enabled and syncs the web ui state and inetd.conf file state to enabled.

2. Reboot the system and the inetd.conf file is read to determine WHAT web ui state to display for the daemons mentioned above.

Time sync override command

Login as demo   password is demo1234

Wall Wart power adapter

Refer to: [Power packs for all products](#)

Leap Second

Leap second Positive
Serial/Remote port: Occurs two seconds after 00:00:00.
365 23:59:59 STZ=00
001 00:00:00 STZ=00
001 00:00:01 STZ=00
001 00:00:02 STZ=00
001 00:00:02 STZ=00
001 00:00:03 STZ=00
00:00:05 STZ=00

NTP: Time is Thursday, June 30, 2005 11:59:59 PM
Time is Friday, July 01, 2005 12:00:00 AM
Time is Friday, July 01, 2005 12:00:00 AM
Time is Friday, July 01, 2005 12:00:01 AM
Time is Friday, July 01, 2005 12:00:03 AM
Time is Friday, July 01, 2005 12:00:04 AM
Time is Friday, July 01, 2005 12:00:05 AM

Leap second Negative
Serial/Remote port
181 23:59:56 STZ=00
181 23:59:57 STZ=00
181 23:59:58 STZ=00
181 23:59:59 STZ=00
182 00:00:00 STZ=00
182 00:00:02 STZ=00
 182 00:00:03 STZ=00
 182 00:00:03 STZ=00
 182 00:00:04 STZ=00
 182 00:00:05 STZ=00

 NTP:
Time is Thursday, June 30, 2005 11:59:57 PM
Time is Thursday, June 30, 2005 11:59:58 PM
Time is Friday, July 01, 2005 12:00:00 AM
Time is Friday, July 01, 2005 12:00:01 AM
Time is Friday, July 01, 2005 12:00:01 AM
Time is Friday, July 01, 2005 12:00:02 AM

SNMP Information

Two traps are always sent out. One is SNMPV1 and the other is SNMPV2. (version 2.2.0 and below. 2.3.0 can chose)

SNMP V3 does not send out any traps.   Traps only apply to V1and V2. V3 sends "notifications" which we don't support.

Trap OID numbers are 18837.3.1.3.0.1 through 18837.3.1.3.0.10 (Last number defines the trap).

CHANGE PASSWORD BACK TO DEFAULT VALUES

Note: Can only change password with RS-232. Can't change from HTTP or Telnet

To Change password back to default values.
TTS/Linux 9188x - Login as "**defaults**"
EMK – at the command prompt, type **sec defaults**. (Version 1.0.0, the passwords cannot be retrieved.)

If the response is a 2.x.x number, connect a straight-thru serial cable to the serial setup interface with a laptop PC running HyperTerminal at 9600 baud. When you hit <enter>, it will request a login. Type defaults <enter> next to "login". Then, for password, just hit the <enter> key. The passwords will be returned to the default values.

If the response is a 1.x.x number, (Other than 1.0.0) connect a straight-thru serial cable to the serial setup interface with a laptop PC running HyperTerminal at 9600 baud. When you hit enter, the unit will show a command prompt ">" . Type **sec defaults** <enter>. The passwords will be set to the defaults.

If the response is 1.0.0, this version of software cannot have the passwords changed without knowing the current password. The unit would need to come back to the factory and new software installed to allow the ability to change the passwords. If this is the case, is there any way to retrieve the password from the installer?

CHANGE PASSWORD TO A DIFFERENT VALUE OTHER THAN DEFAULTS

EMK (Version 1.x.x other than version 1.0.0 in which passwords can't be changed- must update 1.0.0 software to be able to change the passwords):

At the command prompt, type the following:
sec password [either: admin or config] [old password] [new password] <enter>

Where:
[either: admin or config] is the account name (level) for the password desired to be changed.
[old password] is the current password for the level specified.
[new password] is the desired password for the level specified.

Note: The passwords and account names are case sensitive.

Examples:
sec password admin admin123 bulldog <enter> Changes the admin level password from "admin123" to "bulldog".

sec password config config12 retriever <enter> Changes the config level password from "config12" to "retriever".

Linux (Version 2.0.0 and above).
sec password

The **sec** subcommand **password** is used to set an account name. The **password** subcommand is only available at the *admin* security level.

To set the account under *admin* mode, issue the **password** subcommand as shown below:

Type:	login admin admin123 <ent>
Response:	Login Successful
Security Level is now:	admin Level
Type:	**sec password** <ent>
Response:	Account:

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Type:	[current account name] <ent>
Response:	Old Password:
Type:	[current password for this account] <ent>
Response:	New Password:
Type:	[New password for this account] <ent>
Response:	New Password set

Factory password is yazjam10

Obtaining/Calculating the MAC address

You can get the MAC address in one of two different ways. The first way is to obtain it from the System Status page on the Web User Interface (This page is on the **Status and logs** page). It is in the box labeled "static system information". Just open the browser with Internet Explorer and browse to this page.

The second way that the MAC can be obtained is manual calculation. The MAC address can easily be calculated with a calculator that can do decimal to Hex conversion. The first part of the MAC is the Spectracom MIB OID and the last part is the hex conversion of the unit's serial number located on the rear panel.

To calculate the MAC, take the serial number and convert it to a hex number, then insert in in the number below (Then see the example).

MAC Address= 00:0C:EC:00:xx:xx (where xx is the serial number in hex- all the digits are zeroes/not oh's)

 Example for 9188 with Serial Number 567

Conversion of 567 to hex is 237 (Insert a 0 in front of the Serial Number if it is three digits to keep it simple. The answer becomes 0237)
MAC Address= 00:0C:EC:00:02:37

Commands to re-enable HTTP from WebUI

Net http yes

Net http no

Modem Dial-out related

Modem dial-out (TTS220, TTS240 and TTS240RB) (Version 2.2.0 and below).

Modem dial-out logs don't work correctly outside of US

Version 2.2.0 and below for the TTS220, 240 and 240RB have an issue that causes the logs to change when the NIST phone number is out of the continental US (Such as NIST Hawaii). See below from a customer:

If at 10:00AM, I change the modem dialout config to dial to NIST Colorado, the modem dials NIST Colorado and logs the entry in the dialout log as dialed to a 1-303.xxx.xxx.

If at 11:00AM, change the modem dialout config to dial to NIST Hawaii, the modem dials NIST Hawaii and logs the entry in the dialout log as dialed to a 1-808.xxx.xxx.

However, the previous entry at 10:00AM would also show that the dialout was to NIST Hawaii (instead of NIST Colorado).

Telephone #s in logs always reflect the currently configured telephone #.

Support for phone numbers other than ACTS:

We do not support Japan's JYY format.   Other formats such as the UK distribution should work but hasn't been tested.

Command to turn off the modem from the console port, to be able to use the console port

Version 2.3.0 is adding a "modem off" command so that if a user needs full console capability, they can type "**modem off**", power cycle and then be able to talk to the port. Pre-version 2.3.0 allows only the **net show** command to work.

To turn off the modem from the console port when it is on, enter "**modem off**".

Note: The "modem off" command MUST be typed FAST (**within two seconds**) or it won't work. If you can't type quickly enough, copy and paste it into HyperTerminal ("Send Text").   There is no way to know when to start sending this command after power is applied. So just start sending the text string over and over after power is applied.

Baud rate setting for NIST: 9600 baud only (apparently 1200 baud worked at one time but no longer)

Modem "SPRING" capability

From Paul Myers ~ Oct 2005 - We must be clear that SPRING has been implemented but NEVER tested or integrated beyond a UNIT test using simulated data. We were not able to successfully dial the SPRING number from the USA according to Andrew.
Selling the Modem feature using SPRING dialup without System testing is premature at best.

Supported Protocols:

- Switzerland – ITU-R 1200 Baud works

- Sweden – ITU-R 1200 Baud works

- Germany – ITU-R 1200 Baud works BUT is often busy and cannot connect.

- NIST ACTS (Hawaii and Boulder) ACTS 9600 Baud works

SPRING ACTS Singapore was tested by Goldman Sachs. I observed the logs and screen shots and it appears to work & Time sync as well as NISTs.
In theory, other ITU-R Dial-up services should work. Italy and UK have them but seem to require in country dial-up. The UK does not support delay compensation but should get <=50msec in the UK if dialed there.

ITU-R and SPRING allows for disabling of delay compensation. NIST does not. Dialing NIST from overseas has not been tried.

The available "time over phone service" is known as "Spring", "ACTS", "ITU-R" or as "NIST-ACTS".   The UK uses ITU-R and is example of one of the phone services that doesn't seem to work unless the NTP server is physically located "in-country".

The following link provides contact information for the organization responsible for time distribution in their particular country: ftp://ftp2.bipm.org/pub/tai/scale/TIMESERVICES/timeservices.pdf.

LONDON/UNITED KINGDOM: The unit installed in London can use the National Physical Laboratory (NPL)'s TRUETIME service. Phone number: 0891 516 333. For more information on the UK's time service, refer to http://www.npl.co.uk/npl/ctm/truetime.html or http://www.npl.co.uk/science-technology/time-frequency/time/products-and-services/time-synchronisation-of-computers-to-utc(npl).

JAPAN, AUSTALIA, SINGAPORE: Japan does not currently support an ITU-R or equivalent time service like the US and the UK provide. The unit located in Tokyo may be able to use the ACTS phone service provided by Singapore, Australia or Hawaii. The ACTS Singapore or ACTS Australia locations may or may not allow "out-of-country" calls, but the NIST-Hawaii time service should support calls from Japan. The phone number for NIST-Hawaii is a pre-programmed drop-down in the web browser. The number for Singapore should be (65)67799978 and the number for Australia is (02) 8467 3727.

From

- ➢ In Germany by Physikalisch-Technische Bundesanstalt (PTB)'s timecode service. Phone number: +49 5 31 51 20 38.

For more detail, see http://www.ptb.de/english/org/4/43/433/disse.htm

- ❖ **In the UK** by National Physical Laboratory (NPL)'s TRUETIME service. Phone number: 0891 516 333

For more detail, see http://www.npl.co.uk/npl/ctm/truetime.html

- ❖ **In Italy by Istituto Elettrotecnico Nazionale "Galileo Ferrais" (IEN)'s CTD service. Phonenumber: 166 11 46 15**

    For more detail, see http://www.ien.it/tf/time/Pagina42.html

- ❖ **In Switzerland by Swiss Federal Office of Metrology's timecode service. Phone number: 031 323 32 25**

For more detail, see http://www.ofmet.admin.ch/de/labors/4/Zeitvert.html

- ❖ **In Sweden by SP Swedish National Testing and Research Institute 's timecode service. Phone number: +46 33 415783.**

For more detail, see http://www.sp.se/metrology/timefreq/eng/tandf.htm

RS-232 Modem cable pin-out

DB9M Modem
- ➢ --- not connected

        2 --- 3
- ➢ --- 2
- ➢ --- 6
- ➢ --- 5
- ➢ --- 4
- ➢ --- 8
- ➢ --- 7
- ➢ --- not connected

US Robotics modem (1120-0000-5002)

Model 5686E 56k Modem
Power supply for modem provided by US Robotics is a Model AA-091A (P/N ROHS15.0041.00): 120VAC 60Hz 9VAC 1A

Note: It is not rated for 50 Hz international operation.

RS-485 terminal block connector for the 918x and TTS clocks:

3 pin connector for the Remote outputs: P900-0031-0H0T
Description: Term Block, Pluggable, 3.81, 3pin, 10A, 125V, Black, Stackable

Mfg: On Shore Technologies

http://www.on-shore.com/products/terminal-blocks/pluggable/plug

List of On Shore distributors (by State) http://www.on-shore.com/find

Mfg P/N's

EDZ1550/3BK
OSTTJ0331030
http://www.on-shore.com/part/osttjxx11530-terminal-block-pluggable-plug

10 Pin connector for the Alarm output connector: P900-0101-0H0T
Mfg: On Shore Technologies
Mfg P/N: EDCZ1550/10BK
List of On Shore distributors (by State) http://www.on-shore.com/find

Memory/Processor installed in the unit

- Triscend 33 MHz processor.

- 32MB SDRAM

- 16MB Flash memory.

Relays

The relays are drawn in the schematics as de-energized (Shelf state). The relays are energized if no alarm present and power is present. With power on and no alarms. Common is tied to NO and NC is not connected. However, if power is lost or if an alarm condition exists, the relay will switch to short between Common and NC and NO will be broken.

HTTPS Certificates

Private key:
In versions above 2.2.0, the user cannot install their own private key. The private key can only be generated inside of the unit. An external certificate can still be installed, but the private key cannot. Installing the private key into the box (over the network) was a security risk so we removed this capability.

Certificates:

Customers can use the Spectracom default certificate, create a new one inside the box, or create a custom certificate request to generate a new certificate outside of the box. If they don't want to use the Spectracom certificate:

- Login as Admin and go to the System Setup/Security page.
- Scroll down to the HTTPS configuration section.
- Click on the box in from of delete certificate and the box in front of create certificate.
- Fill out the boxes underneath (Note: Putting an "*" in all fields will recreate the Spectracom default certificate- 20 years).
    A. Key size can be 1024-4096 (4096 will take a long time to build cert. 1024 is recommended).
5) Hit the submit button.

6) After a couple of minutes, start refreshing the page. Eventually, the certificate request box will fill in with random data.

7) If using the box created certificate, they are done. If they want to create their own certificate, they can either copy/paste the certificate request to an email/word document or they can FTP the file from the unit (The file is in the Update directory and is called cert.csr). They send this file to Verisign or in-house certifying authority to obtain a new certificate (public key) based on the private key inside of the unit.

8) Copy/paste the new certificate in the "Update Private key" box and then hit submit.

Rubidium Oscillator error codes

For information on Rb error codes, refer to the Engineering document at: Equipment\Spectracom Equipment\9183-9188-9189-TTSxxx\9183RB\SRS_PRS10_Notes.rtf

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Local Time Sync Override Option

➢ Version 2.3.1 only (Han Solo does not have this capability) can have an Option enabled in the field that allows the time to be sent out of all ports as synced data without an external reference. This option is controlled in the bottom of the System Time page.

Below is an email from Paul Myers that describes some of the limitations of providing this feature.
There are some limitations to Local Sync for the 91xx. (ASIDE from the fact it is not on the sales sheet.)

ON Reboot, you lose Sync.

If you lose power and reboot you will lose sync and manually have to enable it.

Local Sync and Holdover are not really meaningful. How can you have holdover if you never really were in sync?

ALSO, eventually you will go out of sync and into holdover

YOU have to keep setting this device INTO Local Sync every day for a TCXO, every month for OCXO and every year or 2 for a Rb.

Are you sure they want this???

This is really an emergency kind of feature.

LOCK-UP CONDITION

TTS200 and TTS220 version 2.0.0, 2.0.1 and 2.1.0 have a lockup condition that could occur that causes everything to stop responding except for the ping command. No HTTP, No Telnet, all rear panel ports including command console stop responding. Believe issue may be related to logging. Power cycle temporarily fixes the problem.

1109-1000-0200 Rev B board -10MHz output is not active on J6 connector

Root Cause:
The 10MHz output is grounded by the incorrect surface mount placement of the Resistor R33 and Capacitor 72. These components are swapped in position. This results in the 10 MHz output being grounded because R33 is a 0Ohm resistor.

It is assumed this was done at the outsource manufacturer not in house by the solder job.

Workaround:
Swap components in manufacturing.

Field Service needed:
If units shipped NOT using the 10MHz output field support has NO need to fix
any units.

If units shipped which when returned will be upgraded to use 10 MHz board
must be inspected to ensure they do not have this defect.

Possibly we need to document which boards and how many units may have been
shipped with this defect.

Board Serial Number 633
Software tested TTS 220 with 10MHz active
Board Silkscreen Spectracom Corp.

1109-0003-2000 W-00830 CD (The 830 is hard to read it looks like 830 not
820)

Board has red wire mod added between GPS Receiver and CR2032 battery.

TTS240 and TTS240RB (discontinued)

A) 10 MHz Stability for TTS240 (without Rb): +/- 1 x 10-8 [page 2, left column, 7th line from the top].

B) 10 MHz stability for TTS240 Rb: [page 2, right column, lower, item 8]

- Locked to GPS: 1 x 10-11

- **Unlocked:** 7 x 10-11 average over 30 days [this is unclear as printed on the datasheet - the word "Unlocked" should be on the next line]

  1. The attached spread sheet has two graphs in it for the Rubidium performance: one for Phase Noise and one for Allan Variance. The Phase Noise is for the internal Rb and not for the output port of the TTS240 - we don't have data on that yet. The Allan Variance chart offers a look at stability over various time intervals.
  2. We don't have phase noise specs for our standard TTS240.

TTS240R Version 2.2.0 has no modem capability

➤ The first couple of units had modem turned off. Updated software to version 2.2.2 to re-enable modem.

TTS240RB Rubidium oscillator specifications

Refer to http://www.srsys.com/products/PRS10.htm (Can send to customers)

Frequency alarms /Oscillator Maintenance alarms in alarm log (At least Ver 2.2.2 and below)

Frequency alarms will be generated when using modem dial-out or window mount (Single satellite mode) and not locked to GPS (4 sats or greater) due to the measurement window of the 10 MHz being so tight for GPS measurement. If the unit really did have a bad oscillator, an **Oscillator Maintenance** alarm would be generated.   **Note**: 2.3.0 and above supposed to fix frequency alarm issue.

Model 9189

9189 Lock-up condition

Version 1.0.4, Version 1.10 and Version 1.2.0 have all experienced a potential lock-up condition that causes the entire unit to stop responding. Can't ping, no telnet, no NTP, all rear panel outputs including command console stop working. Power cycle temporarily fixes the problem. Updating to version 1.2.0 seems to help in at least some cases.

Software update above version 1.2.0

Check the **Status and Logs** -> **System Status** page of the browser for the PCB rev level. PCB rev 3 or below have to come back for double-flash. PCB4 and higher have the double flash already. The Cut-in for this change was around 0640 and around April 01, 2004.

Can't manually change time and date in Version 1.0.0

Bug in version 1.0.0 prevents the ability to change the set system time information unless the unit is connected to Master Clock and Time Sync lamp is green. All other version can only change this page if unit is not synced.

Model 9188

Default RS-485 input (Port 2): 9600 baud, Data Format 2

Empty Web pages

Gateway being entered and enabled in older rev's could cause empty page messages in WebUI when clicking on bottom row of selections on WebUI. Should be fixed in newer releases of software

Holdover alarms present every second for a duration

Version 1.0.0 Appears to have intermittent log issue with Holdover. When in Holdover, the log may show the alarm momentarily clear and then come back a second later. Unknown exact cause at this time. Update to Version 1.2.0 (All boards can be updated without board change-out).

Software updates above version 1.2.0

Check Status and Logs/ System status for the PCB rev level. PCB rev 3 or below have to come back for double-flash. PCB4 and higher have the double flash already. The Cut-in for this change was around 0640 and around April 01, 2004.

Can't manually change time and date in Version 1.0.0

Bug in version 1.0.0 prevents the ability to change the set system time information unless the unit is connected to Master Clock and Time Sync lamp is green. All other version can only change this page if unit is not synced.

(Versions 1.2.0 and below and 2.2.0 and below) Set Serial Time Code page is linked to this screen so if wrong in System time, will be wrong in Set Serial time page.

Leap Year rollover issue

All versions 2.2.0 and below and version 1.2.0 and below (Only when receiving Format 0 configured as local time) will experience leap year rollover issue on Dec 30th. The year and date will jump to an erroneous value on UTC day 366 then count up from there. Unit will receive Holdover and time sync alarms. Problem clears on Jan 01 (Date corrects itself but year may be off by one or two years due to double-increment). Reset year to present year in set serial time code page and update software to fix.

** Troubleshooting

A) **Year rollover/year jump issue (applicable to Model 9188s only)**

> Affects Format 0 input only (not an issue when the Model 9188 is receiving format 2 instead)

> Fix was to change to Format 2 input (if possible) OR update the software to either version 1.2.1 or 2.3.1 (depending on what the current version is and what size memory ICs were installed).

B) Date and year set incorrectly in a Model 9183/9189 that is synced to GPS

Power down.

Remove the top cover.

Remove and reinstall the socketed coin-cell battery for the GPS receiver (this will reset just the GPSD r receiver. Other settings are retained in NVRAM.

Let it sync to GPS again.

Verify date/year is correct.

Model 8188/8189/8190 (discontinued- no longer supported)

- ➢ Link to 8188 manual: I:\Engineering\Archive\Released\089000 - 8188
- ➢ Link to 8189 manual: I:\Engineering\Archive\Released\095000 - 8189
- ➢ Link to 8190 manual: I:\Engineering\Archive\Released\1107 - 8190

Configuration via Serial Setup Interface

Network settings: (Type the following two commands to walk through the setup menu).
   SM ON <enter>
   NTP Setup <enter>

Ethernet port

- ➢ 10 base T only- Half duplex only

PC Configuration

   Win XP/2003 IPCONFIG
   Win98 /Win2000 **IPCONFIG /ALL**
           Win95 **IPCFG**

Year jumps

Which Master clock?
Which Data Format (0 or 2)
Review 8188 setup (does format match)
Version of software 4.0b6
Obtain logs from Master clock

Setup with a PC using Serial port

9600 baud, no parity, 1 stop bit
power cycle while holding the x key

RS-485 input

A) RS-485 input for the black enclosure

   RS-485 mating terminal block connector: P13003

      (1) Spectracom P/N P13003 connector was shipped in the Model 8188 ancillary kit.

      These connectors are available from: DigiKey P/N ED1702-ND (MFG is On Shore Technologies. Their P/N is ED950/3BK). Refer to: http://octopart.com/ed950/3-on%2Bshore%2Btechnology-309365

      List of On Shore distributors (by State) http://www.on-shore.com/find

B) RS-485 input for the silver enclosure

   The Model 8188 connects to the NetClock RS-485 bus on the DB25 connector labeled CH1. To simplify installation a DB25 to screw down terminal strip is provided with the

Model 8188. When using the adapter connect the to the RS-485 bus using the pins shown below.

From a NetClock/2 WWVB Master Clock:

Pin 1 (RxL) of the adapter to pin 8 (+) on the Remote Outputs connector
Pin 2 (RxH) of the adapter to pin 3 (-) on the Remote Outputs connector
Pin 3 (GND) of the adapter to pin 9 (G) on the Remote Outputs connector

From all other Spectracom Master clocks:

Pin 1 (RxL) of the adapter to pin 1 (+) on the Remote Outputs connector
Pin 2 (RxH) of the adapter to pin 2 (-) on the Remote Outputs connector
Pin 3 (GND) of the adapter to pin 3 (G) on the Remote Outputs connector
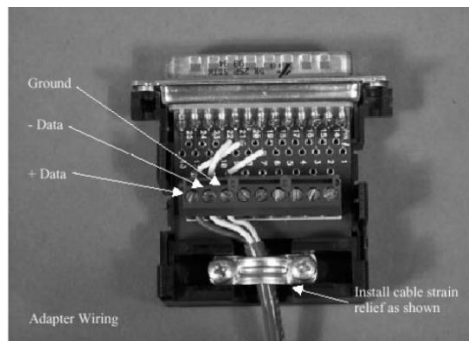
State light flashes red (No RS-485 data present-8188 not time synced)

 Note: 8188 will NOT respond if it is not synced.

1. Check input RS-485 connections.

2. Verify NetClock synced.

3. Verify in 8188 setup that the correct format from NetClock is selected. (formats 0 or 2 only).

4. Verify baud rate is 9600 (only). All other baud rates will NOT work.

State light flashes green (RS-485 data present- but NetClock not synced -8188 not time synced)

- Master clock not synced but 8188 can read data. Check NetClock reception.

8188 will not respond (state light is green).

Verify correct IP address entered using setup (not still set at factory default).

Ping command: (WinNT/Win95/Win98)

1. Go to Dos prompt

2. Type: "**ping 192.168.0.41**" (IP address of server)

Ping command in Windows 2000 is a dos box. At the dos prompt type telnet **xxx.xx.xx.xxx 9999** (where x is IP address and 9999 is the port)

- **If works**: responds with "reply from (IP address) bytes=32 time=?ms (time will vary) ttl=64"

- **If doesn't work**: responds with "reply from (IP address) destination host unreachable."

If TRY PINGING W/O 8188 connected to see if it times out to verify no other duplicate IP addresses.

Yats32

Go to http://www.dillobits.com/Download Yats32.
1. Check "evaluate"
- Click "add server".
- Type in name and IP address of 8188 then click ok.
- Click "set time". Should respond with "system time adjusted by x.xxx seconds

ARP table

The table has to have at least one entry in the table for the 8188 to respond.
- To verify there is an entry, type arp –a 0

Should respond with at least one entry.
- If there is no response, ping another machine on the network to build the ARP table.

Trap information (Refer to document in Cust Service folder)

8188-0854 and below only output one type of trap. (Loss of RS-485 data, Master Clock loses sync)
8188-0855 and above output four different traps (Loss of RS-485 data, power on, Sync'd, Master clock loses sync)

8189-0684 and below only output one type of trap (Loss of RS-485 data, Master Clock loses sync)
8189-0685 and above output three different traps. **(Power-on, Sync'd, Master Clock loses sync)**

Model 8188's with a Serial number of 0732 or higher and Model 8189's with a Serial Number of have four traps that are generated.

Can ping but can't telnet

- Verify port is 9999.
- Try direct connect with cross-over cable.
- Remove Gateway IP address.

Desire to upgrade 8188 software to 4.6b3

S/N must be 0732 or above (This is the first black enclosure. Silver enclosure **CAN'T** be updated).

Desire to upgrade 8189 software to 4.6b3

- ~~S/N 0499 and below require new Lantronix card and software. $490.00 US to upgrade~~
- ~~S/N 0500 and above need just software. $100.00 US to upgrade. Send files via email.~~

PROGRAM TO SEE RAW NTP PACKETS FROM AN 8188 OR 8189

WWW.ETHEREAL.COM/DISTRIBUTION/WIN32 (Windows based. Main site has other OS's)

Model 8189 (Only) Stat command displays NTP as "Error 01"

- Caused by the Antenna type Data Format) being set to "0" instead of "2".
- Telnet or RS-232 into config and change NetClock setup from 0 to 2.

Shortcut to manual: I:\Released\065000 - 8185\Manual\CURRENT RELEASE

TimeBurst RS-485 input

➢ Accepts Data Format 0 only (does not accept Format 1)

2.2.3 TIMEBURST RS-485 OUTPUT: PASS THROUGH CONNECTION TO EXTERNAL DEVICES REQUIRING TIME DATA

Spectracom offers many devices which accept the RS-485 data stream as an input reference, including display clocks, RS-485 to RS-232 converters, talking clocks and radio link products to meet various time applications and requirements. Contact our Sales Department for information on these products. For details on Remote Output usage refer to Section 3.7(Remote Output Usage). The RS-485 Output Port connection requires the three-position terminal block P/N P13003 supplied in the Ancillary Kit. Figure 2-8 shows the RS-485 Output Port pin configuration. Refer to Section 3 (Operation) for additional information.
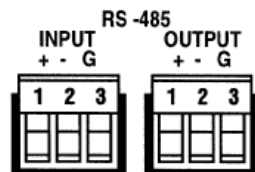
Figure 2-8 RS-485 Input And Output Connectors

DIP Switches

Switch No.	SET-UP									OFF	ON
1	RS-485 End of Line Termination									NO*	YES
2	Key Polarity									POS*	NEG
3	Busy Polarity									POS	NEG*
4	Prompt Polarity									POS	NEG*
	SECONDS			MINUTES		HOURS					
	0	10*	30	15	30	1	2	3	4		Broadcast
5	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF		Schedule
6	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF		Select One
7	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF		Column
8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON		
9	Spare										
10	Spare										
	* factory defaults										

Table 2-3 Dip Switch Assignments - TimeBurst

SETUP DIP SWITCH
1 2 3 4 5 6 7 8 9 10
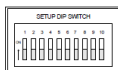
Figure 2-11 Set-Up Dip Switches - TimeBurst

Direct connection works -but over a MUX- no sync.

Is it a Digital or Analog MUX? What type of MUX is it?
If it is digital- the MUX should convert signal to Digital and then back to Analog.
What level is required by the MUX? Our output is 1vpeak into 600 ohms.

Are they using the same channel on both ends (ie 1 and 1)
What is their input impedance?
Is the TimeBurst still synced?

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TimeBridge Comlog (DCL) displays the wrong year

> ➤ The DCL command will display the comlog with the year as 0005 instead of 2005. The alarm log and outputs are fine.

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Rev B PCB

Cut-in Serial Number 504 around 6/16/05.
Adds 600/0kohm audio transformer configuration
Adds PTT on pin 87 of output connector.
        Adds capability to use audio input as a busy input.

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For the new headers:

 H13, H14, H15, and H16 are for 600 ohm/10 k-ohm output impedance. The 600 ohm output impedance needs to have all headers jumpered pins 2 to 3. The new transformer, T2 (part number T030-0610-0H00), should have the side with the "P" facing to the left as you look down on the 65021 PCB.

For the audio busy, the customer would apply the transmitter audio to the BUSY input pin of the TB Control interface connector, J7. H12 was added, it should be set for pins 2-3 for normal BUSY input. For the audio buys output, H11 was added, and it should be set to pins 1-2 for normal busy operation.

All the other Headers should be unchanged from Rev. A PCB

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Narrowband (narrow-band) radios

Q (Matt Loomis sent to Mark McGregor, 8 Jan 2013) My customer is using TV210U clocks and just switched to a narrow band (450-470). The clocks seem to work but they want to make sure it is compliance with the narrow banding requirements

Mark replied I am the person most familiar with the FM receivers in the TV400U/V/G. I will bore you with a technical discussion below. If you don't want to read it, the bottom line is, if the clocks are working now, then I think the customer should be fine.

The narrow banding "requirements" are all on the transmitter. The 450-470 MHz you mention below is the width of the entire commercial FM band, not the licensed FM channel bandwidth. The narrow band FM that I am aware of requires the licensed FM channel that is assigned in the 450-470 MHz band to go from a channel width of 25 kHz down to 12.5 kHz, which is narrower, only half the bandwidth. For example, Spectracom used to have the FM channel of 469.500 MHz licensed to us for the Rochester area to use for TV210, TV400, TV312 U, but we let that expire some time ago.

The TV400 U is only a receiver. It does not transmit, so it does not have an official requirement to meet other than it has to operate properly with the narrower bandwidth FM transmission.

For an FM voice receiver of any kind, the effect of a narrower channel is that the amount of audio signal output demodulated by the FM receiver will be less/lower in level. The impact of this is that the receiver might need more RF signal input to achieve the same audio output signal to noise ratio, or it may not get enough audio signal to work properly.

There is a modem IC in the TV400 U/V/G that uses the TV400 U/V/G FM receiver audio output to get the time data, and it works over a large range of signal level, so we should be OK for the very old as well as the new, but I never tested the very old. When we updated the FM receiver to be mostly in an IC chip on its own printed circuit board that plugs onto the back of a TV400, I tested for the narrow band signal levels to be sure it worked with the narrower channel. Out biggest customer, the AOC in Washington DC implemented narrow band to start with, so we needed to know it worked OK back in 2005.

Email from Dave Lorah to Ed with McCarron Airport (15 Jan 2013)
Hello Edward,

I discussed this issue with our engineers.

We know some systems are successfully using the Timeburst the TV400U clocks in narrowband applications. We are not sure why your clocks do not sync. We have a couple suggestions:

1) Try adjusting the level control (volume) on the rear panel of the Timeburst. First down and then if that does not work, up. We believe you may have to adjust the level down. Try that to begin with.

2) The narrow band signal has a lower 2.5 kHz deviation than the wideband deviation of 5 KHz. This results in a lower audio signal level with more noise than the former wide band signal. You may need more transmitter power. The TV400U and the TV210U have RF meter readouts built-in to the clocks. If you select the rear panel "SET" pushbutton once, the front panel will read out a digital number indicating the relative RF strength of the signal the receiver is getting. It should be in the 12 to 40 range. What numbers are you seeing?

3) Since you can hear the "chirp" on your monitor I believe the transmitter interface is OK. Did you change transmitters to switch over to narrowband or was there just a switch on your existing transmitter?

4) Bring a clock closer to the transmitter and see if it will sync.

5) Is the Timeburst itself IN SYNC. Is the Sync LED on the front panel green?

If all else fails, you may want to return one of these to Spectracom for testing. We can verify if the clock is is working on Narrowband or not.

_____

**AOC system / Detailed Timeburst informatil

➢ Shortcut to AOC system / Detailed engineering info on the Timeburst: I:\Engineering\Products\8185

Important Note: Do not send out the documents in this folder containing detailed proprietary info on the signal. A good document in this folder to send out about the signal is the paper called "**TimeBurst Datalink Security White Paper".**

Model 8183A FAA Net/GPS TOY clock (Discontinued)

Discontinuance/obsolescence/repair capability

➢ Refer to I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8183 and 8183A (FAA)\Discontinuance

Email from Dave Lorah (8 Dec 2020)
Hello Otto,

We have recently been reviewing the serviceability status of many of the older discontinued products. The Spectracom Model 8183A is one of them.
The Model 8183A was originally developed in 2001 and has been discontinued for ten years now, last sold in Nov 2010. In 2017 we published a statement stating the 8183 products (8183A a variant of the 8183) is out of production and repair capability is limited. The document is attached.

As this product has aged, we find we can no longer obtain many of the replacement parts necessary for repair. Key components such as the GPS Receivers, chipsets and various active components are no longer available. We have been able to service the 8183A in limited capacity for the last few years but in some cases, we are unable to make repairs due to lack of components.

Since discontinuance in 2017 the 8183A has been placed in "Limited Support Status" which still provides repair in a limited capacity, provided parts were available. At this time Orolia is planning on placing the 8183A on "No Longer Supported" status due to the age of the product and inability to obtain parts. The No Longer Supported status will be ending repair service for the 8183A as of January 4, 2021.

We recommend working with our Sales Manager Michael Messina to resolve your long term requirements for replacements of the 8183A model. Mike is copied on this email.

8183A Manual: I:\Engineering\Archive\Released\104000 - 8183A\Manual

Parts for RS-2332 grounding hood:

> H52090
> J03509
> Wire pin 3 to pin 5

> **DB9 terminator P/N**: 0900-0001-5000
> **Label** 8183-1006-0810 (drawing)
> 8183-1000-0810 (part)

Accuracy of GPS receivers (Motorola VP and GT plus receivers)

➢ Refer to: Motorola VP/GT/UT receivers

FAA IRIG:

➢ Refer to the "**Addendum**" section of the 8183A manual (at the link further above) or it's also in the "**FAA IRIG**" section of ..\CustomerServiceAssistance.pdf)

GPS 1024 week rollover every 20 years (2019, 2038 etc) for FAA Model 8183A

➢ General info about GPS week rollover/how to test for it: refer to (on our site): https://spectracom.com/resources/blog/lisa-perdue/2018/gps-2019-week-rollover-what-you-need-know

Refer to "GPS Week roll-over issue due to number of bits in the message (2019, 2036, etc..)" in ..\CustomerServiceAssistance.pdf

Model 8314 (UPS for FAA, for their Spectracom Model 8183A TOY clocks)

Never really became a "catalog product". FAA just got a couple of these units before the entire project was just dropped.

Draft Model 8314 manual: I:\Engineering\Products\FAA UPS 8314\FAA_UPS_Design_data_sch_pcb_cpld\UPS Manual

Other available links with info on Model 8314 (such as draft data sheet)

- I:\Sales\SalesForce\Archive\Archive\Glenn Burdett\Dept. of Transportation (Includes FAA)
- I:\Engineering\Products\FAA UPS 8314

Model 8183 and Model 8183ES Net/GPS (discontinued)

Model 8183 NetClock and NetClock/SM – (Surface Mount)

Links

 8183 Manual: I:\Engineering\Archive\Released\069000 - 8183\Manual\CURRENT RELEASE\PDF

RS-485 terminal block connectors

(2) Spectracom P/N P13003 connectors were shipped in the Model 8183 ancillary kit.

These connectors are available from: DigiKey P/N ED1702-ND (MFG is On Shore Technologies. Their P/N is ED950/3BK). Refer to: http://octopart.com/ed950/3-on%2Bshore%2Btechnology-309365

List of On Shore distributors (by State) http://www.on-shore.com/find

GPS Reception

- **Lock red and Sync green**

  More than 15 minutes but less than 2 hours has elapsed with less than the min number of sats and/or min signal strength not met.
  (see reception problems below)

- **Lock red and Sync red**

  More than 2 hours has elapsed with less than the min number of sats and/or min signal strength not met.
  (see reception problems below)

GPS Reception problems

  Refer to: ..\..\GPS\GPS reception Ap Notes\8183 8183A 8184 8189

  GPS antenna cable needs to be at least RG-213 or better (LMR-400/RF-400 for example)

  Specific radio or TV and radio transmitter near site (within about a block)
       Refer to SP 256 for list and solutions

View to horizon partially/ fully blocked

➢ Try relocating antenna.

Model 8225 GPS antenna cabling limitations

A) GPS antenna Model 8225-0839 and below

- **max cable length without preamp** 140 feet

- **max cable length with preamp** 350 feet

B) Antenna Model 8225-0840 and above

- **max cable length without preamp**: 200 feet

- **max cable length with preamp:** 400 feet.

Model 8224 GPS preamps

➢ Newer preamps allow the use of two preamps (lower current draw) for up to 500 feet of RG-213.

➢ Install first 100 feet from antenna. Install second 200 feet from first preamp. Remainder of 200 feet to the clock.

Model 8228 window-mount antenna

➢ Our window antenna requires 10 to 26 dB at the antenna input of clock.

EQUIPMENT IMPEDANCE

8225 (S/N 0839 and below) = **377** ohms or **70** ohms
8225A (S/N 0840 and above) = **176** ohms
8227 = **152** ohms
8225 and 8227 = **110** ohms
8225 A and 8227 = **82** ohms
8228 - both mounting styles – **240** ohms (8189 has typo of 140 ohms).

Power supplies for Model 8183

- **International**: PS00142 (Also include W01000 line cord).

- **US Only**: T00058

  Note from Keith, 18 Feb 16: T00058 and PS00142 power packs are no longer available for purchase from Spectracom. Model 8177 customers should consider replacing with Model TV400W display clock.

Time Sync Override/SHOW mode

Test Mode ON <enter>, TSO On <enter>
GPS Lock light will remain red.
TSO is disabled 15 minutes later, so for longer periods, use Show Model instead (SHOW ON <enter> while in Test Mode).
Show Mode is in versions 2.04 and above.
Show Mode turned off if GPS reception becomes available.

GPS receivers for Model 8183s

(Important note 7/15/2013: neither style Motorola GT GPS receiver is still available. We can no longer offer or replace receivers in the Model 8183)

- **Rev C and above PCB board** requires a GT 2.02 receiver- Our P/N 069053 (Important Note: These Receivers are also no longer available)

    ECN 0425 cut-in Rev C. Cut-in S/N: 1224. Cut-in date: 6/1/00.

- **Rev B and below PCB board** required a GT 2.01 receiver Our P/N 069052

    (Important Note: These Receivers are no longer available)

Note: Since we do not have any replacement GT 2.01 or 2.02 receivers left, ~~we cannot repair~~ **~~units with S/N below 1224.~~** (As of at least July 2013, this note is no longer true). Neither style GPS receiver is still available.

Motorola Oncore GT and GT Plus replacement receivers

- ➢ We used to purchase From Synergy
- ➢ Refer to sites such as: http://www.ioffer.com/i/motorola-oncore-gt-gps-precision-timing-module-mounts-167478135

- **Our P/N 069053**: Motorola GT Plus receiver (Motorola P/N R3111G111X)
- **Our P/N 069052** Motorola GT receiver (Motorola P/N R3111G1112.01 ONLY- Other P/Ns are not compatible with the 8183)

Accuracy of GPS receivers (Motorola VP and GT plus receivers)

Refer to: **"Motorola VP/GT/UT receivers" in:** ..\CustomerServiceAssistance.pdf

GPS 1024 week rollover every 20 years (2019, 2038 etc) for FAA Model 8183

➢ General info about GPS week rollover/how to test for it: refer to (on our site): https://spectracom.com/resources/blog/lisa-perdue/2018/gps-2019-week-rollover-what-you-need-know

Refer to **"GPS Week roll-over issue due to number of bits in the message (2019, 2036, etc..)"** in ..\CustomerServiceAssistance.pdf

New (post 2005) DST rules

To reconfigure the Models 8183, 8183A and 8184 for the new (2006 and above) North America DST rules:

SM ON <ENTER>

DST1 IN 2ND SUN MAR 02:00 01:00 <ENTER>

DST1 OUT 1RST SUN NOV 02:00 <ENTER>

Model 8183ES (NetClock/ES)
Shortcut to manual: I:\Released\1108 - 8183ES\Manual

 ➢ Model 8183ES is a Model 8183 with the following mods:

   • No front panel LED time display

   • Only one Remote and one Serial port on rear panel (instead of two of each).

   Note: 8183ES does have IRIG output

Q. Please indulge this ridiculous question. I've obtained a legacy 8183ES -- I didn't know the difference between it and an 8183 but they seem to share the same mainboard. I want the 10MHz and 1 PPS output but the connectors are de-populated. I see what appears to be the right signals on the board so it seems I can just solder in the BNC connectors. Also driver chips seem populated for the de-populated RS222 and RS485 sockets so maybe I can solder them in also. Will this give me full functions despite my ludicrously poor research budget and my misfortune of working for a company one step away from bankruptcy? Are there any firmware updates that would be useful?

Reply from Dave Lorah (23 May 13) I extend my sympathy for your situation. The 8183ES was a low cost version of the 8183. It is basically the 8183 without the front panel display and some rear panel outputs. It was usually just used for the RS-485 output.

It does share the same main board as the 8183. I do not recall exactly if all the parts are installed for these outputs but if the 1PPS and 10 MHz are present at the PCB connections for the BNC connectors, then all you would need to do is install the connectors.

Please be aware the 10 MHz is coming from the internal TCXO oscillator, which is really not stable or accurate enough to use for broadcast reference or even a good calibration reference. The 8183 was designed as a Time of Day reference. So, it may not be sufficient for your purposes.

 Reply to Dave from this customer Thanks Dave. But it does have a GPS antenna connector at the rear and GPS-lock indicator on the front. There is also what appears to be a Motorola GPS receiver daughter board inside. If disciplined by GPS wouldn't it be a highly accurate 10 MHz and I PPS source?

Model 8182 or Netclock/2 (discontinued)

enhanced communication protocol, to which phase modulation was added

- ➢ Permanent WWVB signal change which prevented our WWVB products from being able to continue syncing to it: November, 2012 (testing was during the summer 2012.

- ➢ https://www.nist.gov/sites/default/files/documents/2017/05/09/NIST_Enhanced_WWVB_Broadcast_Format_1-2012-11-26-2.pdf

For info on WWVB go to http://www.boulder.nist.gov/timefreq/stations/wwvb.htm
Click on station outages for status report.

WWVB XMITTER: 970-484-2372

VOICE FOR TIME INFO: 303-499-7111

 Note: The following NIST website will display the time when the page is refreshed: http://www.time.gov/about.html

WWVB RECEPTION (REFER TO AVAILABLE APPLICATION NOTE IN CUSTOMER SERVICE FOLDER)
\\rocfnp02\idrive\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8182Net2\

IMPEDANCE MEASUREMENTS

 8207 preamp (output) with Model 8219 antenna disconnected from NetClock ~ 12.2 kohms
 8207 by itself ~ 3 Mohms
 8219 by itself ~6.7 kohms
 8206 (active loop) by itself ~6 Mohms
 8206A (active loop) = 6 Mohms
 8208 by itself ~2 Mohms

TIME JUMPS

 -Look at event log (capital letter "E")
        DIP Switch 4 (manual set) must be up (on)
  Email to us for evaluation.
 -Refer to reception problems above
  Frequent loss of reception can cause time jumps due to the drift when not synced. (Older versions of software)
If time jumps 40 minutes, it can be caused by poor reception and an older version firmware which the clock updates on third misread character in the 40 minute location (But not in a row- can be weeks apart). This bug can be fixed by updating the firmware but be careful that it is not using FMT 0 to an old Centracom that does not use the DST character. It will not work. The Motorola Centracom will then need to be updated. The new software will only jump on the fifth mis-compare in a row.

LOCK-UPS

-Obtain from customer:
>   Serial Number of the unit.
>   Time displayed on clock at time of lock-up (if known)
>   Email us Signal Quality Log (Capital letter R)
>>   Event log (Capital letter E) –DIP switch 4 has to be on (up) or you get an *.
➢   Potential for Serial port bombardment

>   New software to prevent possibility of lock-up was introduced when enclosure went to black.

>   Power cycle clock to clear.

Change out big micro (U29) if OKI and (U23) 82C59 Interrupt Controller on logic board.

Remote/Serial output ports

***Remote (RS-485) output

4.0   Remote Output

The Model 8182 has one Remote Port which is labeled Remote Output. This port provides a continuous once-per-second time data stream in the selected data format. There are two time data format selection available (Data Format 0 and 1). Refer to the Netclock/2 instruction manual for a complete description o the Data Format structures.

In addition to Data Formats, baud rate and UTC time difference of this output is selectable via DIP switches and rotary switches on the bottom cover of the Netclock/2. Refer to the Netclock/2 instruction manual for configuring this port.

Connector pin assignments are shown in Figure 4-1 and Figure 4-2.
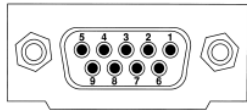
FIGURE 4-1: Remote Output Pin Numbering

PIN	SIGNAL	DESCRIPTION
3 8	-DATA +DATA	RS-485 inverted time data RS-485 non-inverted time data
2 7	-ON- TIME +ON- TIME	RS-485 inverted on-time pulse RS-485 non-inverted on-time pulse
1 6	-TSYNC +TSYNC	RS-485 inverted time sync status RS-485 non-inverted time sync status
4 9	ENABLE GND	+5V Enable output Signal Ground
5	TDATA	RS-232 time data output

FIGURE 4-2: Remote Outputs

Serial output

DESIRE TO USE SERIAL PORT AS ONCE-PER-SECOND BROADCAST

NetClock/2: must be version 1.13 or higher. Set DIP switch 5 up. (Software started around 10/1995).

8182-All have the ability. Set DIP switch 5 up.

CHANGE TO DATA FORMAT 0

DST characters were added to Data Format 0 around 08/92 with a cut in around 0610. EP51/EP52 added the change but that version quickly changed and only a few units shipped with that version. ECN 212/215 appears to be the cut-in. (10/92). Can send upgrade but some systems may no longer sync to the new format DST characters**.**

NetClock/2 (Beige) Options

IRIG- Option 02 (Cost to add this option is $250.00). This option was standard in all Model 8182s (black NetClock/2s)

DST Rollover issues with either a Model 8188 or a 9188

NetClock/2 Software older than version 1.17 will cause a one hour error in the NTP output of the 8188/9188 from the moment that DST rollover occurs UNTIL WWVB flips the switch that changes the transition character from I to D. This is because the correction that needs to be applied to local time is based on this character. Because the character changes several hours later, the calculation in the Time Server is one hour off. The customer will see an error occur at 2:00AM (if reception is good). The one hour error clears and the PC's jump again when WWVB changes the character sometime that evening (Typically around 6-7PM Eastern).

The fix to this issue is to send the version 1.17 prom. This PROM changes the DST character to a D at 2 AM instead of when WWVB changes to a D.

Model 8179T TimeTap (discontinued)

➤ Link to manual: I:\Released\073000 - 8179T

Power and RS-485 Pin-outs

TO
MODEL 8179T
TIMETAP

TO NETCLOCK/2
REMOTE OUTPUT

TWISTED PAIR

8	+DATA
3	-DATA
9	GROUND

1	
2	
3	+DATA
4	-DATA
5	GROUND

TO OTHER
SPECTRACOM
RS-485 DEVICES

DB9 MALE
CONNECTOR

5-POSITION
TERMINAL BLOCK
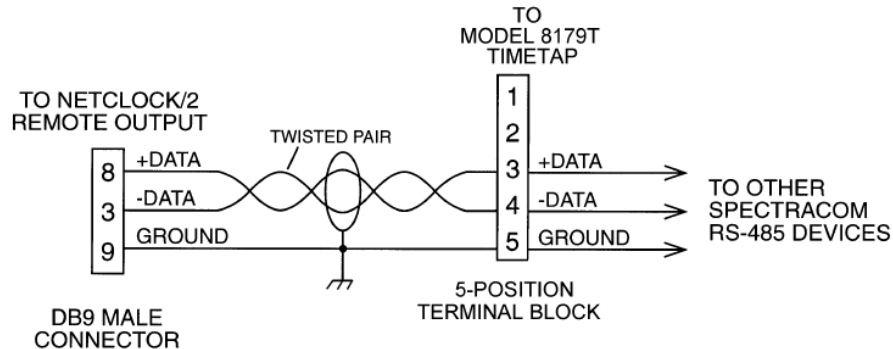
Power pack: T00026 (Needed when 8179T TimeTap is connected to a non-standard RS-232 port (See info below)

The Power pack was removed from the 8179T pack list quite some time ago. Normally, the 8179T TimeTap is powered by the RS-232 com port that the TimeTap is being plugged into. If this serial port is a non-standard RS-232 port, the power pack now needs to be separately purchased, in order to power the 8179T.

The power only needs to be used if the serial port that the TimeTap is being connected to doesn't have all pins supported. The TimeTap doesn't need external power when connecting it to a standard RS-232 port that has flow control lines present. If the port only has connections for data and ground but no connections for flow control (one example is the old Motorola Centracom). With flow control lines, the flow control provides the power to the TimeTap.

When plugging the TimeTap into a standard RS-232 port (such as on a Window PC for instance), the external power pack is not required.

Model 8178T TimeTap (discontinued)

➤ Link to manual: I:\Released\051000 - 8178T

Power pack: Spectracom P/N T00025   **Note**: This power pack is no longer available from us.

 Local Replacement

DC voltage: 9VDC (TimeTap can accept 7 to 15vdc)
          Connector: Barrel
            5.5 mm Outside Diameter
2.1 mm Inside Diameter

Polarity:
   Shell: Positive
   Tip: Negative

Time Tap is Reverse polarity protected with diodes.

Model 8177 TV400 (discontinued/no longer accepted for repair)

➢ Link to manual: I:\Released\072000 - 8177

Note: Since at least Feb, 2016, Model 8177s are no longer supported/accepted back for repair

Power pack for 8177

Uses T00058 (unregulated) 12 vdc power pack, or PS00142 12vdc (regulated) power supply

> **Note from Keith, 18 Feb 16**: T00058 and PS00142 power packs are no longer available for purchase from Spectracom. Model 8177 customers should consider replacing with Model TV400W display clock.

Minimum T00058 operating voltage

The minimum cutoff voltage (unloaded voltage) of the T00058 appears to be about **15** vdc. An 8177 on the bench was cycling on and off at a regular interval because the T00058 was at 15.3vdc. Clock worked fine off of the bench-top power supply.

I believe minimum voltage while under load was like **about 10.6vdc**

RS-485 terminal block connector for 8177

The connector for the Model 8177 is:
http://www.digikey.com/product-detail/en/ED950%2F6/ED1705-ND/123774?WT.z_cid=ref_octopart_dkc_buynow&cur=USD

TS1Win and TimeSet software

***Now discontinued- no longer available on the price list.

➢ Verified XP and 2000 compliant by KW on 10/22/04

➢ The program outputs a Format 1 data stream at a minimum interval of once-per-minute. It cannot broadcast Data format 1 at a once-per-second rate and cannot send Data Format 0 so it cannot be a replacement to NetClock.

Note: The day of the month HAS a leading zero, (01, 02, 03…09, 10 etc) so it is not the same as the NetClock Data Format 1 output. NetClock outputs a space before each Day 1 through 9.

Model 8176 (discontinued and no longer supported)

Shortcut to 8176 manual: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\Spectracom Display clocks\8176

Time Zone Offset

TZO can be set via Mode 4 using the Mode/Set switches (values of 00 to 23).   But there is no DST adjustment available in the clock. So typically, the TZO and DST are configured in the NetClock –not in the display clock.
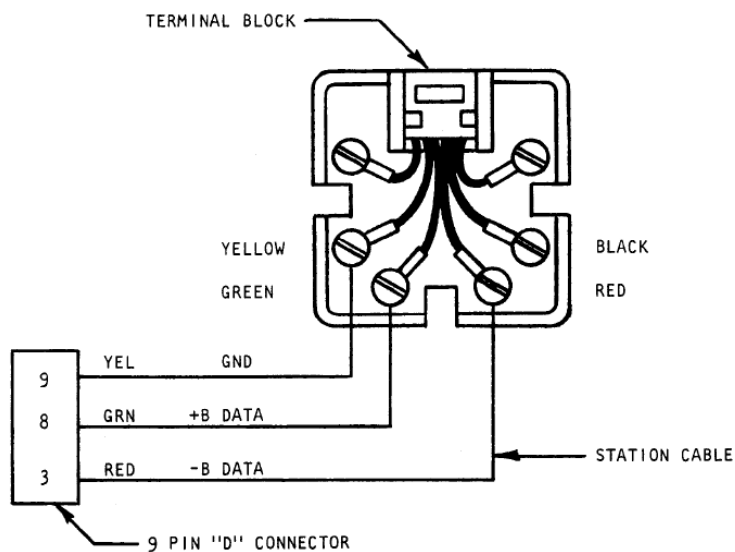

Baud rate

3.0   SWITCH FUNCTIONS

Switch SW2-1,2,3 are the baud rate switches. Units are factory set to
300 baud (100). Refer to Table 3-1 for other available baud rates.

BAUD RATE	SWITCH NUMBER 1	2	3
300	1	0	0
600	0	1	0
1200	1	1	0
2400	0	0	1
4800	1	0	1
9600	0	1	1

Wiring/pin-outs

Signal	Remote port of all GPS-based NetClocks (Models 8183, 9183 9483, etc) (Terminal block connector)	WWVB-based NetClock/2 RS-485 Remote Output port (DB9F)	Color of wire inside Modular Jack (Telephone jack)	RJ-11 Connector on Model 8176 (J4 connector) *** See Notes A and B below
+Data	Pin 1	Pin 3	GREEN wire	Pin 3
-Data	Pin 2	Pin 8	RED wire	Pin 4
Ground	Pin 3	Pin 9	YELLOW wire	Pin 2

Time wont sync (Colons flashing)

(Indicates 24 hours has elapsed with Master NetClock not synced or RS-485 is corrupt/missing)
Is new install?
Is NetClock synced?
Are any other devices on Remote bus synced?
This indicates the NetClock remote port is probally ok.
 ➢ Check baud rate switches set correctly.

Check RJ-11 cable is pinned reverse (Clips up/ next to each other. Inside wires should be same color pinned reverse)

Hi Don,
Good afternoon. I hope all is well and thanks for the call today.

As far as the pin-out information between a NetClock/2 and a Model 8176 display clock, I have some information for you that I hope will help. Below are the pin-outs for connecting the WWVB-based NetClock/2 or a GPS-Based NetClock to a modular jack and/or pin-outs for a direct connection to the RJ-11 connector on the 8176 without the use of a modular jack (just bypass the column in the table for the Modular jack wire color).

Model 8175 TV230 (discontinued - no longer supported or accepted for repair)

Desire to power with DC power supply instead of AC transformer

Min vdc: 15vdc
Max vdc: 20vdc

RMA request response:

Thanks for your email. I have some information for you, regarding the Model 8175 display clock.

To begin, the Model 8175 (Also known as the Model TV230) is, and has been for quite some time, a discontinued product. It was replaced by the Model TV210W display clock. The Model 8175 is no longer supported or accepted back for repair. FYI- This particular display clock was purchased on 1/27/1998, so its 14 ½ years old.

Based on the reported symptoms of the display clocks not having any segments lit, it sound like the external AC power pack may have failed, resulting in a low input voltage condition.

The Model 8175 display clocks shipped with a 110VAC to 24VAC external power pack. These power packs are no longer available for replacement. However, the Model 8175 can also operate on a DC input with a range of about

15VDC to 20VDC (the higher the input voltage, the brighter the display intensity).   We no longer offer any replacement power packs that are compatible with this clock, but you may be able to locate one locally. A multimeter can be used to measure the AC output voltage of the original power pack to verify if the power pack is the likely reason for the reported symptoms of no display.

The other available option is to replace the Model 8175 with a Spectracom Model TV210W (similar to the Model TV230) or with a Model TV400W (a larger display clock). For more information on the Models TV210W and TV400W, please contact Will Hickey in our Sales department at (585) 321-5832 or via email at willh@spectracom.orolia.com.

Model 8173 (four–way RS-232 splitter) (discontinued)

Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8170 8171A 8173\8173

> ➢ The Model 8173 is a RS-485 DB9 connector input with four DB25 RS-232 output ports on the rear panel.
> ➢ The four RS-232 outputs (labelled as Port 1-4) are pinned just like a Model 8178T TimeTap.
> ➢ The input (RS-485) to the unit is a DB9 connector labelled as "Bus B" which gets connected to a NetClock/2 (ONLY) Remote port.
> ➢ The input DB9 (Bus B) uses all of the signals from the NetClock/2 Remote port (pinned as straight-thru from a Net/2).
> ➢ There are two pass-through Remote connectors labelled as "Bus A" and "Bus C" which are pinned just like the Remote port of a NetClock/2.

Important Note: This device is NOT compatible with any GPS-based NetClock because it needs a +5vdc enable line as well as RS-485 Time Sync status. When replacing a NetClock/2 with GPS. This unit needs to be replaced with as many TimeTaps as necessary to provide RS-485 to RS-232 distribution.

Note: The Models 8170, 8171 and 8173 outputted a different Data Format 0 than the current configuration. The data stream did not include the DST character (D, I, S or O) so the ASCII outputs are not compatible with our display clocks.

Models 8170, 8171 and 8171A (discontinued)

Purpose: WWVB predecessors to the NetClock/2.

Refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8170 8171A 8173

**ASCII outputs

Note: The Models 8170, 8171 and 8173 outputted a different Data Format 0 than the current configuration. The data stream did not include the DST character (D, I, S or O) so the ASCII outputs are not compatible with our display clocks.

Models 8165, 8164 and 8161 (discontinued)

> All three Models are WWVB-based Master Oscillators

**Model 8165
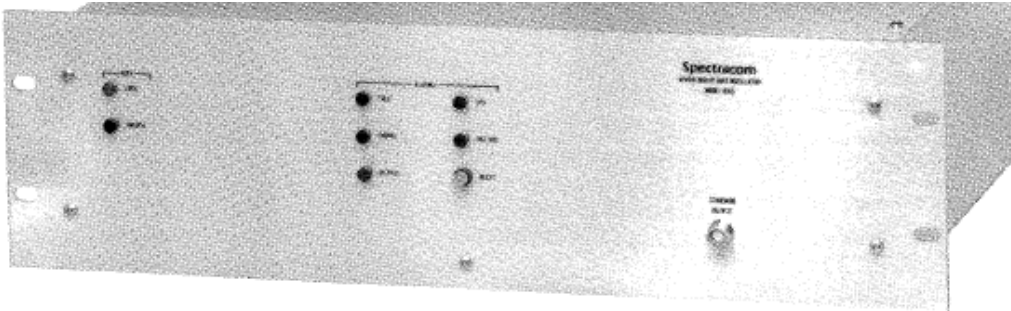
> Output (Front Panel): One 10 MHz BNC output
> Outputs (Rear Panel): Five 10 MHz BNC outputs

**Model 8164

Output (Front Panel): One BNC output for 0.1, 1.0, 5 or 10 MHz (as selected by the pushbutton switches)

Outputs (Rear Panel): Separate BNC outputs for 0.1, 1, 5 and 10 MHz

**Model 8161
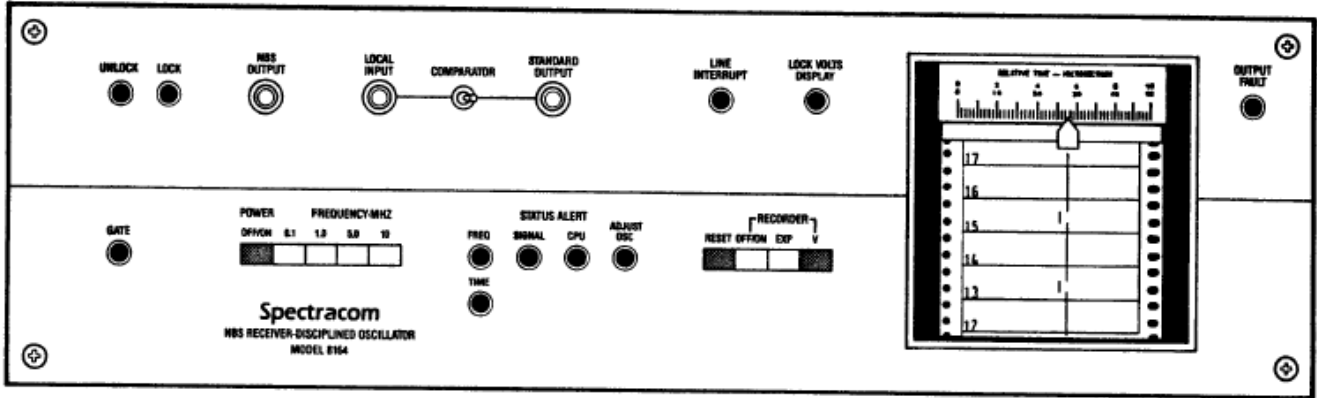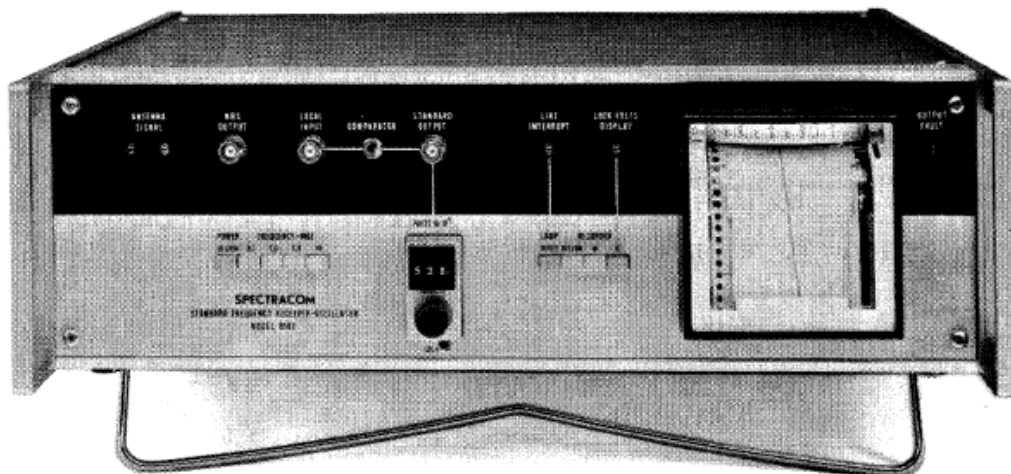

Output (Front Panel): One BNC output for 0.1, 1.0, 5 or 10 MHz (as selected by the pushbutton switches)

Outputs (Rear Panel): Separate BNC outputs for 0.1, 1, 5 and 10 MHz

Manual on our website:
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=141&PortalId=0

_____

10 MHz frequency outputs (Models 8165, 8164 and 8161)

Q. Can you give me a very brief synopsis of the frequency specs for the old 8164 vs the SecureSync system? I am particularly interested in the 1 and 10 MHZ frequency specs.
A. **Email from Tim Richardson to Will Hickey (16 Jan 2013**) 8164 spec, long term accuracy is typically held to within +/- 1.0 e -9. Short term stability is 2 e-10/10 sec.
SecureSync OCXO, long term accuracy is typically 2 e-12. Short term stability is 5 e -11/10 sec.
The user should know his requirements for accuracy and stability. Have him read the data sheet.

_____

**Chart paper

The Model 8164 used only MP00025 chart paper.

The Model 8161 with serial numbers 609 and below use MP00023 chart paper.

Model 8161's with serial numbers 610 and above use the MP00025 paper.

Both come ten rolls to a box and costs $100.00. This information is found on the priced pages found in
I:\Marketing\Price Pages

** *7-19-2010 – Chart paper has been discontinued and is off the price list. Here are sources of paper we can give the customer:

	Manufacturer and P/N		
CHART PAPER, 2750-2, 10 RLS/BOX (2 SIDED) For Model 8161 with SN# 0610 and above, or Model 8164 (2-sided track paper), **10 MP00025** rolls per box	Simpson 22155 0900-0004-0600		10 rolls/box
CHART PAPER (1 SIDED) For Model 8161 with SN# 0609 or lower (1 sided track feed), 10 **MP00023** rolls per	Simpson 22311 0900-0003-0600		10 rolls/box
CHART PAPER, SINGLE ROLL	Simpson 22311	MP00023	SINGLE ROLL
CHART PAPER, 8210, SINGLE ROLL	Gulton Style WA	MP00024	SINGLE ROLL
CHART PAPER, 2750-2, SINGLE ROLL	Simpson 22155	MP00025	SINGLE ROLL

Vendor
RECORDING CHARTS (Rci Charts international)
15 EXCHANGE STREET
LOCKPORT, NY 14094
(716) 433-0374

Model 8212 chart recorder

- ➤ Vendor Model Number: 2750
- ➤ 8212 manual: refer to I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8212 Chart recorder for WWVB receivers
- • There is no Spectracom manual for the chart recorder, just the manufacturer's manual for the Model 2750

Model 8163 WWVB Receiver/Comparator (discontinued)

- ➤ This device was a plug-in module for the Tektronics TM-500 series Mainframe
- ➤ Locks to WWVB and outputs multiple frequencies

Requires: Tek TM500 mainframe.

Upgrading/Replacing a Model 8163:

(Per Tom Richardson), "There is no replacement for the 8163".

Note: (per Tom Richardson) The SecureSync/9483 does not provide the same functionality internally as the 8163 provides.

1.0 INTRODUCTION

The Spectracom Model 8163 WWVB Receiver/Comparator is a frequency calibration instrument that can be used to calibrate standard oscillators to an accuracy of 1×10^{-11}. The calibration is directly traceable to the National Bureau of Standards. The Spectracom Model 8206 ferrite loop antenna is used with the Model 8163.

The Model 8163 receives the 60 KHz signal transmitted by the National Bureau of Standards in Fort Collins, Colorado. Phase locked signals of either 0.1, 1.0, 5.0, or 10.0 MHz are switch selectable at the NBS OUTPUT connector.

The internal phase comparator compares the phase of the LOCAL INPUT signal with the received signal. The comparator operating frequency is switch selectable to one of the four standard frequencies of 0.1, 1.0, 5.0, or 10.0 MHz. The front panel meter displays the relative phase drift between the NBS signal and the LOCAL INPUT. The meter range is normally set to 50 microseconds full scale. An internal switch changes the scale to 10 microseconds full scale.

An auxillary output jack provides drive for an external strip chart recorder for long-term monitoring of oscillator drift.

Green and red go/no-go lamps indicate signal reception and phase locking to the WWVB carrier.

The instrument fits in a Tektronix TM-500 Mainframe and occupies a single plug-in space.

Model 8160/8160A

WWVB-based Frequency Standard receiver (discontinued)

Link to 8160A manual:
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=140&PortalId=0

Model 8150 (Precision Phase Comparator) (discontinued)
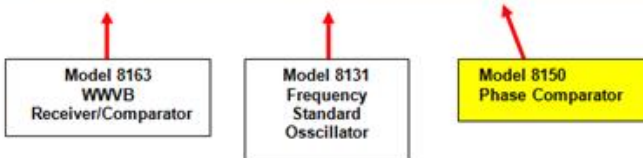
➢ This device was a plug-in module for the Tektronics TM-500 series Mainframe

Manual on our website:
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=203&PortalId=0

Requires: Tek TM500 mainframe.

Outputs: 0.1, 1, 5, 10MHz. Short-term stability: 2x10(-10). Front panel frequency control.

Model 8145 TimeGuard (discontinued)

Figure 3-2: TimeGuard Front Panel

Figure 3-3: TimeGuard Rear Panel

- ➢ **Shortcut to manual**: **I:\Engineering\Archive\Released\050000 - 8145**

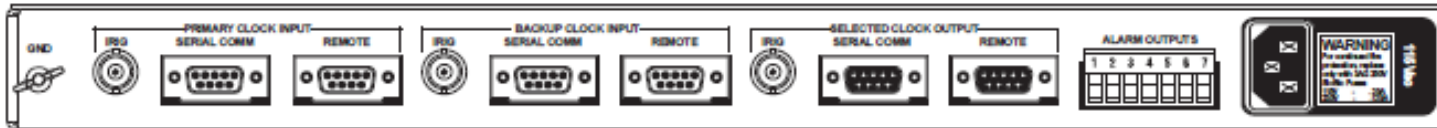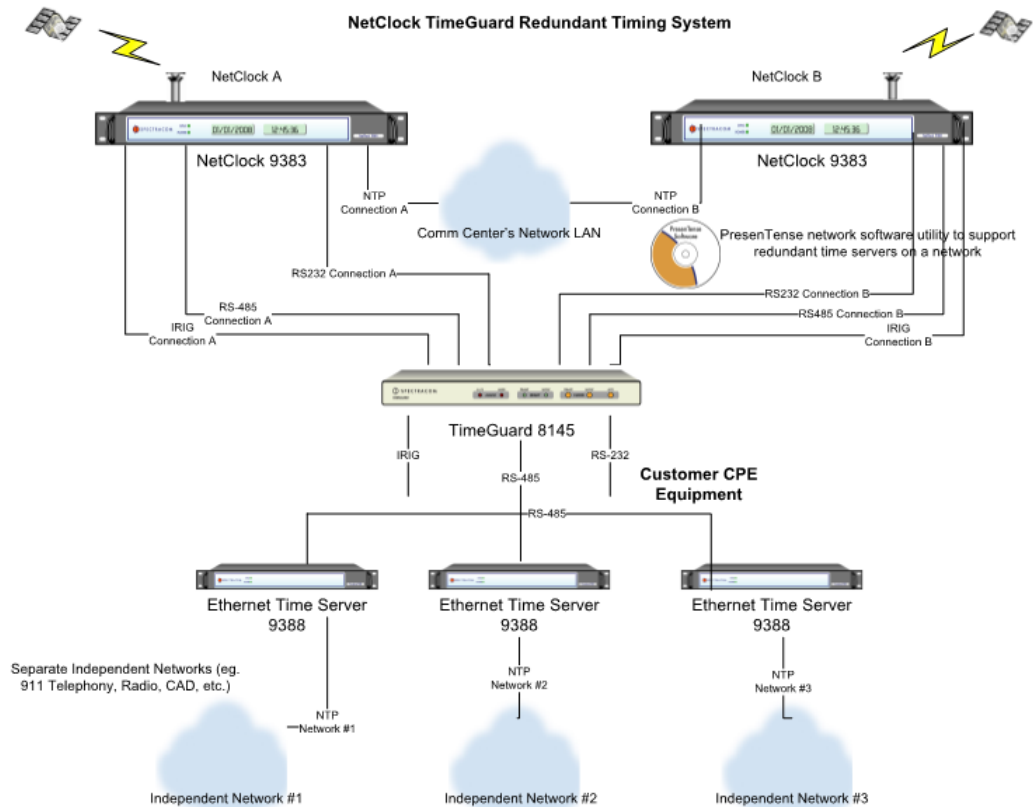 refer also to: ..\..\EQUIPMENT\SPECTRACOM EQUIPMENT\8145

818x to 8145 adapter cable assembly

P/N 8145-0000-5000 (Cable side is DB9F connector /input side has two terminal blocks and a DB9 connector)

918x to 8145 adapter cable assembly

P/N 8145-0001-5000 (Cable side is DB9F connector /input side has only two terminal blocks - No DB9 connector)

Note: Unlike the 8183 adapter assembly, the 91xx/92xx adapter assembly no longer has a DB9 that connects to the second Serial port of the NetClock. The only connections for the adapter are to the Remote port and the Alarm relay output. This is because the 9189 and 9289 only have one Serial port. Per the 8145 manual, switches for Primary and Backup RS-232 should be turned off.

Alternate solutions (since the TimeGuard and 8144-RR are both discontinued)

A) **Desire to switch between two RS-232 sources (for RS-232 redundancy)**

- ➢ Refer to the email below, which includes info on an RS-232 switch available from Blackbox (https://www.blackbox.com/en-us/store/product/detail/async-rs-232-db25-fallback-failover-switch/sw901a)

B) **Desire to switch between two RS-485 sources (for RS-485 redundancy)**

Email Keith sent (14 Jan 2020) Thanks for your call yesterday and for inquiring about ASCII RS-485 redundancy. I have some info for you.

As we no longer offer the TimeGuard or the Model 8144-RR (these devices were discontinued several years ago) we no longer offer a device which can switch between two or more ASCII RS-485 sources.

So, I searched online to see what I could find. Though I wasn't finding exactly what you would need to switch between two sources for redundancy, I did find a device which can switch between two ASCII RS-232 sources. Since RS-485 can be converted to RS-232 (for the two inputs) and RS-232 can be converted to RS-485 (for the output from this device, I suspect this device can meet your customer's requirement (I recommend confirming the application with the manufacturer, just to be safe).

Please refer to: https://www.blackbox.com/en-us/store/product/detail/async-rs-232-db25-fallback-failover-switch/sw901a

Note this device is from a company (Blackbox) I was going to recommend you contact, anyways. I didn't find in their catalog a switch for two RS-485 inputs (like this one, except this one is for RS-232), but that doesn't mean they don't offer at least one Model that can perform this basis functionality (as our TimeGuard and 8144-RR used to provide). So, I recommend contacting BlackBox first, as a likely supplier. Their contact info is at: https://www.blackbox.com/en-us/store/product/detail/async-rs-232-db25-fallback-failover-switch/sw901a

A couple other suppliers I also found while searching, which may also potentially offer a basic RS-485 switch, include the following:

Anixter: https://www.anixter.com/en_us/services-and-solutions.html

**Grainger**: https://www.grainger.com/content/resources

C) Desire to switch between two IRIG sources (for IRIG redundancy)

➢ Refer to the SAS-17E/SAS-36E for IRIG input

Model 8144 (Discontinued)

Note: 8144s were discontinued ~Apr 2015. Refer to ECO 000345

> Shortcut to manuals: I:\Engineering\Archive\Released\075000 - 8144V2\Manual

> Link to manual CD that we used to ship (1217-5003-0001) with units: I:\Engineering\Archive\New Released\Media (includes manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS and SecureSync)
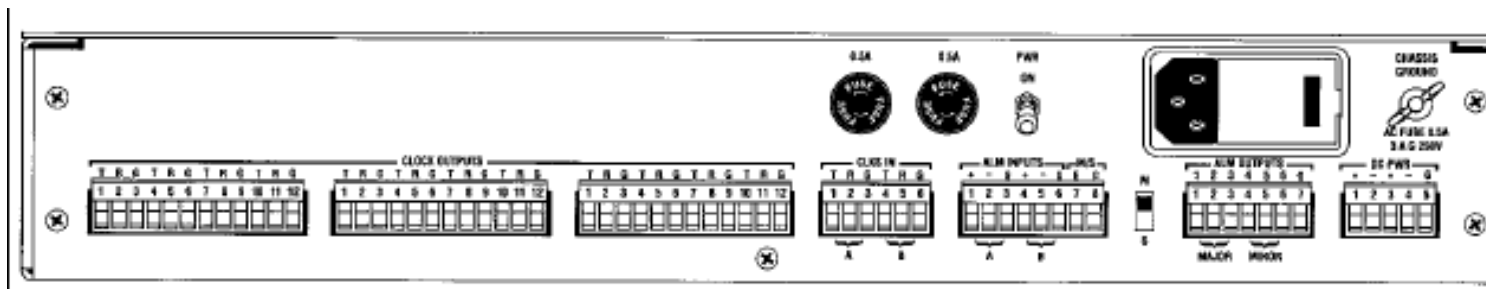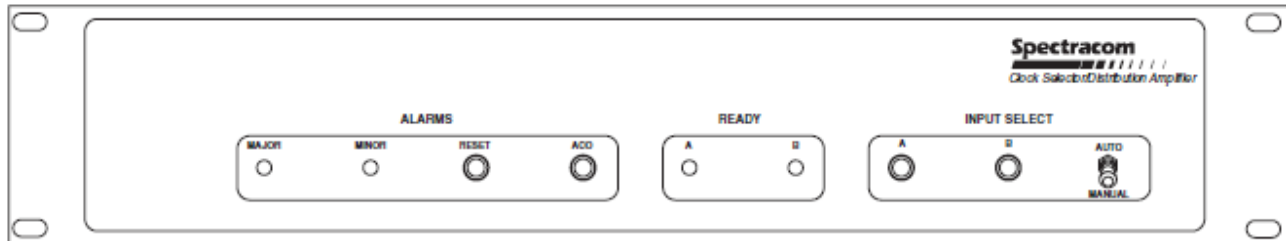
Terminal block connectors

(**1**) 5 pin terminal block connector (DC input power). Spectracom Part Number P13005.
(1) 6 pin terminal block connector (Clocks Input). Spectracom Part Number P13006.
Digikey P/N: ED1705-ND (http://www.digikey.com/product-detail/en/ED950%2F6/ED1705-ND/123774?WT.z_cid=ref_octopart_dkc_buynow&cur=USD)

   (1) 7 pin terminal block connector (Alarm Outputs). Spectracom Part Number P13007.
   (1) 8 pin terminal block connector (Alarm Inputs). Spectracom Part Number P13008.
(3) 12 pin terminal block connectors (Clock Outputs). Spectracom Part Number P13012.

8144 Power Requirements
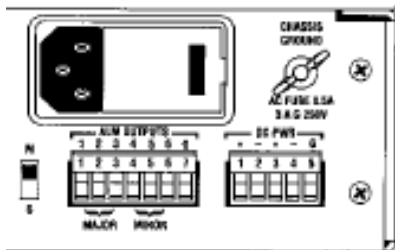
> DC input is on the 5 position terminal block (Spectracom P/N P13005 terminal block connector)

   Standard power: 115/230 VAC ±15% 50/60 Hz, 6 watts
Option 52 (12 to 24 VDC):   ±11.0 to 32.0 VDC, 6 watts
Option 54 (48 VDC):   ±44.2 to 66.2 VDC, 6 watts

_____

Switch-over time from Primary to Back-up input

➢ Results were 9 microseconds to switch to Back-up, once Primary channel removed.

_____

8144-RR SP267 (Model 8144 as a "TimeGuard" with dual RS-485 time code inputs)

RS-485 Timecode input: We made one unit 8144-RR serial number 1031 that will use a NetClock ASCII input for Motorola. It was not an official special. To make this work I changed R58 and R76 to R01224 (220K) and C45, C58 to C27220 (22uF). Header H5 and H6 are in Pos A. The output is inverted so I labeled the rear panel.

➢ ECN 2935 (Oct 2012) releases this configuration
➢ Refer to special header settings below.

The headers have been changed to the following;

Header	Position
H5	This header sets the maximum period of time an RS-422/485 signal can be absent before an alarm is asserted for the B Channel. It is set as follows:

  A   Clock Input 1 Hz. Timeout is 3 sec typical.
  B   Clock Input ≥ 64 kHz. Timeout is 40 μsec typical.
  C   Clock Input ≥ 512 kHz. Timeout is 4 μsec typical.
  D   Clock Input ≥ 1.544 MHz. Timeout is 1.5 μsec typical.

Header	Position
H6	This header sets the maximum period of time an RS-422/485 signal can be absent before an alarm is asserted for the A Channel. It is set as follows:

  A   Clock Input 1 Hz. Timeout is 3 sec typical.
  B   Clock Input ≥ 64 kHz. Timeout is 40 μsec typical.
  C   Clock Input ≥ 512 kHz. Timeout is 4 μsec typical.
  D   Clock Input ≥ 1.544 MHz. Timeout is 1.5 μsec typical.

For proper operation at one pulse per second inputs headers H5 and H6 must be in the A position.

Model 8143 (distribution amplifier) Discontinued

Note: Model 8143 was discontinued ~Apr 2015. Refer to ECO 000345

Options

Specials (some that have been performed in the past)

  SP94: (2) 1544 kHz Inputs, (12) 1544 kHz outputs
SP110: (2) 1PPS Inputs, (12) 1PPS outputs
SP161: (1) IRIG E Input, (12) IRIG E outputs (Single input – no switchover)
SP183: (2) 12.8MHz Inputs, (12) 12.8MHz outputs
SP199: (1) 1-10 MHz input, (12) 1-10MHz outputs (Single input – no switchover)
SP200: (1) 1-10 MHz TTL input, (12) 1-10MHz TTL outputs
SP225: (1) 10 MHz input, (12) 10MHz outputs (Single input – no switchover)

Power and BTU/Hr rating

Per Ed O'Connor: 12 watts (40.945699596 BTU/Hr)

Model 8140MT (MultiTap)   (discontinued)

- ➤ Shortcut to Model 8140MT in custservice: EQUIPMENT\SPECTRACOM EQUIPMENT\8140-8140MT
- ➤ Shortcut to data sheet: link to datasheets in SharePoint
- ➤ Shortcut to manual: ???

Link to manual CD that we ship (1217-5003-0001): I:\New Released\Media (includes manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS and SecureSync)

8140MT Discontinued: Feb 2012

Available output frequencies

Specifications
Output Frequency Choices:
Three square wave outputs per MultiTap. 1.5 V p-p into 50 ohms. There are four groups of output frequency choices. Once a group is chosen, each of the three outputs may be set to any frequency in the group.

For a 10 MHz input, the ouputs are:

A	B	C	D
5	5	1	1
1	0.5	0.2	0.1
1	0.1	0.04	0.02
0.04	0.02	0.008	0.004

Frequency Input:
Typically 10 MHz. TTL input range is 1 kHz to 20 MHz; since input range is 100 kHz to 20 MHz. 300 mV p-p to 5 V p-p sine; high impedance. Output frequencies are proportional to input frequency. Coaxial input line must be properly terminated.

F) OUTPUT LEVELS:

600 mV rms sine wave into 50 ohms (1.5 Vp-p)
TTL-compatible when used without termination

External Power pack (Option 40)

The external power pack (Option 40) must be used when:
- There are more than (8) 8140MTs connected to a Model 8140 (8140 can drive a total of 8-8140MTs, as long as nothing else is connected to the 8140).

- Any of the three BNC outputs is configured to output a frequency lower than 0.1 MHZ (100 kHz).

The external power pack, when connected, automatically disables the 12vdc input from the 8140 (there is no need to block the DC from the Model 8140 using external DC blocks).

The Model 8140MTs (MultiTap) do not automatically include an external DC power pack. If a customer orders the MultiTap and desires to power it with an external power pack, they also need to order one T00058 power pack for each MultiTap.

For replacement power pack, use a T00058 12vdc (same as 8177). The original one was a 9vdc with same polarity but we no longer offer this one.

8140MT with SP156: Modified 8140MT to be an IRIG TTL Splitter (one BNC input, three BNC outputs for up to 12 loads). Used for Zetron public safety equipment.   Refer to \\rocfnp01\idrivedata\Engineering\Archive\New Released\Project Specials\SP151 to SP200\SP156

Number of MultiTaps that can be connected to one Model 8140

Per the Model 8194/8195 series user manual: If the Option 40 external power pack is not connected to the MultiTap, the MultiTap counts as three loads (the Model 8140 can drive a total of 25 loads). However, if the Option 40 external power pack is connected to the MultiTap, the MultiTap counts as only one load.

Model 8140VT (VersaTap) (discontinued)

Note: This product is no longer available – no stock and no longer in production!

➢ Shortcut to 8140VT manual (8147-5000-0050):I:\Engineering\Archive\New Released\Manuals\8147-xxxx-xxxx

➢ Link to manual CD that we ship (1217-5003-0001): I:\Engineering\Archive\New Released\Media (includes manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS and SecureSync)

Input power for both DS1 and E1 output configurations

If the 10 MHz input to the VersaTap is not offset with 12VDC being supplied by the 10MHz reference (such as a Model 8140 distribution amplifier or a Model 8195 series Master Oscillator with Option 3 installed, for examples) the VersaTap needs to be externally powered. External power can be provided by ordering Option 40, to obtain an external AC to DC converter.

Spectracom P/N for the Input power jack on the Model 8140VT: J01029

C) Input Power specs (from page 1-2 of the VersaTap Manual)

1.2.2 Power

VersaTaps with serial numbers 8140VT-1225 and above, or those shipped after 3/12/91, have a switching power connector. This connector allows the VersaTap to be powered from a distribution line or external power supply.

Distribution Loading:	Typically consumes 150 milliamps from distribution line. Equivalent to three (3) line tap loads.
External Power:	Provided with Option 40; otherwise, select AC adapter with specifications listed herein.
Output Voltage:	9-12 Volts DC
Minimum Current:	300 mA
Connector:	Coaxial "Barrel-Type" Plug
Polarity:	Barrell – Negative; Tip – Positive
Plug Size:	5.5 mm OD, 2.1 mm ID

Option 40: Power pack

➢ The Model 8140VT (VersaTap), external DC power pack is ordered as an Option (Option 40). It's not automatically included, either. To order a power pack with a VersaTap, it's specified as either 10-62-40 (DS1) or a 10-66-40 (E1)

➢ When Option 40 is purchased, a T0058 power pack is provided. By the T00058 is a modified PS06-0E0J-DTA0) power pack (which is a PW172 power pack).   Refer to \\rocfnp01\idrivedata\Engineering\Engineering Shared\Spectracom parts\PS06-0E0J-XXXX ("Ault 20080626060157618563076" data sheet).

Accuracy of the DS1/E1 outputs

- ➢ What is the frequency output specification for the 8140VT VersaTap series? (i.e. 1.544… +/- ppm with 10MHz input from an 8195A)
- ➢ Email from Tom Richardson It is a phase locked output. Frequency output accuracy is the same as the reference.

Calibration

Q. How often should these modules be calibrated?
A. Email from Tom Richardson (15 Jan 2013) Calibration is "as required", I don't have any data on how often it should be done. Depends on aging of the crystal and temperature, spec on crystal is a couple of PPM per year but it should probably be much less than that. Do you have any data on returns for calibration? There is a TTL output on pin 2 of the output connector indicating lock, LK. Normally high, when that goes low then do the adjustment for the crystal.

From the Model 8140VT manual:

Crystal Oscillator Adjustment

As the crystal ages, the control voltage to the VCXO will change to compensate for the aging process. To calibrate the VCXO, move the W9 jumper to location W10. Connect a counter to U16 Pin 12. Adjust trimmer capacitor C36 until the counter reads the frequency of the crystal, ± 10 Hz. Return the jumper from W10 to location W9 after the adjustment is complete.

Keith's response to a customer: Calibration of the VersaTap is "as required".   There is a red "Osc Lock" status LED on the VersaTap that indicates the lock status of the internal PLL circuit. As long as this LED is lit solid when 10 MHZ input is present, the VersaTap is locked and outputting the correct signals – no adjustments are necessary.

FYI- There is also a TTL output on pin 2 of the output connector indicating the same lock status as the LED. This output can be used to remotely indicate the lock status.   It's normally high, but when it goes low, the crystal should be adjusted.

There are only two adjustable items in the VersaTap for calibration (the VCXO alignment to account for crystal aging over time and the Lock Detector Level adjustment). With the Lock LED lit, no calibration of the VersaTap is required.

As for how often it should be calibrated, it really depends on aging of the crystal and ambient temperature. The specs on the crystal aging is a couple of PPM per year, but will likely age even less than this. This process typically does not need to be performed for at least 5 years.

Attached you should find a copy of the Model 8140VT manual. Section 3 contains information on performing adjustments on the VersaTap and Section 4 contains Performance tests that can be run to verify normal operation of the VersaTap.

Option 10-62-40 (10 MHz in/ (2) DS1 outputs)

Function: 10 MHz input, two DS1 outputs and external input power via a power pack

PCB drawing: I:\Released\034000 - 8140 VT Option 62

Our P/N: 8147-0007-0600

Input power: Either 12vdc from the 10MHz input (if supplied by the 10MHZ reference) or order Option 40 for external AC to DC converter.

Input
  10 MHZ- Lock LED will illuminate when phase-locked to the 10 MHz input

Q. Will it accept a TTL input in addition to a Sinewave input? Mike is telling that the Zyfer unit that will provide the 10 MHz input to these VT's on this large opportunity, is a TTL output. Hard for me to believe, but I need to let him know if our VT's will accept a TTL input

   A. (From Tom Richardson 4/4/11)
A 10 MHz signal level between 100 millivolts and 5.5 volts peak to peak. Sine, square, asymmetrical it's all good.

Input Impedance: high impedance

Input termination: Terminate into 50 ohms, or reflections/ringing may occur (otherwise, the outputs could be adversely affected)

> Use a red-capped terminator if connected to a Model 8140 distribution amp.

> Use a silver-capped terminator if connected directly to a Master Oscillator that does not output 12vdc on the 10 MHz output signal.

Outputs

> Two DS1 all-ones outputs on terminal block connector

> Output Impedance: 100 ohms

Screenshot of DS1 output from a SecureSync DS1 output Option card

1.544 MHz Square wave output

T1 output with scope probe

T1 output with differential probe
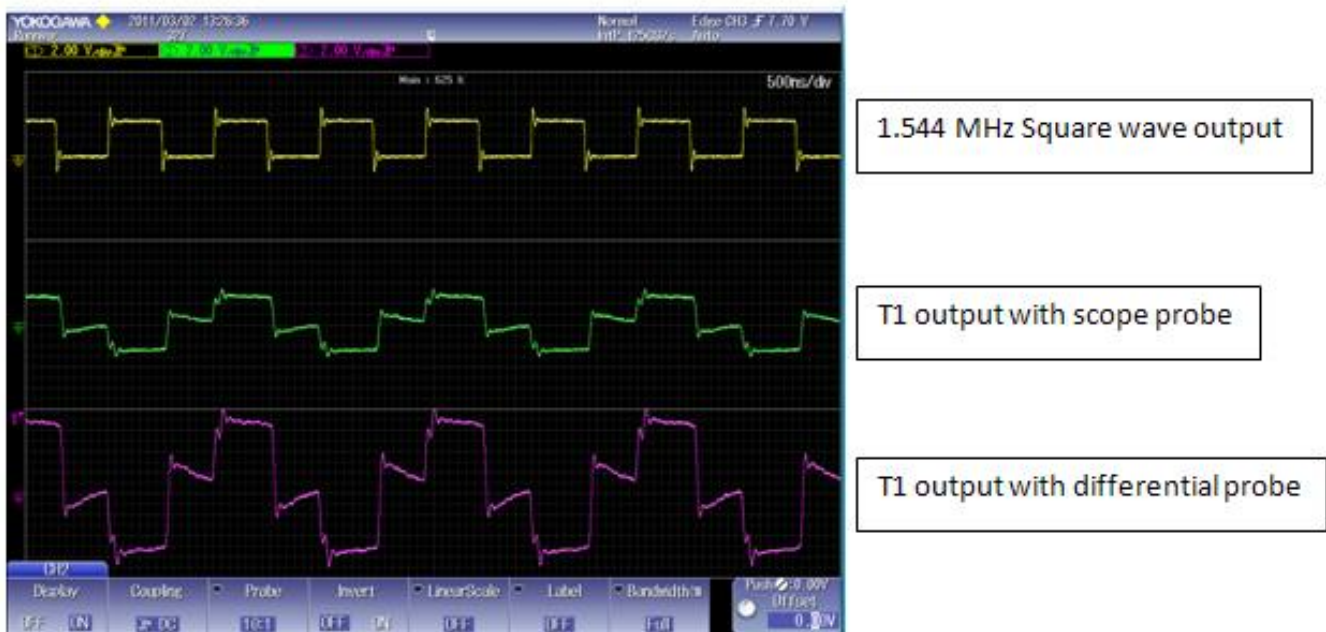
DS1 Pulse Mask (for acceptable signal verification)

**Refer to:** I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8140-8140MT\8140VT

Email from Tom Richardson regarding Case 7452 (1/30/13)- frequency is 1.543 MHz Option 62 is an AMI dual framed all-ones output. You should terminate into 100 ohms from tip to ring. AMI means alternate mark inversion; one goes up next one goes down. The wave shape looks almost correct some of the ringing and slope between pulses is probably cabling. Cable type and length can have effect on signal. Because it is a framed signal and not just all ones you will see some jumping on a scope as the framing information has some zeros in it. Framed all ones because unframed all ones is an alarm signal.

Page | 659

I have attached the 1544 pulse mask, as you can see from the figure the signal can take a dip after the pulse and still meet the curve. Figure in spec is for an isolated pulse, single pulse following a bunch of zeroes, followed by a bunch of zeroes, which is not what we have here so there is some interaction between the pulses.

The unit not meeting 1.544 frequency output is more bothersome. Probably something wrong in the setup. VersaTap needs good reference and 1.543 is way off.

Phase Lock Status:

➢ TTL level high (1) whenever the VersaTap is phase locked to 10 MHz reference

➢ TTL level low (0) when not locked to 10MHz reference.
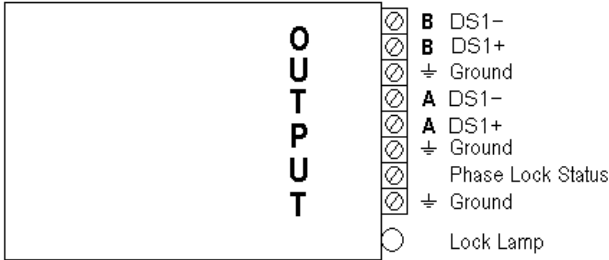
Jumper configuration

HDR3: Determines if both outputs are 193S (12 frames/superframe- called "Superframe") or 193E (24 frames/superframe- called "Extended Superframe" [also referred to as ESF]).
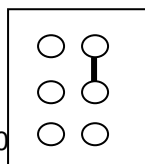
➢ Default configuration is HDR3 in bottom position to program the unit for the unit to the 193S format (12 frames/superframe for "Superframe or [ESF]").

(Jumper on pins 4 and 6)

-frame configuration (193S)
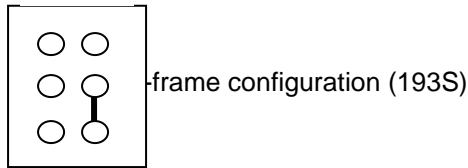
➢ Moving the shorting plug at HDR3 to the upper position programs the unit to the 193E format (24 frames/superframe for "Extended Superframe").

(Jumper on pins 2 and 4)

Extended Super-frame configuration (193E)

HDR5: Determines whether outputs will be present, when not locked to 10MHz input.
- ➢ Leaving the shorting plug at HDR5 configured the outputs to always be present, even when not locked to the 10 MHz reference.

- ➢ Removing the shorting plug at HDR5 removes the outputs when not phase locked to the 10MHz reference.
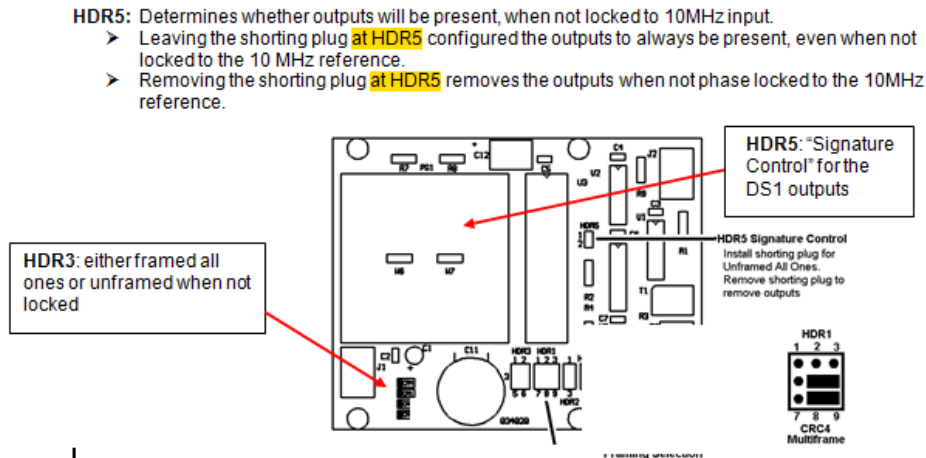
Testing/verification

The DS1 output should be checked using a differential amp and a scope with 100 ohm termination across the tip and ring. If a differential amp is not available, Add and invert channel 2 to act like differential amp and then look at both Tip and Ring signals. Should be around 2 vpp.

Option 10-66-40 (10 MHz in/ (2) E1 outputs)

Function: 10 MHz input, two E1 outputs and external power supplied via power pack

Our P/N: 8147-0011-0600

Input power: Either 12vdc from the 10MHz input (if supplied by the 10MHZ reference) or order Option 40 for external AC to DC converter.

10 MHz Input
Connector: BNC-T
Signal: 10 MHz (Lock LED will illuminate when phase-locked to the 10 MHz input)

Q. Will it accept a TTL input in addition to a Sinewave input? Mike is telling that the Zyfer unit that will provide the 10 MHz input to these VT's on this large opportunity, is a TTL output. Hard for me to believe, but I need to let him know if our VT's will accept a TTL input
A. (From Tom Richardson 4/4/11)
10MHz signal level between 100 millivolts and 5.5 volts peak to peak. Sine, square, asymmetrical it's all good.

Input Impedance: high impedance.

Input termination: Terminate into 50 ohms, or reflections/ringing may occur (otherwise, the outputs could be adversely affected)

> ➢ Use a red-capped terminator if connected to a Model 8140 distribution amp.

> ➢ Use a silver-capped terminator if connected directly to a Master Oscillator that does not output 12vdc on the 10 MHz output signal.

Outputs

> ➢ Two E1 outputs on a terminal block connector

> ➢ Output Impedance: 100 ohms

Phase Lock Status:
> ➢ TTL level high (1) whenever the VersaTap is phase locked to 10 MHZ reference

> ➢ TTL level low (0) when not locked to 10MHz reference.
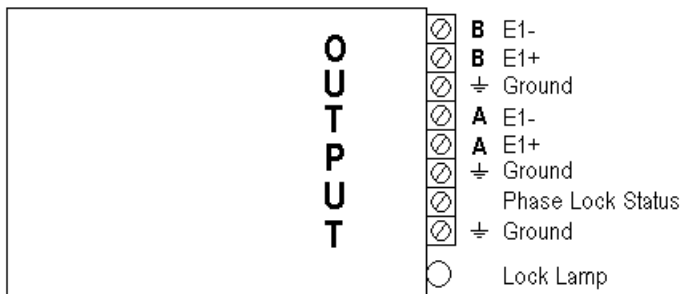
Jumper configuration

HDR1: (E1 Framing) Selects either CAS Multiframe or CRC4 Multiframe (Default setting is CRC4 Multiframe).
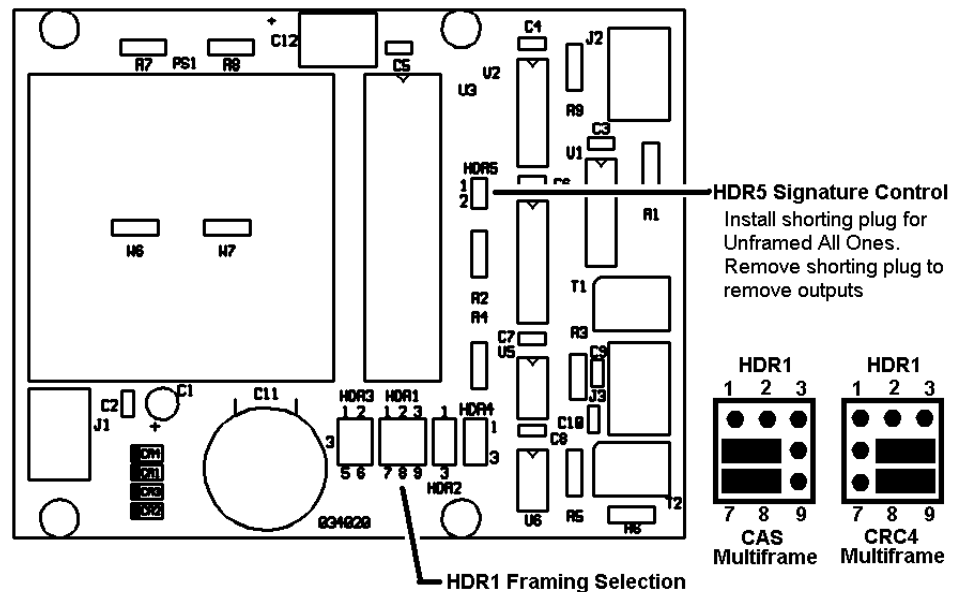(Refer to picture above for the two configurations of HDR1)

HDR5: Provides either an Unframed All Ones (even when not locked to the 10MHz input) or complete removal of the output signal whenever the VersaTap is not phase locked to the 10 MHz input reference.

➢ The unit is factory configured to provide an Unframed All Ones when unlocked (jumper installed).

➢ To program the E1 outputs for complete removal when unlocked, remove the shorting plug found on HDR5.

Option SP308 (rack of VersaTaps)

Note: This option is no longer available (KW 4/4/11)

The rev B manual is stating the 1.0 MHz output is a sine-wave, when it really should state square-wave instead.

Composite Clock output

Note: This option is no longer available (KW 4/4/11)

2/10/10 Email from Tom Richardson: Keith,
Japanese Composite clock is a 64 kHz AMI signal with a bipolar violation every 8th bit (8 kHz), Pulse width < 7.8 microseconds

8140VT opt 50 SP147 took a 10 MHz in and made a Japanese Composite Clock out, might be named option 60. Used option 035020 board assembly with CC prom, jumper W3 determined Japanese or U.S. hi = Japanese. Specs are still in the 8140 VT manual.   8147-0037-0600

Model 8140 Distribution Amplifier (Discontinued)

Note: This product is no longer available – no stock and no longer in production!

Link to manual CD that we ship (1217-5003-0001): [I:\New Released\Media](I:\New Released\Media) (includes manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS and SecureSync)

Maximum cable distance between 8140 or 8195A WITH Option 3 and the LineTap to the end device

To answer your question, the maximum cable distance (using RG-58 cable) that can be used between the Model 8140 distribution amp or the Model 8195A/B (with Option 03 installed) to the input of the Model 8140T10 Line Tap is 1500 feet (457 meters). The maximum cable distance between the Model 8140T Line Tap's output and the device using the 10 MHz cannot be specified in a specific number as it is determined by the input impedance and signal level requirements of the device being synchronized. The input impedance affects the input signal level of the 10 MHZ at the input of the device.

The output signal level of the Model 8140T10 is a 600mV RMS 10 MHz sine wave into 50 ohms. If the device has a 50 ohm load input, the cable distance will be less than if the load impedance of the device is high. The exact distance that can be run is dependent upon the input level requirement of the device and the cable loss of 10 MHZ through the BNC cable. The cable loss of 10 MHz through RG-58 is about 1dB / 100 feet (The longer the cable length, the smaller the input level will be). The higher the impedance, the higher the signal level will be. Also, it depends on whether you connect only one device on each Line Tap (recommended) or if you install more than one device on each LineTap (Dependent upon the input impedance of the devices. Not recommended because if one device shorts to ground, the signal to the other devices will be lost as well).

I apologize for not being able to give you a specific answer. As you can see from the above descriptions, there is no specific answer as it is based on the device's input impedance and signal level requirements. It is recommended to place the LineTap near the device to be able to more easily locate as necessary in the future

---

Number of Taps supported

➢ Up to 25 8140T LineTaps

Note: each 8140VT without the use of Opt 40 (external power) counts as 3 devices. If external power is applied, it counts as only one load,

Ancillary kit P/N: 8140-0000-0700

End-of-line terminators for 10 MHz

Red-capped (red capped) 50 ohm terminator (AC riding on a DC voltage): The part number for the 12VDC Red Cap 50 ohm terminator is 8140-0000-1000 (used to be P/N 004490).

Note: these components are no longer available (in stock or in anc kits) and can't be produced.

Silver-capped 50 ohm terminator (AC only): The part number for the 12VDC silver Cap 50 ohm terminator is 004492).

Model 8140 LineTaps (8140T10/8140T5/8140T1/8140TR1) (discontinued)

Note: This product is no longer available – no stock and no longer in production!

Refer to: \\rocfnp01\idrivedata\Engineering\Archive\Released\004000 - 8140

Also refer to: I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8140-8140MT

Model	Output
8140T10	10 MHz sinewave
8140T5	5 MHz sinewave
8140T1	1 MHz sinewave
8140TR1	100 kHz sinewave
8140TA distribution line extended	extends distance to up to 3000 feet (with fewer Line Taps allowed). Using low-loss cable such as RG-8 extends distance to 3000 feet for all 25 Line Taps.

Link to manual CD that we ship (1217-5003-0001): I:\Engineering\Archive\New Released\Media (includes manuals/quick start guides for 814x product, 9300 and 9400 series, TimeView display clocks, CTCSS and SecureSync)

specs:

Email from Tom Richardson
Product spec is output level 600 mV rms into 50 ohms, 1.67 Vpp, 8 dBm and -40 for spurious. I remember input sensitivity was about 100 mVpp. Does the customer have any further requirements than that?   Note: The 8140T product line was made to be used with the 8140 distribution amp or the 8195 with distribution option.

Model 8134 (LORAN-C receiver) (discontinued)

Note: This product is no longer available – no stock, no longer in production and **no longer supported** (manual not even available)

Links to Model 8134 manuals

- I:\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8134 or

- I:\Engineering\Archive\Released\Old Manuals from Jen 120805\8134

- ➢ Loran-C signal stopped being transmitted by the USCG/NAVCEN) back in Feb, 2010
    - Refer to: http://www.jproc.ca/hyperbolic/loran_c_closure.html

      Email from Tom Richardson
      Keith and Dave,
      It looks like they will finally terminate Loran on Feb 8th, 2010. I don't know if there are any customers still using the 8134 but you might get a call. See the attached for more info. Tom R

- ➢ Per Lisa Perdue and Dave S, we **DO NOT** know if the Model 8134 will work with the enhanced signal (per Tom Richardson, 29 Nov, eLORAN is not yet available and is a "fantasy").

- ➢

Email from Keith (29 Nov 17) for case 122559 To begin, I really hope that this is not equipment that you recently purchased ☹!!   First and foremost, the transmitted signal the Model 8134 locked-to (Loran) stopped being transmitted back in Feb, 2010. So even if this device can be powered-on, it will only be a free-running, unlocked reference.   It will not be able to lock to an external source.

I've been with Spectracom for 21 years, and this is a device which was discontinued before I ever started working here. Because this is a device which was discontinued over 20 years ago, we no longer support this product and do not accept it back for repairs. However, just in case you are still interested in using this device in some manner (even though it cannot be locked to any external reference). I was at least able to at least find a copy of the Model 8134 user manual for you (there was never a Service manual available). You should find it attached. Any support beyond the information contained in this user manual is no longer available!

For your info, Spectracom offers GPS-based NTP time servers and disciplined frequency generators. Based on your area code, I see you are in Canada. Brian Handrigan with Telnet can provide you with information on products such as the modular-design SecureSync. I have copied him in on this response to you. He can be reached directly at (800) 561-4019 or bhandrigan@telnetnetworks.ca.

eLORAN (8134 will not likely compatible with eLORAN, even if this signal ever starts being transmitted)

- ➢ Per Tom Richardson, as of at least Dec, 2017, Loran-c was never turned back on and eLORAN is a "fantasy"

- ➢ Refer to http://www.ursanav.com/solutions/technology/eloran/

Model 8132 (Battery Pack for 8130) (discontinued

Note: This product is no longer available – no stock, no longer in production and no longer supported.

➢ Refer also to folder \\rocfnp02\idrive\Customer Service\EQUIPMENT\SPECTRACOM EQUIPMENT\8132

Product Discontinued December 1992

Note: *Refer to 8132 folder link above for the two docs referenced in email below*
Email from Tom Richardson (13 March KW) Found it. It's a battery pack. Good luck finding an 8131 manual. I think it was two 12 volt batteries wired as a 24 volt battery. I seem to remember them becoming rattles when we overcharged them.

8132 Manual/Schematic

➢ Refer to Salesforce Case 187862

➢ searched our website for 8132 manual with no hits (13 March 2019)

(11 March 2019 KW) I searched Engineering/Archive drive (Released and New Released folders) with no hits for this product.

(13 March 2019). Spoke to Ed O'Connor We loked through the 8130 manual but didn't see any refernce to 8132. I emailed Tom Richardson to see if he happens to have a copy of the manual, somewhere.
reply from Tom Richardson (13 March KW) Found it. It's a battery pack. Good luck finding an 8131 manual. I think it was two 12 volt batteries wired as a 24 volt battery. I seem to remember them becoming rattles when we overcharged them.

8132 Schematic : Note I found from forever ago "Schematic in 8131 manual"   (13 March 2019) 8131 manual not on our website and couldn't locate anywhere

Model 8131 (Frequency Standard Oscillator) (discontinued)

| Model 8163 WWVB Receiver/Comparator | Model 8131 Frequency Standard Oscillator | Model 8150 Phase Comparator |

➢ This device was a plug-in module for the Tektronics TM-500 series Mainframe

Requires: TEK TM500 mainframe.

Outputs: 0.1, 1, 5, 10MHz. Short-term stability: 2x10(-10). Front panel frequency control.

Model 8130 (Frequency Standard Oscillator) (discontinued)

Note: This product is no longer available – no stock and no longer in production!

Refer to: \\rocfnp01\idrivedata\Engineering\Archive\Released\003000 - 8130

➢ This device was a free-running 10 MHZ oscillator (not locked to an external reference – no WWVB input)
➢ User calibrates the oscillator using a front panel knob.

Manual on our website:
http://www.spectracomcorp.com/Desktopmodules/Bring2Mind/DMX/Download.aspx?EntryId=162&PortalId=0

Model 8121 (clock synthesizer) (discontinued)

Note: This product is no longer available and no longer supported.

- ➢ Refer to I:\Engineering\Archive\Released\8121

8120 (frequency synthesizer?) (discontinued)

Note: This product is no longer available and no longer supported.

- ➢ Link to 8120 manual and other documentation: I:\Engineering\Archive\Released\030000 - 8120

VO-100 (VO100) (discontinued)

- ➢ As of at least 10/5/2010, VO100 boards are no longer accepted back for repair, due to parts availability issues.

TEK products (Tek-100/ Tek-150/ Tek-200   (all Models are discontinued)

Note: This product line is no longer available and no longer supported – no stock and no longer in production!

Email from Jim Allocco to Spectracom France (5/16/11):
Frederic,
The TEK equipment has been scrapped we no longer stock or manufacture it.

- ➢ Link to TEK documentation in Engineering: I:\Engineering\Archive\Released\1149 - TEK

Kannad/McMurdo ELTs and EPIRBs

Shortcut to Kannad folder for manuals, FAQs and additional documentation

(13 March 2019) Contact info below is VER& old. Refer instead to Kannad/McMurdo contact info in:
..\CustomerServiceAssistance.pdf

Kannad Contact information (ELTs)

 In the US ??
 Bryan Hart dow
 North American Regional Sales Director, Kannad Aviation Products
 Bryan.Hart@spectracom.orolia.com |
 ~~Direct: +1.585-321-5874?)~~ Mobile: +1.503.997-4455

Kannad address:
ZI des Cinq Chemins - BP 23
56520 GUIDEL
France

Kannad tech support:
Main tech support email address: support.sar@kannad.com.

Main Tel: +33 2 97 02 49 00

Bruno Poyti (Customer Support) 9 011 33   02 97 02 49 35 (bruno.poyti@kannad.com)

Christelle Spennato
Customer Support Engineer
Kannad Aviation and Sarbe
Service Client Orolia SAS / Orolia SAS Customer Service
Tel +33 2 97 02 49 00

Isabelle Leromancer (Isa) +33 2 97 02 49 00 isabelle.leromancer@kannad.com

MCMURDO contacts (EPIRBs)
   Geoff Sargent (Customer Service Manager) sargeo@mcmurdo.co.uk

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SOFTWARE/OPERATING SYSTEMS

VxWorks

VxWorks appears to accept an NTP time stamp, even if the NTP server is at Stratum 16

   ➢ Refer to Salesforce case 5840 for Masataka with TOYO

(Email from Masataka 7/6/12, regarding VxWorks version 5.5.1)
Symptom] When an NTP request is sent from the Client (a PC whose OS is "VxWorks") to the SecureSync which is at Stratum 16, the software on the Client says that the Client is in synchronization with the SecureSync, although the Client should not synchronize with the Client when the SecureSync is at Stratum 16.

Keith's comment: We report the Stratum value as "0" when we are at Stratum 16. Stratum "0" indicates an invalid NTP packet. If the VxWorks NTP Client is still accepting these time stamps, they are not correctly following the NTP specifications.

Tech support for VXWorks

Refer to: http://www.windriver.com/support/

VMWare

Maximum time correction when syncing VMWare

I found two different websites that I believe explain why you are having difficulty syncing it, and are getting the error message you observed. In summary, apparently VMware software has a maximum limit on how much time correction that can be made.   It's time apparently has to be within 1000 seconds (less than 17 minutes) of the correct time (the time of the SecureSync) or it won't sync to the NTP server. You will likely need to manually change the time to bring it closer than 17 minutes of the correct time;

Below are the two websites I found that provided this information, along with the information from each site (see especially the bolded sentences):

1) http://andywolf.com/vmware-vsphere-5-ntp-settings-not-syncing/

I was setting up a new vSphere 5 environment on some HP DL380 G7's in one of our remote offices and I needed to configure NTP on the hosts. It is critical that the servers have the correct time, especially if you are virtualizing DC's. Even if you are not syncing time with the host, if the clock on the physical hardware is incorrect, it can cause a real mess if you reboot a DC and it initially has the system time of the physical hardware.

Please review my previous post VMware Guest Time Issue. It is unrelated to this, but still VERY important.

I configured NTP on my hosts and kept waiting for the service to sync the time. I wanted to see that NTP was working. I verified that the firewall had the appropriate rules, but for some reason it was not updating the time. I ran some commands in PuTTY and still could not get these hosts to sync their time! Take a look at the screenshot below:

Notice that the current date was 1/26/12, but the system time was 7/19/11**. I discovered on the VMware forums that the maximum correction time for NTP is 15 minutes.** I set the time to about 3-5 minutes behind the current time and within an hour or so the time was sync'd up to the correct time.

2) http://bsmith9999.blogspot.com/2010/11/esxi-ntp-not-syncing.html

ESXi NTP not syncing

What I found was that NTP has a default maximum correction of about 1000 seconds. **I had this same issue, but if I set the clocks 3-4 minutes off, they would auto correct within about 15 minutes**. Using ESXi 4.1, almost none of the ntpd commands gave me any output, but I was able to see the corrections happening in the /var/log/messages.

The above links and information on maximum time correction should help you resolve the issue you are seeing with syncing VMWare. If not though, below are a few other sites I found that may also help:

http://www.vmware.com/files/pdf/Timekeeping-In-VirtualMachines.pdf

http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1003063

http://www.chriscolotti.us/vmware/gotcha-the-importance-of-ntp-to-vmware-vcloud-director/

http://communities.vmware.com/thread/264640

http://communities.vmware.com/thread/81298

http://communities.vmware.com/message/413491

Solaris OS

Only way to sync Solaris is via an NTP time server. Can't use a TSync-PCIe timing board, unless the customer writes their own software that allows NTP to get time from the installed TSync-PCIe board. The Solaris drivers do not support the NTP patch.

NOTES

Only the Linux driver for TSync-PCIe boards contains the NTP patch for syncing the machine to an installed TSync-PCIe board. The TSync (and TSAT) Solaris driver does not provide this patch for NTP, so we don't provide the means for a Solaris machine running NTP to obtain time stamps from the TSync-PCIe/ TSAT timing boards. However, with NTPv4 software installed, the machine can still sync to a networked NTP server (such as SecureSync).
Spectracom TimeKeeper software is not compatible with Solaris- it is only compatible with Linux.

_____

Cisco Routers

The following is information received from Joe Carvalho from SAVVIS Communications (Jan 06) that is above and beyond the Cisco documentation regarding Cisco routers syncing to NTP using MD5 authentication. He used this to get the routers to synchronize.

Cisco router configuration;
ntp authentication-key 5 md5 some_secure_key   *(defines key 5 and key)*
ntp authenticate   (*tells the router/switch to use MD5 authentication*)
ntp trusted-key 5   *(tells the router/switch to trust key 5)*
ntp source loopback0   (defines a source interface. Loopback could be used if 2 paths are available)
ntp update-calendar   *(tells the router to update its calendar using NTP time)*
ntp peer 1.1.1.1 key 5   *(defines the "peer" to get time from and tells it to use key 5)*

Linux NTP with MD5 configuration;

Ntp.conf file;
Prohibit general access to this service.
restrict default nomodify notrap noquery
Permit all access over the loopback interface. This could
be tightened as well, but to do so would effect some of
the administrative functions.
restrict 127.0.0.1
--- OUR TIMESERVERS -----
or remove the default restrict line
Permit time synchronization with our time source, but do not
permit the source to query or modify the service on this system.
restrict mytrustedtimeserverip mask 255.255.255.255 nomodify notrap noquery
server mytrustedtimeserverip
server 1.1.1.1 prefer key 5
driftfile /etc/ntp/drift
broadcastdelay 0.008
authenticate yes
enable auth
trustedkey   5
keys   /etc/ntp/keys

Keys file;
PLEASE DO NOT USE THE DEFAULT VALUES HERE. Pick your own, or remote
systems might be able to reset your clock at will. Note also that
ntpd is started with a -A flag, disabling authentication, that

will have to be removed as well.
#
#65535 M   akey
#1   M   pass
5   M   some_secure_key

Joe Carvalho
Senior Architect
SAVVIS Communications
14901 FAA Blvd.
Ft. Worth, TX 76155
Tel. (817) 835-4313
Cell. (469) 544-5311
Yahoo IM. carvalho_m_joseph

Desire to use redundancy- *If a site desires redundancy for time sync on a network:*

Windows NT
TIMESERV DOES NOT SUPPORT THE USE OF REDUNDANT ETHERNET TIME SERVERS
Two Netclocks providing RS-232 to a Timeguard. The RS-232 output of Timeguard goes to a NT server. The NT server runs Timeserv. All other NT machines also run Timeserv. (TimeGuard is the single point of failure).
OR
Run two 8188's or two 8189's to a hub on the same network.
Instead of running Timeserv, download SHAREWARE SOFTWARE version of **YATS 32** *program from Tucows.* http://www.tucows.com/preview/195342.html **_(Spectracom does not provide tech assistance)_**

OR

*NTP 4 has been ported to Windows NT***. NTP 4.X** *for Windows does support multiple time servers. It is a free download. . Refer to the following web-site for info.* http://www.eecis.udel.edu/~ntp/ntp_spool/html/hints/winnt.htm**. (Spectracom does not provide tech assistance).**

OR

Dimension 4 *freeware software download. Refer to* http://www.thinkman.com/dimension4/ *. This is a free download from the Internet.* **. (Spectracom does not provide tech assistance).**

OR

Net Time program from SourceForge.

G) Windows 2000/2003

Windows 2003 seems to sync once but fails to sync after that

From a customer email "According to Microsoft, the article we followed to allow Windows 2003 to sync with an external time source puts the Windows 2003 in **symmetric active mode.** Microsoft sent Bob an article that refers to an issue with an external non-Windows NTP Server where Windows has to be in **client mode**.

Here are the two articles: The new one they sent yesterday has the NtpServer setting in the registry changes from **<ip address of 8188>,0x1** to **<ip address of model 8188>,0x8**; apparently the difference between **symmetric active mode** and **client mode**."

Apparently, there is an issue with Win2003 that causes the registry value of **<ip address of model 8188>,0x8** (After it is manually changed from the default of **<ip address of 8188>,0x1)** to change back to default value intermittently. If it goes back to the value of "0x1".

A possible fix is to add the comment of ,**0x8** to the end of the IP address. It appears that Win2003 uses the first "0xx"value and doesn't care that the "real" "0x" value is later on. In their registry they may see either of these in the registry entry intermittently, and it will still sync to the Time Server:
<ip address of model 8188>,0x8 0x8
<ip address of model 8188>,0x8 0x1

\

Link to good Microsoft document regarding Windows 2003 changes for NTP
http://www.microsoft.com/technet/prodtechnol/windowsserver2003/library/TechRef/71e76587-28f4-4272-a3d7-7f44ca50c018.mspx

3 WAYS TO SYNC
- Use an 8188 and provide each Win2000 machine with the IP address. (Run W32Time on each machine).

- Sync a non-Win2000 machine on the network (i.e. Win NT 4.0 or higher workstation/server and have Win2000 get its time using W32Time from that machine.

W32Time Network Time Service (built-in software)
- Built-in to WinNT and Win2000 operating systems.
- Used to sync all Win NT or Win2000 machines on the Network.
- Can only accept RS-232 if using the NTM5 or DTM5 program. (See above). Otherwise it will only accept an IP address using NTP. Win32 DOES NOT allow the use of RS-232 to sync Win2000.

Change the desired Time Format display from 12 hour to 24 hour

To change the time display on a Windows PC from 12 hour to 24 hour mode, go to Control Panel to "Regional and Language options". Click on the "Customize" button and then click on the "Time" tab.

W32TIME DOES NOT SUPPORT MULTIPLE NTP SERVERS.

Two Netclocks providing RS-232 to a Timeguard. The RS-485 output of the Timeguard goes to a Model 8188 server. This provides redundant input to the Model 8188 (The Model 8188 is the single point of failure).

<div align="center">OR</div>

Run two 8188's or two 8189's to a hub on the network.
Instead of running Timeserv download SHAREWARE SOFTWARE version of **YATS 32** program from Tucows.
http://www.tucows.com/preview/195342.html **(Spectracom does not provide tech assistance)**

<div align="center">

OR

NTP 4.X *has been ported to Windows 2000. Refer to the following web-site for* *info.* *http://www.eecis.udel.edu/~ntp/ntp_spool/html/hints/winnt.htm* **(Spectracom does not provide tech assistance)**

OR
*GREYWARE software package from Spectracom*

Dimension 4 appears to only work with Windows NT only. It will not work with Windows 2000.

</div>

Redundant time servers: If more than one NTP time server is available on the network, it is possible to point the 2003 or XP (SP2 or higher) PC(s) to all of the NTP time servers for redundancy (backup capability). This requires manually editing the System Registry's "NTPServer" value. Microsoft documentation states that a comma should be placed between the IP address of each NTP server. The command prompt window does not allow for a space between each address, even though W32Time also requires a space between each IP address. Since the space can't be entered via the command prompt window, the space needs to be manually entered into the "NTPServer" System Registry value.

Important note: Editing the System Registry can potentially cause problems with Windows operation. System Registry should always be backed up prior to performing edits directly in System Registry. Refer to Microsoft instructions on editing System Registry.

To add additional NTP time servers for redundancy:
  ➢ Go to Start/ Run and type "regedit" to open System Registry.

  ➢ Browse to: KEY_LOCAL_MACHINE/SYSTEM/CONTROLSET001/SERVICES/W32TIME/PARAMETERS

  ➢ Click on "NTPServer".

  ➢ In the "Value data" field for NTPServer, place a comma and space after the first NTP Server address and then enter the IP address of the second reference time server. Repeat this process for all additional and available NTP Servers with a comma and space between each IP address. Refer to **Error! Reference source not found.** f or an example.
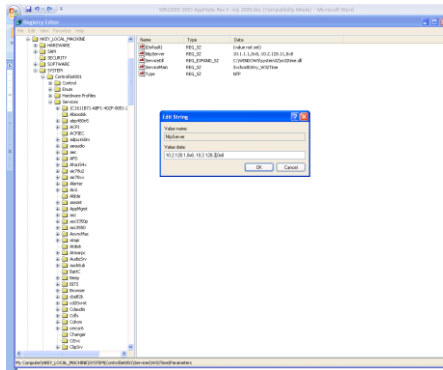
UNIX

- ➢ by default, NTP and XNTP software can use multiple NTP servers. TimeWatch software (No longer available) does not accept NTP interface (RS-232 only).

AS-400

- ➢ IBM SNTPE Client software supports multiple NTP servers.

The AS-400 can be used in conjunction with the H T E CAD system, New World CAD system, proprietary CAD software OR without any CAD software running on it (non-CAD applications)

No CAD software installed- Use IBM software to sync the CAD
Contact Ray Harney at 507-253-4955
They have two software packages available- one for NetClock (RS-232) and the other is SNTPE Client (for 8188/8189)
Requires use of Serial port (with NetClock package) or Model 8188 or 8189 (with SNTPE Client package).

Part of a CAD
H T E and New World CAD are the only two that I am aware of.
Refer to appropriate CAD vendor sheets in CAD section for info.   (The CAD will supply necessary software).
If proprietary CAD software – treat as NO CAD software installed (above)

DTM and NTM SOFTWARE

Software is from IDS.
Fax number (818) 223-3340
Email address is www.idsus.com

DTM5/NTM5

- Replaces NTM4. Syncs Novell Workstation which syncs rest of network.   No longer uses Netclock.NLM. Will also do same functions as DTM5.

- Will sync one designated Server (you tell it which server to sync). Software resides on a workstation which has to be kept up and running. Rest of the Novell Network uses Timesync.NLM software built-in to Netware 5.

- Software is downward compatible with Novell 4. We sync a Workstation and designate a Server to sync. Then, the Network administrator will set up the built-in time service to sync the rest of the network.

- To manually set time on a Novell server-use command line "set time" and type in the time.

- Will sync either one Win2000 workstation OR one Win2000 stand-alone only.

    - **NetClock**: Data Format 2 only, off of the Serial port

    - **TimeTap**: Data Format 0 or 1, off of a TimeTap

- Replaces DTM3 for Win 95 Win98 NT standalone. FOR WINDOWS- NOT NOVELL.

- Will sync Windows 2000 server OR Windows 2000 workstation (Stand-alone ONLY).

- NetClock program requires Format 2 only and requires Serial port

  TimeTap program requires Format 0 or 1 and requires use of a TimeTap.

3-15-2006 DL – Jim Arcaro installed NTM5 on a win/2003 server and it was able to sync.
- KW-   I personally installed DTM5 on a Win2003 server borrowed from IT and it was able to sync.

Operation on a Windows 2003 PC

Email from Curtis Mathews of IDS on 8/25/04
We can only certify that our products are compliant with the operating
systems they were developed under, unless further development or testing
is requested with the newer operating system by the customer.

We currently don't know of any reasons why these products would not be
Windows 2003 compliant, however it would be impossible to say for sure
until it the product was fully tested in the new environment.

Please let us know if you need our assistance in this process.

Thank You,
Curtis

Leap Second affects RS-232 input

Jim Arcaro noticed that the PC running DTM software stopped syncing on December 1st of a month where a leap second was being added. The Format 0 time stamp adds an indication of the pending leap second, which apparently the DTM/NTP software was not designed to handle. This software is very old and not worth changing.

Novell

Netware 4 (Novell 4)– Requires NTM5 software to sync a workstation which then syncs a server. NTM5 software will not sync a server directly. EED says we can sell NTM4 at the old price if we need to sync a server directly. Netware 4 DOES NOT support NTP (8188 or 8189). (Refer to NTM4 and NTM5 below).

Netware 5 (Novell 5)- Can use NTP (8188 or 8189) using built-in software OR can use NTM5 to sync a workstation which then syncs a server. EED says we can sell NTM4 at the old price if we need to sync a server directly (Refer to NTM4 and NTM5 below).

NTM4

Current version is our version 5.1 (IDS version in readme.txt says 1.06)
Fixes problem with DST bug in NLM (early time change) and bug with the 8183 interface.
  - ➢ Older software needs to be upgraded to be compliant with Netware 5. We can send upgrade. Cut-in was around 5/99.
  - ➢ Use Format 2 to sync server. Make sure to enable DST and TZO to ensure DST occurs at the proper time.

    To manually set time on a Novell server-use command line "set time"

NTM 4 (NetClock- NLM)

Versions before 1.06 do not work properly during the Daylight Saving Time (DST) change when a NetClock/GPS is used.
Versions before 1.05 do not work properly with NetWare 5.
Versions before 1.04 had problems with some newer AIO, AIOCOMC and CLINB files.
Because of a bug I Netware 3.xx, the screen clock may show the wrong time for one hour during DST. The server time, however, is correct.
Version 1.00 had a problem in some setups that could occur on New Year's Eve and when DST took effect.

NTM 4 (NetClock-EXE)

NetClock.exe and TimeTap.exe do not work with Windows 98.
Version 2.10 had an error when both Auto DST enabled which would cause the time to be 1 hour fast under certain circumstances.

Note: The workstation where you are running this program must be logged in as a user with console rights in order to use this program to the File Server's clock.

NTM 4 (TimeTap-EXE)

NetClock.exe and timeTap.exe do not work under Windows 98.
All versions before 2.20 had a possible problem after year 2000.

Ports.exe

  - ➢ Utility program included to help tech staff solve problem installing a Net/2.

DTM3 software

- ➢ DOS/Win95 software.
- ➢ NOT compliant with Win 98
- ➢ Being replaced by DTM5 for everything except DOS and Dictaphone 6600.
- ➢ Daylight Savings Time correction when using Fmt 2
  - ▪ Enable auto DST correction in DTM3 software
  - ▪ Must set DST rule for Fmt 2 to 1 so that the DST character changes from D to S and not always an

NetClock.exe and TimeTap.exe do not work in Windows98.

All versions before 2.20 had a possible problem after the year 2000.

H) WINDOWS 2000/2003

Refer to the Windows 2000-2003 Ap Note in the Customer Service folder and on our website.

I) UNIX Operating System

For systems like IBM AIX, IBM RSC-6000, Sun Solaris and any other Unix based systems.

web-site address for NTP information **http://www.ntp.org**
used to be http://www.eecis.udel.edu/~ntp/ provides EXCELLENT info on NTP
Two options to sync: Either XNTP4 or TimeWatch.   Refer to sheets for specific info.
Our web-site has Hotlink to info about program and driver.

Can use RS-232 interrogation 9600 baud Format 0 (BOTH XNTP OR TimeWatch) or 2 OR NTP from Model 8188/8189 (xntp3 only-not TimeWatch). If they use RS-232, use the type 4 driver for Spectracom (IP address of 127.127.4.*u,* where u indicates the number of redundant servers on the Network (i.e. the number of NetClocks on the network). XNTP has very little tech support. Have to post a question on a talk-group for help.
Refer to pages in software section for more information.
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