EPSILON CLOCK
MODEL EC20S
USER'S MANUAL

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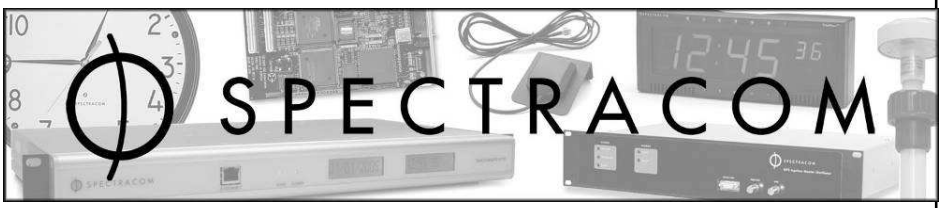


www.spectracomcorp.com
www.spectracom.fr
Ref. Number 170142-A1
Manual Revision A1
09 December 2008

SPECTRACOM LIMITED WARRANTY

LIMITED WARRANTY

Spectracom warrants each new product manufactured and sold by it to be free from defects in software, material, workmanship, and construction, except for batteries, fuses, or other material normally consumed in operation that may be contained therein AND AS NOTED BELOW, for five years after shipment to the original purchaser (which period is referred to as the "warranty period"). This warranty shall not apply if the product is used contrary to the instructions in its manual or is otherwise subjected to misuse, abnormal operations, accident, lightning or transient surge, repairs or modifications not performed by Spectracom.

The GPS receiver is warranted for one year from date of shipment and subject to the exceptions listed above. The power adapter, if supplied, is warranted for one year from date of shipment and subject to the exceptions listed above.

THE TIMEVIEW ANALOG CLOCKS ARE WARRANTED FOR ONE YEAR FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

THE TIMECODE READER/GENERATORS ARE WARRANTED FOR ONE YEAR FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

THE WIRELESS CLOCK SYSTEM TRANSMITTERS AND/OR TRANSCEIVERS AND CLOCKS ARE WARRANTED FOR TWO YEARS FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

THE EPSILON CLOCKS, BOARDS, AND SYNCHRONIZATION UNITS ARE WARRANTED FOR TWO YEARS FROM DATE OF SHIPMENT AND SUBJECT TO THE EXCEPTIONS LISTED ABOVE.

The Rubidium oscillator, if supplied, is warranted for two years from date of shipment and subject to the exceptions listed above.

All other items and pieces of equipment not specified above, including the antenna unit, antenna surge suppressor and antenna pre-amplifier are warranted for 5 years, subject to the exceptions listed above.

WARRANTY CLAIMS

Spectracom's obligation under this warranty is limited to in-factory service and repair, at Spectracom's option, of the product or the component thereof, which is found to be defective. If in Spectracom's judgment the defective condition in a Spectracom product is for a cause listed above for which Spectracom is not responsible, Spectracom will make the repairs or replacement of components and charge its then current price, which buyer agrees to pay.

Spectracom shall not have any warranty obligations if the procedure for warranty claims is not followed. Users must notify Spectracom of the claim with full information as to the claimed defect. Spectracom products shall not be returned unless a return authorization number is issued by Spectracom.

Spectracom products must be returned with the description of the claimed defect and identification of the individual to be contacted if additional information is needed. Spectracom products must be returned properly packed with transportation charges prepaid.

Shipping expense: Expenses incurred for shipping Spectracom products to and from Spectracom (including international customs fees) shall be paid for by the customer, with the following exception. For customers located within the United States, any product repaired by Spectracom under a "warranty repair" will be shipped back to the customer at Spectracom's expense unless special/faster delivery is requested by customer.

Spectracom highly recommends that prior to returning equipment for service work, our technical support department be contacted to provide trouble shooting assistance while the equipment is still installed. If equipment is returned without first contacting the support department and "no problems are found" during the repair work, an evaluation fee may be charged.

EXCEPT FOR THE LIMITED WARRANTY STATED ABOVE, SPECTRACOM DISCLAIMS ALL WARRANTIES OF ANY KIND WITH REGARD TO SPECTRACOM PRODUCTS OR OTHER MATERIALS PROVIDED BY SPECTRACOM, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Spectracom shall have no liability or responsibility to the original customer or any other party with respect to any liability, loss, or damage caused directly or indirectly by any Spectracom product, material, or software sold or provided by Spectracom, replacement parts or units, or services provided, including but not limited to any interruption of service, excess charges resulting from malfunctions of hardware or software, loss of business or anticipatory profits resulting from the use or operation of the Spectracom product or software, whatsoever or howsoever caused. In no event shall Spectracom be liable for any direct, indirect, special or consequential damages whether the claims are grounded in contract, tort (including negligence), or strict liability.

EXTENDED WARRANTY COVERAGE

Extended warranties can be purchased for additional periods beyond the standard five-year warranty for those products covered under five-year warranty. Contact Spectracom no later than the last year of the standard five-year warranty for extended coverage.

Table of Contents

1 Introduction

1.1 Safety Precautions

- **Before switching on** the unit, ensure that it is compatible with the local mains supply. (Refer to *Setting the EC20S Into Operation*).
- The plug must be inserted into a socket with earth connection. The safety connection must not be broken by using an extension cord without earth conductor.
- Before switching on the unit, if the unit is connected to measurement or control circuits, protective earth terminal(s) shall be connected to a protective conductor.
- If measurement or control circuits are without earth-ground protection terminal(s), the mains plug shall be inserted before connections are made to measurement or control circuits.

WARNING:

If the protective conductor's path to ground is broken or defeated, the danger of electrical shock to the operator may be present. Never break the connection on purpose.

Before disconnecting the unit from the main power supply, always switch it off. Failure to do may cause damage that voids your Spectracom warranty.

1.2 Safety during Adjustments, Maintenance, and Repair

When the unit is connected to the power supply, it may be dangerous to touch the terminals and parts that may be exposed when opening covers or removing components (except for plug-in components).

The unit must be disconnected from all power sources before carrying out any adjustments, replacements, maintenance, or repair.

When it is unavoidable to open the unit for maintenance and repair, such operations should be carried out only by qualified personnel who are properly informed of the hazards involved.

Only fuses with a suitable rating and of the specified type are to be used for replacement purposes. It is prohibited to use fuses that have been tampered with, or shorted fuse-holders.

For special hot plugging removal, please follow the instructions *Maintenance*.

WHENEVER IT IS LIKELY THAT PROTECTION HAS BEEN IMPAIRED, THE APPARATUS MUST BE SWITCHED OFF, DISCONNECTED, AND SECURED AGAINST ANY UNINTENDED OPERATION.

1.3 Inventory

Before installing your Spectracom product, please verify that all material ordered has been received. If there is a discrepancy, please contact Spectracom Customer Service. Customer service is available by telephone at +33 (0) 1.64.53.39.80 (France), or +1.585.321.5800 (United States). Updated contacts information are available on web site, see “Support” page.

CAUTION:  *Electronic equipment is sensitive to Electrostatic Discharge (ESD). Observe all applicable ESD precautions and safeguards when handling the Spectracom equipment.*

NOTE: If equipment is returned to Spectracom, it must be shipped in its original packing material. Save all packaging material for this purpose.

The basic shipment includes the following items:

- EPSILON EC20S Base Unit
- One AC lead
- One DC connector kit
- User’s Manual

1.4 Inspection

Unpack the equipment and inspect it for damage. If any equipment has been damaged in transit, please contact Spectracom Customer Service. Customer service is available by telephone at +33 (0) 1.64.53.39.80 (France), or +1.585.321.5800 (United States). Updated contacts information are available on web site, see “Support” page.

1.5 General Description

The EPSILON CLOCK MODEL EC20S is a GPS Clock, providing the best cost-effective solution for reliable, and 24-hour-a-day, uninterrupted applications. The EC20S is particularly well-suited for broadcast operators requiring high quality, reliability and availability.

The Spectracom EC20S is well dedicated to digital broadcast applications using SFN (Single Frequency Network) mode. The EC20S gives the high reliability required at any step of the network, from SFN adapters to high and medium power transmitters and gap fillers.

The EPSILON CLOCK MODEL EC20S provides accurate time and frequency synchronization.

Key parameters are:

- High performance OCXO or Rubidium oscillator disciplined by GPS through Epsiltime© smart predictive slaving algorithm
- High performance holdover stability (2.10^{-10}/day)
- AC and DC power supply redundancy
- Up to 10 x 1 PPS outputs
- Up to 10 x 10 MHz outputs
- 1 PPS and 10 MHz signals are phased locked, which helps prevent phase jump and wander between time and frequency signals
- Remote management by SNMP/HTTP, through Ethernet port

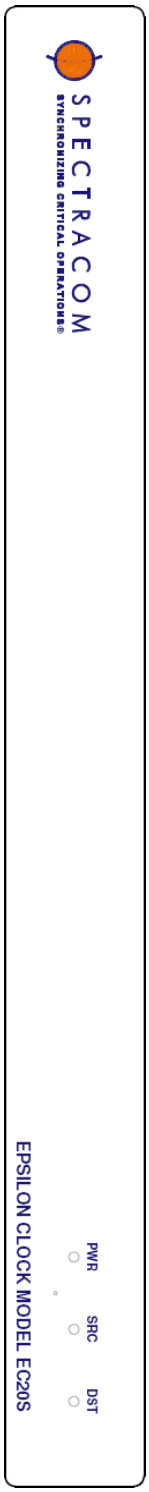
1.6 Integrated Remote Control Interface

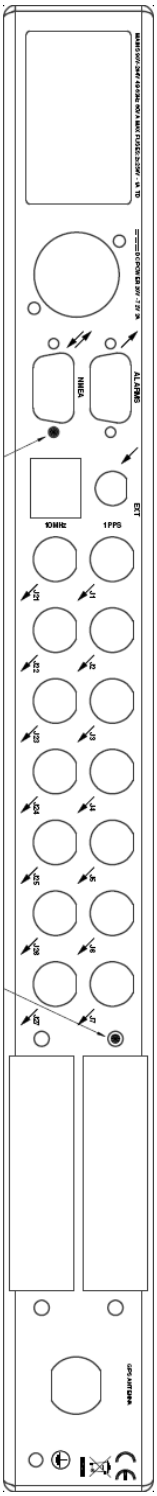
The EC20S contains an Ethernet IP interface so that it can be fully controlled from a remote location.

The EC20S includes its own HTTP web server so that a simple navigator is sufficient to configure and retrieve status from the equipment. Application and system software release is also possible through this interface.

Moreover, network supervision can be achieved with SNMP protocol, especially traps sent to a programmable IP address.

1.7 Front and Rear Panels





1.7.1 EC20S Front Panel

1.7.1.1 Front Panel LEDs

POWER – 'PWR'	
Indicator of AC and DC power supplies status.	
Red blinking	Indicates Initialisation of product.
Red	Indicates general fail of product.
Yellow	Indicates the missing of one power supply.
Green	Indicates presence of all power supplies.

SOURCE – 'SRC'	
Indicates the current status of the enabled synchronization source (GPS, External synchronization source).	
Red	No synchronization source is present
Yellow	One or more synchronization source are not present. The unit use present source.
Green	All synchronization sources are present.

DISTRIBUTION – 'DST'	
Indicates the current status of the distributed 1PPS and 10MHz.	
Red	No distribution or error on 1PPS and 10MHz outputs.
Yellow	Distributions of signals are provided without accuracy.
Green blinking	Distributions of signals are provided with accuracy. The blinking is synchronised to 1PPS.

On normal operation, all LEDs should be green. Only available synchronization sources should be enabled. Only available power alarms should be enabled.

1.7.1.2 Set IP Button

SET IP	
Micro-Switch	Press this button more than 2 seconds to re-initialize product with a static IP address.

1.7.2 EC20S Back Panel Connectors

Connector	Type	Description
AC POWER	IEC 320 – C14	AC power entry with integrated fuse.
DC POWER	XLR circular	DC power supply input.
10MHz (7 + option 3)	50 Ω BNC	Distributed sinus frequency outputs.
1PPS (7 + option 3)	50 Ω BNC	Distributed One Pulse Per Second outputs.
External 1PPS	50 Ω BNC	External input for a 1PPS Synchronization source.
Ethernet 10/100 BaseT	50 Ω BNC	Network connectivity.
GPS Antenna	50 Ω N	Antenna inputs for GPS receiver and remote active antenna 5VDC supply.
ALARMS	SUBD-9	Dry contacts for alarms.
NMEA - TIME message Output	SUBD-9	RS232 for Time message output.
GROUND		Casing grounding.

1.8 Dimensions and Weight

Width: 19" (441 mm), without bracket
Height: 1 U (44 mm).
Depth: 340 mm.
Weight: <4.7 kg.
Compatibility: 19" rack

The EC20S unit is compatible with 19" racks and can be mounted with slides. Screws to fix the slides on the equipment sides are provides with the equipment.
Use Slides Accuride, part number: DZ 2907-0020 Hub 559mm.

1.9 Operating Environment

- Operating temperature:
  With OCXO: -5 to 60℃
  With Rubidium Oscillator: -5 to 50℃
- Storage temperature: -40 to 85℃
- Relative humidity: 95 % non-condensing

1.10 Power Supply

1.10.1 DC Power Supply Input

- Nominal DC input voltage conditions: 20 to 72 Volts DC
- Maximum Total Power consumption: < 55 W

- Protection against polarity reversal
- -48V and 0V DC input wires are not ground referenced
- Protected by a PolySwitch fuse (automatically rearmed)
- Detection of power input presence on connector, information available with remote control software, threshold level of detection between 20 and 25 Volts

1.10.2 AC Power Supply Input

- Nominal AC input voltage: 90 to 264 Volts AC / 48 to 63 Hz
- On switch: 2 fuses: D1TD 1A 5x20
- Detection of power input presence on AC/DC converter, information available with remote control software

1.10.3 Redundancy

Power supply redundancy: between AC and DC converters.

If the AC Input power supply is present, DC input is internally disconnected. If AC input fails, DC input switches over to supply the equipment.

1.11 Terminology

DHCP	Dynamic Host Configuration Protocol.
GPS	Global Positioning System.
OCXO	Oven Controlled XTAL (Crystal) Oscillator.
Rb	Rubidium oscillator.
S/A	Selective Availability.
SFN	Single Frequency Network.
TRAIM	Time Receiver Autonomous Integrity Monitoring.
UTC	Universal Time Coordinated.
1PPS	One Pulse Per Second.
1 PPS driver	Pulse signal obtained through division of the frequency driver
Holdover	If the reference input signal is lost, the EPSILON CLOCK® maintains the generation of information and of time and frequency signals.
Reliability	Concerns the positioning mode of the antenna. In automatic mode, the EPSILON CLOCK® calculates the position of the antenna and, after testing the result, imposes the reliable position on the internal GPS receiver. The receiver therefore functions in GPS 0D reception mode. The EPSILON CLOCK® is synchronized by following at least one satellite.
Frequency driver	Frequency signal generated by the built-in oscillator.
Reference input	Time and frequency source used by the EPSILON CLOCK®.
IERS	International Earth Rotation Service.
MAC	Medium Access Control.
MIB	Management Information Base.
NTP	Network Time Protocol.
SNMP	Simple Network Management Protocol.
NMEA	National marine Electronics Association.
IRIG	Inter Range Instrumentation Group.

2 Technical Features

2.1 Timing Reference Generation and Characteristics

The following characteristics are minimum values. Enhanced performance options are available.

2.1.1 GPS Reception

- Connector: Antenna female 50 Ω (type N)
- 2 x L1 GPS C/A code
- Power supply to active antenna: 5V/80mA max
- Fold Back protection: The power supply is cut in the event of a short-circuit in the antenna input

2.1.2 1PPS External Synchronization Input

- TTL level
- Input impedance: 50Ω
- 50Ω BNC connector
- Active rise edge (high level duration 100µs minimum)
- Minimal Accuracy to UTC: ±50ns (1σ)

CAUTION:

If the External Synchronization Input do not have the required minimum characteristics, the global performance of the EPSILON CLOCK MODEL EC20S will decrease dramatically.

2.1.3 Phase Lock-in at Power-up

2.1.3.1 Warming-up

- Warm-up time for the local oscillator before tracking search: 5 minutes
- A subsequent fast tracking search brings the oscillator frequency close to the reference input signal frequency

2.1.3.2 Lock-in Time with GPS signal

- Output wander compatible with EN 300 462-4-1 (4.1) fig. 1 in:
  600 s max after warming-up
- Optimum stabilization after 2 hours
- Total locking time after power-up: < 30 minutes if not a first time power-up

2.1.4 10MHz Output

- Number of outputs: 7
- Port type: 50Ω BNC coaxial.
- Level: 12±2dBm, with a 50Ω load.
- Type: Sinewave signal, -40dBc harmonic distortion.

2.1.4.1 Phase Noise

- Typical, static conditions:
  With OCXO:

10Hz	-120dBc/Hz
100Hz	-135dBc/Hz
1kHz	-145dBc/Hz
10kHz	-150dBc/Hz
100kHz	-150dBc/Hz

  With Rubidium oscillator:

10Hz	-110dBc/Hz
100Hz	-130dBc/Hz
1kHz	-140dBc/Hz
10kHz	-145dBc/Hz
100kHz	-145dBc/Hz

2.1.4.2 Holdover Mode

- According to EN 300462 – 4 – 1 (§9.2) (Transmission and Multiplexing (TM) - Generic requirements for synchronization networks).
- Stability $< \pm 2x10^{-10}$/day with OCXO.
  $< \pm 5x10^{-11}$/day with Rubidium oscillator.

2.1.4.3 Short Term Stability (Allan Variance)

- With OCXO:
  - 1s: $1x10^{-11}$
  - 10s: $3x10^{-11}$
  - 100s: $3x10^{-11}$

- With Rubidium oscillator:
  - 1s: $3x10^{-11}$
  - 10s: $1x10^{-11}$
  - 100s: $3x10^{-12}$

2.1.4.4 Temperature Stability

- With OCXO:
  - Peak to peak, from 0 to 60°C: $1x10^{-9}$
- With Rubidium Oscillator:
  - Peak to peak, from 0 to 50°C: $1x10^{-10}$

2.1.5 1PPS Output

- Number of outputs: 7
- Port type: 50Ω BNC coaxial
- Level: TTL/5V, with a 50Ω load.
- Accuracy to UTC, GPS locked: ± 25ns (1σ).
- Accuracy to UTC instantaneous (phase locked): ± 35ns max.

With OCXO:

Holdover (constant temperature, 24 hours GPS locked)	
after 4 hours	0.8 µs
after 1 day	10 µs

With Rubidium:

Holdover (constant temperature, 24 hours GPS locked)	
after 4 hours	0.3 µs
after 1 day	2 µs

2.2 Auxilliary Connector Signals

2.2.1 Alarms

- Number of Relay contact: 2
- Maximum switching power: 30 W, 62.5 VA (resistive load)
- Maximum switching voltage: 110 VDC, 125 VAC
- Maximum switching current: 1 A
- Port type: 9-pin female SUB-D

2.2.2 NMEA

RS232 output for Time of Day (TOD) information.

- NMEA mode: Asynchronous RS232C, 9600 bauds, 8 bits, 1 stop bit, no parity.
- Port type: 9-pin female SUB-D

2.3 Network Connectivity

2.3.1 Ethernet Interface

- Port type: RJ45 connector
- Interface: 10/100 BaseT signal

2.3.2 IP Address Assignment

- DHCP automatic assignment
- Or fixed IP address

2.3.3 Protocols

- Transfer Control Protocol and Internet Protocol (TCP/IP).
- IP address setting: DHCP protocol.

The EC20S includes a web pages server with HTTP protocol for configuration and status.

Configuration and status parameters are manageable through SNMP protocol. The MIB includes a sub-set of configuration and status parameters. SNMP traps are sent to the network on event trigger.

2.4 Control PC for Web Interface

- OS: Windows or Linux
- Internet Browser: Tested with Firefox 1.5 and Microsoft IE6.

2.5 Electromagnetic Compability

Complies with the requirements of the standards:

- EN 300386 V1.3.1 ed 2001:
  Electromagnetic compatibility and radio spectrum matters (ERM) – telecommunication network equipment - electromagnetic compatibility (EMC) requirements.
- EN 61000-6-1: ed 2001:
  Generic standards - Immunity for residential, commercial and light-industrial environments.
- EN 55022 ed 1998+ A2 ed 2003 Class A:
  Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement.

2.6 Safety

- EN 60950:
  Safety of Information Technology Equipment.

3 Putting the EC20S into Operation

The EC20S can be installed in a rack or used as-is.

3.1 Preliminary Connections

Before starting the EPSILON CLOCK MODEL EC20S, perform the following tasks:

- **Leave free space of a few centimeters under the unit, in order to facilitate natural air flow from bottom to top of the EPSILON CLOCK MODEL EC20S**.
- Connecting cables for signals and power supply should be secured to locks provided for this purpose.
- Connect the GPS antenna (refer to *GPS Antenna Installation*).
- Connect a ground lead from the earth pin on the EC20S back panel to the frame of the rack.

3.2 Powering Up

The EC20S can be powered from an AC source, from a DC source, or from both.

For full redundancy, connect DC power cables to the DC connector and AC power cable to the AC connector. Checks the polarity of the power signal before connecting it (refer herein and to back panel labels for the pin-out).

Power-up is immediate when connecting DC power with the cable, while AC power must be switched on.

- During power-up, check the initialization sequence process on the LED.

For a standard configuration (GPS reference), after the system initialization sequence, the GPS receiver locks to the satellites (Source LED switches from red to green), the internal oscillator warms-up, and the oscillator tracking operation gets locked. The whole process may take about 15 minutes.

3.3 Network Connection

Factory setting for the network is dynamic address (DHCP configuration).

If not DHCP server is available, press the ‘Set IP’ button to set IP address at 192.168.0.100 in static mode.

Connect the control PC through a crossover Ethernet cable or a hub. Set the control PC IP address to an address belonging to the same sub-network (e.g. 192.168.0.101).

On the control PC, open a web browser page at http://192.168.0.100. Click to enter the web interface. Go to "System Setup">"Network Setup" web page. Enter password (factory set at: "pwd"). Modify the mode of IP address allocation (static or DHCP) and the static address as necessary.

If the EC20S is already DHCP configured and if no DHCP server is available, you cannot connect a control PC to access EC20S network configuration pages. It is then possible to reset the IP address and mode to the factory setting using the “Set IP” button in front of the product.

3.4 Configure the EPSILON CLOCK MODEL EC20S

The EC20S is configured through an Ethernet network with a web browser.

After boot sequence, open a browser at the EC20S IP address and enter the setup parameters. Enable GPS or External Synchronization source as a minimum.

During installation, you may check the quality of the GPS reception on the Clock status web page. The GPS status tables show the number and quality of received satellites. The minimum number of received satellites should be four (out of 12).

For a standard configuration, if no external reference is available, disable the External Synchronization in the "Time and Reference Setup" page with priority level setting to "disabled".

Depending on the available power sources, enable or disable the Power Alarms in the "Power Setup menu".

4 Operation

4.1 General Information

4.1.1 Control of operating functions

The EC20S may be controlled through a web interface (Ethernet/RJ45) with a remote PC.

4.1.2 Network Configuration

The IP address of the EC20S can be assigned through DHCP protocol or manually. The assignment mode is programmable through the web interface and reset with the “Set IP” button.

The assignment mode is saved when switching off.

4.1.2.1 DHCP IP Assignment

If DHCP mode is selected, the address is assigned only by a DHCP server on the network.

If there is no DHCP server on the network, the IP address can be reset to the 192.168.0.100 fixed factory setting with the ‘Set IP’ button in order to connect a PC that is set accordingly.

4.1.2.2 Web Interface IP Assignment

When the unit is connected to a PC, configuration is made in the corresponding "System Setup>NetworkSetup" web page. 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.

4.1.3 Clock Generation

4.1.3.1 Reference Sources and Selection

Reference sources for oscillator tracking include 1PPS from the integrated GPS receiver and External 1PPS reference from BNC input.

Automatic selection of the source is made according to Enable, Source Forcing, Priority Configuration Parameters, and Reference Source Alarm status.

4.1.3.2 Tracking algorithm

The algorithm is a phase/frequency locked loop-type tracking algorithm. The phase measurement filter uses Kalman computation.

The tracking process involves several states:

- Warm-up period after power-up during which the oscillator control is stationary.
- Fast tracking for coarse oscillator control adjustment on tracking algorithm start-up.
- Accurate tracking with long-time constant filtering when the reference signal is present. The oscillator is locked on the reference ("Distribution" LED switches to green).
- Holdover when reference signal is absent (e.g., GPS loss of satellites, during input switchover). Oscillator control remains steady on the last valid value.
- Degraded state: Hidden state in which tracking was accurate and lost its reference input. Before declaring urgent alarm on the EC20S, a delay of a few minutes (factory programmable) is used to confirm the loss of the reference source and the switch to the holdover state with alarm triggering.

4.1.4 Distribution Monitoring

All channels are monitored so that a drop of signal at the output is detected and an alarm (Outputs Frequency and 1PPS) is generated.

4.1.5 GPS Reception

An integrated module takes care of the GPS reception. All related configuration parameters and reception status are available through the web interface.

The operator may choose among three operating modes:

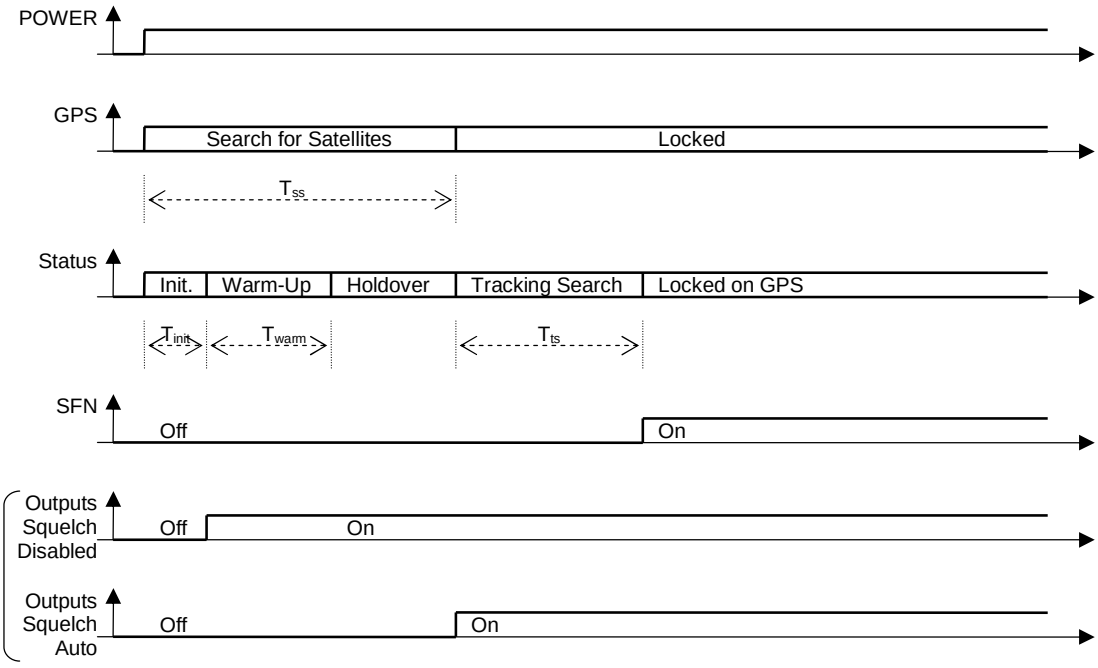
- Manual or fixed: The operator sets manually the accurate coordinates for the receiver. The receiver can then start immediately in an accurate timing reception mode. This mode needs only one satellite.
- Automatic: The receiver starts computing its polar coordinates and after 1 hour switches to the 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.

4.1.6 Equipment Start-up

At start-up, after initialization, the software retrieves the last configuration and starts programmable hardware. Distributed signals are generated with a degraded performance first and with required performance after oscillator locking.

4.1.7 Start-up sequence detail

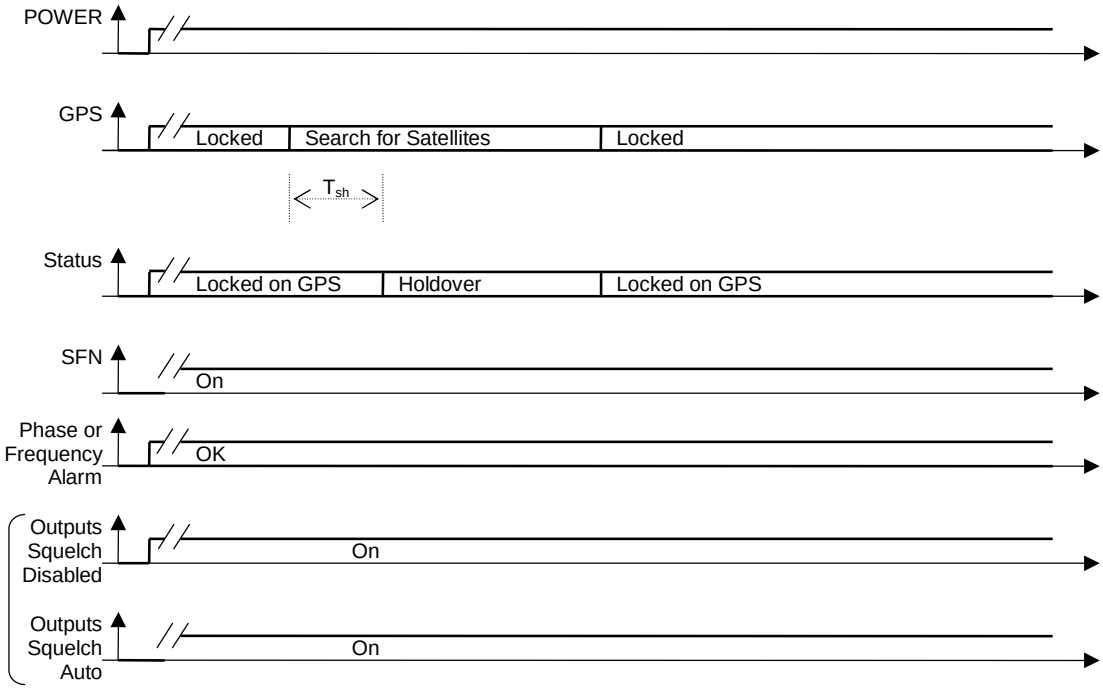
Following diagrams show the Start-up status of the EC20S product:



T_{ss}	Search for Satellites Time	5 minutes typical, depending on GPS signal reception quality.
T_{init}	Initialization Time	Start of EC20S software: 2 minutes typical.
T_{warm}	Warm-Up Time	5 minutes typical, depending on oscillator.
T_{ts}	Tracking Search Time	Depending on synchronization source quality.

4.1.8 Short loss of source sequence detail

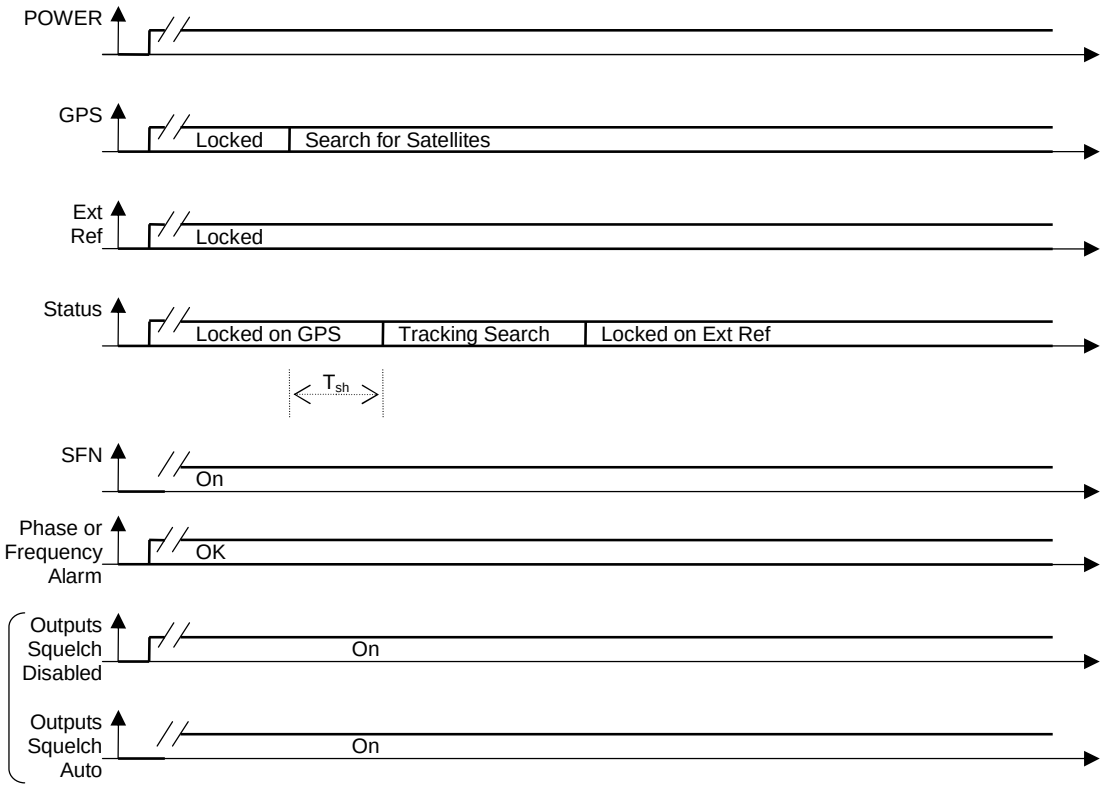
Following diagrams show the status of the EC20S product with GPS source loss:



T_{sh}	Shadow Time	A synchronization source can miss 2 minutes before the product switch to another source.

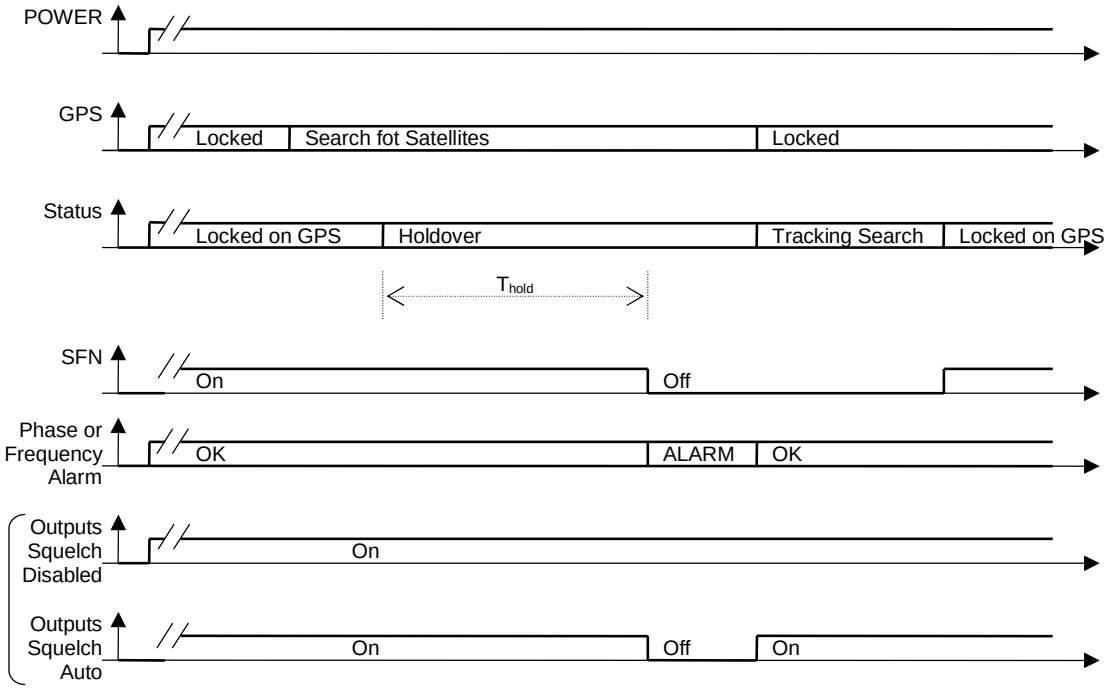
4.1.9 Source change sequence detail

Following diagrams show the status of the EC20S product with GPS source loss:



4.1.10 Holdover sequence detail

Following diagrams show the status of the EC20S product with GPS source loss:



T_{hold}	Hold Time	Time before phase or frequency alarms happen. Depending on synchronization setup.

4.2 Alarm Connector

This SUB-D connector may be used to provide a control switch (dry relay contact) for any alarm display. There are two relays: Alarm and Warning. According to the selected wiring for the alarm monitor, a relay can be closed when the alarm is on, or open (refer to the pin-out of the SUB-D connector).

4.3 Web Pages

4.3.1 Welcome Page

Click to enter the web site. The first displayed page is the Clock Status page.

4.3.2 Upper task bar and page header

This menu bar gives access to the following menus:

- System Setup:
  - Network Setup: Network connection parameters (protected by password).
  - Traps Setup: SNMP parameters and traps enable (protected by password).
  - Logout: Logout from the web site.
- Clock Setup:
  - Time and Synchronization 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 EC20S.
- Tools:
  - Software Version: Display of current version of software parts.
  - Software Upgrade: Upgrading software (protected by password).
  - Reboot: Per module hardware reset (protected by password).

Header time information is provided by the EC20S. A letter is displayed near the time message, according to the setting of the display mode and source reception (GPS) availability:

- U: UTC time reference.
- G GPS time reference.
- L: UTC time corrected by programmed offset.
- N: No time reference (no GPS information since start-up).
- M: Manual reference (time has been set manually in "Time and Synchronization Setup menu").

4.3.3 Clock Status page

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

Designed by SPECTRACOM, a company of the OROLIA group

This page is automatically refreshed every 5 seconds.

The "Alarm" label indicates an urgent alarm during which the distributed signal does not comply with its specifications for some reason: no signal, tracking not locked, no reference source.

"Warning" means that the detected problem does not affect the distributed signal quality but the operator should take action to solve the problem.

Global Status

- EC20S Status:

  Global working status of EC20S:

  - Ok: All functions run as expected, no alarm in EC20S.
  - Warning: EC20S distributes valid signals referenced to a valid input (GPS or External), but alarms remain. Maintenance is required.
  - Alarm: EC20S does not distribute a valid signal (GPS input loss, any other important failure).

- SFN Status:

  Indicates when unit is in SFN mode or not:

  - On: EC20S 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.
  - Off: EC20S is not in SFN mode.

- Synchronization Source:

  Selected synchronization source for the module:

  GPS: 1PPS signal of the GPS receiver.

  External: External 1PPS signal (BNC rear panel input).

  None: EC20S in Holdover or Forced Holdover mode.

- Oscillator Control voltage:

  Control voltage of the internal oscillator (in volts).

  Ranges from 0V to 8V.

  Generates an Internal Oscillator alarm when the value reaches 0V or 8V, meaning that the EC20S is no longer able to drive the Internal 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.

- Synchronization Time:

  Time during EC20S is synchronized to a valid source.

Alarms

GPS Alarms

- GPS Locked:

  Performance of the 1PPS signal of the GPS receiver:

  - OK: 1PPS signal of the GPS receiver can be used as 1PPS reference signal for slaving operation.
  - Alarm: 1PPS signal of the GPS receiver can't be used as 1PPS reference signal for slaving operation.

- Antenna Status:

  State of the connection to the GPS antenna:

  - Unpowered: GPS antenna is disconnected or incorrectly powered. Use of an antenna splitter produces this message. No alarm generated for this reason.
  - Powered: GPS antenna is connected and correctly powered.
  - Shorted: GPS antenna is in short-circuit.

- GPS Module Status:

  Working state of the GPS receiver:

  - OK: The GPS receiver is working well.
  - Alarm: Problem with the GPS receiver. Communication breakdown with the GPS receiver or 1PPS signal not delivered by the GPS receiver.

Internals Alarms

- Internal Oscillator:

  Monitored status of the 10MHz generated by internal oscillator:

  - OK: Frequency driver operational.
  - Alarm: Frequency driver failure.

- Internal 1PPS:

  Monitored status of internal 1PPS generated from oscillator frequency:

  - OK: 1PPS driver operational.
  - Alarm: 1PPS driver failure.

Power Supply

- AC:

  Status of AC power:

  - OK: AC power on.
  - Alarm: AC power off.
  - Disabled: Power alarm not allowed by operator (see Power setup page).

- DC:

  Status of DC power:

  - OK: DC power on.
  - Alarm: DC power off.
  - Disabled: Power alarm not allowed by operator (see Power setup page).

Synchronization Sources Alarms

- External Reference:

  Status of the external reference synchronization source:

  - OK: Synchronization source is available.
  - Alarm: Synchronization source is not available.
  - Disabled: Synchronization source not allowed by operator (Clock setup page).

- NMEA Validity:

  Status of the NMEA Input:

  - OK: NMEA message source is available.
  - Alarm: NMEA message is not available.
  - Disabled: NMEA message not allowed by operator (Clock setup page).

Synchronization Alarms

- Phase Accuracy:

  Estimated phase accuracy has crossed the limit (see Clock setup page) during a holdover sequence:

  - OK: Phase limit not exceeded.
  - Alarm: Phase limit exceeded.

- Frequency Accuracy:

  Estimated frequency accuracy has crossed the limit (see Clock setup page) during a holdover sequence:

  - OK: Frequency limit not exceeded.
  - Alarm: Frequency limit exceeded.

Distribution Alarms

- Global 10 MHz output:

  Monitoring of the frequency output signals delivered by the EC20S:

  - OK: The signal is delivered at all outputs.
  - Alarm: The signal is not delivered at one of the outputs.
  - Squelched: The signal is not delivered; shut off for frequency accuracy alarm reason.

- Global 1PPS output:

  Monitoring of the 1PPS output signals delivered by the EC20S:

  - OK: The signal is delivered at all the outputs.
  - Alarm: The signal is not delivered at one of the outputs.
  - Squelched: The signal is not delivered; shut off for phase accuracy alarm reason.

Optional Distribution Alarms

- IRIG Board:

  Monitoring of the outputs signals delivered by the EC20S optional board:

  - OK: The signal is delivered at all outputs.
  - Alarm: The signal is not delivered at one of the outputs.
  - Disabled: The optional board is not present in unit.

- STANAG Board:

  Monitoring of the outputs signals delivered by the EC20S optional board:

  - OK: The signal is delivered at all outputs.
  - Alarm: The signal is not delivered at one of the outputs.
  - Disabled: The optional board is not present in unit.

- 2MHz/2MBit Board:

  Monitoring of the outputs signals delivered by the EC20S optional board:

  - OK: The signal is delivered at all outputs.
  - Alarm: The signal is not delivered at one of the outputs.
  - Disabled: The optional board is not present in unit.

Output status

State of the signals delivered by the EC20S:

- OK: The signal is delivered at the output.
- Alarm: The signal is not delivered at the output.
- Squelched: The signal is not delivered at the output.
- Disabled: The signal is not available in this EC20S revision.

GPS Status

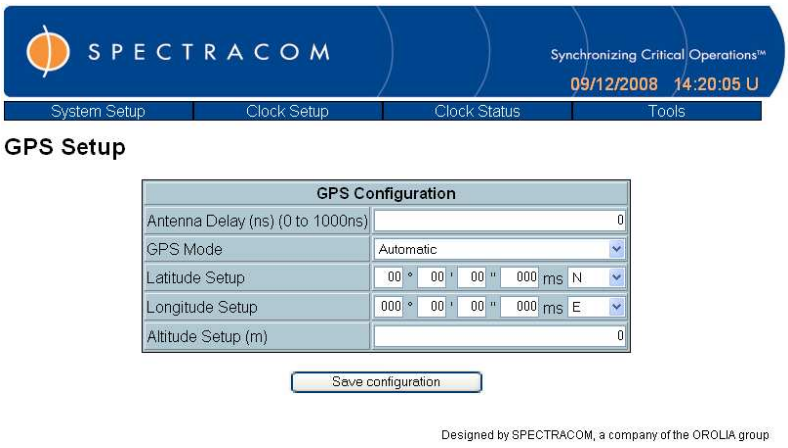
- GPS Longitude:
  Current longitude of the GPS antenna.
- GPS Latitude:
  Current latitude of the GPS antenna.
- GPS Altitude:
  Current altitude of the GPS antenna.
- Self Survey:
  Not applicable in 'Manual' and 'Mobile' modes. In 'Automatic' mode, the self survey phase allows the GPS receiver to average continuously the geographical position of the GPS antenna for a period of one hour to get a precise GPS antenna position. The following values are then possible:
  - Pending: The calculation of precise GPS antenna position is not done.
  - In progress: The calculation of precise GPS antenna position is in progress.
  - Done: The calculation of precise GPS antenna position is done.
- Visible Satellites:
  Number of locked GPS channels (out of a maximum of 12).
- ID / SNR:
  Satellite number and SNR (Signal over Noise Ratio) of the 8 best satellites channels tracked by the GPS receiver.

NMEA Status

- NMEA Longitude:
  Current longitude of the NMEA input.
- NMEA Latitude:
  Current latitude of the NMEA input.
- NMEA Altitude:
  Current altitude of the NMEA input.

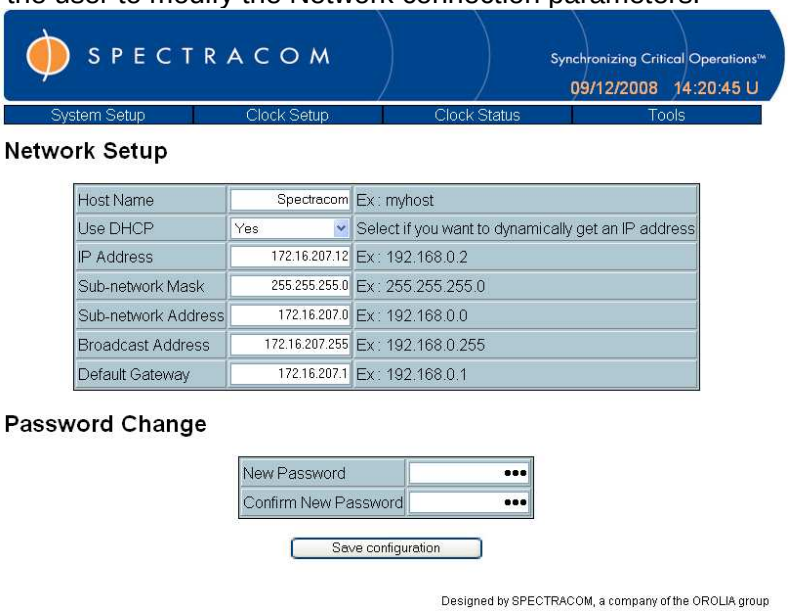
4.3.4 Password page

A password is necessary to access the setup pages. The default password is “pwd”. It can be modified in the Network Setup page.



4.3.5 Network Setup page

This page allows the user to modify the Network connection parameters.



When set in Use DHCP mode, if the EC20S starts without network connection, the IP address is not set. After the network connection is restored, a 1 or 2 minute delay occurs before the IP address is assigned.

Network Setup

- Host Name:

  Unique name of the EC20S in the network. This functionality depends on the DNS server type.

- Use DHCP:

  Dynamic Host Configuration Protocol:

  - Yes: The Dynamic Host Configuration Protocol function is available. In this case, the IP address of the EC20S is automatically allocated by the network DHCP server according to the EC202S MAC address. Following fields do not apply.
  - No: The Dynamic Host Configuration Protocol function isn't available. A static IP address is used. In this case, the operator must fill in the fields that follow.

- IP Address, Sub-network Mask, Sub-network Address, Broadcast Address, Default Gateway:

  Fields allowing configuration of the network access when the DHCP is set to No.

Password Change

- New Password:

  Field for password modification. This password is required when accessing setup pages.

- Confirm Password:

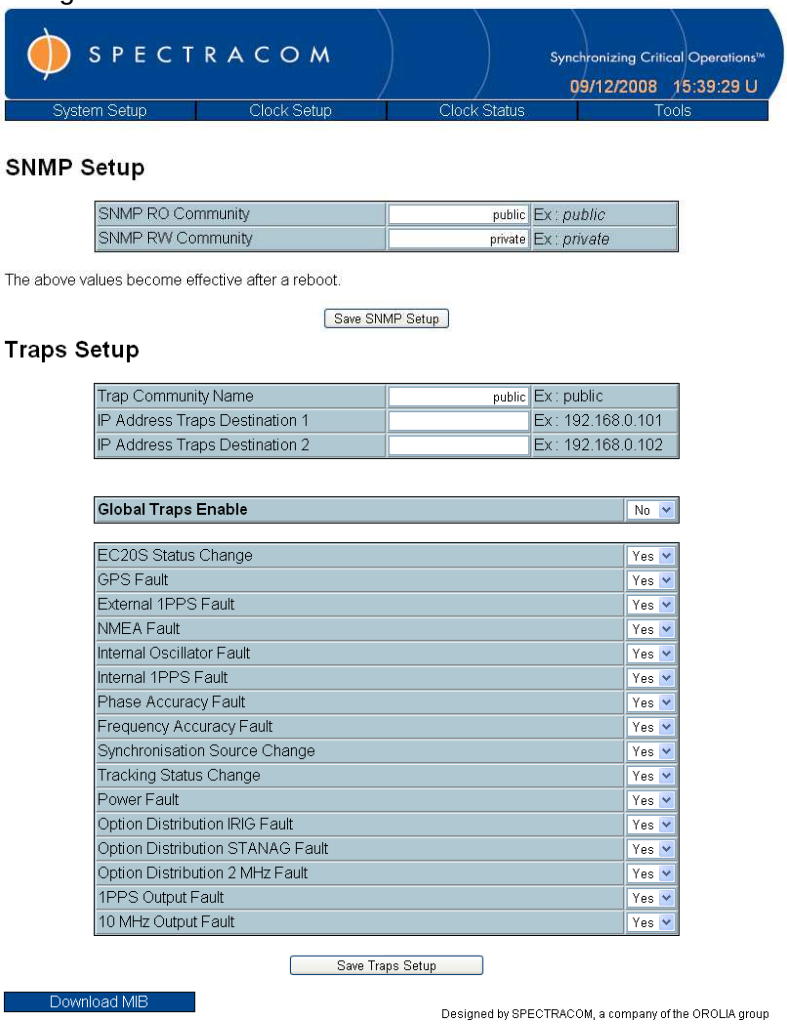
  Field for password verification.

WARNING:

If the user forgot the password, the product must come back to Spectracom for put the default password.

4.3.6 SNMP Setup page

In this page, the operator can enable the SNMP traps generation and program RO and RW community names. The SNMP traps report an event (alarm or configuration modification) by sending a trap message to a destination.



- SNMP RO Community:

  SNMP parameter for get request.

- SNMP RW Community:

  SNMP parameter for set request. RO and RW communities will become effective after a software reboot of unit (Tools menu).

- Trap Community:

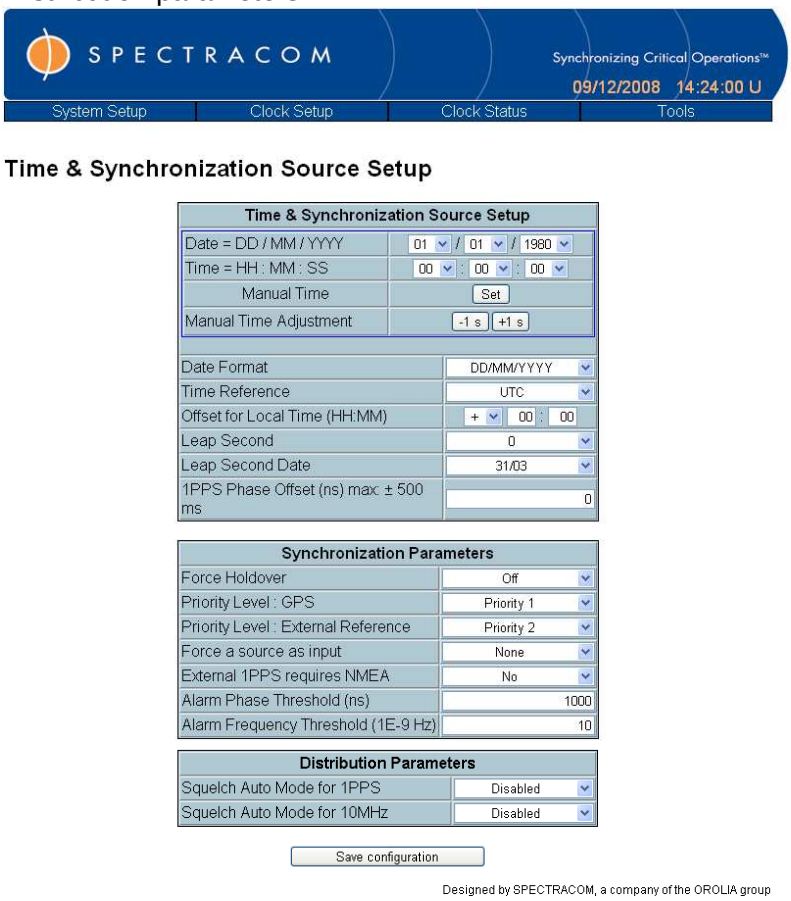
  SNMP parameter is sent in trap messages and helps identify the managed equipment family, public by default.

- IP Address Traps destination 1:
  Primary SNMP manager address where traps are sent. Clear field to deactivate.
- IP Address Traps destination 2:
  Secondary SNMP manager address where traps are sent.
- Global Traps Enable:
  - Yes: Traps are sent according to individual enabling.
  - No: No trap generated.
- EC20S Fault:
  - Yes: Generates a trap when the EC20S goes on default (according to "Global Status").
  - No: No trap generated.
- GPS fault:
  - Yes: Generates a trap when the gps receiver fails or unlocks (according to "GPS Locked").
  - No: No trap generated.
- External 1PPS Fault:
  - Yes: Generates a trap when the External 1PPS is lost (while enabled).
  - No: No trap generated.
- NMEA Fault:
  - Yes: Generates a trap when the NMEA input is lost (while enabled).
  - No: No trap generated.
- Internal oscillator Fault:
  - Yes: Generates a trap when the frequency driver goes on alarm (generally the oscillator goes on default).
  - No: No trap generated.
- Internal 1PPS Fault:
  - Yes: Generates a trap when the 1PPS driver goes on alarm.
  - No: No trap generated.
- Phase Accuracy Fault:
  - Yes: Generates a trap when estimated phase of the output signal exceeds the phase limit.
  - No: No trap generated.
- Frequency Accuracy Fault:
  - Yes: Generates a trap when estimated frequency of the output signal exceeds the phase limit.
  - No: No trap generated.

- Synchronization Source Change:
  - Yes: Generates a trap when the source of synchronization changes.
  - No: No trap generated.
- Tracking Status:
  - Yes: Generates a trap when the tracking status changes.
  - No: No trap generated.
- Power Fault:
  - Yes: Generates a trap when any enabled power source alarm is detected.
  - No: No trap generated.
- Option Distribution IRIG Fault:
  - Yes: Generates a trap when one of the IRIG Board output signals fails.
  - No: No trap generated.
- Option Distribution STANAG Fault:
  - Yes: Generates a trap when one of the STANAG Board output signals fails.
  - No: No trap generated.
- Option Distribution 2MHz Fault:
  - Yes: Generates a trap when one of the 2MHz Board output signals fails.
  - No: No trap generated.
- 1PPS Output Fault:
  - Yes: Generates a trap when one of the 1PPS output signal fails.
  - No: No trap generated.
- 10 MHz Output Fault:
  - Yes: Generates a trap when one of the 10 MHz output signal fails.
  - No: No trap generated.
- Download MIB:
  Link for downloading zipped MIB text file.

4.3.7 Time & Synchronization Setup page

This page is used for setting time computation and display parameters, synchronization source parameters, and Distribution parameters.



Time parameters

- Date and Time, Set Manual Time button:

  Time manual setting allowed only when the EC20S is in forced holdover mode or when the EC20S has not yet been synchronized on a GPS reference source.

- Manual Time Adjust:

  Adjust the time by 1 second when the EC20S is in forced holdover mode or when the EC20S is not yet synchronized on a reference source. Helpful for fine adjusting manually set time.

- Date format:

  Selection of display format:

  - DD/MM/AAAA: day / month / year
  - MM/DD/AAAA: month / day / year
  - DD/AAAA: day of the year / year

- Time reference:

  Choice of reference time scale:

  - UTC: Universal time scale.
  - GPS: Time given by GPS (almost equivalent to UTC).
  - Local: UTC time corrected by a programmable offset.

An information letter is displayed after the time message on the header of the web page (see Upper Task Bar and Page Header description).

- Offset for Local Time:

  Allows computation of local time from UTC time.

- Leap Second:

  Programs in advance the leap second correction, hence ensuring it will be applied even in case of GPS loss. Direction of the application:

  - 0: Non leap second pending
  - –1: Positive leap second pending
  - +1: Negative leap second pending

- Leap Second Date:

  Programs in advance the leap second correction, hence ensuring it will be applied even in case of GPS loss. Date of application:

  - 31/03: 31/03.
  - 30/06: 30/06.
  - 30/09: 30/09.
  - 31/12: 31/12.

- 1PPS Phase Offset:

  Phase shift implemented on 1PPS output, from –500ms to +500ms, entered in ns.

Synchronization parameters

- Force Holdover:

  Keep the oscillator control voltage at a fixed value even if a synchronization reference is available:

  - On: Force holdover
  - Off: Normal slaving mode

- Priority Level: GPS:

  Programs the priority of the GPS reference source.

  - Priority 1: Highest priority
  - Priority 2: Medium priority
  - Priority 3: Lowest priority
  - Disable: Disable the source; this source is not supervised; no corresponding alarm

- Priority Level: External Reference:

  Programs the priority of the External 1PPS synchronization source:

  - Priority 1: Highest priority
  - Priority 2: Medium priority
  - Priority 3: Lowest priority
  - Disable: Disable the source; this source is not supervised; no corresponding alarm.

- Force a source as input:

  Force the EC20S to be synchronized on a reference source even if other sources with a highest priority are available, for debug purposes:

  - None
  - GPS
  - External Reference

- External 1PPS requires NMEA:

  External source use NMEA input to datecode the 1PPS:

  - Yes
  - No

- Alarm Phase Threshold:

  Programs the limit value in nanoseconds of the accuracy after which the 1PPS signal output is deemed invalid.

- Alarm Frequency Threshold:

  Programs the limit value in 10-9 hertz of the accuracy after which the 10MHz signal output is deemed invalid.

Synchronization parameters

- NMEA Port Baud Rate:

  Set Speed of in/out message on NMEA connector.

- Squelched Auto Mode for 1PPS:

  If enabled, squelching is applied to distributed signals on phase alarms triggering:

  - Enable: Output signal is squelched on phase alarm.
  - Disable: Signal always available at the output.

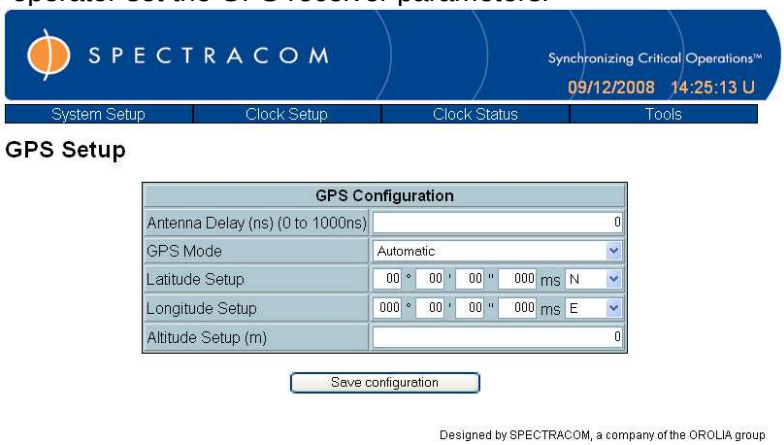
- Squelched Auto Mode for 10MHz:

  If enabled, squelching is applied to distributed signals on frequency alarms triggering:

  - Enable: Output signal is squelched on frequency alarm.
  - Disable: Signal always available at the output.

4.3.8 GPS Setup page

On this page, the operator set the GPS receiver parameters.



- Antenna Delay:

  Time shift compensating the propagation delay of the GPS signal in the antenna cable (in nanosecond). To be computed according to type and length of cable.

- GPS Mode:

  Defines the receiver operating mode regarding the position processing:

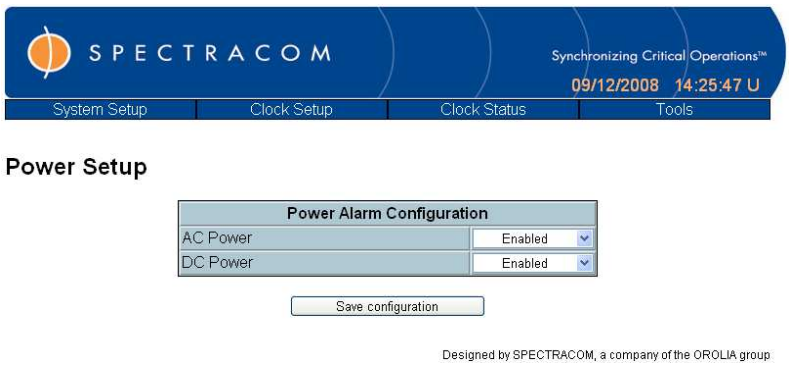
  - Automatic: The GPS receiver averages during 1 hour the antenna position supplied by the receiver in order to make it reliable. After this period and providing that a minimum of 4 satellites are detected, the position is set. This 1 hour position reliability process is initialised every time the board is switched on and is hold as long as a minimum of 4 satellites is continuously detected. The EC20S must be fixed.
  - Manual: The GPS receiver can provide reference information with only 3 satellites available. The user is required to precisely enter the geographic position of the antenna into corresponding fields.
  - Mobile: The GPS receiver computes its position continuously so that the EC20S (with GPS antenna) can be moved.

- Latitude, Longitude, Altitude:

  Data defining the geographic position of the GPS antenna applied in time processing while in manual mode.

4.3.9 Power Setup page

According to 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.

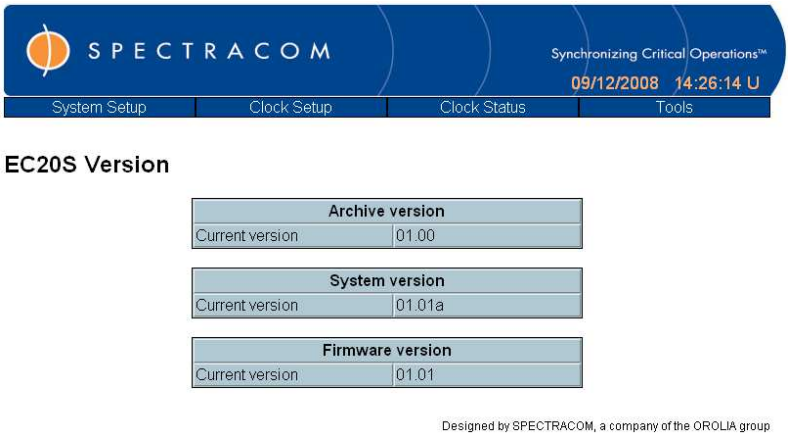
- DC Power:

  Check DC power supply:

  - Enable: Generates an alarm if DC power supply is not available.
  - Disable: No alarm generated.

4.3.10 Versions

This page displays the version number of key elements of EC20S software and firmware.

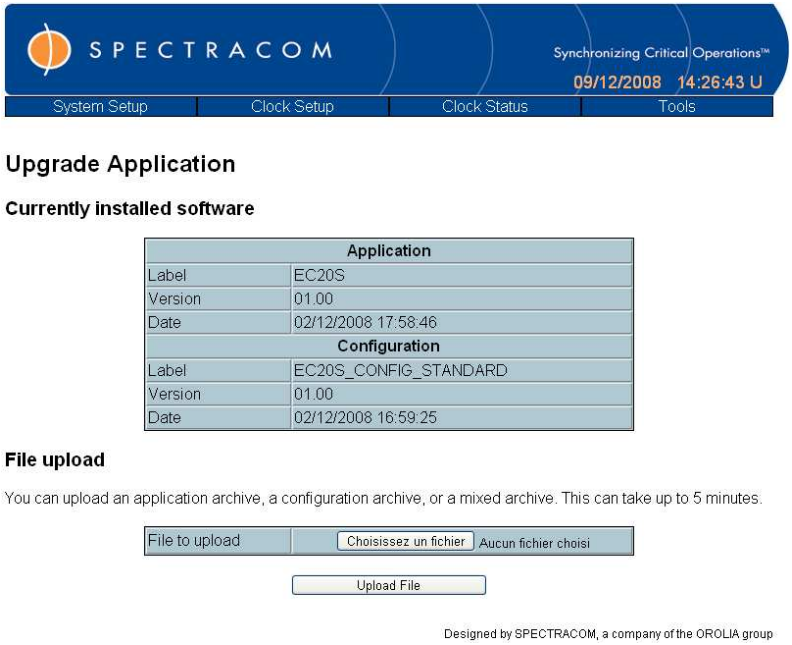


4.3.11 Software Upgrade

Software upgrade is performed with this "Upgrade Application" page.

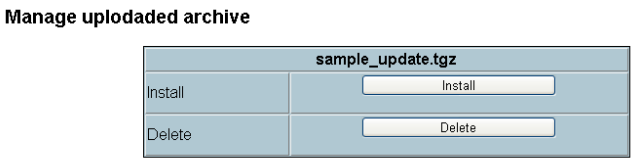
Two steps are necessary: First Upload a New Release from the web client to the EC20S, and then Activate New Release.

Before starting the upload of a new version, select the file to be downloaded (usually a .tgz file provided by the manufacturer). Click on the "Upload" button to proceed.



- Upload File:

  First step of upgrade. A tgz compressed file is sent to the EC20S and stored.



- Install:

  Second step of upgrade. When clicking on "Install" button, upgrading module is restarted. Signal Distribution is not impacted.

- Delete:

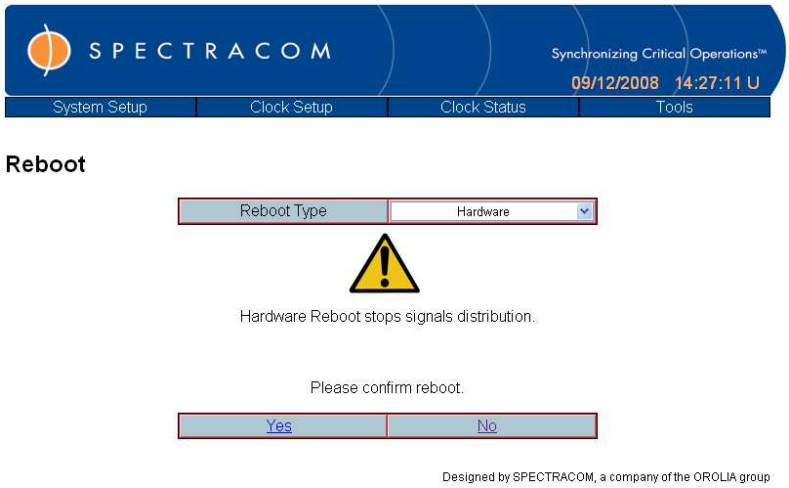
  When clicking on "Delete" button, the last uploaded archive is deleted.

4.3.12 Reboot

If the unit malfunction occurs, the operator can order a soft or hard reboot. If the unit is not reachable, the requested reboot will not be processed.

Select type of reset.

Click on Yes to confirm the reboot.



WARNING: Hard reset stops signals distribution. Take care about your choice.

5 SNMP Control

5.1 MIB Content

MIB is made of elements related to:

- Configuration parameters that can be read (GET procedure) and written (SET procedure),
- Status information, similar to the status displayed on the web page, which can be read (GET procedure).

Name	GET / SET
ec20s-STA-HARDWARE-OK	GET
ec20s-STA-DATETIME	GET
ec20s-STA-TIMEREF	GET
ec20s-STA-SYNCTIME	GET
ec20s-STA-1PPSOUT	GET
ec20s-STA-1PPSOUT-FAILURE	GET
ec20s-STA-10MHZOUT	GET
ec20s-STA-10MHZOUT-FAILURE	GET
ec20s-STA-FREQ-ERROR	GET
ec20s-STA-FREQ-ALARM	GET
ec20s-STA-PHASE-ERROR	GET
ec20s-STA-PHASE-ALARM	GET
ec20s-STA-REFEXT-PRESENCE	GET
ec20s-STA-NMEA-VALIDITY	GET
ec20s-STA-HOLDOVER	GET
ec20s-STA-DCPOWER-OK	GET
ec20s-STA-ACPOWER-OK	GET
ec20s-STA-OPT-IRIG-OUT	GET
ec20s-STA-OPT-STANAG-OUT	GET
ec20s-STA–OPT-2MHZ-OUT	GET

ec20s-GPS-LOCKED	GET
ec20s-GPS-SAT-LOCKED	GET
ec20s-GPS-SAT-ID1	GET
ec20s-GPS-SAT-SNR1	GET
ec20s-GPS-SAT-ID2	GET
ec20s-GPS-SAT-SNR2	GET
ec20s-GPS-SAT-ID3	GET
ec20s-GPS-SAT-SNR3	GET
ec20s-GPS-SAT-ID4	GET
ec20s-GPS-SAT-SNR4	GET
ec20s-GPS-SAT-ID5	GET
ec20s-GPS-SAT-SNR5	GET
ec20s-GPS-SAT-ID6	GET
ec20s-GPS-SAT-SNR6	GET
ec20s-GPS-SAT-ID7	GET

ec20s-GPS-SAT-SNR7	GET
ec20s-GPS-SAT-ID8	GET
ec20s-GPS-SAT-SNR8	GET
ec20s-GPS-SAT-ANTENNA-MODE	GET
ec20s-GPS-RECEPTION-MODE	GET
ec20s-GPS-ANTENNA-STATUS	GET
ec20s-GPS-LATITUDE	GET
ec20s-GPS-LONGITUDE	GET
ec20s-GPS-ALTITUDE	GET

ec20s-NTP-MAC-ADDRESS	GET
ec20s-NTP-STRATUM-LEVEL	GET

ec20s-TRAPS-DESTINATION-1	GET + SET
ec20s-TRAPS-DESTINATION-2	GET + SET
ec20s-TRAPS-COMMUNITY	GET + SET
ec20s-TRAPS-ENABLE	GET + SET

ec20s-CFG-FREQ-ALARM-LIMIT	GET + SET
ec20s-CFG-PHASE-ALARM-LIMIT	GET + SET
ec20s-CFG-DATE-FORMAT	GET + SET
ec20s-CFG-1PPS-SQUELCH-AUTO	GET + SET
ec20s-CFG-10MHZ-SQUELCH-AUTO	GET + SET

5.2 SNMP TRAPS

Traps are generated on events related to alarm and warning activation and deactivation, as well as configuration modification. The two trap destinations are programmable and traps are individually enabled in the SNMP Setup web page.

Name
ec20sGeneralHardwareFault
ec20sGpsFault
ec20sExternalPpsFault
ec20sNmeaFault
ec20sInternalOscFault
ec20sInternalppFault
ec20sPhaseAccuracyFault
ec20sFreqAccuracyFault
ec20sSyncSourceChangeAlarm
ec20sEnteringHoldoverModeAlarm
ec20sPowerFault
ec20sOptionIrig
ec20sOptionStanag
ec20sOption2MHz
ec20sOutputPPSFault
ec20sOutput10MHzFault

6 Maintenance

6.1 Periodic Verification and Calibration

The EC20S is fully automatic functioning and self-calibrated. It does not require maintenance for a period of 10 years.

6.2 Updating the Software Version

See corresponding web pages to perform the upgrade.

6.3 Spare Parts

Fuses 5x20 1A D1TD: Manufacturer CEHESS/SHURTER, manufacturer part number 7040.3120

DC connector kit: Manufacturer NEUTRIK, manufacturer part number NC3FXY (female plug).

6.4 Troubleshooting

Symptoms can be diagnosed from front panel LEDs and using information from the web interface.

6.4.1 Searching for Alarm Origin

6.4.1.1 LED Indicators

Power Alarm: Shows the validity of the power supply.

Source alarm: Shows the validity of the reference source.

Distribution alarm: Shows the state of outputs and state of the tracking algorithm.

6.4.1.2 Web Interface status analysis

6.4.1.2.1 Method

The purpose of the method is to determine what object has failed: Input reference source or hardware failure. Then, in case of hardware failure, the user must determine if the failure comes from component in the EC20S.

The Web interface status windows give some information on the input reference sources, on the distributed output signals, on the frequency generation, on the signal distribution.

6.4.1.2.2 EC20S Status

The EC20S status page can tell if the tracking algorithm is locked and if a signal is sent to the distribution. Any abnormal detected function leads to the unit replacement.

6.4.1.2.3 GPS Status

The GPS receiver is an autonomous module connected to the unit.

The GPS should be able to decode at least 4 satellites to be used as a timing reference. Possible situations could be a low received level on the antenna input, a disconnected antenna, a shorted antenna, no PPS generation inside the GPS receiver, and no management link between the unit and the GPS receiver.

After checking the antenna installation, if the receiver is still in a failure status, the unit should be replaced.

6.4.2 Customer Support Information

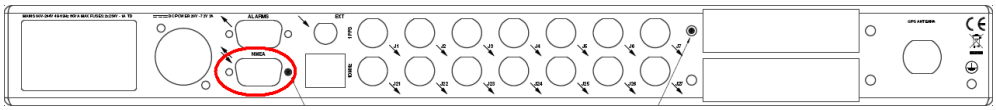
In case of failures, please contact Spectracom Customer Service. Customer service is available by telephone at +33 (0) 1.64.53.39.80 (France), or +1.585.321.5800 (United States).

7 Appendix

7.1 NMEA Connector

7.1.1 Pin-Out

Type of connector: SUB-D9 Female



The pin-out of the connector is described in the following table:

1	NC	**6**	NMEA_RS485_A
2	NMEA_OUT	**7**	NMEA_RS485_B
3	NMEA_IN	**8**	OTHER_RS485_A
4	GND	**9**	OTHER_RS485_B
5	GND		

The inputs/outputs of the SUB-D connector are defined in the following table:

NC	Not Connected
GND	Ground
NMEA_IN	Receive line input of the NMEA message. RS232 compatible level
NMEA_OUT	Transmit line output of the NMEA message. RS232 compatible level
NMEA_RS485_A **NMEA_RS485_B**	Transmit line output of the NMEA message. RS485 compatible level
OTHER_RS485_A **OTHER_RS485_B**	Receive line input of the NMEA message. RS485 compatible level

7.1.2 NMEA Message Input

Connector: connector SUB-D9

Input signal characteristic required:

Data and port parameters:	ASCII, 4800 bps, 8 bits, 1 stop bit, no parity.
Protocol:	<Message> <CR> <LF>

Format: $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh

- RMC = Recommended Minimum Specific GPS/TRANSIT Data
- hhmmss.ss = UTC of emitter position fix. Must be date the last EXT_1PPS
- A = status of the emitter (A = OK, V=warning).
- llll.ll = Latitude of emitter, not used by the EPSILON CLOCK MODEL EC20S
- a = N or S (North or South) of emitter, not used by the EPSILON CLOCK MODEL EC20S
- yyyyy.yy = Longitude of emitter, not used by the EPSILON CLOCK MODEL EC20S
- a = E or W (East or West) of emitter, not used by the EPSILON CLOCK MODEL EC20S
- x.x = not used by the EPSILON CLOCK MODEL EC20S
- x.x = not used by the EPSILON CLOCK MODEL EC20S
- ddmmyy = UTC date
- x.x = not used by the EPSILON CLOCK MODEL EC20S
- a = not used by the EPSILON CLOCK MODEL EC20S
- *hh = Checksum

NOTE: When the status sent is V and /or the checksum sent is incorrect, the NMEA message is not used by the EPSILON CLOCK MODEL EC20S.

7.1.3 NMEA Message Output

Data and port parameters: ASCII, 4800 bps, 8 bits, 1 stop bit, no parity.

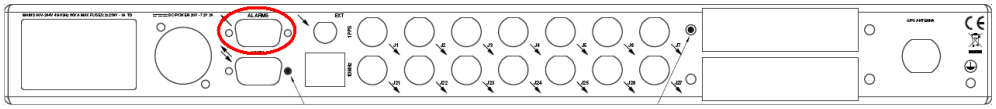
Protocol: <Message> <CR> <LF>

Format: $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh

- RMC = Recommended Minimum Specific GPS/TRANSIT Data
- hhmmss.ss = UTC of position fix
- A = status of the EPSILON CLOCK MODEL EC20S (A = OK, V=warning)
- llll.ll = Latitude of fix
- a = N or S (North or South)
- yyyyy.yy = Longitude of fix
- a = E or W (East or West)
- x.x = not used, set to 0
- x.x = not used, set to 0
- ddmmyy = UTC date
- x.x = not used, Set to 0
- a = Set to E
- *hh = Checksum

7.2 ALARM Connector

Type of Connector: SUB-D9 Female



The pin-out of the connector is described in the following table:

1	RL_URG_C	**6**	RL_URG_T
2	Reserved	**7**	RL_URG_R
3	Reserved	**8**	RL_NON-URG_R
4	RL_NON-URG_C	**9**	RL_NON-URG_T
5	GND		

The inputs/outputs of the SUB-D connector are defined in the following table:

GND	Ground
Reserved	Do not connect any signal to this pin.
RL_URG_C	Urgent Alarm – Common contact
RL_URG_T	Urgent Alarm – Active opened contact
RL_URG_R	Urgent Alarm – Active closed contact
RL_NON-URG_C	Non-Urgent Alarm – Common contact
RL_NON-URG_T	Non-Urgent Alarm – Active opened contact
RL_NON-URG_R	Non-Urgent Alarm – Active closed contact

If one wants to get a closed contact when Urgent Alarm is active, 1-7 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, 1-6 should be used.
If one wants to get an opened contact when Non-Urgent Alarm is active, 4-9 should be used.

REVISION HISTORY

Revision Level	***ECN Number***	***Description***
A0	08/10/08	First Release
A1	09/12/08	Web Page Updated

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