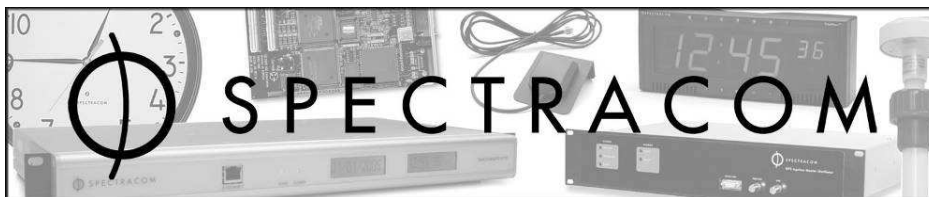


*EPSILON CLOCK  
MODEL EC31M  
USER'S MANUAL*

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# **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.

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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.

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## **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.

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# 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 EC31M 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 EC31M Base Unit
- One DC line cord
- 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 EC31M is a GPS Clock, providing the best cost-effective solution for reliable, and 24-hour-a-day, uninterrupted applications. The EC31M is particularly well-suited for defence applications as well as network infrastructures requiring high quality, reliability and availability.

The EPSILON CLOCK MODEL EC31M provides accurate time and frequency synchronisation.

Key parameters are:

- High performance OCXO or Rubidium oscillator disciplined by GPS through Epsitime© smart predictive slaving algorithm
- High performance holdover stability ( $2.10^{-10}$ /day)
- AC and DC power supply redundancy
- 2 independent Ethernet ports.
- 2 x 1 PPS outputs
- 2 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

The quality of the internally generated reference Clock is related to the oscillator performance and the high performance tracking algorithm:

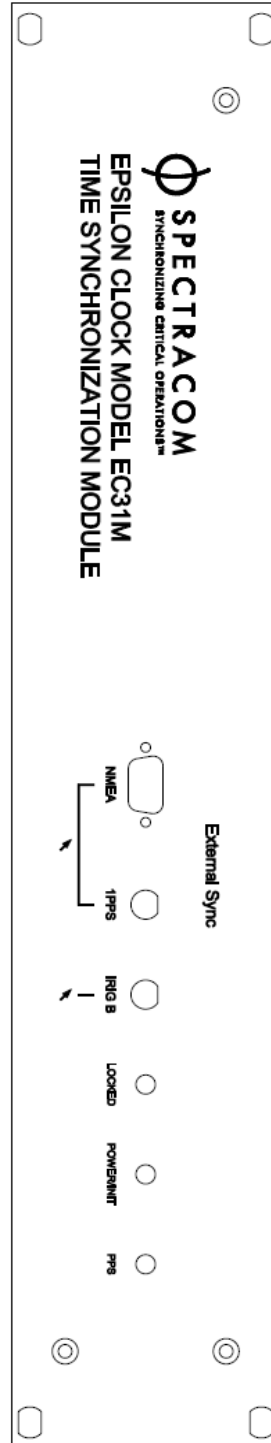
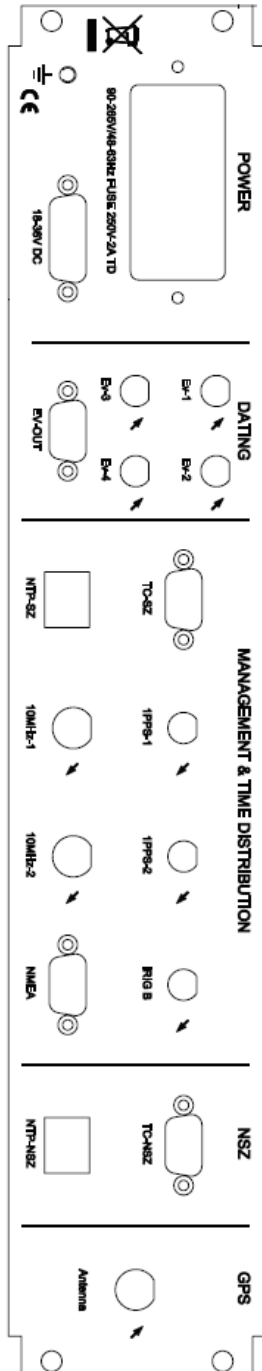
## ***1.6 Integrated Remote Control Interface***

The EC31M contains an Ethernet IP interface so that it can be fully controlled from a remote location.

The EC31M 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 EC31M Front Panel

### 1.7.1.1 Front Panel LEDs

<b>LOCKED</b>	
Indicator of power supplies connections.	
Yellow	No exploitable source available or currently used synchronization source not available.
Blinking Green	EC31M is in tracking mode.
Green	EC31M is locked to a source.

<b>POWER/INIT</b>	
Indicates the current status of the reference source.	
Red	EC31M is stopped after three attempts to start (Hard or Soft).
Blinking Red	EC31M is in initialising state.
Green	EC31M is running.

<b>PPS</b>	
Indicates the current status of the distributed 1PPS and 10MHz.	
Red	At least one of the PPS signals not present on outputs ( output may be shorted ).
GREEN	Both PPS signals present on outputs.

On normal operation, all LEDs should be green. Only available reference input sources should be enabled.


### 1.7.1.2 Front Panel Connectors

<b>NMEA - TIME message input</b>	
SUBD-9	RS232 for Time message input.

<b>1PPS External input</b>	
BNC	External input for a 1PPS reference.

<b>IRIG B input</b>	
BNC	External input for an IRIG B reference.

**1.7.2 EC31M Back Panel**

<b>AC POWER</b>	
Schaffner	AC power entry with integrated fuse.
<b>DC POWER</b>	
POWER SUB-D	DC power supply input.
<b>10MHz (2)</b>	
BNC	Distributed sinus frequency outputs.
<b>1PPS (2)</b>	
BNC	Distributed One Pulse Per Second outputs.
<b>IRIG B</b>	
BNC	IRIG B002 Output.
<b>Ethernet 10/100 BaseT (NTP-SZ and NTP-NSZ)</b>	
RJ45	Network connectivity.
<b>Terminal Console (TC-SZ and TC-NSZ)</b>	
RJ45	RS232 for Terminal control.
<b>GPS Antenna</b>	
TNC	Antenna inputs for GPS receiver and remote active antenna 5VDC supply.
<b>NMEA - TIME message Output</b>	
SUBD-9	RS232 for Time message output.
<b>Dating Inputs (Ev-1 to EV-4)</b>	
BNC	Inputs for the Datation module.
<b>Dating Output (EV-OUT)</b>	
SUBD-9	RS232 for Datation message output.
<b>GROUND</b>	
	Casing grounding.

## ***1.8 Dimensions and Weight***

<b>Width:</b>	19" (483 mm)
<b>Height:</b>	2 U (88 mm).
<b>Depth:</b>	385 mm.
<b>Weight:</b>	<4.7 kg.
<b>Compatibility:</b>	19" rack

The EC31M unit is compatible with 19" racks and can be mounted with slides. Screws to fix the slides on the equipment sides are provided with the equipment. Use Slides Accuride, part number : DZ 2907-0020 Hub 559mm.

## ***1.9 Operating Environment***

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

## ***1.10 Power Supply***

### ***1.10.1 DC Power Supply Input***

- Nominal DC input voltage conditions: 18 to 36 Volts DC (Option 36 to 72 Volts DC)
- Maximum Total Power consumption: < 60 W
- Protection against polarity reversal
- DC input wires are not ground referenced
- Protected by a PolySwitch fuse (automatically rearmed)

### ***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 2A 5x20

### ***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

<b>DHCP</b>	Dynamic Host Configuration Protocol.
<b>GPS</b>	Global Positioning System.
<b>OCXO</b>	Oven Controlled XTAL (Crystal) Oscillator.
<b>Rb</b>	Rubidium oscillator.
<b>S/A</b>	Selective Availability.
<b>SFN</b>	Single Frequency Network.
<b>TRAIM</b>	Time Receiver Autonomous Integrity Monitoring.
<b>UTC</b>	Universal Time Coordinated.
<b>1PPS</b>	One Pulse Per Second.
<b>1 PPS driver</b>	Pulse signal obtained through division of the frequency driver
<b>Holdover</b>	If the reference input signal is lost, the EPSILON CLOCK® maintains the generation of information and of time and frequency signals.
<b>Reliability</b>	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.
<b>Frequency driver</b>	Frequency signal generated by the built-in oscillator.
<b>Reference input</b>	Time and frequency source used by the EPSILON CLOCK®.
<b>IERS</b>	International Earth Rotation Service.
<b>MAC</b>	Medium Access Control.
<b>MIB</b>	Management Information Base.
<b>NTP</b>	Network Time Protocol.
<b>IP</b>	Internet Protocol.
<b>SNMP</b>	Simple Network Management Protocol.
<b>NMEA</b>	National marine Electronics Association.
<b>IRIG</b>	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  $\Omega$  (type TNC)
- 2 x L1 GPS C/A code
- Power supply to active antenna: 5V/80 mA 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: 50 $\Omega$
- 50 $\Omega$  BNC connector
- Active rise edge (high level duration 100 $\mu$ s minimum)
- Minimal Accuracy to UTC:  $\pm 50$ ns (1 $\sigma$ )

**CAUTION:**

*If the External Synchronization Input do not have the required minimum characteristics, the global performance of the EPSILON CLOCK MODEL EC31M 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: 2
- Port type: 50Ω BNC coaxial.
- Level: 12±2dBm, with a 50Ω load.
- Type: Sinewave signal, -35dBc 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	-155dBc/Hz
100kHz	-155dBc/Hz

### 2.1.4.2 Holdover Mode

- According to §9 EN 300 462-4-1 (9.2) (Transmission and Multiplexing <sup>TM</sup> - Generic requirements for synchronization networks).
- Stability < ± 2x10<sup>-10</sup>/day with OCXO.  
< ± 5x10<sup>-11</sup>/day with Rubidium oscillator.

**2.1.4.3 Short Term Stability (Allan Variance)**

With OCXO:

- 1s:  $1 \times 10^{-11}$
- 10s:  $3 \times 10^{-11}$
- 100s:  $3 \times 10^{-11}$

With Rubidium oscillator:

- 1s:  $3 \times 10^{-11}$
- 10s:  $1 \times 10^{-11}$
- 100s:  $3 \times 10^{-12}$

**2.1.4.4 Temperature Stability**

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

**2.1.5 1PPS Output**

- Number of outputs: 2
- Port type: 50Ω BNC coaxial.
- Level: TTL/3.3V, with a 50Ω load.
- Pulse Length 300μs.
- Accuracy to UTC, GPS locked:  $\pm 25\text{ns}$  ( $1\sigma$ ).
- Accuracy to UTC instantaneous (phase locked):  $\pm 35\text{ns}$  max.

With OCXO:

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

With Rubidium:

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

## ***2.2 Auxilliary Connector Signals***

### **2.2.1 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

### **2.2.2 Event inputs**

- Number of inputs: 4
- Port type: BNC coaxial.
- Level: TTL

### **2.2.3 Event output**

RS232 output for events information.

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

### **2.2.4 IRIG B Input**

- Input: TTL level
- 50Ω BNC connector
- Format: IRIG-B002

### **2.2.5 IRIG B Output**

- Output: TTL level
- BNC connector
- Format: IRIG-B002

## ***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 EC31M 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 EMC**

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 61000-6-2: ed 2005,
- EN 61000-6-3: ed 2007:  
Generic standards – Immunity for residential, commercial and light-industrial environments.
- EN 55022 ed 2006:  
Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement.

## **2.6 Safety**

- EN 60950:  
Safety of Information Technology Equipment.

## ***3 Putting the EC31M into Operation***

The EC31M can be installed in a rack or used as-is.

### ***3.1 Preliminary Connections***

Before starting the EPSILON CLOCK MODEL EC31M, 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 EC31M.**
- 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 EC31M back panel to the frame of the rack.

### ***3.2 Powering Up***

The EC31M 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. Check 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 (Locked LED switches from yellow to blinking 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).

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 PC, open a web browser page at the EC31M IP address. Click to enter the web interface. Go to "System Setup">"Network Setup" web page. Enter password (factory set at: "pwd").

If the EC31M is already DHCP configured and if no DHCP server is available, you cannot connect a control PC to access EC31M network configuration pages. It is then possible to reset the IP address and mode to the factory setting using the TC interface.

Connect a serial cable from EC31M (TC-SZ and TC-NSZ connectors) to a control PC. With serial software (like Putty or Hyperterminal), configure serial parameter: 9600-N-8-1.

Press Enter to show Menu:

```
TSM - Terminal Control Interface

Value to modify      | Actual value
-----|-----
1 - Use of a DHCP    | Yes
2 - Static IP address| 172.16.207.12
3 - Sub-network mask | 255.255.255.0
4 - Sub-network address| 172.16.207.0
5 - Broadcast address| 172.16.207.1
6 - Default gateway address| 172.16.207.255
7 - Default setup    |
8 - Reboot systeme   |

Current IP address  : 172.16.207.38
++> █
```

#### 3.3.1 Network with DHCP

If your network uses DHCP, you can use the current IP address of product with your Web-browser.



### 3.3.2 Network without DHCP

If your network doesn't use DHCP, or you want specify an IP address manually, enter '1' on command line.

Enter 'no' to disable DHCP configuration Mode.

```
++> 1
Please type 'yes' for dhcp configuration or 'no' for static ip configurati
on : █
```

Enter '2' on command line to modify the IP address:

```
++> 2
Please type the new Static IP : 192.168.0.20█
```

Enter '8' on command line to Reboot system and apply modification.

```
++> 8
Are you sure (y/n) ? █
```

## 3.4 Configure the EPSILON CLOCK MODEL EC31M

The EC31M is configured through an Ethernet network with a web browser.

After boot sequence, open a browser at the EC31M 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 Synchronization Setup" page with priority level setting to "Disabled".



## ***4 Operation***

### ***4.1 General Information***

#### ***4.1.1 Control of operating functions***

The EC31M may be controlled through a web interface (Ethernet/RJ45) with a remote PC.

#### ***4.1.2 Network Configuration***

The IP address of the EC31M can be assigned through DHCP protocol or manually. The assignment mode is programmable through the web interface and reset with the Terminal Control interface.

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 Terminal Control in order to connect a control 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 EC31M, 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.

## 4.2 Web Pages

### 4.2.1 Welcome Page



## WELCOME TO EC31M INTERFACE

[Click to enter](#)

Spectracom  
3 Avenue du Canada  
91974 Les Ulis Cedex  
France

Tel : +33 (0)1 64 53 39 80  
Fax : +33 (0)1 64 53 39 81  
Email : [sales@spectracom.fr](mailto:sales@spectracom.fr)

Web : [www.spectracom.fr](http://www.spectracom.fr)

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

## 4.2.2 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)
- Clock Status:
  - Summary of status and alarms of the EC31M
- Tools
  - Events Logging: Display of events history.
  - Software Version: Display of current version of software parts.
  - Software Upgrade: Upgrading software
  - Reboot: Per module hardware reset

Header time information is provided by the EC31M. 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 Reference Setup menu")

### 4.2.3 Clock Status page



#### Clock Status

Global Status			
EC31M Status	Alarm	SFN Status	Off
Synchronization Source	None	Oscillator Control Voltage	2.500 V
Tracking Status	Holdover	Synchronization Time	0

Alarms			
GPS Alarms		Synchronization Sources Alarms	
GPS Locked	Alarm	External 1PPS Locked	Alarm
Antenna Status	Unpowered	IRIG B Locked	Alarm
GPS Module Status	Alarm		
Internal Alarms		Synchronization Alarms	
Internal Oscillator	Ok	Phase Accuracy	Alarm
Internal 1PPS	Ok	Frequency Accuracy	Alarm
Distribution Alarms			
1PPS Outputs	Ok		
10 MHz Outputs	Ok		
IRIG B Output	Ok		

GPS Status				
GPS Longitude	0° 00' 00" 000ms E	Best Satellites		
GPS Latitude	0° 00' 00" 000ms N	ID	0	0
GPS Altitude	0.00 m	SNR	0	0
Self Survey	Pending	ID	0	0
Visible Satellites	0	SNR	0	0

NMEA Status	
NMEA Longitude	0° 00' 00" 000ms E
NMEA Latitude	0° 00' 00" 000ms N

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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**

- EC31M Status:
  - Global working status of EC31M:
    - Ok: All functions run as expected, no alarm in EC31M.
    - Warning: EC31M distributes valid signals referenced to a valid input (GPS or External), but alarms remain. Maintenance is required.
    - Alarm: EC31M 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: EC31M 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  $1 \times 10^{-8}$  and a phase accuracy better than  $1 \mu\text{s}$ .
    - Off: EC31M 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: EC31M 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 EC31M is no longer able to drive the Internal Oscillator.
- Tracking Status:
  - Slaving algorithm status:
    - Warming up: The EC31M internal oscillator is warming up.
    - Tracking search: The EC31M receiver is searching best slaving conditions.
    - Locked: The EC31M 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.
- Synchronisation Time:
  - Time during EC31M is synchronized to a valid source.

**Alarms****GPS Alarms**

- GPS Locked:
  - OK: Performance of the 1PPS signal of the GPS receiver:  
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:
  - Unpowered: State of the connection to the GPS antenna  
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:
  - OK: Working state of the GPS receiver:  
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:
  - OK: Monitored status of the 10MHz generated by internal oscillator:  
Frequency driver operational.
  - Alarm: Frequency driver failure.
- Internal 1PPS:
  - OK: Monitored status of internal 1PPS generated from oscillator frequency:  
1PPS driver operational
  - Alarm: 1PPS driver failure

**Synchronization Sources Alarms**

- External 1PPS Locked:
  - Status of the external 1PPS synchronization source
  - OK: Synchronization source is available.
  - Alarm: Synchronization source is not available.
  - Disabled: Synchronization source not allowed by operator (Clock setup page).
  
- IRIG B Locked:
  - Status of the external IRIG B synchronization source
  - OK: Synchronization source is available.
  - Alarm: Synchronization source is not available.
  - Disabled: Synchronization source 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**

- 10 MHz Outputs:
  - Monitoring of the frequency output signals delivered by the EC31M:
    - OK: The signal is delivered at all outputs.
    - Alarm: The signal is not delivered at one of the outputs.
  
- 1PPS Outputs:
  - Monitoring of the 1PPS output signals delivered by the EC31M
    - OK: The signal is delivered at all the outputs.
    - Alarm: The signal is not delivered at one of the outputs.
  
- IRIG B Output:
  - Monitoring of the IRIG B output signal delivered by the EC31M
    - OK: The signal is delivered at the output.
    - Alarm: The signal is not delivered at the output.
    - Disabled: The signal is not delivered at the output. (Clock setup page)

**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.

#### 4.2.4 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.



#### Time & Synchronization Source Setup

A login is needed to display this page

Password

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## 4.2.5 Network Setup page

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



### Network Setup

Host Name	Spectracom	Name of the host ex: myhost
Use DHCP	Yes	Select if you want to dynamically get an IP address
IP Address	172.16.207.12	Ex: 192.168.0.2
Sub-network Mask	255.255.255.0	Ex: 255.255.255.0
Sub-network Address	172.16.207.0	Ex: 192.168.0.0
Broadcast Address	172.16.207.255	Ex: 192.168.0.255
Default Gateway	192.168.0.1	Ex: 192.168.0.1

Change Password:

Save configuration

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When set in Use DHCP mode, if the EC31M 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.

- Host name:
 

Unique name of the EC31M 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 EC31M is automatically allocated by the network DHCP server according to the EC31M 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
- Change password:
 

Field for password modification. This password is required when accessing setup pages. (default password : pwd)

### 4.2.6 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 Name:** 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.
- General Hardware Fault:
  - Yes: Generates a trap when the EC31M 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.
- 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 Alarm:
  - Yes: Generates a trap when the source of synchronization changes.
  - No: No trap generated.
- Entering Holdover Mode Alarm:
  - Yes: Generates a trap when the product goes in holdover mode.
  - No: No trap generated.
- Download MIB:  
Link for downloading zipped MIB text file.

### 4.2.7 Time & Synchronization Setup page

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



#### Time & Synchronization Source Setup

Time Parameters	
Date = DD / MM / YYYY	01 / 01 / 1980
Time = HH : MM : SS	00 : 00 : 00
Manual Time	Set
Manual Time Adjustment	-1 s +1 s
Date Format	DD/MM/YYYY
Time Reference	UTC
Offset for Local Time (HH:MM)	+ 00 : 00
Leap Second	0
Leap Second Date	31/03
1PPS Phase Offset (ns) max: ± 500 ms	0
Synchronization Parameters	
Force Holdover	Off
Priority Level : GPS	Priority 1
Priority Level : External 1PPS	Priority 2
Priority Level : IRIG B	Priority 3
Force a source as input	None
External 1PPS requires NMEA	Yes
Alarm Phase Threshold (ns)	1000
Alarm Frequency Threshold (1E-9 Hz)	10
Distribution Parameters	
IRIG B Output	Enabled

Save configuration

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#### Time parameters

- Date and Time, Set Manual Time button:  
Time manual setting allowed only when the EC31M is in forced holdover mode or when the EC31M has not yet been synchronized on a GPS reference source.
- Manual Time Adjust:  
Adjust the time by 1 second when the EC31M is in forced holdover mode or when the EC31M is not yet synchronized on a reference source. Helpful for fine adjusting manually set time.

- Date format:
  - DD/MM/AAAA: day / month / year
  - MM/DD/AAAA: month / day / year
  - DD/AAAA: day of the year / year
- Time reference:
  - 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.

**Synchronisation 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 1PPS:
  - Programs the priority of the External 1PPS 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: IRIG B:
  - Programs the priority of the External IRIG B 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
- Force a source as input:
  - Force the EC31M to be synchronized on a reference source even if other sources with a highest priority are available, for debug purposes:
  - None
  - GPS
  - External 1PPS
  - IRIG B

- 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<sup>-9</sup> hertz of the accuracy after which the 10MHz signal output is deemed invalid.

**Distribution parameters**

- IRIG B Output:  
Activate or deactivate the IRIG B Output.
  - Enabled
  - Disabled

### 4.2.8 GPS Setup page

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



#### GPS Setup

GPS Configuration	
Antenna Delay (ns) (0 to 1000ns)	0
GPS Mode	Automatic
Latitude Setup	00 d 00 " 000 ms N
Longitude Setup	000 d 00 " 000 ms E
Altitude Setup (m)	0.000

Save configuration

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- **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 EC31M 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 EC31M (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.

## 4.2.9 Events Logging

This page displays the recording of events (alarms, warning, information) detected inside the EC31M.

Alarm and warning refer to status displayed on the Clock Status web page. Information relates to configuration or state change.

**Events Logging** [Clear logs](#)

<< < 1/1 > >>

Time	Module	Gravity	Message
30/11/1999 00:00:59N	EC31M	Alarm	Clock Fault
30/11/1999 00:00:59N	EC31M	Alarm	Internal Oscillator Fault
30/11/1999 00:00:59N	EC31M	Alarm	Frequency Accuracy Fault
30/11/1999 00:00:59N	EC31M	Alarm	Phase Accuracy Fault
30/11/1999 00:00:59N	EC31M	Alarm	GPS Fault
30/11/1999 00:00:59N	EC31M	Alarm	NMEA / PPS Ext Fault
30/11/1999 00:01:03N	EC31M	Alarm	Internal Oscillator OK
30/11/1999 00:01:04N	EC31M	Warning	Entering Holdover Mode

<< < 1/1 > >>

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- "<>" Button: Navigation through the whole content.
- "Clear Logs" Button: Clear the log buffer
- Module: Origin of event. EC31M origin relates to general event.

## 4.2.10 Versions

This page displays the version number of key elements of EC31M software and firmware.



### EC31M Version

Archive Version	
Current Version	02.05
Date	01/10/2008 15:32:48

System Version	
Current Version	01.01a
Date	27/05/2008 20:03:55

Firmware Version	
Current Version	01.11

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### 4.2.11 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 EC31M, 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.

**Upgrade Application**

**Upload a New Application Version**

Select an archive to upload. Its name looks like *EC31M\_XXXXXXXX.yy.zz.tgz*. The transfer can take up to 5 minutes.

Chisissez un fichier    Aucun fichier choisi

Upload File

**Application Version**

Select an uploaded archive then click the *Install New Version* button.

New Version	na
Current Version	02.05
Date Of Current Version	01/10/2008 15:32:48

Install New version

**Delete File**

This function allows removing uploaded versions.

File    na

Delete

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- **Upload File:**  
First step of upgrade. A tgz compressed file is sent to the EC31M and stored. Last uploaded release is shown in the 'New Version' field.
- **Install New version:**  
Second step of upgrade. 'New version' is the last downloaded version for upgrade. Current version is the running version.  
When clicking on "Install new version" button, upgrading module is restarted. Distributed is not impacted.
- **Delete:**  
This function allows removing uploaded versions.

#### 4.2.12 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.



#### Reboot

Please confirm reboot.

<a href="#">Yes</a>	<a href="#">No</a>
---------------------	--------------------

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

## ***5 SNMP Control***

### ***5.1 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.



## **6 Maintenance**

### **6.1 Periodic Verification and Calibration**

The EC31M 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

### **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**

Locked alarm: Shows the validity of the reference source and state of the tracking algorithm.

1PPS alarm: Shows the state of outputs.

##### **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 EC31M.

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 EC31M Status**

The EC31M 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.

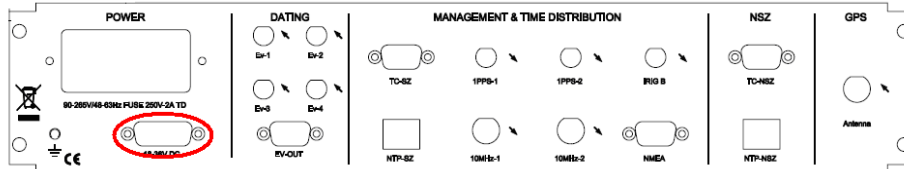
After checking the antenna installation, if the receiver is still in a failure status, the unit should be replaced.

**6.4.2 Customer Support Information**

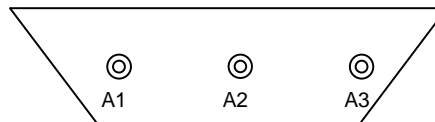
In case of failures, please contact Spectracom Customer Service. Customer service is available by telephone at +33 (0) 1.64.53.39.80 (France), or +1.585.321.5800 (United States).

## 7 Appendix

### 7.1 DC Connector Pin-Out



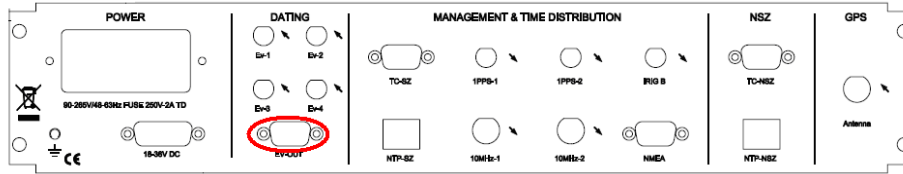
Type of connector: POWER SUB-D



Pin	Signal	Description
A3	+DC	DC power supply
A2	0V	Power supply return
A1	CASEGND	Case grounding

The above view is the rear panel view as seen by the operator.

## 7.2 Event Output Connector Pin-Out



Type of connector: SUB-D9 Female

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

1	NC	6	NC
2	TX_EV	7	NC
3	NC	8	NC
4	NC	9	NC
5	GND		

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

<b>NC</b>	Not Connected
<b>GND</b>	Ground
<b>TX_EV</b>	Transmit line output of the Datation Event message. RS232 compatible level



### 7.3 Datation Message Output

Data and port parameters: ASCII, 19200 bps, 8 bits, 1 stop bit, no parity.

Protocol: <Message> <CR> <LF>

For each detected event the equipments send on the dating output the message corresponding to the following ASCII sentences.

Format:

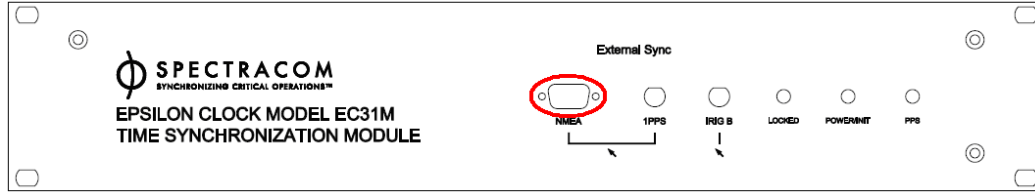
<F><space><S><space><DD/MM/YY><space><HH><h><MM><m><SS><s><space><MMM><ms><space><UUU><us><space><CCCC><C<sub>R</sub>L<sub>F</sub>>

e.g: F 1 24/02/07 12h00m00s 123ms 456us 084d

- space = ASCII space character ( x20 )
- F = Front, R for rising edge and F for falling edge
- S = Event input source number 1, 2, 3 or 4
- DD/MM/YY = Day month year
- HH = Hour
- MM = minutes
- SS = Seconds
- MMM = Milliseconds
- UUU = Microseconds
- CCCC = Checksum (binary sum of all characters) calculated on 16 bits on all characters send before the checksum, including the <space> located after the <us> string and the checksum.

C<sub>R</sub>L<sub>F</sub> = ASCII carriage return and line feed characters

### 7.4 NMEA IN Connector Pin-Out



Type of connector: SUB-D9 Female

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

1	NC	6	NC
2	NMEA_IN	7	NC
3	NC	8	NC
4	NC	9	NC
5	GND		

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

<b>NC</b>	Not Connected
<b>GND</b>	Ground
<b>NMEA_IN</b>	Receive line input of the NMEA message. RS232 compatible level

## 7.5 NMEA Message Input

Connector: connector SUB-D9

Input signal characteristic required:

Data and port parameters: ASCII, 9600 bps, 8 bits, 1 stop bit, no parity.

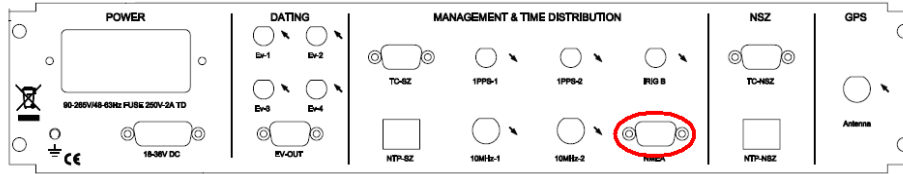
Protocol: <Message> <CR> <LF>

Format: \$GPRMC,hhmmss.ss,A,llll.ll,a,yyyy.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 EC31M
- a = N or S (North or South) of emitter, not used by the EPSILON CLOCK MODEL EC31M
- yyyy.yy = Longitude of emitter, not used by the EPSILON CLOCK MODEL EC31M
- a = E or W (East or West) of emitter, not used by the EPSILON CLOCK MODEL EC31M
- x.x = not used by the EPSILON CLOCK MODEL EC31M
- x.x = not used by the EPSILON CLOCK MODEL EC31M
- ddmmyy = UTC date
- x.x = not used by the EPSILON CLOCK MODEL EC31M
- a = not used by the EPSILON CLOCK MODEL EC31M
- \*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 EC31M.

### 7.6 NMEA OUT Connector Pin-Out



Type of connector: SUB-D9 Female

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

1	NC	6	NC
2	NMEA_OUT	7	NC
3	NC	8	NC
4	NC	9	NC
5	GND		

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

<b>NC</b>	Not Connected
<b>GND</b>	Ground
<b>NMEA_OUT</b>	Transmit line output of the NMEA message. RS232 compatible level

## 7.7 NMEA Message Output

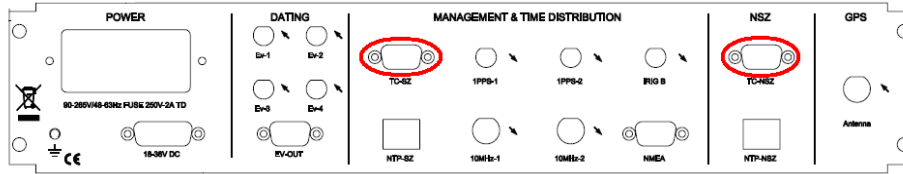
Data and port parameters: ASCII, 9600 bps, 8 bits, 1 stop bit, no parity.

Protocol: <Message> <CR> <LF>

Format: \$GPRMC,hhmmss.ss,A,llll.ll,a,yyyy.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 EC31M (A = OK, V=warning)
- llll.ll = Latitude of fix
- a = N or S (North or South)
- yyyy.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

### 7.8 Terminal Control Connectors Pin-Out



Type of connector: SUB-D9 Female

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

1	NC	6	NC
2	TX_TC	7	NC
3	RX_TC	8	NC
4	NC	9	NC
5	GND		

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

<b>NC</b>	Not Connected
<b>GND</b>	Ground
<b>TX_TC</b>	Transmit line output of the terminal console. RS232 compatible level
<b>RX_TC</b>	Receive line input of the terminal console. RS232 compatible level



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