GPS Network Time Sever:
LEU9070

GPS Antenna 25dB:
LEU9071

Antenna Cable (25 metres):
EHNU9070

Configuration Cable:
EHNU9071

GPS Network Time Server

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SALES: **(0118) 965 5100**
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Contents

Introduction

This manual is the installation and operating manual for the GPS Network Time Server and accessories.

- GPS input antenna,
- Mains power input (90 to 265V / 48 to 63 Hz),
- DC power supply input (18 to 32 VDC),
- Four 10 MHz outputs (>10 dBm / 50),
- 1-pps output (TTL / 50),
- Time stamp output (RS232C),
- Alarm output (relay contact),
- Remote control interface (RS232C),
- Ethernet output, 10 MHz, AUI or 10BaseT,
- IRIG output, NFS 87-500 standard compliant.

The manual describes the device components, on-site installation, commissioning, operation in regular service, troubleshooting information and user-accessible maintenance.

A summary of performance and a description of the clock inputs/outputs are also given for information.

The product-specific terminology is explained in on page 24. The main abbreviations used in the document are detailed in the glossary.

Product Description

General

The GPS Network Time Server meets the precise synchronization and syntonization requirements of local and remote users.

The GPS Network Time Server offers highly accurate and stable frequency sources synchronized and slaved on the reception of signals transmitted by the GPS satellite constellation.

The clock operates on a stand-alone basis, in a predefined setting. This configuration can be modified by the user, via the remote control interface.

The clock integrates a GPS receiver used to deliver, at user level, the time/frequency reference broadcast by the GPS system. It autonomously uses the integrity aspects of this system (TRAIM); i. e. it automatically rejects the signals transmitted by satellites considered as faulty, which might impair the clock's performance.

The time reference thus obtained is processed by high performance algorithms, which control the internal frequency pilot of the unit. The system is used to distribute frequency and time signals (1-pps second signal) locally, and time stamp and synchronization messages remotely, via Ethernet network under IP or by IRIG signal over amplitude coded on symmetrical pair. Distribution under IP is performed using the NTP protocol for which the GPS Network Time Server is a primary timeserver.

In case of GPS reception loss, the clock maintains the time and frequency distribution from its internal pilot. Also, learning of the frequency pilot behaviour (effects resulting from ageing and temperature variations, in the presence of the GPS reference), it is used to improve the time and frequency distribution performance when the GPS is lost.

Most functions of the GPS Network Time Server are software controlled. At start-up, the unit runs self-tests of its hardware resources, it checks that its internal pilot is stabilized and makes a first coarse adjustment of the distributed frequency. After half an hour of operation, the frequency accuracy is of 1.10-9 and the time accuracy is less than 1 s relative to UTC(GPS) time.

As a timeserver on IP protocol, the GPS Network Time Server includes a DHCP and a BOOTP client. Those clients automatically set to the configuration of the GPS Network Time Server as it is connected to server configured IP network. Through the remote control link, the GPSNTSTP external software enables the configuration of an address mask for broadcasting to specified subnets.

Standard functions

The GPS Network Time Server is designed to generate, maintain and deliver:

- A time reference synchronized with the UTC (GPS) time. The unit delivers a 1PPS signal and a time stamp message for this signal;
- A frequency reference (four 10 MHz outputs);
- A time stamp signal with one second repetition (TOD output);
- A frequency and time reference via a 1KHz carrier modulated by the time and date (IRIG output);
- A time service on an Ethernet network, under IP and NTP protocols.

The clock is supplied with an AC or DC voltage. These two voltage sources are both connected to provide full redundancy.

The user can access the clock status data via the remote control interface. Sets of commands are also available to the user to initialise or set up the clock.

The synthetic status of the system operation is reported locally on the three front panel indicator lights.

In the event of a hardware failure, a relay contact output closes.

The GPS Network Time Server is fully automatically operated. The IP address and the subnet masks can be modified through the remote control access. The GPS Network Time Server requires no maintenance operation over a 10-year period.

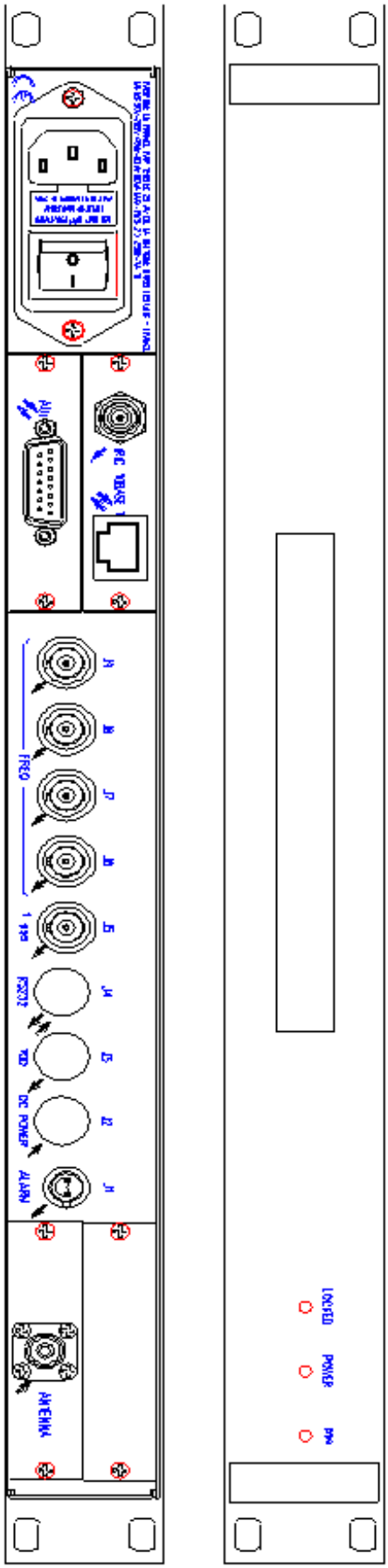
Dimensions and weight

The GPS Network Time Server can be mounted in a standard 19-inch rack.

Height:1 U (44 mm)
Width: 19" (483 mm)
Depth: 13.5 “ (340 mm)
Weight: < 5 Kg

Front and rear panel drawings

(See overleaf)


ALARM
DC POWER
FREQ
ANTENNA
LOCKED
POWER

Quick Start Guide

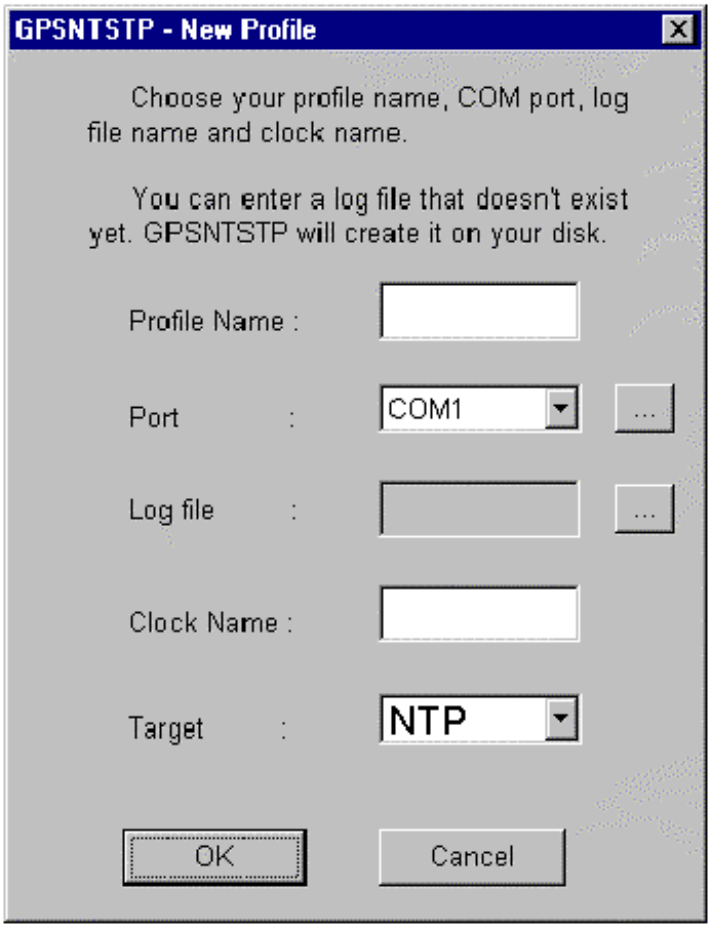
This section breaks down the installation of the GPS Network Time Server, into an easy to follow step-by-step guide.

Step One – connecting the server to a configuration terminal

After unpacking your GPS Network Time Server, connect it to a PC for configuration. Take the configuration cable, (EHNU9071) and plug the 8-pin DIN connector into the port labelled "RS232" on the back of the server. Connect the 9-pin D type connector into a free comm port on your PC.

Now take the CD supplied with the GPS Network Time Server and insert it in to your CD drive. Your PC will now automatically load the software and take you through to the welcome screen. From here to create a new session you must select MANAGE and then NEW.

You are now presented with a screen that looks as follows:



Profile name

The name entered in this box will be the name of the file that contains the profile parameters.

Port

This box allows you select a serial port through which you can configure the GPS Time Server.

Log File

Enter here the name of the file where you would like alarm logs to be recorded.

Clock Name

This label will be used in the log file.

Target

"NTP" must be selected in this box. This is relevant if flash upgrades are performed.

Step 2 – Connection to the Network

Attach the GPS Network Time Server to your network hub or switch using a straight Category 5 patch lead.

After connecting to the network, use the configuration software and serial configuration cable to set the IP address and subnet mask. Please see your network manager for a spare IP address. Alternatively, select the DHCP setting for the time server to obtain a dynamically assigned IP address at startup. Networking parameters are set via the Setup and then the Network menu.
After configuring the IP parameters, reboot the server from the Clock toolbar.

Step 3 – Connecting the antenna

Unpack the antenna, (LEU9071) and the antenna cable (EHNU9070) now connect the antenna to the cable, and the cable to the antenna port on the back of the server.

Step 4 – Positioning the antenna

The antenna should be mounted horizontally outside with a clear 360-degree view of the sky.

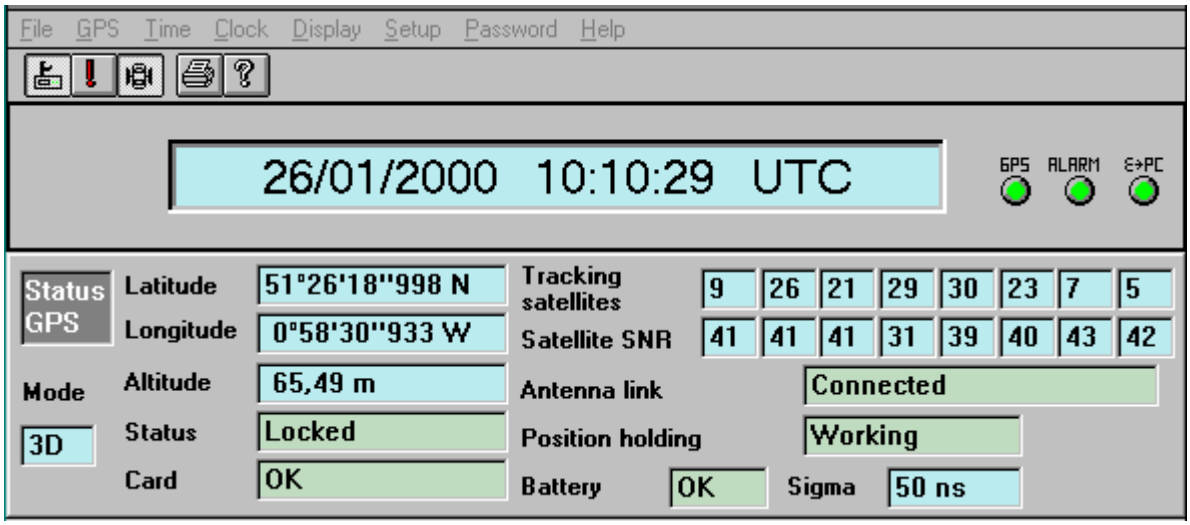
Step 5 – Using the software

The software is used to monitor and control the GPS Time Server. It is used to set-up the slaving of the GPS Time Server to the GPS source.

Explanations of each of the software menus can be found in the help menu.

After following the steps 1-4 the equipment has to lock on to the GPS sources and synchronise, this can take up to 30-minutes. When synchronisation is complete, the "locked" LED on the front panel, will turn green.
A "power" LED also goes green when the temperature of the power supply and internal clock source have stabilised. This also takes around 30 minutes.

Enabling the GPS status menu from the Display toolbar of the software allows you to watch the clock lock onto the different satellites. It requires three satellites to get valid time, and four to determine correct altitude. The clock can then work with any number of satellites between one and eight.



As soon as all the "status" fields turn green the GPS Time Server will be fully synchronised and ready to provide a GPS time source to your network.

Step 6 – Enabling servers to use to GPS Network Time server over your network

To enable servers on your network to use the GPS Network Time Server, they will need to be loaded with a piece of Daemon software.

This Daemon software can be found on many web sites, here are two possible sites:

http://www.accessone.com/~thinkman/dimension4/

www.infres.enst.fr/~dax/services/rfc

Appearances vary, but you will need to enter the IP address and name of the server, and select NTP, or SNTP protocols for the Daemon software to communicate with the server.

Start-Up

Preliminary connections

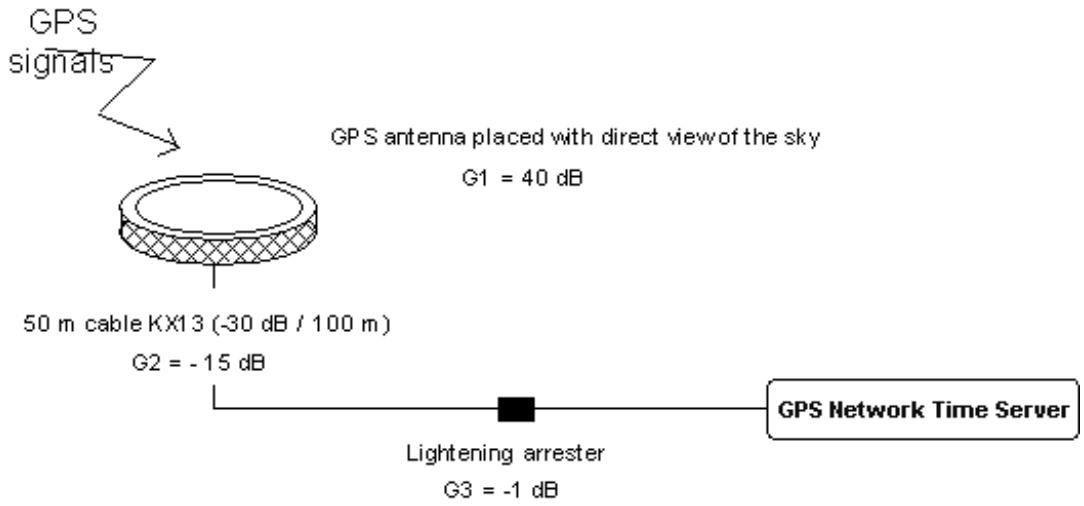
Before starting up the GPS Network Time Server, the following operations should be performed:

- Place the system so that the lower and upper cooling air inlets are not obstructed.
- Place the GPS antenna outdoor in a position such that it views the sky directly over 360 degrees (e. g. at the top of an antenna mast).

CAUTION
The GPS Network Time Server is designed to operate exclusively with the recommended GPS antenna. Connecting another antenna can turn the system inefficient, or even damage it irreversibly.

- Connect the antenna to the Antenna connector. For the GPS signals to be received correctly, the antenna-cable-lightening arrester assembly should have a gain in the range from 3 to 33 dB.

Typical antenna mounting:



G1 + G2 + G3 = 40 dB - 15 dB - 1 dB = 24 dB
We actually have: 3 dB < G1 + G2 + G3 = 24 dB < 33 dB

- Connect the power supply circuit to the mains socket, or connect a DC power supply (24V for Series 2S or 48V for Series 2T) to the DC Power connector J2.

CAUTION
A break of the arrester conductor, inside or outside the unit, or disconnecting the earth terminal may turn the unit hazardous.
It is forbidden to break the circuit intentionally. First switch off the unit before disconnecting.

Connection quality

Special care should be taken when connecting the GPS antenna. Remember that the antenna must be placed so as to have a full-unobstructed view of the sky.

Also, the type of cable connecting the antenna to the clock, and its length, will significantly influence the receive quality and should follow the rules shown in the diagram on the previous page.

The user must make sure that the connections between the antenna, accessories (lightning arrester, line amplifier) and cable are not directly submitted to weather conditions (rain, snow, ice, etc.).

An installation of poor quality will cause operating faults, from random losses of reception, to total inability to receive GPS signals. Such faults prevent correct slaving of the clock to the GPS reference.

Starting the clock

Note: The On/Off switch of the mains input does not act on the "DC Power" DC power supply connected to receptacle J2. This paragraph only concerns a mains supply. When the DC power supply is turned on, the same starting sequence, then same operation takes place, as described below.

Check the preliminary connections.

When power is applied to the device, the whole system will be powered. Set the rear panel switch into position 1. The GPS Network Time Server starts.

About 10 seconds after powering up, the front panel 1pps indicator flashes at a one second rate. It indicates correct generation of the 1PPS signal from the internal frequency pilot.

CAUTION
- The POWER indicator remains red until the end of the oscillator heating time period (about 20 min).
- For 10 seconds following clock start up, the TOD and Remote control messages are not usable.

The power on sequence of the two-colour LOCKED and POWER indicator is intended to check the clock start-up, while checking the correct operation of the indicator lights:

	LOCKED	POWER	Comments
Standard hardware resource self-testing	Red	Red	Checks the clock operation
Optional hardware self-testing	Green	Red	Checks the options
Synchronization period	Red	Green	Search for signals transmitted by the GPS satellites

In the event of a hardware fault, the Alarm output (connector J1) is activated (relay contact closed) and the POWER indicator goes red.

The conditions for activation of this output are the following:

- GPS receiver fault;
- Frequency pilot fault;
- Frequency division circuit fault;
- Fault in the distribution of the frequency or synchronization signals;
- Synchronization or frequency performance fault*

*this function is programmable via the remote control interface.

If the fault occurs during the start-up sequence, both "LOCKED" and "POWER" indicator go red. Under such condition, the time message is no longer distributed (Time Of Day message, connector J3) and the clock no longer synchronizes with the GPS source. In such a case, contact the Black Box technical support.

When all indicators are out, the clock is not powered.

When the "LOCKED" indicator goes green, the front panel illuminates. When this indicator goes red to indicate the start of synchronization period, the front panel display indicates the initial date, time, and increments on each second. This time indication starts at the end of the self-tests at: 01/01/92 00:00:00N

.

The system then automatically switches over to UTC time acquisition.

Note: The "POWER" indicator goes red at the end of the self-test and remains red throughout the heating time of the internal oscillator, this will be a maximum of 20 minutes.

The "LOCKED" indicator remains red until UTC time acquisition by the GPS receiver. Acquisition lasts less than 30 minutes when the GPS constellation is under nominal operating condition.

Operating faults

All indicators out indicate that the clock is not powered.

Under normal operating conditions, the clock is synchronized to UTC time via GPS. Under such condition, the "LOCKED" and "POWER" indicators are green, while the "1pps" indicator flashes at a one second rate.

If one of the following faults occurs during the starting period, both "LOCKED" and "POWER" indicator go red:

- GPS receiver positioning fault;
- Frequency pilot fault;
- Frequency division circuit fault;
- Fault or impedance mismatching of the frequency or synchronization outputs;
- Synchronization or frequency performance fault*

* The estimated phase shift is greater than 1 ?s or the estimated frequency deviation is greater than 110-9.

Under such condition, the clock no longer synchronizes with the GPS source. In this case, contact the Black Box technical support.

In continuous operation, the same faults cause the "POWER" indicator to go red.

Setting out of service

To set the GPS Network Time Server out of service, set the switch to position O and disconnect the "DC Power" input (J2).

Operation

Adjusting to UTC time

This mode is used to acquire the time output from an external U.T.C. reference and to initialise the internal time of the system.

The U.T.C. time reference is acquired fully automatically from the GPS receiver.

This operating mode is accessed automatically at the end of successful self-testing. It lasts throughout the time the system is powered. It is automatically sequenced as described below.

At the end of the self-tests, the receiver operating parameters are initialised by the central processor.

The GPS receiver goes into the satellite data acquisition mode. Such acquisition lasts less than 30 minutes. During this phase, the UTC time is not available. This state is indicated by the front panel "LOCKED" indicator lighting red. This state can resume during operation whenever the antenna is accidentally masked.

In all cases, acquisition lasting more than 30 minutes indicates either a failure, or a system installation fault, or an unavailability of the GPS constellation.

The reception quality of signals transmitted by the GPS satellite constellation is directly conditioned by the antenna having an open view of the sky.

The time data is received from the receiver is analysed by the GPS Network Time Server. When the data enables the timekeeper to acquire the UTC (GPS) time scale, the system switches over to the continuous time acquisition mode. This state is indicated by the front panel "LOCKED" indicator lighting green. The current time is then displayed, with the suffix corresponding to its programming by the remote control.

The accuracy of the time acquired in such mode is better than one microsecond, exclusive of SA (Selective Availability) degradation of the GPS signals.

Time keeping

Time is maintained with a stable temperature controlled oscillator. When there are no GPS signals received, the long-term stability of time keeping is directly conditioned by the characteristics of the selected oscillator:

OCXO type oscillator:

- thermal drift: 5.10-10 from +10°C to +30°C,
  1.10 -8 from 0°C to +50°C.
- long-term drift: + 25.10 -9 per year.

Such characteristics enable to ensure a maximum yearly drift of approximately 5 s.

NTP server operation

The GPS Network Time Server is a level 1 time server, according to the definition of time broadcasting and synchronization given in the NTP recommendation.

It operates in conformance with the NTP version 3 described in recommendation RFC 1305. It delivers time information over the network in the server mode, only in response to client polling. It supports communication through routing networks. It handles selection of up to five bridges connecting its local network to other networks.

When the system maintains a UTC time acquired by synchronization on GPS, the information broadcast over the network is identified as broadcast level 1. Such information is maintained as long as the clock is locked on information reception from GPS satellites.

A loss of locking is indicated by the "LOCKED" indicator going red, the broadcast NTP level is 16, which indicates that the message or its synchronization is invalid.

When locking is restored, the server automatically returns to level 1.

Control is fully automatic.

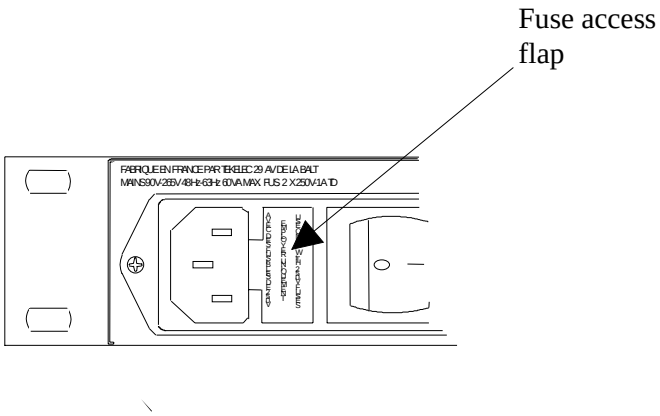
The addresses of the bridges and adjacent networks can be entered via the remote control interface. A specific sub-menu is provided in the GPSNTSTP software.

Maintenance

The GPS Network Time Server operates automatically. It requires no maintenance over a 10-year period.

Apart from replacing, where necessary, one of the installation units, following damage or fault, the only curative maintenance operation consists of replacing the 2 fuses of the AC power supply.

These fuses are accessible on the rear panel, between the CCE 22 connector and the on/off switch of the mains input.



CAUTION
Only the following fuses can be used:
250V – 1A TD 5 x 20mm

To replace the fuses:

- set the on/off switch to position 0,
- disconnect the AC power supply cord from the rack,
- pull the flap, from the tab in the mains connector hole,
- replace the faulty fuse(s),
- push back the fuse flap,
- connect the power supply cord,
- set the on/off switch to position 1.

Performance Characteristics

Environment

The GPS Network Time Server meets the safety recommendations for industrial equipment

- Operating temperature: - 40 °C to + 85 °C ;
- Relative humidity: 90%, no condensation, at + 40 °C ;
- Low voltage safety: per EN 60950 ;
- Electromagnetic compatibility: per EN 50082-1, 1992 issue
- Radiated perturbations transmitted: per EN 55022 C1ass B, 1994 issue.

Internal time generation

The initial accuracy of the system internal time is conditioned by the adjustment source used by the user. The 1-pps signal rising edge gives the precise time for the second roll over. The accuracy of the 1-pps signals relative to the UTC (GPS) is:

- Accuracy in synchronization with GPS: $< \pm 100$ ns (at 1σ, without SA on GPS);
- Accuracy with GPS unavailable (1): $< \pm 20$ µs (at 1σ, without SA on GPS).

(1) 24 hrs after GPS synchronization of duration > 48 hrs, at almost constant temperature;

The system accuracy, following disconnection of the U.T.C. time reference source depends directly on the oscillator used, i.e. the OCXO described in paragraph "4.2. ". However, following locking for a sufficient period on GPS broadcasting, the intrinsic stability of the oscillator is improved by the system internal algorithm. Thus, if locking on GPS lasted at least 48 hrs and that subsequent unlocking follows for 24 hrs, the internal reference accuracy is better than: +20 µs

Frequency outputs

The four frequency outputs each deliver a 10 MHz frequency sine wave signal. These outputs are delivered by the OCXO frequency pilot included in the timekeeper.

The performance characteristics of these outputs are:

- Frequency accuracy(1), with GPS available: $<\pm$ 2 x 10-12 ;
- Frequency accuracy(1), with GPS unavailable(2): $< \pm$ 3 x 10-10.

(1) Average frequency accuracy over 24 hrs at 1σ,
(2) 24 hrs after last synchronization on GPS lasting > 48 hrs, at almost constant temperature.

NTP reference accuracy

The reference delivered by the GPS Network Time Server has an accuracy level equal to the internal time generation accuracy. The processing of client request messages to the server introduces an average internal error less than 1 ms.

The overall synchronization performance including the client is highly dependent on parameters external to the GPS Network Time Server. Such influence is inherent to the operation of exchanges on UDP protocol for NTP. This performance depends on the message path over the interconnecting network(s), the load on the routing networks, the setup and the operating system used by the client.

For an exchange over a local Ethernet network with less than 80% average load and with a client implemented on a SUN SPARC Classic workstation under Solaris 2.3, the accuracy of the data transmitted by the GPS Network Time Server allows synchronizing a client with the server to better than: ± 20 ms.

Input/Output Characteristics

Power supplies

The GPS Network Time Server is designed to operate from two power supply sources. The source used is automatically selected according to the respective input levels.

DC Source + 18 V to + 32 V:

- - Input voltage: + 18 to + 32 Volts ;
- - Power consumption: typically < 25 W;
- - Protection: - against input polarity reversal,
  - against internal short-circuits, by "polyswitch" type automatic reset fuses

Connectors:

- Item: J2;
- Type: mini Din, 7-contact, female receptacle;
- Pin layout:

Pin	Description	Pin	description
1	Vdc	5	Electrical ground
2	Vdc	6	Electrical ground
3	Vdc	7	Electrical ground
4	Vdc		

AC Source 110/220 Volts:

- Input voltage: 90 to 265 Volts ;
- Frequency: 48 to 63 Hz ;
- input power: 60 V A ;
- Input protection: fuses, 2 x 250 V -1A TD (time-delayed).

Connector:

- Type: CCE22 receptacle with built-in on/off switch.

"Antenna" input

The GPS Network Time Server is designed to operate connected to an antenna receiving GPS signals at L1 (1575.42 MHz) phase coded spread spectrum. The input is capable of supplying an active remote antenna.

Antenna power supply:

- voltage: 5V typical;
- current: < 75 mA ;
- protection: power supply cut off upon antenna input short-circuit.

Connector:

- Type: TNC female receptacle, 50? ;
- core: PS L1 input signal and +5V remote power supply;
- braid: electrical and mechanical ground.

"RS 232" output (J4)

The GPS Network Time Server connects to a control unit over the remote control bi-directional series link. Operation monitoring, status history and commands including; programming of subnet and clock IP addresses are all performed over this link.

Link characteristics:

- Transmission mode: asynchronous series links;
- Transmission level: RS232C, V.24 Recommendation of UIT-T ;
- Transmission rate: 9600 bps ;
- Coding: natural binary, 8-bit words
  odd parity, 1 stop bit;
- Logic level 1 (open): voltage < - 3 V ;
- Logic level 0 (closed): voltage > + 3 V ;

Connector:

- Item: J4 ;
- Type: mini Din 8-contact female receptacle;

Pin layout:

Pin	Description	Pin	description
1	reserved	5	Message input
2	reserved	6	NC
3	Message output	7	NC
4	Signal ground	8	reserved

"1-pps" output (J5)

The 1-pps output supplies a periodic electrical pulse, the rising edge of which is synchronous with the instant of second rollover of the time scale internally maintained in the clock.

Signal time characteristics:

- Period: 1s ;
- Synchronous instant: rising edge;
- High level duration: 100 ?s 10 ?s ;
- Rise time: < 50 ns (loaded with 50 ?).

Signal electrical characteristics:

- High level: > 2.4 V (loaded with 50 ?) ;
- Low level: < 0.8 V (loaded with 50 ?).

Connectors:

- Item: J5 ;
- Type: BNC female receptacle;
- Core: periodic pulse;
- Braid: clock electrical and mechanical ground.

"FREQ." Outputs (J6, J7, J8, J9)

The four frequency outputs each deliver a 10 MHz frequency sine wave signal matched to 50Ω.

Signal time characteristics:

- Frequency: 10 MHz ;
- Wave shape: sine wave.

Signal electrical characteristics:

- Minimum level: > + 10 dBm loaded with 50 ? ;
- Typical level: 13 dBm loaded with 50 ?.

Connectors:

- Item: J6, J7, J8, J9 ;
- Type: BNC female receptacle;
- Core: periodic sine wave;
- Braid: clock electrical ground.

"IRIG" output

The major characteristics of these signals are:
Standardized time of day message:

- Transmission mode: Series link;
- Transmission level: 0 dBm over 600 ? ;
- Frequency carrier: 1 kHz ;
- Repetition frequency: 1 s ;
- Information content: current date and time, from second to year;
- Coding: amplitude modulation, 0.317 ratio;
- Synchronization: identification bit of the synchronous start of second rollover.

Connectors:

- Type: BNC female receptacle.

"AUI" output

The AUI is used to connect the GPS Network Time Server to an Ethernet network at 10 MHz and to broadcast over this network the time reference, in accordance with NTP V3 Recommendation.

Connecting this connector to the network prevents simultaneous connection to the 10BaseT connector.

The output connector is a DB15 male receptacle.

The connection complies with the connection standard for matching to the physical layer of an IEEE 802.3 network.

"10BaseT" output

The 10BaseT is used to connect the GPS Network Time Server to a shielded pair network at 10 MHz and to broadcast the time reference over this network in accordance with NTP V3 Recommendation.

Connecting this connector to the network prevents simultaneous connection to the AUI connector.

The output connector is a RJ45 female receptacle.

The connection complies with the physical connection standard for shielded twisted pair per IEEE 802.3.

"ALARM" output (J1)

The "ALARM" output indicates an operating fault in the GPS Network Time Server. The relay contact closure, between two pins of the output, states the failure.

Breaking power: 30 VA at 250 V.

Connectors:

- Item: J1 ;
- Type: BR2 female receptacle;

Pin layout:

- 1 and 2 : loop;
- connector body: clock mechanical ground.

"TOD" output (J3)

The GPS Network Time Server includes an RS232 line for broadcasting a time of day message, programmable via the remote control link.
Time Of Day Message:

Coding: ASCII, 9600 bds, 8 bits, 1 stop bit, odd.
Protocol: <Message> CR LF
Format*: Day/Month/Year Hour: Minute: SecondSource
e. g.: 20/03/1996_21:02:05U

Format*: Day/Month/Year Hour -Minute - Second Source
e.g.: 11/12/1996_18:14:38L

Format*: Days/Years Hour: Minute: SecondSource
e.g.: _317/1996_18:16:20_L

-format*: MJD - integer part Hour: Minute: SecondSource
e.g.: _ _ _ _ _ _ 50399_18:20:50_U

-format* : MJD Source
e.g.: _ _ _ _ _ _ 50399.762130_L

The "Source" byte contains 1 ASCII character for coding the distributed time reference:

N	No reference
U	UTC
G	GPS
L	Local
M	Manual

- Transmission period: 1 s
- Transmission synchronization: transmission at 200 ms (100 ms after the 1PPS signal transition
  *Programmable from the remote control interface.

Connectors:

Item: J3 ;
Type: mini Din 6-contact female receptacle;

Pin layout:

Pin	Description	Pin	Description
1	Reserved	4	Electrical and mechanical ground
2	NC	5	Message output (RS232C)
3	Electrical and mechanical ground	6	NC

Terminology

1-pps pilot: Second type signal obtained by dividing the frequency of the clock internal pilot.

Holdover: In the event of a loss of input reference, the clock maintains the generation of the data and frequency time signals, based on its internal pilot.

Pilot frequency: Frequency signal delivered by the internal frequency pilot.

Time keeper: Set of functions providing the generation of time of day information, sequenced on the basis of the signal output by an oscillator the frequency characteristics of which provide a representation of the time circuit to be maintained.

Input reference: Time frequency source to which the clock slaves its internal pilot and the phases of the signals it distributes. This reference consists of the reception of GPS signals.

Day of year: Number describing the number of the day in the year.

Glossary

BOOTP: Bootstrap Protocol, network state and configuration information exchange protocol on TCPIP network.

DHCP: Dynamic Host Configuration Protocol, automatic and/or dynamic exchange protocol on TCPIP network.

GPS: Global Positioning System, worldwide coverage positioning system. By restriction, designates the positioning system by GPS/NAVSTAR satellites.

IP: Internet Protocol, interconnecting protocol at link level.

NTP: Network Time Protocol, time broadcasting protocol over IP network.

OCXO: Oven Controlled XTAL Oscillator, crystal oscillator in temperature controlled enclosure.

SA: Selective Availability, degradation of the performance on GPS satellite signals for civil users.

TRAIM: Time Receiver Autonomous Integrity Monitoring, algorithms used to check the integrity of data received by the receiver from GPS satellites.

UDP: User Datagram Protocol, protocol for data packet transfer without session setting up.

U.T.C: Universal Time Coordinated, universal time scale maintained by the Bureau International de l'Heure (B.I.H.), differing from the International Atomic Time by an integer number of seconds.

U.T.C.(GPS): U.T.C. time delivered by the GPS system.

1PPS: One Pulse Per Second, name of the 1 second time reference signal, the significant edge is synchronous with second rollover.