ptf 3207A

Time and Frequency System

User Guide

(Includes ptf 3207A-GNS, ptf 3207A-GPS, and ptf 3207A-TCG)

Document #: 11786

Certificate of Conformance

This certificate confirms that the following equipment:

Unit type: ptf 3207A GlobalTyme2 GNS Receiver

Serial Number: _904-01502-01

has successfully passed a FINAL ACCEPTANCE TEST and conforms in all respects of form, fit, and function to current specifications, including regulatory requirements and certifications.

This part is RoHS 2 (DIRECTIVE 2011/65/EU) / RoHS 3 (DIRECTIVE EU 2015/863) compliant with no exemptions.

This part is REACH compliant (EC/NO 1907/2006) per ECHA SVHC list 209, June 25,2020

Inspected and verified by: Date:

Stacy Roope 09/28/2020

_____ _____

For Precise Time and Frequency, LLC

Declaration of Conformity

This certificate confirms that the following equipment:

Unit type: ***ptf* 3207A**

is in conformity with the relevant provisions of the following standard(s) or other normative document(s):

EU EMC Directive 2014/30/EU:
Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

EN 55022:2006
Information technology equipment — Radio disturbance characteristics - Limits and methods of measurement

EN 61000-4-2: 2001
Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

EN 61000-4-3:2006
Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radiofrequency, electromagnetic field immunity test

EN 61000-4-4:2004
Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

EN 61000-4-5:2006
Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Surge immunity test

EN 61000-4-6:2005
Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

EN 61000-4-11:2004
Electromagnetic compatibility (EMC) - Part 44: Testing and measurement techniques — Voltage Dips and Short Interruptions immunity test

ISO 7637-2:2004
Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only
EN 61000-3-2:2006 +A1:2009 +A2:2009

Electromagnetic compatibility (EMC) - Part 32: Limits - Limits for harmonic and current emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3:1995
Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

EN 55016-1-1:2007
Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-1: Radio disturbance and immunity measuring apparatus — Measuring apparatus Amendment1 (2007)

CISPR16-1-2:2003
Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-2: Radio disturbance and immunity measuring apparatus —Ancillary equipment — Conducted disturbances 5
Amendment1 (2004)
Amendment 2 (2006)

EN 55016-1-4:2007
Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances

EN 55016-2-3:2004
Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity — Radiated disturbance measurements
Amendment 1 (2005)

EN 55016-4-2:2003
Specification for radio disturbance and immunity measuring apparatus and methods — Part 4-2: Uncertainties, statistics and limit modeling — Measurement instrumentation uncertainty

EU Low Voltage Directive 2014/35/EU
2014/35/EU Safety of Information Technology Equipment, including electrical business equipment

IEC 60950-1:2005/AMD2:2013 +A2 Safety of Information technology equipment

EU ROHS directive compliance according to Directive 2015/863

NOTE: This manual is best viewed in electronic form. Clicking on any of the Contents items will take you to that item. To return to the contents page, click on the "Go to Contents" link at the foot of the page.

View of the Dual Module Rear Panel

Notices

The manual's contents do not apply to previously released versions of ptf 3207A hardware or software.

Contents

1: Equipment Overview

Declaration of Compliance

Certificate of Conformance

This certificate confirms that the ptf 3207A has been tested and complies with the following CE standards to comply with the requirements for CE Marking:

EU EMC Directive 2004/108/EC:

EN 301 489-17 v2.2.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

EN 301 489-1 v1.9.2 Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

EN 300 440-2 v1.4.1 - Radio equipment to be used in the 1 GHz to 40GHz frequency range

EN 62479: 2010 Human exposure to magnetic fields

EN 60 950-1 Information technology equipment - Safety Part 1

EN 55022:2006

Information technology equipment — Radio disturbance characteristics - Limits and methods of measurement

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Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

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EN 61000-4-5:2006

Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Surge immunity test

EN 61000-4-6:2005

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EN 61000-4-11:2004

Electromagnetic compatibility (EMC) - Part 44: Testing and measurement techniques — Voltage Dips and Short Interruptions immunity test

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Amendment1 (2007)
ClSPR16-1-2:2003
Specification for radio disturbance and immunity measuring apparatus and methods — Part 1-2: Radio disturbance and immunity measuring apparatus —Ancillary equipment — Conducted disturbances 5
Amendment1 (2004), Amendment 2 (2006)
EN 55016-1-4:2007
Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances
EN 55016-2-3:2004
Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity — Radiated disturbance measurements
Amendment 1 (2005)
EN 55016-4-2:2003
Specification for radio disturbance and immunity measuring apparatus and methods — Part 4-2: Uncertainties, statistics and limit modeling — Measurement instrumentation uncertainty

EU Low Voltage Directive 2006/95/EC
EN 60950-1:2006 Safety of Information Technology Equipment, +A1+A11+A12including electrical business equipment
EU ROHS directive compliance according to Directive 2015/863
This part conforms to RoHS-3 Standards for material content with no exemptions.
This part conforms to REACH Standards for material content.
REACH compliant level 173, SVHC's
Signed: Date:

January 9, 2018

For Precise Time and Frequency, LLC

ptf 3207A Time and Frequency System Description and Features

The ptf 3207A provides high-precision time and frequency signals. Its modular design allows factory customization for a wide range of applications. In its standard configuration, the ptf 3207A functions as a stand-alone unit which can receive an IRIG time code input, 10MHz input, or 1PPS input, synchronizes its internal oscillator to that input, and produces time code and frequency outputs.

When paired with its internal timing-optimized GNS receiver, the ptf 3207A provides 1x10-12 frequency output accuracy, and better than 30 nS RMS accuracy to UTC (USNO). The ptf 3207A is available in a 19-inch 1U or 2U chassis with rack mount ears for installation.

This new range of Time and Frequency Clocks incorporates a flexible architecture to meet the most demanding clock synchronization requirements. The ptf 3207A incorporates a dual redundant reference source design that enables high-availability of the clock source. To achieve high-availability, the user configures the ptf 3207A with dual independent GPS receivers and antennas, or with one GPS antenna/receiver and one time code or 1PPS reference. In addition, the 1U chassis, when configured with two modules, provides dual redundancy and distribution in a single 1U unit.

Optional oscillator upgrades provide enhanced short term stability when locked to a reference source, and improved holdover 'flywheeling' when a reference source is unavailable.

The ptf 3207A-TCG configuration is designed to provide additional time code features, in particular this configuration offers count up/down capability and an additional I2C interface to provide remote control for loading preset count up/down time, start, hold, and direction (up/down).

Features and Options

Three user interfaces are available for managing the ptf 3207A:

- The web interface, available using a browser connected to the Ethernet port
- The command line interface, available from the serial port and standard Ethernet port (telnet)
- The keypad/display interface, available on the front panel of the ptf 3207A

In addition the unit includes SNMP v1,2,and 3.

The ptf 3207A's modular design allows factory customization for a wide range of applications. The following range of features are available in the standard configuration:

- Voltage-controlled temperature-compensated crystal oscillator (VCTCXO)
- 1 PPS Output
- Digital Output 1/10/100 PPS, 1/10/100 kPPS, (PPS=Pulses Per Second)
  1/5/10 MPPS, IRIG B 000 (DCLS)
  1 PPM (minute), 1 PHH (half hour), 1 PPH (hour),
  Pulse widths are settable in 100 nano second steps
- Time Code Output (IRIG B 120 1kHz amplitude modulated) , NASA 36
- Count down pseudo IRIG B time code output (ptf 3207A-TCG only)
- Alarm clean contact Output
- Time Code Input (AM or DC: IRIG- B)
- Auxiliary Reference Frequency Input (10 MHz)
- Ethernet Port (10/100 Base-T)
- Command Line Interface (Telnet and Serial Port)
- Simple Network Management Protocol (SNMP)
- Web Interface (HTML)
- Vacuum florescent display, 19-button keypad
- 90-264 VAC

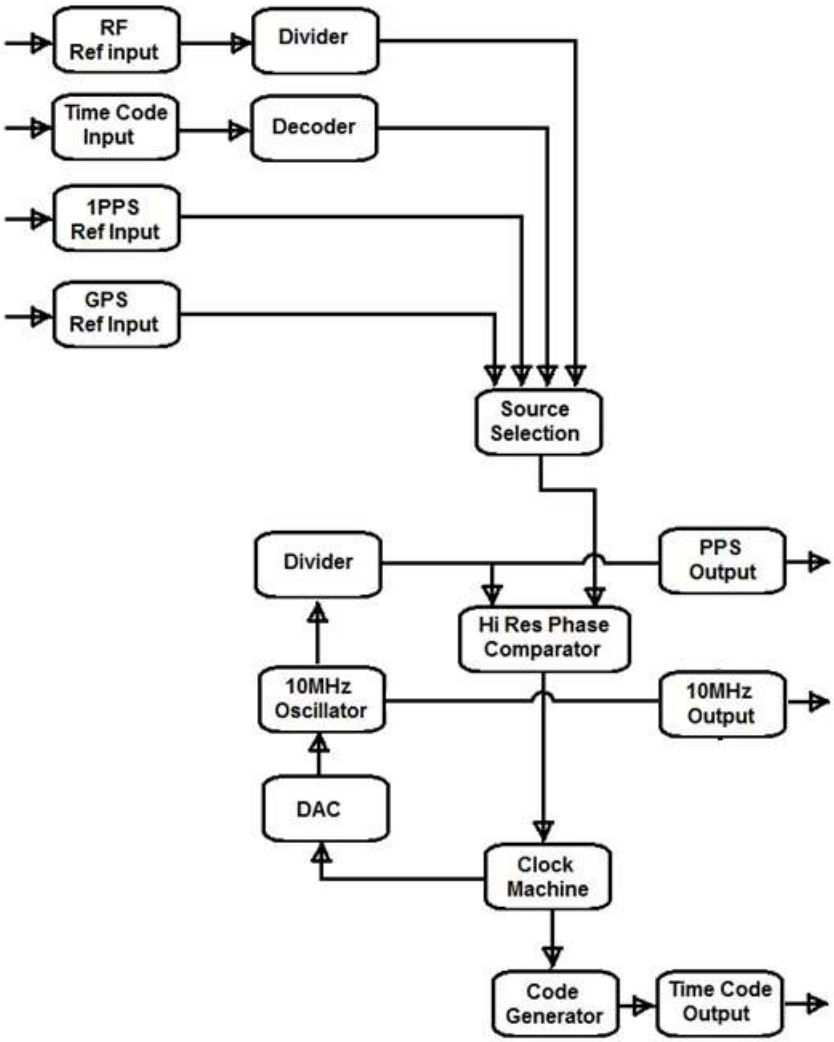
In addition, the ptf 3207A's standard features can be expanded with the following optional configurations:

- GPS C/A Receiver References
- Network Time Server (NTP)
- T1/E1 Output
- RS485 Control/Monitor interface
- Oscillator Options: OCXO, ULNO, Rubidium
- DC Power Supplies for 18 to 72, and 48 VDC applications
- Redundant power supplies

Optional oscillator upgrades provide enhanced short term stability when locked to a reference source, and improved holdover 'flywheeling' when a reference source is unavailable.

Clock Architecture

The following figure provides a simplified view of the ptf 3207A's clock architecture.



2: System Specifications

Mechanical/Environmental

Operating Temperature:
-25 °C to +55 °C (-13 °F to +104 °F)

Maximum Rate of Change:
8 °C per hour

Storage Temperature:
-55 °C to +85 °C (-67 °F to +185 °F)

Humidity: to 95% non-condensing

Operating Altitude:
Maximum 4 km (2.49 mi. or 13147 ft.)

Dynamic Characteristics:

Velocity	1000 knots (515 m/s) Maximum at altitudes < 60,000 ft.
Acceleration	4g maximum
Jerk	5 m/s3
Vibration	7.7G rms per Mil. Standard 810E

Front Panel Display:

Vacuum Fluorescent Display (VFD)
3.27" x 0.88" (83mm x 20 mm). 256X60 pixels.
Displays startup messages, clock status, time and day of year, and menu functions.

Keypad: 0–9, F1, F2, UP, DOWN, LEFT, RIGHT, MAIN, MENU, ENTER

Serial I/O: User-selectable RS-232 communication protocol up to 115200 baud

AC Power Supply

Input:
Input connector: IEC 320 connector
Input voltage range: UL: 100 – 240 VAC
Universal, 90 – 264 VAC and 110 – 370 VDC
Input freq. range: 47 Hz – 440 Hz

Output:

+ 5 V,	15 watts,	0 to 3 amps
+ 15 V,	22.5 watts,	0 to 1.5 amps
- 15 V,	7.5 watts,	0 to 0.5 amps

Wattage: 45 watts maximum

Power Supply Status:
Visual (green panel LED)

Status LED

Alarm Status LED:
Green LED on with no fault
Amber LED with fault

System Time & Frequency Accuracy

The tables below describe system clock accuracy while locked to the reference source indicated.

GPS Receiver Reference

1 PPS Output: UTC(USNO)	20 nS RMS, 100 nS peak
Frequency Output Accuracy:	<1 x 10-12 @ 1 day

Frequency/Timing, Allan Deviation, Stability	
1 second	5×10^{-11}
10 seconds	1×10^{-11}
100 seconds	2×10^{-11}
1000 seconds	5×10^{-12}
10000 seconds	7×10^{-13}

IRIG B (am) Code Output Accuracy:	10 µS to the 1 PPS output
DC Level Shift Code Output Accuracy	200 nS to the 1 PPS output
Time to System Lock	<20 minutes typical

Time Code Input Reference

1 PPS Output:	10 µS to the incoming code, IRIG B (am) 10 nS to the incoming code, IRIG B (DCLS)
Frequency Output Accuracy:	1×10^{-10}, referenced to 5×10^{-11} carrier @ 1 day
Stability of Frequency/Timing Allan Deviation:	5×10^{-9} @ 10 sec, referenced to 3×10^{-11} @ 10 sec carrier
Accuracy of IRIG B 120 (am) Time Code Output:	10 µS to the incoming code
Accuracy of IRIG B 000 (DC Level Shift) Code Output:	10 µS to the incoming code (IRIG B am) 10 nS to the incoming code (IRIG B DCLS)

****

1 PPS Input

1 PPS Output:	<30 nS to the incoming 1 PPS

Stability of Frequency/Timing
Allan Deviation: $1x10^{-11}$ @ 10 sec
Accuracy of IRIG B 120 (am)
Code Output: 10 µS to the incoming 1 PPS
Accuracy of IRIG B 000 (DC Level Shift)
Code output: 100 nS to the incoming 1 PPS

Ext RF Input

Frequency output accuracy is equal to the reference < 1 x 10-12.

Note: Manually set the time and date, when using 1 PPS or Ext RF as the primary references. Set the date (year) when using IRIG B 000, or IRIG B 120.

Chassis

1U Chassis: Standard 19" EIA Rack System, hardware included
Receiver Size: 1.75 in. x 17.1 in. x 16 in.
Weight: Standard configuration, without options <10 lb.

2U Chassis: Standard 19" EIA Rack System, hardware included
Receiver Size: 3.5 in. x 17.1 in. x 16 in.
Weight: Standard configuration, without options <14 lb.

Standard Inputs and Outputs

The following specifications describe the standard inputs and outputs on the ptf 3207A.

Serial I/O Port

The standard serial data port is a bi-directional EIA standard RS-232C interface. The serial data port baud rate can be configured via the Keypad / Display, or Standard Ethernet port.

Control and monitoring is available through an RS232 port (female 9-contact D connector) and over an Ethernet port (RJ45 connector). The RS232 port is configured as DTE, receiving data on pin 3 and transmitting data on pin 2. Pin 5 is chassis ground. Pins 1, 4, and 6 are used for the instrument summary alarm relay, see table below.

DB9 Connector

Pin #	Function	Comments
1	Alarm Relay NO	Closed when in alarm
2	TX Data (RS232)	
3	RX Data (RS 232)	
4	Alarm Relay NC	Open when in alarm
5	Ground (RS232)	
6	Alarm Relay Common	
7		
8	Time Print Tx(RS232)	Optional
9	Time Print Gnd(RS232)	Optional

Interface:
RS-232, ground, receive and transmit only.

Data Rates:
4800, 9600 and 19200, 38000, 57,600 bps

Data Bits:
8

Parity:
none

Stop Bits:
1

Connector:
Male 9-pin D subminiature

Pin Assignment:
1------N/C
2------Rx (RS-232)
3------Tx (RS-232)
4------N/C
5------GND
6------
7------
8------
9------

Factory settings:
57,600, 8, N, 1

Optional Time Print Interface

The time print interface is optionally available and provides an ASCII formatted string once per second with the current day of year and time.

Pin connections on the 9 pin D connector are:

RS-232 ground and transmit only.

Data Rate:
same as selected for main serial I/O

Data Bits:
8

Parity:
none

Stop Bits:
1

Connector:
Male 9-pin D subminiature

Pin Assignment:
1------
2------
3------
4------
5------
6------
7------
8------ Tx (RS-232)
9------ GND

Format of Time Print Output

<SOH>DDD:HH:MM:SSQ<CR><LF>

Format:

<SOH> Hex 01 The start bit of the <SOH> character is transmitted on time.

DDD Day of year

HH Hours

MM Minutes

SS Seconds

Q Time quality indicator. Represented by:

space (ASCII 0x20, Locked, maximum accuracy)

? (ASCII 0x3F, reference source unavailable)

ENET – Ethernet Port

The Ethernet port interface has a standard RJ-45 connector that provides IEEE 802.3 frame 10/100 Base-T Ethernet. The ptf 3207A can optionally be factory configured as a Network Time Protocol (NTP) server, which can be used to synchronize client computer clocks over a network.

J2 Input – IRIG B 120 (am) Time Code
Time Code Input Specifications
Format:
IRIG-B120

Amplitude (AM): 0.5V to 3V Vp-p into 50 ohms
Ratio (AM): 3:1 ±10%

Impedance: 50 ohms
Direction: Forward
Quantity: 1
Connector: Female BNC

Accuracy Refer to "System Time & Frequency Accuracy"

J3 Output – RF Output

Frequency:	10 MHz
Amplitude:	1 V rms, into 50 Ohms
Quantity:	1
Connector:	Female BNC
Factory Configuration:	Enabled

J4 Output – Digital Output

Rate:	1 PPS, 10 PPS, 100 PPS, 1 kPPS, 10 kPPS, 100 kPPS, 1 MPPS, 5MPPS, 10 MPPS, 100MPPS, PPM, PHH, PPH
Duty cycle:	40-60% ± 10% , or 100ns pulse width
Amplitude (TTL):	TTL Levels into 50 Ohms
Quantity:	1
Connector:	Female BNC
Factory Configuration:	1 PPS

J5 Output – Time Code Output to IEEE1344

Time Code Output Specifications - IRIG B120 modulated (am)

Format:	IRIG-B120
Amplitude (AM):	3 Vp-p, into 50 Ohms
Ratio (AM):	3:1 ±10%
Quantity:	1
Connector:	Female BNC
Default Configuration:	Enabled

IRIG-B-120 IS DEFINED IN IRIG STANDARD 200-04 AS:
- Format B 100 pps
- 1 = Sine wave amplitude modulated
- 2 = 1KHz carrier/1mSec resolution
- 0 = BCD TOY,CF,SBS

IEEE1344 IS DEFINED IN IEEE1344-1995(R2001) ANNEX F AS:
IRIG-B format, <sync>SS:MM:HH:DDD<control bits> <binary seconds>

where :
<sync> is the on time marker
SS seconds 00-59 (60 during leap seconds)
MM minutes 00-59
HH hour of day 00-23
DDD day of year 001-366
<control> 27 binary control characters, see Table 1 (reference IEEE1344)
<binary seconds> binary seconds of day

Binary Time quality	Estimated Time Error (ETE)
1111	Initial condition clock unlocked or 10Sec < ETE
1011	Clock unlocked and 1Sec < ETE <= 10Sec
1010	Clock unlocked and 100mSec < ETE <= 1Sec
1001	Clock unlocked and 10mSec < ETE <= 100mSec
1000	Clock unlocked and 1mSec < ETE <= 10mSec
0111	Clock unlocked and 100uSec < ETE <= 1mSec
0110	Clock unlocked and 10uSec < ETE <= 100uSec
0101	Clock unlocked and 1uSec < ETE <= 10uSec
0100	Clock unlocked and 100nSec < ETE <= 1uSec
0011	Clock unlocked and 10nSec < ETE <= 100nSec
0010	Clock unlocked and 1nSec < ETE <= 10nSec
0001	Clock unlocked and ETE <= 1nSec
0000	Clock locked to a reference source

Many IRIG reader devices only decode the BCD time-of-year (TOY) portion of the IRIG frame. Reader devices designed to the IRIG-B122, B002 standard should be compatible with the ptf 3207A's time code outputs.

DB9 - ALARM Output

Contacts:	Type C
High Z:	Power off
High Z:	Alarm (enabled alarm fault)
Low Z:	Normal (no enabled alarm faults)
Drive:	Relay contacts
Max. Voltage:	25 VDC
Max. Current:	50 mA
Quantity:	1
Connector:	DB9

The ptf 3207A first synchronizes to IRIG-B-120 w/ IEEE1344 when the Time Quality control bits are = 0000. The ptf 3207A remains synchronized (Locked) while the Time Quality control bits are 0000 through 0101 (ETE < 10uSec).

The ptf 3207A remains synchronized (Locked) while the Time Quality control bits are 0000 through 0101 (ETE < 1uSec). The ptf 3207A uses the incoming local time offset information to convert the time internally to receiver time, which is always UTC. Displayed time will be according to the local time offset, DST etc. set internally on the system menu

Manual Leap Second Entry

The Manual Leap Second Entry is configurable via the Keypad / Display, RS232 and the Network port via telnet and HTML. This function allows the user to enter leap second data. This mode of operation will allow the user to maintain UTC with the ptf 3207A clock without an external time reference providing leap second data or in a standalone mode (i.e. without a time reference).

Locked reference sources containing leap second data (GPS and IRIG-B w/ IEEE1344) take priority over the manual leap second entry.

Manual leap second data is applied to the ptf 3207A UTC TOD when locked to any reference source that does not contain leap second data.

The manual leap second data will be applied to the clock at the end of the current quarter that it was entered at UTC midnight on the last day of June, or December . Note: Due to the nature of the reset mechanism it is not possible to manually enter a leap second during the months of January or December.

ADDITIONAL FEATURES

External Phase Measurement

If the option is selected, the ptf 3207A can provide precision measurements of the phase of an external 1PPS signal against the ptf 3207A internal 1 PPS signal, referenced to UTC.

The external phase measurement uses one of the proprietary design ptf phase interpolators, which returns a phase value to within a resolution of 1 nano seconds (100 pico seconds)

The phase measurement capability defaults to “OFF” and can be enabled by setting command EXT-PHASE to “on.

The phase measurement can be viewed on the front panel display, option 0 with the MAIN display function selected, or on the serial or Ethernet M/C interfaces by typing Status.

The External Phase value may also be viewed on the web interface by clicking on the status button from the module menu.

3: Installation/Configuration

Installing the GNS Antenna

For units that include the GPS, Glonass, Galileo, or multi receiver options, install the GNS antenna and cable as described below.

Selecting a GNS Antenna Site Outdoors

Select a site that...
- Is the highest point available
- Offers a full 360° view horizontally, to within 10° vertically of the horizon
- Is higher than neighboring buildings/obstructions
- Is protected from strong radio frequency (RF) and microwave transmissions
- Is set away from RF-reflective surfaces that cause multipath interference
- Is set 3 ft. (1 m) away from other GPS antennas

Avoid...
- Mounting the antenna between tall buildings or next to walls and equipment
- Cable runs from the antenna to the receiver that exceed the specified length
- Patching multiple cables together to make a single cable run
- Running the cable through bulkheads and alongside high-energy cables
- Crimping or damaging the cable

Blocked signals and multipath cancellation significantly increase GNS acquisition time. Multipath cancellation is caused by reflected signals that reach the antenna out of phase with the direct signal due to vertical reflective objects positioned to the side and above the antenna. To solve these problems, mast mount the antenna at least 1 meter away from and above the reflecting surface.

Mounting the GNS Antenna

Mount the GNS antenna on an antenna mast (recommended) or on the peak of a building.
A mast is included with the GNS antenna mounting kit.
If you use a tall mast longer than 10 ft. (3.048 m), use guy wires for stabilization.

Notes:
- The ptf 3207A requires a 5 Volt-compatible antenna.
- Use an active splitter to connect a GNS antenna to multiple receivers. Also insure the splitter includes one "DC pass through" channel for powering the antenna, and that the other channels present a dummy load to the other receivers . The receiver front end has a sensing circuit to insure the antenna is not over or under the DC load. Without a dummy load the receivers will indicate a fault, and will not lock even though sufficient satellites may be in view. Avoid using BNC “T” connectors.
- The L1 GPS antenna is designed to operate with up to 150 ft. (60.96 m) of RG-59 coax cable.

Refer to Figure 4: GPS Signal Strength Requirements.The required external gain at the GPS receiver's ANTENNA connector is between 15 and 25 dB.

For example, the GPS antenna provides approximately 35 dB of gain. If one subtracts the 16 dB loss of a 150 foot RG-59 coax antenna cable, the external gain reaching the ANTENNA connector is between 19 dB, which meets the requirement. Abide by the minimum input gain requirements when using other cable types and GPS antennas.

Other factors, such as radiation, coverage, VSWR, and input impedance also affect system performance. It is recommended to use the standard antenna and cable provided.

GNS-related Accessories

The following options can be obtained to:

- Protect against lightning and field-induced electrical surges.
- Connect multiple GPS receivers to a single antenna.
- Extend the range of the GPS antenna cable.

LKIT - Lightning Arrestor

Lightning may damage GPS system components and receiving equipment, even without a direct hit, resulting in costly repairs and critical interruption of service. The lightning arrestor is designed to work in conjunction with a low-resistance, low-inductance ground to protect your GPS receiver and elements of the antenna system from lightning discharges and field-induced electrical surges. In-line lightning arrestors are mounted between the antenna and the point where the cable enters the building and require no additional power or wiring except the ground lead.

ptf 1231A - Antenna Distribution Amplifier

An antenna distribution amplifier may be used to drive multiple GPS receivers using a single antenna. The ptf 1231A has built-in amplification to overcome losses.

HGAN - High Gain Antenna

High gain antennas overcome signal attenuation in by amplifying the GPS signal. The high gain antenn has a gain of 50 db and can be mounted in place of the standard antenna.

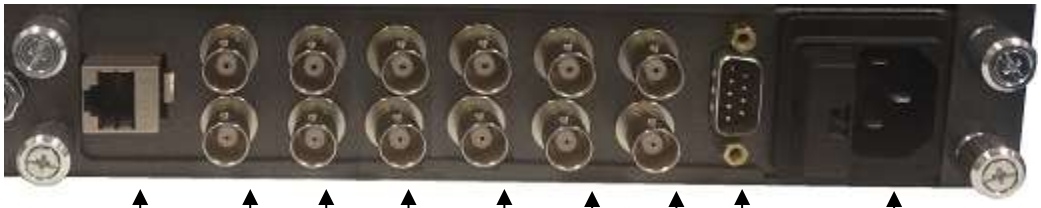
Making Additional Connections

Half-Width Module

Make the following connections to the standard input/output connectors on the ptf 3207A rear panel:

- The ANTENNA connector to a GNS antenna cable.
- The ENET Ethernet port (RJ-45) to an Ethernet network using Cat 5 cable. This connection is needed to manage the ptf 3207A remotely, or to use the optional NTP function.
- The SERIAL I/O connector to a PC using an RS-232 null modem cable.
- J1 thru J12 as needed.

Rear View of single Module



Connections

J1 (Ethernet, RJ45)
J2 (lower)
J3 (upper)
J4(lower)
J5(upper)
J6(lower)
J7(upper)
J8(lower)
J9(upper)
J10(lower)
J11(upper)
J12(lower)
J13(upper)
J14(RS232 control/monitor/alarms relay)
J15(AC Mains)

Pin #	Function	Comments
1	Alarm Relay NO	Closed when in alarm
2	TX Data (RS232)	
3	RX Data (RS 232)	
4	Alarm Relay NC	Open when in alarm
5	Ground (RS232)	
6	Alarm Relay Common	
7, 8, 9	Not used	

NOTE: There are many different configurations that necessarily require different input/output connections. In some cases many of the connections will be blank. For each specific instrument connections are detailed on a label above the input/output connectors. Where this label differs from the connections outlined above, the label always takes precedence.

Full width Module

Dependent upon the configuration, a full width module may be used in place of a half width module. Connections for Ethernet, RS232, and GNS antenna should be made as described above.

Details of output connector configuration will again be detailed on a label affixed to the top of the unit.

Connecting the Power Supply

Warning: Ensure that a disconnect device, such as a switch, with the appropriate voltage/ current rating is provided when operating/installing the ptf 3207A.

Connect the Power Supply to a power source. The green POWER LED indicates that the ptf 3207A is receiving power.

Notes for optional DC power supplies:

- Use a 15 amp circuit breaker in series with the DC power source; avoid connecting directly to a DC power source without the breaker.
- 14 gage wire is the minimum recommended for DC power source hookup.
- DC Power Supply Only to be used in a restricted access area.
- The screw torque range on the Power Terminal Block is 5 to 8 inch pounds.
- When connecting to a DC power source, first connect the positive power cable to “+” on the power supply, then connect the negative power supply cable to “-”.

Upon receiving power, the ptf 3207A goes through its startup sequence;
Fault LED flashes GREEN rapidly while the operating system is booting.
After approximately 30 seconds, the ptf 3207A display will indicate it is doing self tests
After successful completion of self tests the display will indicate "Ready"
Next, the display will show the initial menu of status screens
Finally, if no key is pressed on the keypad, the last selected status screen will display.

Before using the ptf 3207A for the first time it may be necessary to set up certain parameters such as Ethernet settings, time displays, etc. This is done by use of the menu system, accessible through either the front panel keypad, serial, telnet, or web browser capabilities. Please see the next section.

Navigating the front panel menu system

- Access via the front panel keypad can be protected by use of a four number “PIN”. A special “hidden” menu command, KEYPAD-PIN is available to select a PIN of your choice. If this entry is set to 0000 the pin is not active and access to the setup menus is granted just by pressing the “MENU” key. Any other number up to 9999 will activate the PIN and before any menu items can be changed the PIN must be entered. The PIN will remain active during an editing session. Once an editing session is complete, or at any time during the editing process, pressing the “MENU” key will reset access and to re-enter edit mode the PIN will need to be re-entered.

- Press MENU - this will display the menu screen options. To scroll through menu items press the ⇨ (RIGHT ARROW) key. The cursor on the left side of the screen will highlight each menu item in turn.

  TIP: To more rapidly move through the menu items, you can use the ⇩ (DOWN ARROW) key. This will page through the screens 4 items at a time. When the screen containing the item you require appears, you can use ⇨ (RIGHT ARROW) and ⇦ (LEFT ARROW) keys to place the cursor next to the required item.

- Menu items can be either string, integer or "special format" items. Dependent upon the type of item to be edited the menu edit screen will present different formats.

- Scroll through the menu items as described above until the cursor highlights the required menu item

String edits

- Press ENTER - the available string choices will be displayed, with the cursor against the currently selection. Using the ⇨ (RIGHT ARROW) and ⇦ (LEFT ARROW) keys highlight the required selection, then press the ENTER key. The new selection will be stored.

  TIP: To exit without storing the new value press the MENU key.

Integer Edits

- Press ENTER - the integer edit screen is presented, displaying the current integer value. Use the number keys to enter a new value, where applicable to enter a - (minus) sign use the F1 key, where applicable to enter a . (decimal point, i.e. for decimal fractions)) use the F2 key, then press enter to save and store the new value.

  TIP: To exit without storing the new value press the MENU key.

Special format edits (e.g. IP addresses, time, date)

- Press ENTER - the special format edit screen is presented. Enter the new value:

  network parameters:
  use the number keys and F2 for the decimal point.
  Enter in three digit groups e.g. 192.168.000.023

  Time:
  use the number keys and F2 for the : (colon)
  Enter in 2 digit groups for HH:MM:SS e.g. 01:03:45

  Date:
  use the number keys and F2 for the / (slash)
  Enter in 2 digit groups dependent on format selected, USA, European or Japanese

for USA	MM/DD/YYYY	e.g. 01/29/2014
for European	DD/MM/YYYY	e.g. 29/01/2014
for Japanese	YYYY/MM/DD	e.g. 2014/01/29

- Press ENTER - to save and store the new value.

  TIP: To exit without storing the new value press the MENU key.

Configuring Ethernet Settings

The following additional steps are required to make the ptf 3207A operational on a network. Make the ptf 3207A operational on a network if you plan on managing the ptf 3207A remotely over the network or distributing timing information from the ptf 3207A over the network

Insure a network cable is plugged in and connected to the network.

First determine the current network settings of the ptf 3207A by pressing keys on the front panel keypad as follows:

- Press MAIN - this will display the main status screen options. To scroll through available options press the ⇨ (RIGHT ARROW) key. The cursor on the left side of the screen will highlight each status screen option in turn.

- Press the number 7 - this will select the system network parameter status screen

  OR

- Move the cursor by pressing the ⇨ (RIGHT ARROW) key until the cursor is pointing to selection number 7, and then press ENTER. This will also set item 7 as the default screen on power on.

The system network status screen will be displayed. On the left hand column the set STATIC parameters are displayed. If DHCP is ON the dynamically allocated parameters will be displayed in the right column. If DHCP is OFF the dynamic parameters will be replaced by ---.---.---.---. See the examples below:

DHCP ON example;

IP Addr	192.168.000.023	192.168.000.010
Netmask	255.255.255.000	255.255.255.000
Gateway	192.1658.000.001	192.168.000.001

DHCP OFF example;

IP Addr	192.168.000.023	- - -.- - -.- - -.- - -
Netmask	255.255.255.000	- - -.- - -.- - -.- - -
Gateway	192.1658.000.001	- - -.- - -.- - -.- - -

If the network parameters are not as you wish, you can change them by pressing keys on the front panel keypad as follows:

- Press MENU - this will display the menu screen options. To scroll through menu items press the ⇨ (RIGHT ARROW) key. The cursor on the left side of the screen will highlight each menu item in turn.

  TIP: To more rapidly move through the menu items, you can use the ⇩ (DOWN ARROW) key. This will page through the screens 4 items at a time. When the screen containing the item you require appears, you can use ⇨ (RIGHT ARROW) and ⇦ (LEFT ARROW) keys to place the cursor next to the required item.

To setup STATIC network parameters

- Scroll through the menu items as described above until the cursor highlights menu item IP
- Press ENTER - the IP address edit screen is presented. Enter the new IP address in dot format using three digits for each number e.g. 192.168.000.023 and then press the ENTER key. This will store the new value.

  TIP: To exit without storing the new value press the MENU key.

- Now scroll through the menu items as described above until the cursor highlights menu item NMASK.
- Press ENTER - the Netmask edit screen is presented. Enter the new Netmask in dot format using three digits for each number e.g. 255.255.255.000 and then press the ENTER key.

- Next scroll through the menu items as described above until the cursor highlights menu item GWAY.
- Press ENTER - the Gateway edit screen is presented. Enter the new Gateway in dot format using three digits for each number e.g. 192.168.000.001 and then press the ENTER key.

  If DHCP was already OFF, the new static values will be set. If DHCP was ON, it is necessary to scroll to the DHCP item to turn DHCP off as follows:

- Scroll through the menu items until the cursor highlights menu item DHCP. Press ENTER - the DHCP edit screen is presented. The two choices of ON and OFF are presented, with the cursor pointing to the current selection - ON. Using the ⇨ (RIGHT ARROW) and ⇦ (LEFT ARROW) keys highlight the OFF selection, then press the ENTER key. The new selection will be stored and the STATIC IP parameters will be invoked.

To setup DYNAMIC network parameters

- Scroll through the menu items until the cursor highlights menu item DHCP. Press ENTER - the DHCP edit screen is presented. The two choices of ON and OFF are presented, with the cursor pointing to the current selection - OFF. Using the ⇨ (RIGHT ARROW) and ⇦ (LEFT ARROW) keys highlight the ON selection, then press the ENTER key. The new selection will be stored and the DYNAMIC IP parameters will be setup by the DHCP server.

Configuring the Serial Monitor/Control Port

- Press MENU - the menu items will be displayed
- Scroll through the menu items until the cursor highlights BAUD-RATE

To change the baud rate:

- Press ENTER - the baud rate edit screen will be displayed
- The buad rate choices are presented, with the cursor pointing to the current selection (default is 57,600). Using the ⇨ (RIGHT ARROW) and ⇦ (LEFT ARROW) keys highlight the required selection, then press the ENTER key. The new selection will be saved and stored.

Configuring the Time Displays

The ptf 3207A has a number of different time displays that are selected via the main status screen. Time can be displayed in either UTC, GPS or LOCAL time in 12 hour or 24 hour format, with a local time zone offset, and with daylight savings time set to on or off.

- UTC (Coordinated Universal Time) differs from GPS Time by the addition of leap-second corrections to compensate for variations in the earth's rotation.
- GPS time is derived directly from the GPS constellation and doesn't contain any leap-second adjustments or other GPS-to-UTC corrections.
- Standard/Local Time is UTC plus a time zone offset. For example, Eastern Standard Time is UTC minus 5 hours, if the daylight savings parameter is on and daylight savings is in effect, Local Time is adjusted by adding an additional 1hour, i.e. EDT is UTC minus 4 hours.

Use the following menu items to configure how the ptf 3207A displays time.

Short-Form ID	Possible selections
TIME-MODE	UTC, GPS, LOCAL
T-OFFSET	+/- 23.5 hours
T-DISP	12 or 24 hour
DST	ON or OFF
DST-TYPE	USA, EUROPE, JAPAN
DATE-FORM	USA, EUROPE, JAPAN

Using the Command Line Interface

The next two sections show how to connect to the ptf 3207A using the serial and Ethernet (telnet) ports. Both the serial port and the telnet interface give the user access to the ptf 3207A's command line interface. While the keypad/display interface provides a simple menu-driven user interface, the command line interface features:

- Additional functions that aren't available through the keypad/display
- Remote access over a network

To use the command line interface, refer to the explanations and examples in the 'Command Line' subsections for each function in the ptf 3207A User's Guide and Reference Manual.

Connecting to the Serial Port

Complete the following steps to set up and use the Serial Port to communicate with the ptf 3207A.

Set up the required baud rate as described in the" Configuring the Serial Monitor/Control Port" section above.

Connect a null-modem cable from the PC's serial port to the ptf 3207A's DB9 connector.

If needed, configure your PC's terminal emulation program (e.g. Hyperterminal) to match the serial port settings above (57600, 8, N, 1). Set Hardware Flow Control to "None".

Initiate a serial port connection between the terminal emulation program and the ptf 3207A. (The Serial Port connection does not require you to log in.)

Once connected, press ? followed by the Enter key on your keyboard to display the standard menu commands.

To display the extended help commands type:

showptf<ENTER>

Tip: If the terminal emulation software has trouble communicating, verify the serial port settings.

****

Connecting to the Ethernet Port (TELNET - port 23)

The Ethernet port provides remote access to the ptf 3207A's command line interface. Complete the following steps to connect to the Ethernet (telnet) port.

- Set up the Ethernet parameters as per the section " Configuring Ethernet Settings " above
- Open a telnet session from your PC to the ptf 3207A.
- Log in as user name "admin" and password, "ptf_pwd". Press Enter on your keyboard to get to the initial entry screen.
- Once connected, press ? followed by the Enter key on your keyboard to display the standard menu commands shown on the next page.

To display the extended help commands type:

showptf<ENTER>

Tip: If the telnet software has trouble communicating, verify the Ethernet settings.

Multiple Telnet Sessions may be active at one time. Each will be allocated a separate session ID and each will be individually timed out if the timeout function is active

Command Line Interface Command Format.

The format for commands on both the serial and telnet command interfaces is as follows:

3 character command, space, new value[ENTER] << sets new value

or

3 character command, space, help[ENTER] << displays additional help for the command

or

3 character command[ENTER] << displays current value

Example:

A01[SPACE]fixed[ENTER] << sets the positioning mode to fixed

Note: There are some special commands that can be entered using just the command name e.g. STATUS[ENTER]. These can be easily identified as they do not have a value in the value column.

Available commands as of this edition of the user manual are:

ptf 3207A Menu Help Screen

```
A HELP
Help menu for module A

Name        Cmd# Value                Name        Cmd# Value
RCVR1-MODE  A01  Survey               RCVR1-AVGS  A02  35
RCVR1-LAT   A03  +42.517149-L         RCVR1-LON   A04  -71.045549-L
RCVR1-HGT   A05  +20.540000-L         RCVR1-CAB   A06  15.00
TIME        A13  18:52:34             DATE        A14  03/23/2016
TIME-MODE   A15  Local                T-OFFSET    A16  +00:00
DST         A17  Off                  DST-TYPE    A18  USA
TIME-FORM   A19  24hr                 DATE-FORM   A20  USA
1PPS-SRCE   A21  ExtTCAM              SRCE-SEL    A22  Manual
CNST-SEL    A23  GPS1                 DISP-BRITE  A24  4
DISP-BLANK  A25  0                    BAUD-RATE   A26  57600
IP(v4)      A27  192.168.000.030-L     NMASK(v4)   A28  255.255.255.000-L
GWAY(v4)    A29  192.168.000.001-L     DHCP        A30  On
SNMP-MGR    A31  192.168.000.001      SNMP-TRPV   A32  1
REM-SERV    A33  000.000.000.000      TNET-T/OUT  A34  0
WEB-T/OUT   A35  0                    STATUS      A36
NTP-MULT    A37  Off                  MULT-PER    A38  +16
LOGOUT      A39                       INSTR-ID    A40  1
SHOWPTF     A41  +0

Commands below this line are primarily for initial system configuration and
are therefore only displayed once the user enters :
SHOWPTF<ENTER>
------------------------------------------------------------------------
SHOWPTF     A41  +1                   RCVR1-TYPE  A42  GGS1
RCVR1-MASK  A43  +10                  RCVR1-DFLT  A44  Finished
PPS1-LSEC   A45  +0                   RCVR2-TYPE  A46  None
PPS2-LSEC   A49  +0                   TIME-AMOUT  A50  IRIG-B
DIGOP-1     A51  NASA36               DIGOP-2     A52  1PPS
DIGOP-3     A53  1PPS                 DIGOP-4     A54  1PPS
DIGPW-1     A55  250                  DIGPW-2     A56  250
DIGPW-3     A57  250                  DIGPW-4     A58  250
PCLK-DIV    A59  1                    PCLK-PUL    A60  Square
OSC-TYPE    A61  ULNO                 OSC-LOCK    A62  120
OCXO-DAC    A63  +600000              JAM-SYNC    A64  +0
AUTO-JAM    A65  Off                  KEYPAD-PIN  A66  0000
MODULE      A67  A                    MODULES     A68  1
SNMP-TRAPS  A69  +1                   SNMP-USER   A70  ptfOne
SNMP-PWD    A71  okayUser             SYS-RESET   A72  Idle
PRINTLOG    A73  Idle                 CLEARLOG    A74  Idle
PRINTMON    A75  Idle                 DLOAD-IP    A76  192.168.000.017
DLOAD-NAME  A77  ptf3207A-GPS         UG-FLASH    A78  +0
UG-CONFIRM  A79                       WD-DISABLE  A80  +0
NMEA-OUTPUTA81  Off                   PTP-CONFIG  A82  Idle
PASSWORD    A83  ptf_pwd
```

To display the above list of commands type : A[SPACE]?<ENTER> or A[SPACE]HELP<ENTER>

Alternatively the ? provides a special function whereby entering : ?<ENTER> will bring up the command help screen for the current module. This can be particularly useful if you are not sure of the module's designation letter.

The special commands shown below the line in the table above are used primarily for initial configuration and should not normally be changed during standard operation. To access these additional commands type : SHOWPTF<ENTER> or A37[SPACE]1<ENTER>

In addition to the summary description shown in the table, each of the commands in the table has additional individual help available. To display the additional help on a particular command for example command type:

A01[SPACE]?<ENTER> or A01[SPACE]HELP<ENTER>

```
a01 ?

Name                          Cmd#  Current Value
Receiver 1 Position Mode      A01   Survey
Edit type is a string
SetPos
Survey
Fixed
Mobile
Cont.Avg
Reserved
```

The additional help displays the current setting, the format of the required entry, and the allowable range for integers, or available string options for string entries.

To enter a new value for a particular menu, e.g. for command A01 if the current value is set to survey and you wish to change it to fixed type:

A01[SPACE]Fixed<ENTER>

If you try to enter a value that is already set the unit will return:

"Value already set"

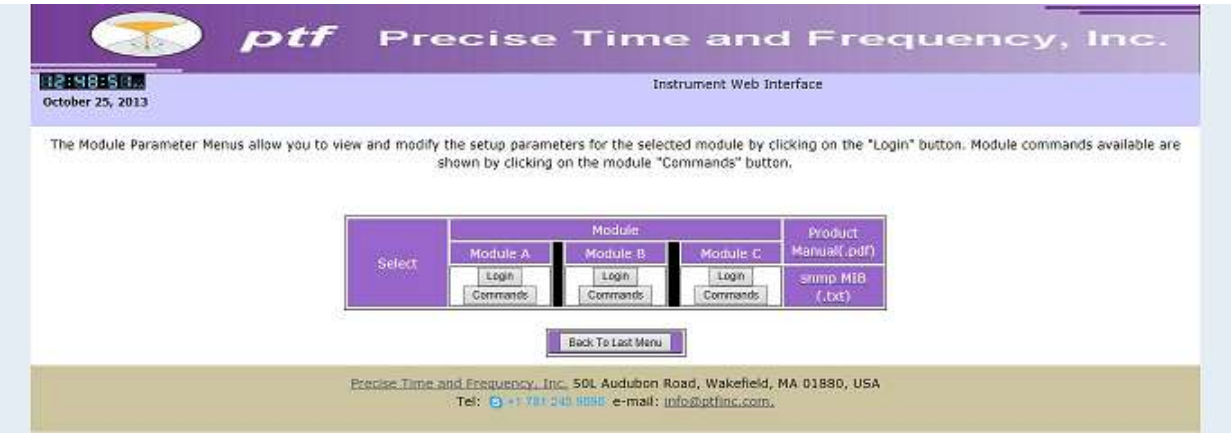
TIP: To find a currently set value type command<ENTER> e.g. for command A01 type: A01<ENTER>

NOTE: Some of the menu options that are dependent upon other settings will not display unless appropriate for the setting selected. e.g. the option to choose between constellations will not be visible unless the system configuration has a receiver that is capable of receiving multiple constellations.

In addition to the telnet command line interface the Ethernet port also provides remote access to the ptf 3207A's web interface. To connect to the web interface:

- Find the Ethernet parameter settings as described in the section " Configuring Ethernet Settings " above
- Open a standard web browser (Internet Explorer, Firefox etc.)
- In the address bar enter the ptf 3207A's IP address as follows:
- http://192.168.0.23/
- This will bring up the web browser entry screen. Selected the required module, usually A or B(if fitted), or C (if fitted).
- This will bring up the login screen. Enter the password, (ptf_pwd) and click on submit.

Tip: Although the login page may have an entry in the password field, it is best to re-enter the password to make sure it is correct.
User name is automatically populated e.g. Module A



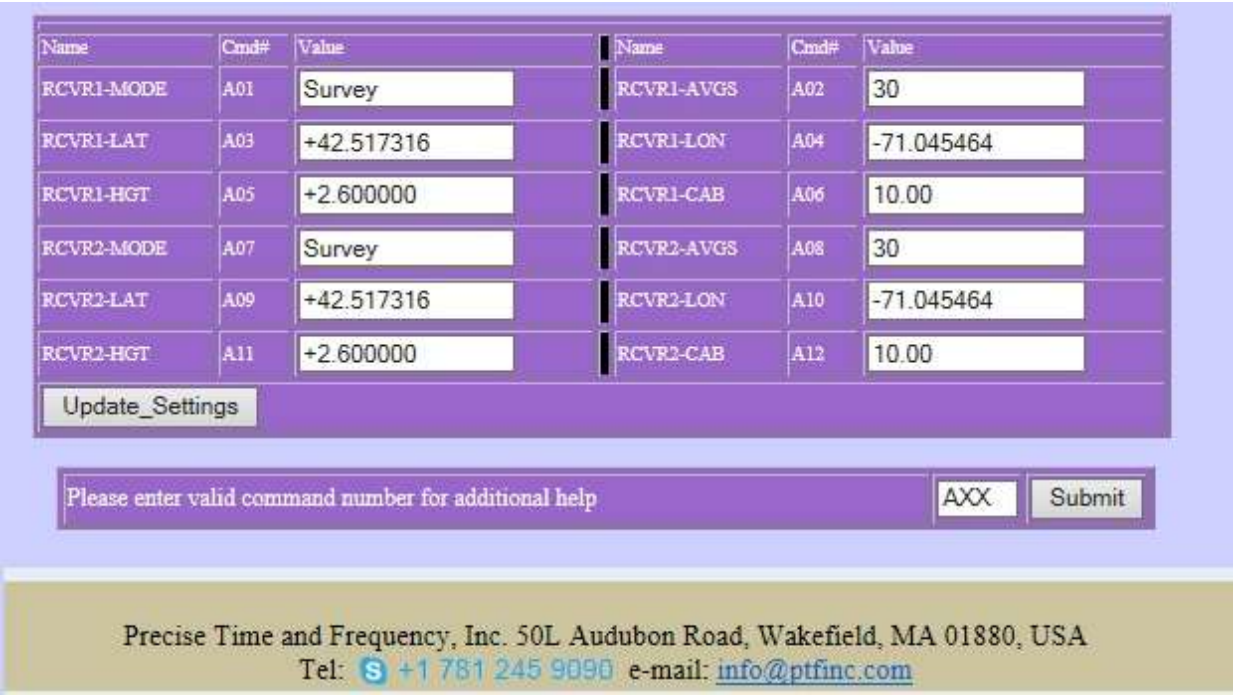
****

Once the correct password is entered the ptf 3207A will serve up the initial menu selection page.

The web browser menus offer similar features to the command line interface menus, with two key differences:

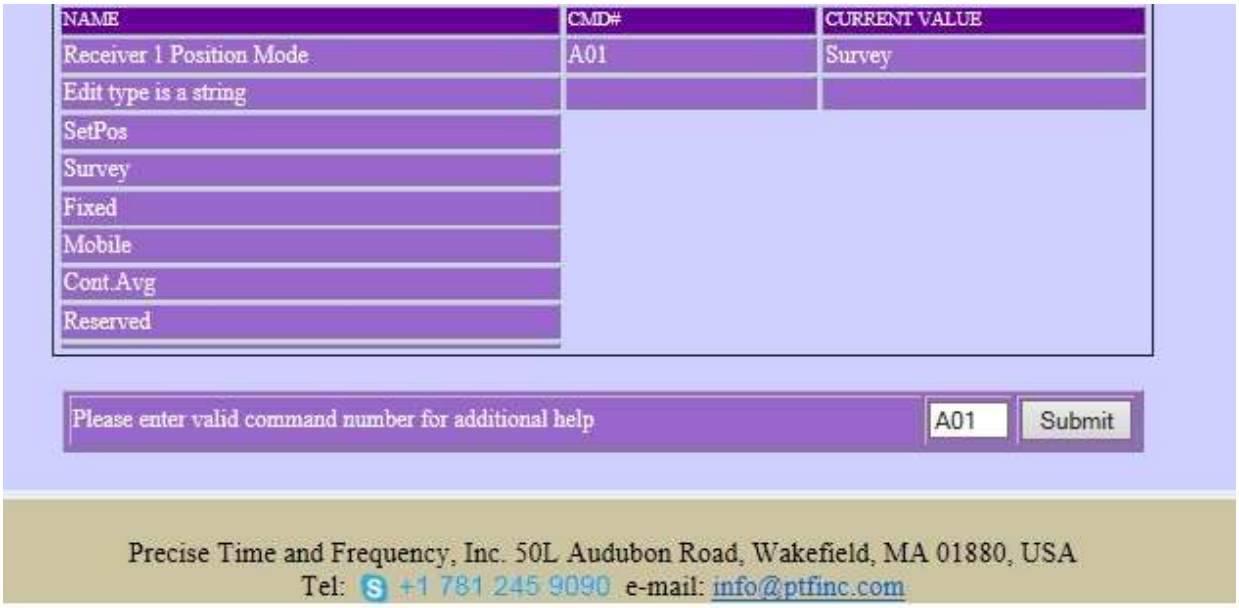
- The screens are separated into groups for presentation purposes
- Multiple values on one screen can be changed simultaneously

Click on the group required to bring up the menu page for the group. If you try to change system configuration settings a warning will be presented which must be acknowledged before proceeding to the system settings menu.



To change the current values, enter the new required value into the text box adjacent to the parameter ID and when all required parameters have been entered click on the "Update_Settings" button.

Each menu item also has a more comprehensive help similar to the command line interface. To see additional help on an individual item enter the command ID e.g. A01 into the text box at the bottom of the screen and click on the "submit" button



A system status page is also available by clicking on the "System_Status" button near the top of the page:

Hardware Configurations

Standard ptf 3207A Without GNS Receiver front end

The standard ptf 3207A configuration comes with an AC Power supply and CPU module. In order to operate, the standard ptf 3207A does not require changes to its factory settings, which are as follows:

Connector	Description	Default Configuration
J1 - BNC Female	Time Code Input	IRIG B(am).Non-configurable
J2 - BNC Female	Digital Input	IRIG B DCLS
J3 - BNC Female	IRIG B (am) Time Code	Output, non-configurable
J4 - BNC Female	10MHz RF Sine Output	Non-configurable
J5 - BNC Female	Digital Output	1 PPS
DB9	Serial Monitor/Control Alarm C contacts.	Baud rate 57600 De-energized = alarm
Ethernet - RJ45	100/10 Base-T	DHCP
AC Power	IEC 60320	90 to 264 V AC. Non-configurable

Standard ptf 3207A with GNS Receiver

The standard ptf 3207A configuration comes with an AC Power supply and CPU module. In order to operate, the standard ptf 3207A does not require changes to its factory settings, which are as follows:

Connector	Description	Default Configuration
J1 - TNC Female	Antenna Input	Non-configurable
J2 - BNC Female	Digital Input	IRIG B DCLS
J3 - BNC Female	IRIG B (am) TIme Code	Output, non-configurable
J4 - BNC Female	10MHz RF Sine Output	Non-configurable
J5 - BNC Female	Digital Output	1 PPS
DB9	Serial Monitor/Control Alarm C contacts.	Baud rate 57600 De-energized = alarm
Ethernet - RJ45	100/10 Base-T	DHCP
AC Power	IEC 60320	90 to 264 V AC. Non-configurable

Operating Modes – Survey, Fixed, Mobile

The unit has several different modes of operation according to the requirements of a particular application. The three modes available are: Survey (default mode), Fixed, Mobile. **Acquiring accurate position is essential before the unit can provide accurate frequency and time outputs.**
NOTE: For operation the unit internally calculates which satellite it should be viewing according to the position information it has. This information is stored in an “Almanac” that is regularly updated. If the position information is incorrect it is likely that the unit will not “lock” as it will not be viewing the satellites expected from the position information.

Survey
This is the default mode and is suitable for most applications. When powered on the unit will do a self-survey, and automatically store the position parameters. In order to calculate position, it is necessary for the unit to be viewing and locked to a minimum of 4 satellites. The position stored is the average position calculated from the number of user selectable averages (default is 35). The survey process will be repeated each time the unit is powered on.

Fixed

The fixed mode can be used in two different ways.

First, once a self-survey (above) has been completed, the surveyed average position will be stored into the fixed position memory. Once the survey is completed then, the fixed mode can be selected and in future upon power on, the unit will use the fixed position parameters instead of completing a self-survey.

Alternatively, if the position location is accurately know, the known position, Latitude, Longitude, and Height, can be entered using the setPos mode, and then the fixed mode can be selected and the unit will use these coordinates for its position.

NOTE 1: The position parameters cannot be entered directly in the fixed mode as the entries are “locked” . It is necessary to first select the setPos mode to enter the coordinates, and then selct fixed mode.

NOTE 2: If after entering fixed position coordinates the survey mode is selected, the fixed position parameters will be overwritten once the self-survey is complete.

Mobile

In some applications the unit will be installed on a moving platform e.g. a ship. In this case the mobile mode should be selected so that the unit continuously updates its position. In this mode the position information is not quite as accurate as in the survey mode as the unit is using an individual reading to calculate position, rather than an average of multiple surveyed position coordinates.

NOTE: If installed on a moving platform the mobile mode should be selected as otherwise the unit will be trying to operate on incorrect position information and will likely not be able to track any satellites.

4. User Interfaces

The ptf 3207A features four user interfaces for controlling the ptf 3207A's functions:

- A keypad/display interface on the front panel of the ptf 3207A
- A command line interface, available through the serial port
- A command line interface, available through the Ethernet port
- A web interface, available from a browser connected to the ptf 3207A's Ethernet port.

There are also three Status LEDs on the front panel:

Label	Type	Function
Power	Green LED	Illuminated when power is connected
Lock	Green LED	Extinguished until external reference is valid
	Green LED	Flashing while internal oscillator is locking to the reference source
	Green LED	Illuminated when internal oscillator is locked to the reference source
Fault	Multi Color LED	Flashing Amber while waiting for external reference to be valid
		Solid amber when external reference is valid and oscillator is locking
		Extinguished when external reference is valid and oscillator locked.
		Solid amber when unit is in holdover
		Flashing Green/Red when selected reference is not present
		Solid Red if there is a catastrophic fault

Time and Status Displays

There are a total of five different time displays. The time displays are accessed as a part of the standard ptf 3207A status displays. Press the MAIN button to bring up an itemized list of the available status displays. Each display page displays up to four different items. To see the next group of available displays, , press the ⇩ page down key on the front panel keypad.

To select a specific status display item on a page, use the ⇨ forward arrow key until the cursor is next to the required display item, and then press the ENTER key. The selected status display will be displayed.

Status displays may also be selected by using a shortcut key. The shortcut keys are the numbers 1 to 9 on the front panel keypad. Pressing a number will take you directly to the status display itemized next to that number.

If no key is pressed within 10 seconds of pressing the MAIN key, the default status display will be automatically displayed. To select a particular default, use the ⇩ page down and ⇨ forward arrow keys as described above to navigate to the required item, and when the cursor is next to the item desired as the default screen press ENTER.

On subsequent presses of the MAIN key, if no other key is pressed, the ptf 3207A will go to the new default status display after 10 seconds.

The time displays are the first three status displays as follows:

Status Display Number	Description	Format	Comments
1.	Main time display	DOY hh:mm:ss am	DOY=Day of year, hh= Hour mm=Minute, ss=Second, am/pm*note1
2a.	Date and Time display	MM/DD/YYYY hh:mm:ss am	Time/Date USA format*note2 hh=hour mm=Minute, ss=Second, am/pm*note1
2b.	Date and Time display	DD/MM/YYYY hh:mm:ss am	Time/Date European format*note2 hh=hour mm=Minute, ss=Second, am/pm*note1
2c.	Date and Time display	YYYY/MM/DD hh:mm:ss am	Time/Date Japanese format*note2 hh=hour mm=Minute, ss=Second, am/pm*note1
3.	Day of week, Date/Time display	Fri, January 30, 2015 hh:mm:ss am	mm=Minute, ss=Second, am/pm*note1

*NOTE 1: am/pm only present when TIME-MODE= LOCAL and TIME-FORM=12HR format.
*NOTE 2: Date format is selected from the menus by DATE-FORM.

Additional status displays

Status Display Number	Description	Format	Comments
4.	Position display	Latitude Longitude Height	Degrees Degrees Meters
5.	Date and Time display	MM/DD/YYYY hh:mm:ss am	Time/Date USA format*[note2]
6.	Satellite status display		
7.	System Network Status display	XXX.XXX.XXX.XXX XXX.XXX.XXX.XXX XXX.XXX.XXX.XXX	IP Address Netmask Gateway
8.	Servo Control Loop	Phase Control Voltage	nano seconds +524,287 to -524,287 (+600,000 = manual control)

Optional SNMP Protocol

The ptf 3207A provides an optional SNMP interface. The interface is compatible with SNMP versions 1, 2 and 3. The required version is selectable from the system menus.

The current MIB for the SNMP package is available in the downloads section of the ptf web site.

NMEA Protocol

In place of the standard print output (if fitted) a standard NMEA protocol output can be selected from the menus (NMEA-OUT). In order to use the NMEA output instead of the standard print output set NMEA-OUT to on. When NMEA is ON, the output port is set to 4800 Baud and the four standard NMEA messages are output each second as follows:

$GPRMC, $GPGGA, and $GPZDA, $GPGLL. The messages are output as an ASCII string, always starting with a $ sign, and terminated with <CR><LF> (Carriage return, Line Feed) characters. An exclusive OR'd checksum is calculated for each message string, and output as the last two characters before the <CR><LF>.

The two letters immediately following the $ sign are called the talker ID. This is determined according to the table below:

Talker IDs

GP	Global Positioning System receiver
GL	GLONASS, according to IEIC 61162-1
GA	Galileo Positioning System
QZ	QZSS regional GPS augmentation system (Japan)
GB	BeiDou (China)
GS	SBAS (EGNOS, WAAS, SDCM, GAGAN, MSAS)

When fitted, the NMEA output appears on a separate DB9 'D' RS 232 serial connector. The port is transmit only and is set to:

Serial Port Setup		
Function	**Setting**	**Comments**
Baud rate	4800	Standard NMEA fixed rate
Data Bits	8	
Parity	None	
Stop Bits	1	
Hardware handshaking	None	

DB9 Pin Connections – RS 232C		
Pin #	**Function**	**Comments**
1	No connection	
2	TX Data (RS232)	
3	RX Data (RS 232)	Not used
4	No connection	
5	Ground (RS232)	
6,7,8,9	No connection	

Details of the individual message formats are shown below:

GPRMC - recommended minimum data for gps

```
$GPRMC,hhmmss.ss,A,bbbmm.mmm,n,lllmm.mmm,e,000.0,000.0,ddmmyy,000.0,a*cs<CR><LF>
```

Where:

```
$     Start character, ASCII Code 24h. Sent at change of second
hhmmss.ss  current time:
      hh          hours(00..23)
      mm          minutes (00..59)
      ss          seconds (00..59, or 60 while leap second)
      ss          fractions of seconds (1/10 ; 1/100)
A     Status      (A = time data valid) (V = time data not valid)
bbbmm.mm   latitude in degrees and minutes:
      bbb         degrees
      mm.mmm      minutes
n     latitude, where: `N'=north of equator `S'=south of equator
lllmm.mm   longitude in degrees and minutes:
      lll         degrees
      mm.mmm      minutes
e     longitude, where: `E'=east of Greenwich `W'=west of Greenwich
sss.s      speed in knots
aaa.a      track/heading in degrees
ddmmyy     the current date:
      dd          day of month (01..31)
      mm          month (01..12)
      yy          year - 2000 (00..99)
a          magnetic variation
cs         checksum(all characters between and excluding `$' and `*')
           and output as hex.
<CR>       Carriage Return, ASCII Code 0Dh
<LF>       Line Feed, ASCII Code 0Ah
```

GPGGA – fix information

```
$GPGGA,hhmmss.ss,bbbmm.mmm,n,lllmm.mmm,e,A,vv,hhh.h,aaa.a,M,ggg.g,M_0*cs<CR><LF>
```

Where:

```
$           Start, ASCII Code 24h. Sent at change of second
hhmmss.ss   current time:
      hh          hours(00..23)
      mm          minutes (00..59)
      ss          seconds (00..59, or 60 while leap second)
      ss          fractions of seconds (1/10 ; 1/100)
A     Status      (A = time data valid) (V = time data not valid)
bbbmm.mm    latitude in degrees and minutes:
      bbb         degrees
      mm.mmm      minutes
n           latitude, where: `N'=north,`S'=south of equator
lllmm.mm    longitude in degrees and minutes:
      lll         degrees
      mm.mmm      minutes
e           longitude, where: `E'=east, `W'=west of Greenwich
A           Position fix valid, 1=yes, 0=no
vv          Satellites used (0..12)
hhh.h       HDOP (Horizontal Dilution of Precision)
aaa.a       Mean Sea Level altitude(MSL=alt. of WGS84-Geoid Separation)
M           Units, meters (Fixed value)
ggg.g       Geoid Separation (altitude of WGS84 - MSL)
M           Units, meters (Fixed value)
cs          checksum(all characters between and excluding `$' and `*')
            and output as hex.
<CR>        Carriage Return, ASCII Code 0Dh
<LF>        Line Feed, ASCII Code 0Ah
```

GPZDA – date and time information

```
$GPZDA,hhmmss.ss,dd,mm,yyyy,+HH,II*cs<CR><LF>
```

Where:

```
$     Start character, ASCII Code 24h. Sent at change of second
hhmmss.ss  current time:
      hh          hours(00..23)
      mm          minutes (00..59)
      ss          seconds (00..59, or 60 while leap second)
      ss          fractions of seconds (1/10 ; 1/100)
dd          day of month (01..31)
mm          month (01..12)
yyyy        year
HH,II       the local timezone (offset from UTC):
      HH          hours (00..+-13)
      II          minutes (00..59)
cs          checksum(all characters between and excluding `$' and `*')
            and output as hex.
<CR>        Carriage Return, ASCII Code 0Dh
<LF>        Line Feed, ASCII Code 0Ah
```

GPGLL – geographic position, latitude and longitude

```
$GPGLL,bbbmm.mm,n,lllmm.mm,e,hhmmss.ss,A*cs<CR><LF>

bbbmm.mm   latitude in degrees and minutes:
      bbb         degrees
      mm.mmm      minutes
n           latitude, where: `N'=north,`S'=south of equator
lllmm.mm   longitude in degrees and minutes:
      lll         degrees
      mm.mmm      minutes
e           longitude, where: `E'=east, `W'=west of Greenwich
hhmmss.ss  current time:
      hh          hours(00..23)
      mm          minutes (00..59)
      ss          seconds (00..59, or 60 while leap second)
      ss          fractions of seconds (1/10 ; 1/100)

A     Status      (A = time data valid) (V = time data not valid)
cs          checksum(all characters between and excluding `$' and `*')
            and output as hex.
<CR>        Carriage Return, ASCII Code 0Dh
<LF>        Line Feed, ASCII Code 0Ah
```

5. Configuring and Using External Input Ports

Introduction

The ptf 3207A may be fitted with optional input ports that can be used to synchronize the unit to an external source other than one of the pre-configured satellite systems (GPS, Glonass etc.) This section explains the setup requirements for these input signals to function as expected.

IRIG B (AM)

IRIG B AM is a 1kHz modulated sine wave signal, sometimes referred to as IRIG B 123 or similar

Connect a timecode source IRIG AM Output to the ptf 3207A IRIG AM Input.
Using either the Telnet, Serial, or ptf 3207A Menu display go to command A21 1PPS-SRCE.
Set the command to ExtTCAM
NOTE: The actual command number (A21) can change dependent upon specific capabilities built into the unit, however the short command (1PPS-SRCE) will always remain the same.

After about 1 minute (or less), the ptf 3207A should lock to the incoming signal and display the inputted time on the front panel display (MAIN Status Display 1).
Note: In this mode it is not possible to set the time or date manually as the commands (A13, A14) are locked

The input time is now used as the time base for generating the time information outputs.

If the instrument version is ptf 3207A it is possible to configure different time options on the digital outputs, excluding countdown time which is only available on the –TC version. To set the Digital Output 1 go to command A53 DIGOP-1, and set the required output format:

1PPS	PCLK	NASA36
1PPM	None	IRIG-H
1PHH	IRIG-A	IRIG-G
1PPH	IRIG-B	

The other optional Digital Outputs 2 through 5 (if fitted) may also be set in the same way.

In addition, the format of the amplitude modulated (AM) time code output may also be set, using command A52 TIME-AMOUT to:

IRIG-B (AM) or NASA-36 (AM)

If the instrument version is ptf 3207A-TC it is possible to configure different time options on the digital outputs, including countdown time. To set the Digital Output 1, go to command A53 DIGOP-1, and set the required output format:

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	Countdown	IRIG-B	IRIG-G
1PHH	Multi	NASA36	

The other optional Digital Outputs 2 through 5 (if fitted) may also be set in the same way.

In addition, the format of the amplitude modulated (AM) time code output may also be set, including a countdown format, using command A52 TIME-AMOUT to set:

IRIG-B NASA-36 CntDown

In the CntDown mode the output will be a “Pseudo” IRIG B AM signal

If CntDown is set and the Time Code Front panel (TCF – control unit for the ptf 3207A-TC) is available : First confirm the units are set correctly according to the Control Panel fitted. The units can either be in Hours:Minutes:Seconds, or in seconds up to 9999. Use command CTDWN-DISP A51 to set the correct units:

9999SECS OR HH:MM:SS

Next, use the Thumbwheel switch unit to set the desired count value. The + or - sets the count direction (+ is for counting up, - is for counting down). Use the top and bottom switches to change the individual digits

Next set:

SOURCE switch to A1 or A2, dependent upon the unit ID
Int/Ext switch to INT
Arm/Hold switch to HOLD

Press the LOAD button to load the count value.

If a Control Panel is not available, it is possible to use the ptf 3207A-TC Monitor / Control protocol. Use command A19 START-HOLD:

Idle Start Hold

set START-HOLD A19 Start (to start counting)
set START-HOLD A19 Hold (to stop counting)

DIGITAL Input

When fitted, the digital input may be used for either IRIG B time code (DCLS version), 1PPS (1 pulse per second), or 10MHz RF source.

IRIG B (DCLS)

For IRIG DCLS Input

Connect a timecode source DCLS Output to the ptf 3207A Digital Input. On the telnet, Serial, or Unit display use the command A21 1PPS-SRCE
set A21 to ExtTCDC
After about 1 minute (or less), the ptf 3207A will lock to the IRIG B DCLS input.
Once locked the ptf 3207A is ready to use.
Note: In this mode it is not possible to set the time or date manually as the commands (A13, A14) are locked

On the ptf 3207A the digital outputs can be set to a range of different functions as shown in the IRIG B (AM) section above (command A53 DIGOP-1) :

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	PCLK	IRIG-B	IRIG-G
1PHH	None	NASA36	

Options on the ptf 3207A-TC are slightly different:

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	Countdown	IRIG-B	IRIG-G
1PHH	Multi	NASA36	

The unit label will show which physical output is connected to which digital output (DIGO-1,2,3,4)

1PPS

Connect timing source 1PPS Output to the ptf 3207A Digital Input.
On the telnet, Serial, or Unit display use the command A21 1PPS-SRCE
set A21 to ExtPPS
After about 1 minute (or less), the ptf 3207A will lock to the 1 PPS input.
Once locked the ptf 3207A is ready to use.
Note: In this mode commands A13 (time) and A14 (Date) can be used to manually set the time.

On the ptf 3207A the digital outputs can be set to a range of different functions as shown in the IRIG B (AM) section above (command A53 DIGOP-1) :

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	PCLK	IRIG-B	IRIG-G
1PHH	None	NASA36	

Options on the ptf 3207A-TC are slightly different:

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	Countdown	IRIG-B	IRIG-G
1PHH	Multi	NASA36	

The unit label will show which physical output is connected to which digital output (DIGO-1,2,3,4)

Note: The output time codes will reflect whatever time and date were manually set (if any), incrementing by 1 second each second

10MHz RF

Connect timing source 10MHz (TTL square wave) output to the ptf 3207A Digital Input.
On the telnet, Serial, or Unit display use the command A21 1PPS-SRCE
set A21 to ExtRF
After about 1 minute (or less), the ptf 3207A will lock to the 10MHz RF input.
Once locked the ptf 3207A is ready to use.
Note: In this mode commands A13 (time) and A14 (Date) can be used to manually set the time.

On the ptf 3207A the digital outputs can be set to a range of different functions as shown in the IRIG B (AM) section above (command A53 DIGOP-1) :

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	PCLK	IRIG-B	IRIG-G
1PHH	None	NASA36	

Options on the ptf 3207A-TC are slightly different:

1PPS	1PPH	IRIG-A	IRIG-H
1PPM	Countdown	IRIG-B	IRIG-G
1PHH	Multi	NASA36	

The unit label will show which physical output is connected to which digital output (DIGO-1,2,3,4)

Note: The output time codes will reflect whatever time and date were manually set (if any), incrementing by 1 second each second

6. Default Settings

When delivered, the unit is set to the following default settings. Please note the numerical Cmd# values may change as new commands are added to the unit. Always refer to the actual help menu on the unit for the current command set.

Telnet 10.10.20.52

Help menu for module A

Name	Cmd#	Value	Name	Cmd#	Value
RCVR1-MODE	A01	Survey	RCVR1-AVGS	A02	35
RCVR1-LAT	A03	+42.517193-L	RCVR1-LON	A04	-71.045442-L
RCVR1-HGT	A05	+9.620000-L	RCVR1-CAB	A06	15.00
TIME	A13	16:03:25-L	DATE	A14	12/13/2016-L
TIME-MODE	A15	Local	T-OFFSET	A16	+00:00
DST	A17	Off	DST-TYPE	A18	USA
TIME-FORM	A19	24hr	DATE-FORM	A20	USA
1PPS-SRCE	A21	Rcvr-1	SRCE-SEL	A22	Manual
CNST-SEL	A23	GPS1	DISP-BRITE	A24	4
DISP-BLANK	A25	0	BAUD-RATE	A26	57600
IP(v4)	A27	010.010.020.049-L	NMASK(v4)	A28	255.255.255.000-L
GWAY(v4)	A29	010.010.020.001-L	DHCP	A30	On
SNMP-MGR	A31	010.010.020.050	SNMP-TRPV	A32	1
REM-SERV	A33	000.000.000.000	TNET-T/OUT	A34	0
WEB-T/OUT	A35	0	STATUS	A36	
NTP-MULT	A37	Off	MULT-PER	A38	+16
LOGOUT	A39		INSTR-ID	A40	1
SHOWPTF	A41	+1	RCVR1-TYPE	A42	GGS1
RCVR1-MASK	A43	+10	RCVR1-DFLT	A44	Finished
PPS1-LSEC	A45	+1	RCVR2-TYPE	A46	None
PPS2-LSEC	A49	+0	TIME-AMOUT	A50	IRIG-B
DIGOP-1	A51	1PPS	DIGOP-2	A52	1PPS
DIGOP-3	A53	1PPS	DIGOP-4	A54	1PPS
DIGPW-1	A55	250	DIGPW-2	A56	250
DIGPW-3	A57	250	DIGPW-4	A58	250
PCLK-DIV	A59	1	PCLK-PUL	A60	Square
OSC-TYPE	A61	ULNO	OSC-LOCK	A62	120
OCXO-DAC	A63	+600000	JAM-SYNC	A64	+0
AUTO-JAM	A65	Off	KEYPAD-PIN	A66	0000
MODULE	A67	A	MODULES	A68	1
SNMP-TRAPS	A69	+1	SNMP-USER	A70	ptfOne
SNMP-PWD	A71	okayUser	SYS-RESET	A72	Idle
PRINTLOG	A73	Idle	CLEARLOG	A74	Idle
PRINTMON	A75	Idle	DLOAD-IP	A76	192.168.000.017
DLOAD-NAME	A77	ptf3207A-GPS	UG-FLASH	A78	+0
UG-CONFIRM	A79		WD-DISABLE	A80	+0
NMEA-OUTPUT	A81	Off	PTP-CONFIG	A82	Idle
PASSWORD	A83	ptf_pwd			

****

7. Sales and Customer Assistance

Precise Time and Frequency, Inc. Maintains a central Customer Assistance Centers resource to handle customer needs.

Customer Assistance Center Telephone Number:

• Worldwide (Main Number): 1-781-245-9090

• In addition Precise Time and Frequency, Inc. maintains a network of Representatives around the world who are able to offer first line technical support. For a list of the representative(s) for your region please refer to the ptf web site at www.ptfinc.com.

Customers may e-mail support requests to:

support@ptfinc.com

OR

use the customer contact form on the ptf web site, www.ptf-llc.com

8. Revision Record

Revision	Date	Comments	
ptf 3207A revB	November 3, 2014	Initial release	
ptf 3207A revC	February 27, 2015	Added watchdog disable info for upgrades. Added Serial Time "Print"	
ptf 3207A revD	August 20, 2015	Additional menu features	
ptf 3207A revE	September 15, 2015	Additional menu features	
ptf 3207A revF	September 22, 2015	Additional menu features	
ptf 3207A revG	November 25, 2015	Additional menu features	
ptf 3207A revH	March 15, 2016	Added NMEA protocol	
ptf 3207A revJ	December 13, 2016	1U full width chassis / added defaults	
ptf 3207A revL	August 14, 2017	Added Declaration of Compliance	
ptf 3207A revM	August 22, 2017	Add Dynamic Performance (specs)	
ptf 3207A revN	September 18,2017	Updated certifications	
ptf 3207A revP	June 28, 2018	Updated Certifications	
ptf 3207A revQ	December 2018	Updated comment re: default values	
ptf 3207A revT	June 12, 2019	Updated to RoHS 3, Directive 2015/863	
ptf 3207A revU	October 31, 2019	Added position mode operation	
ptf 3207A revV	August 12, 2020	Update RoHS and Reach Declarations	