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XLi IEEE 1588 Clock



User Guide

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Notices

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1: Overview and Features

Overview

Description

The standard *XLi IEEE 1588 Clock*, also referred to as the “XLi”, provides a complete implementation of a Precise Time Protocol (PTP) “ordinary clock” over a dedicated IEEE 1588 card. The IEEE 1588 card can be configured to operate as a PTP grandmaster or as a PTP slave.

As a PTP grandmaster, the IEEE 1588 card typically synchronizes PTP slaves on the network to International Atomic Time (TAI). The XLi IEEE 1588 Clock derives TAI from the Global Positioning System (GPS). In addition, Symmetricom designed the XLi IEEE 1588 Clock so the user can distribute Coordinated Universal Time (UTC) or user-entered time over PTP.

As a PTP slave, the IEEE card automatically discovers a PTP master within its subnet/subdomain and synchronizes to it. The PTP slave in turn, can be configured as the primary reference source for the XLi IEEE 1588 Clock (the clock synchronizes to the PTP slave).

The XLi’s Time Interval/Event Time (TIET) feature can be used to measure PTP synchronization across timing networks. For example, to measure a PTP slave’s synchronization to the PTP grandmaster, the user connects the PPS output of a PTP slave to the XLi IEEE 1588 Clock and configures F110 to display the time interval between each PPS.

See F130 - Precision Time Protocol Status (page 116) and F131 - Precision Time Protocol Network Config (page 119) for more information.

Standard Configuration

The XLi IEEE 1588 Clock can be purchased in two configurations. The first configuration includes one IEEE 1588 card preconfigured as a PTP master and located in Option Bay 4. The second configuration has an additional IEEE 1588 card preconfigured as a PTP slave located in Option Bay 2. Both configurations include the following items.

- XLi chassis and CPU card running special firmware
- The IEEE 1588 card(s)
- GPS C/A Receiver (87-8028-2)
- L1 GPS Antenna
- GPS antenna cable: 50 ft. (15.24 m) of RG-59[1]
- Time Interval Event Time (TIET)
- Standard 110 VAC Power Supply
- Standard TCVCXO Oscillator

1. Other GPS antenna cable lengths can be specified at the time of purchase.

Only the features listed above are supported for the XLi IEEE 1588 clock. At the time of this writing, none of the other options for the *XLi Time and Frequency system* are supported on the *XLi IEEE 1588 clock*. Contact Symmetricom Sales to obtain a special supported configuration of the XLi IEEE 1588 clock. For contact information, please see Sales and Customer Assistance (page 197).

1588-Related Specifications

The specifications in this section cover options included as standard features in the XLi IEEE 1588 Clock. See also “2: System Specifications” on page 9.

IEEE 1588 card

IEEE 1588 Subsystem

Compliance: IEEE 1588-2002

While operating as Grandmaster:

- Time stamp accuracy is equivalent to XLi clock accuracy: Please consult the datasheet online.[1]
- Sync Intervals: 1, 2, 8, 16, and 64 seconds
- Packet throughput: >100 Delay_Req/second
- Delay_Req buffer: 256 time stamps

While operating as a Slave:

- Sync accuracy to master via crossover cable: Please consult datasheet online.
- Sync Interval: 2 seconds

Physical

Size:	One option bay (1.9 cm h x 10.5 cm w x 17.4 d)
Connectors:	One network port (RJ-45), labelled “1588” One PPS output (BNC), labelled “SYNC OUT”
LEDs	See “LEDs”, page 4.

1. http://www.symmttm.com/pdf/gps/DS_XLi1588.pdf

Network Port (“1588”)

A IEEE1588-compliant “ordinary clock” is available from a stand-alone Ethernet port, labelled “1588”, on the rear panel of the IEEE 1588 card.

Type:	Standard RJ-45 8-pin connector, 100 Base-T
Qty:	1
Packet type	Ethernet DIX II (RFC 894)
Protocols	IPV4, IEEE1588, 802.3, ARP, and PING

PPS Output (“SYNC OUT”)

A raw unfiltered PPS output is available from the stand-alone BNC connector, labelled “SYNC OUT”, on the rear panel of the IEEE 1588 card.

The PPS Output from the IEEE 1588 card while configured as a PTP master:

- 50% duty-cycle, +/-10% typical
- Please consult the datasheet online for additional specifications.[1]

Behavior

The IEEE 1588 card can function as:

- PTP Grandmaster
  - Best Master
  - Preferred Master
- PTP Slave
  - Primary Reference
  - Secondary Reference
  - Standby

User Interface

All of the IEEE 1588 card’s functions can be managed using the Web Interface (page 31), Command Line Interface (page 29), or Keypad/Display Interface (page 25).

The following 1588-related functions are available from the command and keypad/display interfaces:

- F130 - Precision Time Protocol Status (page 116)
- F131 - Precision Time Protocol Network Config (page 119)

1. http://www.symmttm.com/pdf/gps/DS_XLi1588.pdf

LEDs

The following LEDs are available on the IEEE 1588 card rear panel:

- Network Port (1588), Green and Amber LEDs illuminate when receiving or transmitting network traffic.
- PPS: LED illuminates (green) while the SYNC OUT signal is high. See “PPS Output (“SYNC OUT”)” on page 3.
- TX: LED illuminates (green) with transmission of a PTP packet.
- RX: LED illuminates (green) with arrival of a PTP packet.
- M/S: 1588 port operating as PTP master or slave:
  - Green: PTP master.
  - Amber: PTP slave.

ENA: Indicates the state of the 1588 port whether the 1588 software is running:

- Green: 1588 port is *enabled*, and the 1588 software is *running*.
- Amber: 1588 port is *disabled*, and the 1588 software is *running*.
- Red: The state of the 1588 port is *unknown*, and the 1588 software is *not running*.

See “F131 - Precision Time Protocol Network Config” on page 119.

GPS C/A Receiver (87-8028-2)

Introduction

The GPS C/A Receiver acts as a Stratum 0 timing reference source to the XLi. It tracks up to 12 L1 GPS satellites, decodes their signals for time and position, and feeds this data to the XLi through the internal backplane. When available and enabled, the GPS C/A Receiver card provides superior time and frequency accuracy on the XLi (See “System Time & Frequency Accuracy” on page 10). The GPS C/A Receiver card comes with an L1 GPS antenna, cabling, and mounting hardware unless otherwise specified at the time of purchase.

The GPS C/A Receiver uses a TRAIM (Time Receiver Autonomous Integrity Monitoring) algorithm to monitor the integrity of the receiver’s timing solution. Using redundant measurements, TRAIM detects and quarantines anomalous GPS signals, independent of the GPS health ephemeris data. The quarantined signal is excluded from the timing solution for 12 hours before it is requalified for inclusion in the timing solution.

See “Installing the GPS Antenna” on page 15 for information on selecting an antenna site, mounting the antenna, and signal strength requirements.

The GPS C/A Receiver card can be managed and configured using F53 – GPS Operation Mode (page 58) and F119 – GPS Receiver Configuration (page 110).

Specifications

Frequency	1575.42 MHz (L1 signal)
Code	Coarse Acquisition (C/A) code
Tracking	Up to 12 satellites with TRAIM
Position Accuracy	Typically < 10m when tracking four (4) satellites
TRAIM Mask	1 μS
1 PPS Accuracy	UTC-USNO ±30 ns RMS 100 ns Peak
Time standard:	UTC or GPS
Antenna input	Female BNC
Antenna Power	20 mA – 220 mA, +12 V

Related topics:

- "Installing the GPS Antenna" on page 15
- "F50 – GPS Receiver LLA/XYZ Position" on page 53
- "F51 – GPS Antenna Cable Delay" on page 55
- "F53 – GPS Operation Mode" on page 58
- "F60 – GPS Receiver Satellite List" on page 60
- "F69 – Time Mode" on page 65
- "F73 – Alarm Control / Status" on page 69
- "F74 – Clock Source Control" on page 77
- "F119 – GPS Receiver Configuration" on page 110

Standard TCVCXO Oscillator

Frequency/Timing	Allan Deviation,
Stability	1×10^{-9} @ 1 sec 2×10^{-10} @ 1K sec 3×10^{-12} @ 1 day
Temp	5×10^{-7}, over 0°C to 50°C when not locked to a reference
Drift Rate	5×10^{-9} / Day

The XLi comes with the standard TCVCXO oscillator described below. The stability of the following oscillators is dependent on the reference source. For reference source accuracies, see "System Time & Frequency Accuracy" on page 10.

Standard 110 VAC Power Supply

The XLi's internal fault detector can monitor the three output voltages from the primary and the secondary power supplies. With the Primary Power or Secondary Power indicators in F73 enabled, a 10% decrease in any of the output voltages triggers an alarm. See "F73 – Alarm Control / Status" on page 69.

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

Warning: Prior to servicing the interior of a unit with dual power supplies, remove both power cords.

Input connector:	IEC 320 type
Input voltage range:	Universal, 90 – 260 VAC and 110 – 370 VDC
Input frequency range:	47 Hz – 440 Hz
Isolation, ground:	For 110-370 VDC operation, the input is fully floating. Either input polarity may be strapped to chassis ground.
Isolation:	1,500 VAC, input to ground
Output Specifications:	+5.2 V (5.0 to 5.4 V), 25 watts, 0 to 5 amps +12 V (11.4 to 12.6 V), 45 watts, 0 to 3.8 amps -12 V (–11.4 to –12.6 V) 32 watts, 0 to 2.7 amps
Fan:	Exhaust 3-6CFM

Clock Architecture

Figures 1 and 2 on the following pages provide a simplified view of the standard XLi's clock architecture.

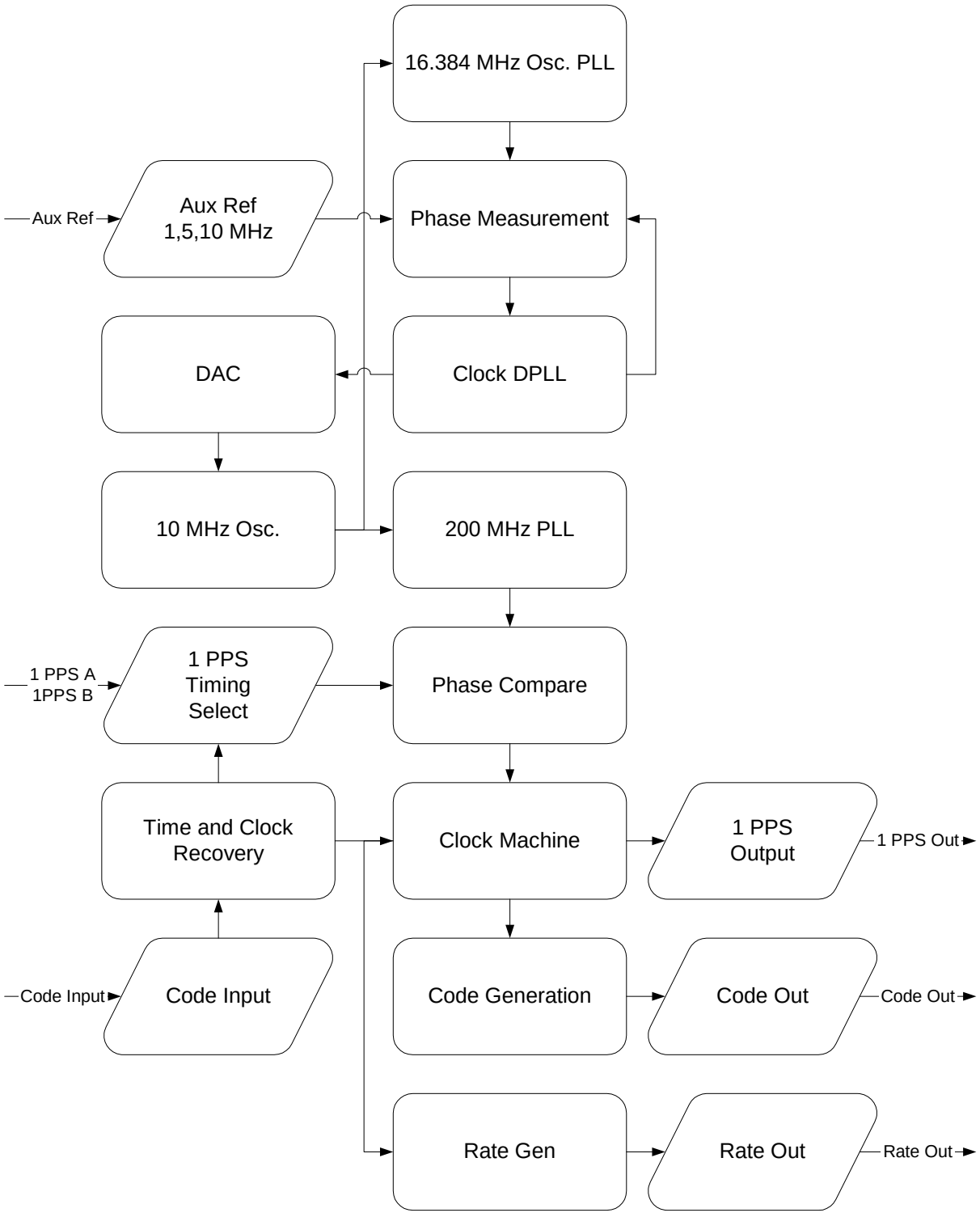


Figure 1: Functional Timing Block Diagram

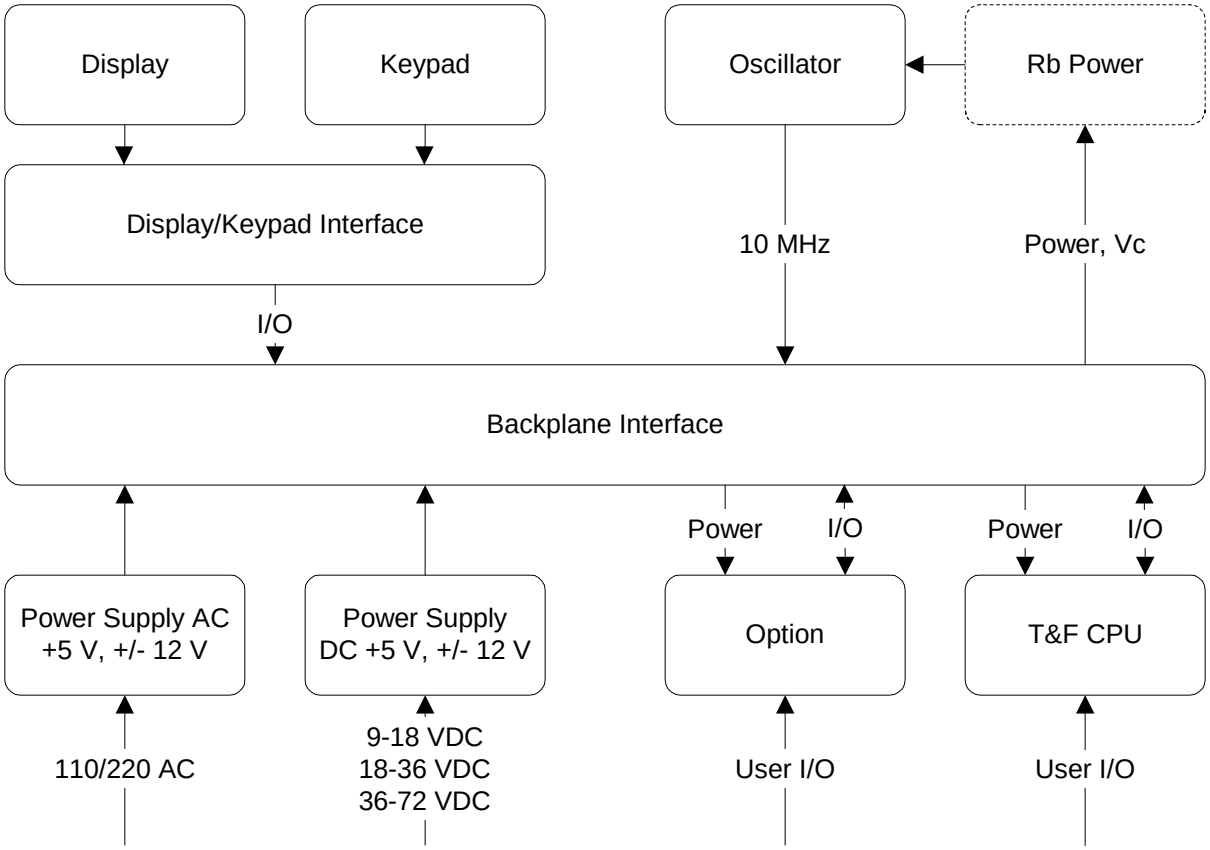


Figure 2: Interface Architecture Block Diagram

2: System Specifications

Mechanical/Environmental

Power:	95-260 VAC, 47 to 440 Hz
Operating Temperature:	0 °C to +50 °C (+32 °F to +122 °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.)
Front Panel Display:	Vacuum Fluorescent Display (VFD) 4.38” x 0.88" (11.13cm x 2.24 cm). 160X16 pixels. Displays startup messages, clock status, time and day of year, and interactive clock functions. TIME mode displays Time and Day of Year (TOD) on one full-height line.
Keypad:	0–9, UP, DOWN, LEFT, RIGHT, ENTER, CLR, TIME, STATUS, MENU
Serial I/O:	Full user-selectable RS-232/422 communication protocol up to 19200 baud
Vibration Operating:	GR-CORE-63, 4.5.2/4, locked to 1.0 g
Storage Transport:	GR-CORE-63.4.4.1 to 1.5g

AC Power Supply

Input:	
Input connector:	IEC 320 connector
Input voltage range:	Universal, 90 – 260 VAC and 110 – 370 VDC
Input freq. range:	47 Hz – 440 Hz
Output:	+5.2 V (5.0 to 5.4 V), 25 watts, 0 to 5 amps +12 V (11.4 to 12.6 V), 45 watts, 0 to 3.8 amps -12 V (-11.4 to -12.6 V) 32 watts, 0 to 2.7 amps
Wattage:	104 watts
Power Supply Status:	The Fault Detector monitors all three output voltages and provides a visual (panel LED) and fault status if any output voltage decreases by 10%.
Alarm Status LED:	Green LED on with no fault and AC power applied. Green LED off with fault or no AC power applied.
Fan:	Exhaust 3-6 CFM

System Time & Frequency Accuracy

The tables below describe system clock accuracy while locked to the reference source indicated. Currently, GPS is the only supported reference source.

GPS Receiver

1 PPS Output:	±30 ns RMS, 100 ns peak without SA (99%)
Frequency Output Accuracy:	< $2x\ 10^{-12}$
Frequency/Timing, Allan Deviation, Stability:	1×10^{-9} @ 1 sec 2×10^{-10} @ 1000 sec $1x\ 10^{-12}$ @ 1 day
AM Code Output Accuracy:	10 μS to the 1 PPS
DC Level Shift Code Output Accuracy:	200 ns to the 1 PPS
Time to System Lock	<20 min. typical

See GPS Signal Strength Requirements (page 17) and GPS C/A Receiver (87-8028-2) (page 4).

Aux Ref Input

If an Aux Ref input is available and enabled, the XLi assumes that Aux Ref is a better frequency source than its own oscillator. If a timing reference is not available (or becomes unavailable) and Aux Ref is enabled, the XLi locks to the Aux Ref input. Under those conditions, frequency output accuracy is equal to the reference < 1 x 10^{-12}.

Note: To set the time and date manually, see "F3 – Time & Date" on page 40.

Chassis

1U Chassis:	Standard 19" EIA Rack System, hardware included
Receiver Size:	1.75 in. x 17.1 in. x 15.35 in.
Weight:	Standard configuration, without options ~9.25 lb. Fully loaded ~ 10.95 lb

Standard Inputs and Outputs

The following specifications describe the standard (as opposed to optional) inputs and outputs on the standard configuration of the XLi.

Serial I/O Port

The standard serial data port is a bi-directional EIA standard RS-232C interface. The serial data port is configured via the Keypad / Display and Standard network port.

Interface:	RS-232 or RS-422
Data Rates:	1200, 2400, 4800, 9600 and 19200 bps
Data Bits:	7 or 8
Parity:	even, odd, or none
Stop Bits:	1 or 2
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------Rx- (RS-422) 7------Rx+ (RS-422) 8------Tx- (RS-422) 9------Tx+ (RS-422)
Factory settings:	9600, 8, N, 1

Note: Parity - NONE is only available/valid when Data Bits is set to 8.

See “F4 – Serial Port Configuration” on page 42.

NET – Network Port

The Ethernet port interface has a standard RJ-45 connector that provides IEEE 802.3 frame 10/100 Base-T Ethernet. See “F100 – Network Port Configuration & XLi Firmware” on page 80.

J1 Input – Time Interval - Event Time

The Time Interval - Event Time (TIET) option measures a 1 PPS or Event input signal on J1 against the XLi derived time. The rising edge of the pulse is measured against XLi time with 5 ns resolution.

Pulse Width	100 ns, min.
Active Edge:	Rising
Amplitude (DC):	
Logic Low:	< 1.25V and Min. 300mV
Logic Hi:	>1.25V and Max 10V
Impedance:	100 kΩ, 50 Ω
Resolution:	5 ns, Single Shot
Accuracy	Refer to “System Time & Frequency Accuracy” on page 10

See “F110 – J1 Input (TIET)” on page 99.

Note: Any stray input capacitance loading will impact TIET measurements

Note: Configuring J1 as the input for a time code reference source is not supported.

J2 Output – Rate Out

Rate:	1 PPS, 10 PPS, 100 PPS, 1 kPPS, 10 kPPS, 100 kPPS, 1 MPPS, 5 MPPS, 10 MPPS
Duty cycle:	40-60% ± 10%
Amplitude (TTL):	TTL Levels into 50 Ω
Quantity:	1
Connector:	Female BNC
Factory setting:	10 MPPS

See “F111 – J2 Output (Rate)” on page 102.

Note: Configuring J2 as a Programmable Pulse Output (PPO) is not supported.

J3 Input – Auxiliary Reference

Auxiliary Reference (Aux Ref):

Frequency:	1, 5, 10 MHz
Amplitude:	1 Vp-p to 10 Vp-p at 1 kΩ to ground
Amplitude:	1 Vp-p to 3 Vp-p at 50 Ω to ground
Impedance:	Configurable 1 kΩ or 50 Ω to ground
SNR:	>20db
Quantity:	1
Connector:	Female BNC
Factory Configuration:	Disabled

See “F113 – J3 Input Configuration (Aux Ref)” on page 104.

1 PPS – Pulse Per Second Output

Pulse width:	20 µS ±1 µS
On time edge:	Rising
Amplitude:	TTL Levels into 50 Ω
Quantity:	1
Connector:	Female BNC

If a time reference is unavailable, 1 PPS is as stable as the frequency reference (e.g., OCXO, Aux Ref).

CODE – Time Code Output

Format:	IRIG-B 000, IRIG-B 120, IRIG-A 003, IRIG-A 133, and NASA 36
Amplitude (AM):	3 Vp-p, into 50Ω ±10%
Ratio (AM):	3:1 ±10%
Amplitude (DC):	TTL into 50Ω
Quantity:	1
Connector:	Female BNC
Phasing:	In phase with carrier ± 10 µS
Factory setting:	IRIG-B 120

Many IRIG devices only look at the BCD portion of the IRIG frame. Devices that use IRIG A002, B002 and B122 should be able to synchronize with the XLi’s time code outputs.

ALARM Output

High Z:	Power off
High Z:	Alarm (enabled alarm fault)
Low Z:	Normal (no enabled alarm faults)
Drive:	Open Collector
Max. Voltage:	25 VDC
Max. Current:	50 mA
Quantity:	1
Connector:	Female BNC

Certifications

UL, C-UL:	UL 1950/CSA 22.2 950, Standard for Safety, Information Technology Equipment (ITE)
FCC:	FCC Part 15, Subpart B
CE:	89/336/EEC EMC Directive 73/23/EEC Low Voltage Safety Directive IEC 60950 Safety of Information Technology Equipment (ITE)

3: Installation and Set-up

In a nutshell:

- Install the GPS antenna outdoors, run the cable, and connect it to the XLi's GPS receiver.
- Make the following connections to the XLi (all cables supplied):
  - From the network to the NET port (for access to the command line and web interfaces).
  - From an AC outlet to the XLi's AC power supply.
- Configure the network settings of the XLi's standard network port.
- Configure the network settings of the XLi's IEEE 1588 network port.

Installing the GPS Antenna

Precise Time Protocol (PTP) grandmasters are typically synchronized to International Atomic Time (TAI). To accomplish this, the user sets up the GPS antenna, connects it to the GPS receiver in the XLi IEEE 1588 Clock, and configures GPS as its primary reference source. When the XLi IEEE 1588 Clock locks to the GPS reference source, it computes TAI and synchronizes the PTP grandmaster (the IEEE 1588 card). When the PTP grandmaster is synchronized to the XLi IEEE 1588 clock it starts operating, sending out PTP *Sync* and *Follow_Up* messages and responding to PTP requests.

Selecting a GPS Antenna Site

Select a site outdoors 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
- Is within the maximum GPS antenna cable length from the XLi

Typically, this site is on the roof of the building.

Avoid...

- Mounting the antenna between tall buildings or next to walls and equipment
- Exceeding the maximum cable-lengths specified for a particular cabling arrangement.
- Patching multiple cables together to make a single cable run
- Running the cable through bulkheads and along side high-energy cables
- Crimping or damaging the cable
- Mounting within 15 meters/yards of lightning rods, tower, or structures that attract lightning

Blocked signals and multipath cancellation significantly increase GPS acquisition time. Multipath cancellation is caused by reflected signals that reach the antenna out of phase with the direct signal. Multipath cancellation and blocked signals are typically caused by 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.

Verifying the Site

Verify that the length of cable from the GPS antenna site to the XLi does not exceed the maximum GPS antenna lengths recommended to meet the GPS signal strength requirements. When calculating the total antenna cable length, include cable that is needed to meet safety and regulatory requirements, such as lightning arrestors and building code requirements for running coaxial cable from the exterior to the interior of a building.

If possible, test the GPS signal reception of a particular site before mounting the antenna and running the cable indoors. Some sites may turn out to be unsuitable due to interference.

Notes:

- The XLi requires a 12-volt compatible antenna. Antennas not rated for 12 V will be damaged.
- Use a splitter, not a BNC “T” connector, when connecting an antenna to multiple receivers.
- The L1 GPS antenna is designed to operate with up to 150 ft. (45.72 m) of RG-59 coax cable.
- A *line amplifier* is available for cable runs between 150 - 300 ft. (46 - 91 m) in length (RG-59).
- A *down-converter* kit is available for cable runs of 1,500 ft. (457.2 m) in length (RG-58).

Mounting the GPS Antenna

Mount the GPS antenna on an antenna mast (recommended) or on the peak of a building. For the mast, use 2-inch (5.08-cm) diameter PVC pipe or conduit that is rigid enough to withstand high winds without flexing. Use guy wires to stabilize masts longer than 10 ft. (3.048 m). Avoid mounting the antenna on a tower, which requires a specialist to maintain.

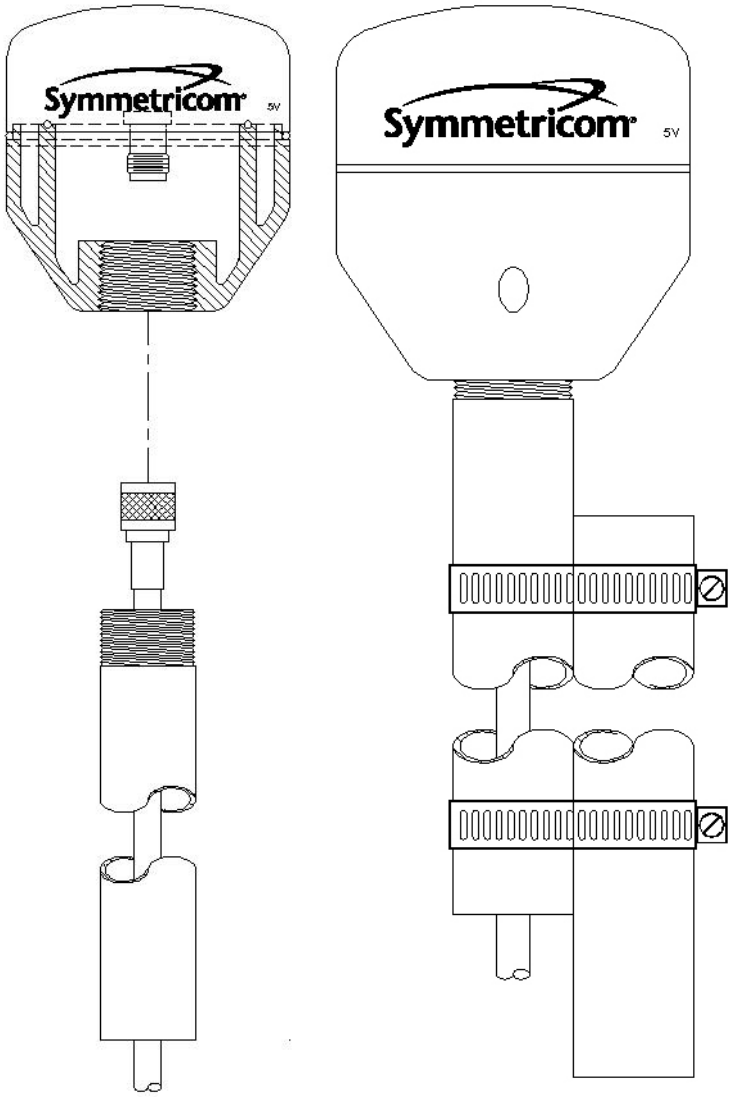


Figure 3: L1 GPS Antenna - methods for cabling and mounting

GPS Signal Strength Requirements

Refer to Figure 4:The required gain at the GPS receiver's ANTENNA connector is greater than 20 dB and less than 36 dB. A 150 foot length of RG-59 coax cable of has a loss of 16-21 dB, which meets this requirement. Abide by the minimum input gain requirements if using other cable types. Additionally, if changing the antenna, abide by the 41 dB gain requirement. Other factors, such as radiation, coverage,

VSWR, and input impedance also affect system performance. Symmetricom recommends using the standard 12-volt capable antenna and cable provided with the GPS receiver.

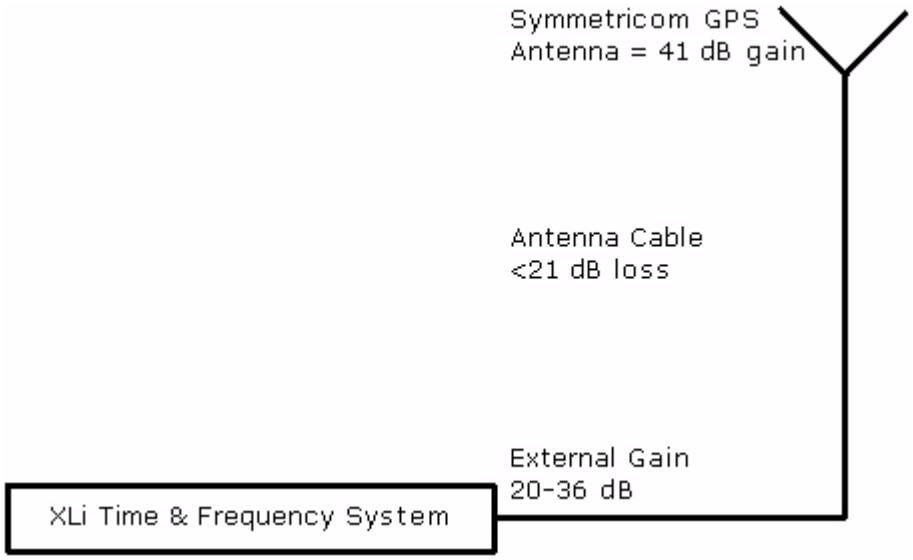


Figure 4: GPS Signal Strength Requirements

Connect the GPS antenna cable to the GPS receiver's ANTENNA connector at the rear of the XLi.

Note: Use a 12-volt capable GPS antenna.

Making Additional Connections and Powering Up

Make the following connections to the XLi (all cables supplied):

1. For access to the web and command line interfaces, connect NET network port (on the Main CPU Card, 87-8000) to the LAN using the Cat 5 network cable (supplied).

   For local access to the command line interface *only*, connect the SERIAL I/O port (on the Main CPU Card, 87-8000) to the to the PC's serial port using a null modem cable.

2. Connect the 1588 network port to the timing network.

3. Connect the AC Power Supply it to a power source. The green STATUS light on the power supply indicates that the XLi is receiving power.

   Upon receiving power, the XLi goes through its startup sequence; displaying "BOOTING", "LOADING", and "STARTING". After approximately 40 seconds, the XLi displays the clock status, and user interfaces (front panel/command line) become available. The IEEE 1588 card requires an additional 2 minutes to complete its startup sequence before it is available from the user interfaces.

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

Configuring Network Settings

The following steps are required to make the XLi's Main CPU card operational on a network. Do this if you plan on using the command line or web interface to manage the XLi over the network.

Using the front panel keypad/display configure the network port settings as follows:

Press	**Result**
ENTER	Displays "FUNCTION"
100	Enters 100 as the function number
ENTER	Displays Function 100's first screen: "COMPANY 00-A0-69…"
ENTER	Displays "IP ADDRESS…"
1-9…	Enter the unit's IP Address (e.g., 192.168.0.11
ENTER	Displays "SUBNET MASK…"
1-9…	Enter the Subnet Mask (e.g., 255.255.255.000)
ENTER	Displays "DEFAULT GATEWAY…"
1-9…	Enter the Default Gateway's IP address (e.g., 192.168.0.1)
ENTER	Displays "10-100 BASE-T (CURR BW 10) - AUTO"
ENTER	Displays "REMOTE LOCKOUT – UNLOCK" (Leave unchanged)
ENTER (5 times)	Displays "SAVE CHANGES – YES"
ENTER	Saves the new network parameters, and reboots the XLi

Configuring the XLi

Enter the XLi's IP address as the address in a browser and log on to the XLi's web interface. The factory set user name is "operator1" and the password is "zeus". If this XLi was field-upgraded for IEEE 1588 operation, the password may also be "casey".

- Click the **Admin Home** link and then the **Accounts Admin** link. Change the factory set user names and passwords.
- Click the **Admin Home** link and then the **Option Bay # GPS M12 RECEIVER** link.
  - Verify that the Antenna Cable Delay is correct. For the standard 50 foot (15.24 m) coaxial cable supplied with the GPS antenna, the Antenna Cable Delay is 60 ns. To compute the correct value for other antenna cable lengths, see "F51 – GPS Antenna Cable Delay" on page 55.
  - Leave *GPS Operation Mode* as "Dynamic" and *Time Reference* as "Primary".
- Click the **GPS Config & Status** link. After approximately 20 minutes of operation, check that *GPS Clock Status* is locked and *GPS Antenna* is OK.
  - If *GPS Antenna* is OK and *GPS Clock Status* is unlocked, click the **GPS Satellite List** link. The Tracked Satellite List should list four or more "current" GPS satellites. It may take significantly longer than 20 minutes for four or more "current" GPS satellites to appear if the GPS

antenna is not in an optimal site or there is a problem with the antenna cable connections. If this delay is unexpected, consider relocating the GPS antenna to a better site or trouble-shooting the GPS antenna cable.

- Press the STATUS key on the front panel. The display should show “LOCKED GPS PRI” ***without an asterisk*** (“*”). If an asterisk appears, it means that the GPS receiver is currently unlocked from the GPS satellites, this may indicate a problem with GPS satellite visibility or signal strength.

Configuring the IEEE 1588 Card(s)

Two versions of the XLi IEEE 1588 clock are currently available:

The first version has:

- An IEEE 1588 card configured as a PTP master in Option Bay 4
- A GPS receiver in Option Bay 1

The second version has:

- An IEEE 1588 card configured as a PTP master in Option Bay 4
- An IEEE 1588 card configured as a PTP slave in Option Bay 2
- A GPS receiver in Option Bay 1

Note: With two IEEE cards, be mindful of the *Option Bay number* when changing the settings.

PTP Master

Note: The IEEE 1588 card requires 5 minutes from power up to initialize. Until then, the card does not appear in the user interfaces, or is reported as "NOT AVAILABLE".

Function F131 is available for configuring IEEE 1588 cards. The IEEE 1588 card located in Option Bay 4 is preconfigured as a PTP master, as shown here:

- PTP AVAILABILITY - OPTION BAY 4
- PTP IP ADDRESS (STATIC) - 010.048.000.103
- PTP SUBNET MASK (STATIC) - 255.255.000.000
- PTP DEFAULT GATEWAY (STATIC) - 010.024.000.001
- PTP DHCP - ENABLE
- PTP SYNC INTERVAL - 2 SECONDS
- PTP BURST MODE - DISABLE
- PTP PORT STATE - ENABLE
- PTP SUBDOMAIN NAME - _DFLT
- PTP RESET TO FACTORY DFLT? - NO
- PTP INIT TO USER SETTINGS? - NO
- PTP CLOCK CONFIG, BAY 1 - MASTER

- SLAVE SYNC THRESHOLD - 5 microsec
- PTP PREFERRED MASTER - DISABLE

Note: When two IEEE 1588 cards are present, use the up/down arrow keys to select the *PTP master in Option Bay 4* before making changes.

Using the familiar keypad display interface, modify the following F131 settings:

- If a DHCP server is not available on the timing network, disable DHCP and set static values for the PTP IP ADDRES, SUBNET MASK, and DEFAULT GATEWAY.[1]
- Configure the following settings on so that the PTP master and PTP slaves match each other:
  - PTP SYNC INTERVAL - The rate at which synchronization packets are sent out. The factory setting, 2 seconds, is the recommended value.
  - PTP BURST MODE - Enables quick and accurate synchronization. Generates additional network traffic.
  - PTP SUBDOMAIN - Defines the PTP master as a member of a logical timing network.
- (Recommended) Enable PTP PREFERRED MASTER to have PTP slaves on the timing network favor the PTP grandmaster over other potential masters.

IMPORTANT: If one of the PTP slaves on the timing network is a Symmetricom IEEE 1588 card, the interval for all PTP masters and PTP slaves must be set to 2 SECONDS.

PTP Slave

To reconfigure the IEEE 1588 card from being a PTP master to being a PTP slave, complete the following steps:

1. Having logged in to the web interface, from the Admin Homepage, click the link Option Bay 4 IEEE 1588 Master. The new 1588 web page takes approximately 5 seconds to load.

2. Set *Clock Configuration* to *Slave Primary*.

3. Try operating with *Slave Synchronization Threshold* at 5 microseconds. Timing networks with bursty or heavy traffic, routers, or many layers of hubs and switches may need the higher 1000 microsecond setting.

4. Click the *Submit Changes* button.

5. The front panel display should show "LOCKED PTP PRI" soon after.

The IEEE 1588 card is now operating as a PTP slave and is also functioning as the primary reference source to the PTP master. The GPS receiver, which was previously operating as the primary reference source to the IEEE 1588 clock, is now a STANDBY reference source.

1. After saving changes, if DHCP is enabled and a DHCP server is available, F131 displays the DHCP-assigned settings following the PTP DHCP ENABLE screen.

Note: The IEEE 1588 card configured as a PTP slave relies on TAI as the time scale of the PTP master. Distributing non-TAI time over PTP while the PTP slave is a reference source will have a predictable effect on the XLi's system time.

Note: Later on, when reconfiguring the IEEE 1588 card as a PTP master, use F119 to set the GPS receiver as the PRIMARY reference source. (In F119: Set GPS TIME REFERENCE, BAY 1 to PRIMARY.)

Note: For XLi IEEE 1588 Clocks with the second IEEE 1588 card in Option Bay 2 (preconfigured a PTP slave, configure the network settings, PTP SYNC INTERVAL, PTP BURST MODE, and PTP SUBDOMAIN. The factory settings are the same as for the PTP master, except the static *IP Address* is *010.048.000.105* and *Clock Configuration* is *Slave Primary*.

Rack Mounting the XLi

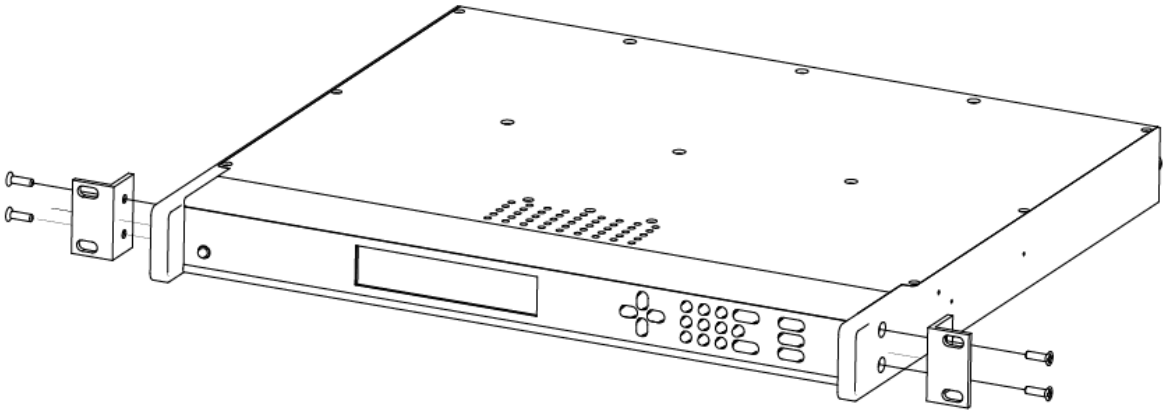
The XLi comes with the following parts needed to mount the XLi securely in any EIA standard 19-inch (48.26-cm) rack:

- 2 mounting brackets
- 4 flat-head, Phillips screws

Have the following items ready and available:

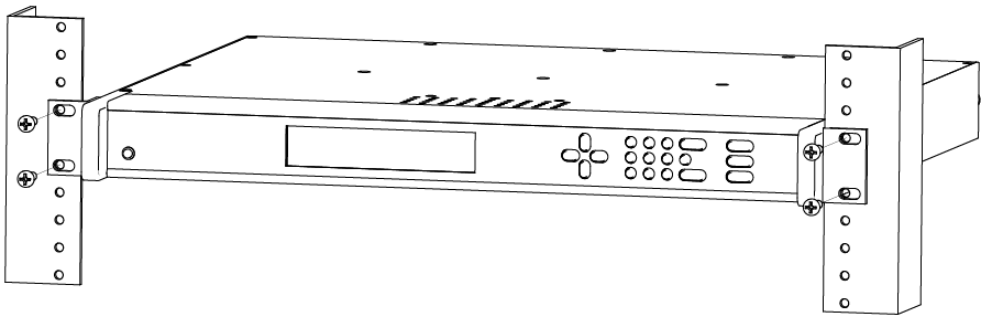
- The appropriate AC source to connect to the XLi's power supply.
- A #2 size Phillips bit screwdriver

To rack mount the XLi:



- Unscrew the four phillips-head screws from the front end of the side panels.
- Use the same screws to attach the rack mount brackets, as shown.
- Tighten the screws using a #2 size Phillips screwdriver.
- Position the XLi in any EIA Standard 19-inch (48.26 cm) rack system, and line up holes in the brackets with the holes in the rack.

- Secure the brackets to the rack using rack mount screws.



Note: Ensure that the ambient operating temperature does not exceed +50° C. Install the XLi chassis so that the top and bottom holes are unobstructed and have sufficient clearance to allow 6 cfm of air to pass through the chassis. To maintain recommended operating temperatures, install a rack-cooling fan capable of 100 cfm in heavily loaded racks.

4: User Interfaces

The XLi features two user interfaces for controlling the XLi's functions:

- A keypad/display interface on the front panel of the XLi
- A command line interface, available through the serial and network ports
- A web interface, available from a browser connected to the XLi's network port.

There is also an Alarm Status LED on the front panel.

Alarm Status LED

The Alarm Status LED, located on the front panel, displays the alarm-state of the XLi unit. The LED has four states:

Dark	=	Power is off.
Green	=	No F73-related alarms. The current reference source input is locked.
Amber	=	No F73 Alarms. Timeout Delay is counting down, but hasn't elapsed. The current reference source input is unlocked (e.g. broken antenna cable or no GPS signal)
Red	=	An indicator in F73 has triggered an alarm. Check F73 to find out what the fault/unlock condition is and take appropriate action.

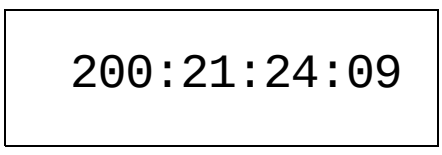
Notes:

- The amber LED can turn green again while the reference source input remains unlocked because:
  - F119's 'GPS Status' controls whether the LED turns amber.
  - F73's 'Timeout Delay' controls how long the LED remains amber.
- The blinking of the LED has no meaning. It is a user preference that can be enabled or disabled using the F73's 'LED Blink' setting. If enabled, the LED blinks when it is green and yellow, but stays unblinking when it is red. If disabled, the LED doesn't blink.

Keypad/Display Interface

Time Display

Press the TIME button on the keypad to display the time only. Use the TIME button to exit the STATUS, MENU, or function displays. The time format is DDD:HH:MM:SS.



Time Display related functions:

- Select between the 12 or 24 hour format displayed: “F2 – 12/24 Hour Format” on page 39.

Time related functions:

- “F1 – Time Zone Offset” on page 38
- “F3 – Time & Date” on page 40
- “F66 – Daylight Saving Time (DST) Mode” on page 63

Status Display

The Status Display comes up automatically when the XLi is rebooted. To manually switch from another display to the Status Display, press STATUS button on the keypad. The keypad appears as follows:

```
LOCKED     * GPS PRI
UTC      200:21:24:09 2002
```

where:

LOCKED	=	System Clock Status is Locked or Unlocked to the current reference source. See Clock Status in “F73 – Alarm Control / Status” on page 69
*	=	A reference source input has been configured, but is not available. (**Note:** When using GPS, “*” may remain visible for up to 13 minutes) See “F119 – GPS Receiver Configuration” on page 110
GPS PRI	=	Shows the reference source type (The function that controls each one is noted below): • GPS PRI, GPS SEC (“F119 – GPS Receiver Configuration” on page 110) • PTP PRI, PTP SEC (“F131 - Precision Time Protocol Network Config” on page 119) The “IRIG” and “AUX REF” reference sources are also possible, but not supported. Automatic switching between the reference sources listed above is controlled by “F74 – Clock Source Control” on page 77.
UTC	=	Time display mode: GPS, UTC, TAI, Standard, or Local (“F69 – Time Mode” on page 65)
200:21:24:09 2002	=	The time, in DDD:HH:MM:SS YYYY format (See “Time Display” on page 25.)

Menu Display

To use the XLi functions that are available from the keypad, press the MENU button on the keypad. “Function Summary” on page 35 lists which functions are available from the Menu Display.

Pressing the MENU key on the front of the XLi displays the first function, F1: TIME ZONE OFFSET:

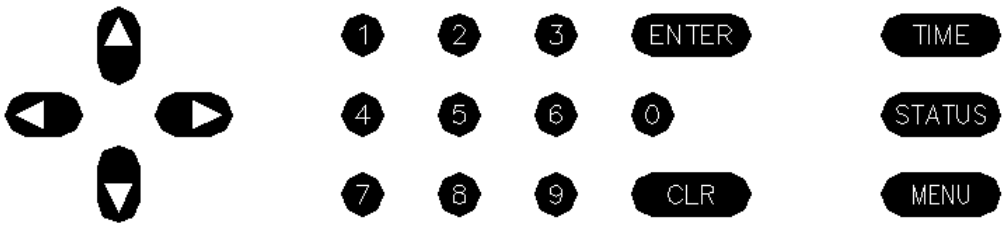
```
F1:
TIME ZONE OFFSET
```

Pressing the UP ARROW key increments to the next function, F2 - 12/24 HOUR FORMAT, and so on. Pressing the DOWN ARROW key skips to the highest available function, F126 OPTIONS KEY ENTRY, and, from there, decrements through the functions.

The section, "5: Function Reference" on page 35, provides detailed information on all of the XLi's functions.

Keypad Operation

Use XLi's front panel keypad to operate the menu-driven keypad/display interface.



The following table explains how the individual keys work:

UP ARROW	Increase value/Display next choice above
DOWN ARROW	Decrease value/Display next choice below
RIGHT ARROW	Move cursor right
LEFT ARROW	Move cursor left
0-9	Enter numeric values
ENTER	Enters currently displayed choice, e.g., a function or yes/confirmation to save changes
CLR	Clears the current selection/choice and returns to the last saved value
TIME	Displays the current time. Can also be used to exit a function without saving changes.
STATUS	Displays the clock status and time. Can be used to exit a function without saving changes.
MENU	Displays first item in function menu. Use UP/DOWN ARROWs to display other functions.

Keypad Examples

The following examples show how to use the keypad effectively.

To open a function using ENTER:

Press	Result
ENTER	Displays the "FUNCTION" prompt
2	Enter the function's number ("2" in this example)
ENTER	Displays F2's first screen, "DISPLAY HOUR FORMAT: 24 HOUR"

To open a function using MENU:

Press	Result
MENU	Displays F1 on the front panel display
UP/DOWN ARROW	Scrolls through the list of functions
ENTER	Opens the function and displays its first screen

To change the settings in a function, and not save them:

Press	Result
MENU	Displays "F1: TIME ZONE OFFSET"
ENTER	Displays "TIME ZONE OFFSET –08:00"
UP ARROW	Changes the minus sign in "– 08:00" to a plus in "+08:00"
RIGHT ARROW	Moves the cursor to the right, under "0".
UP ARROW	Changes "0" to "1", making "+18:00"
ENTER	XLi asks "SAVE CHANGES? YES"
UP ARROW	Changes "YES" to "NO"
ENTER	Abandons the changes and displays the Status Display

Other ways to abandon new settings in a function:

Press	Result
CLR	Abandons all changes and displays to the first screen in the function
TIME	Abandons all changes, exits the function, and displays the Time Display
STATUS	Abandons all changes, exits the function, and displays the Status Display

To enter numeric values in a function:

Press	Result
ENTER	Displays the "FUNCTION" prompt
3	Enters "3" as the function number
ENTER	Opens Function 3, displays the first screen, "TIME MODE – LOCAL"
ENTER	Displays the second parameter, "DATE-TIME…<mm>/<dd>/<yyyy>"
05152002	Enters May 15, 2002 as today's date. (replace)
ENTER	Displays "DATE-TIME"
ENTER	XLi asks "SAVE CHANGES? YES"
ENTER	Selects "YES", saves the changes, and displays the Status Display

Command Line Interface

To open a command line session, connect to the serial or network port using a terminal or a terminal emulation program on a PC.

Consult "5: Function Reference" on page 35 for information on the function commands.

Logging In

Two user names are available for logging in to the network port's command line interface: "operator" and "guest". The serial port's command line interface does not require the user to log in.

Operator Login

The Operator has full privileges to change the settings in all the XLi's functions and to perform firmware updates. As shipped, you can log in as Operator using:

```
User Name: operator
Password: janus
```

To maintain security, change the Operator password at installation. If you are logged in as "operator", the only command line interface function you cannot perform is changing the Guest password.

Guest Login

Use the guest login to view function settings. As shipped, you can log in as guest using:

```
User Name: guest
Password: ttm
```

To maintain security, change the Guest password at installation. If you try to use a function that is not accessible from the guest login, you will see a message such as "Access denied" or "Command canceled".

Logging Out

You can log out using any of the following commands:

logout
logoff
exit
quit

Changing Username and Password

To change the user name and password, use the following commands:

- “F100 P – Change User Password” on page 95
- “F100 PN – Change User Name” on page 97

To reset a lost or forgotten operator username/password, use F100 P and F100 PN commands from the command line interface ***on the serial port***.

Session Timeout and Priority

The XLi’s system firmware closes inactive command line sessions on the *network port* after 15 minutes. The XLi does not terminate inactive command line sessions on the *serial port*.

The user can open a network port session and a serial ports session concurrently, provided the other session is inactive (i.e., not actively performing a function such as F8 - Continuous Time Once-per-Second). The XLi does not allow two or more concurrent network port sessions.

A network port session can be active while an inactive serial port session is open. However, if the serial port session receives user input at this point, it takes control away from the network port and does not yield control to the network port again. The network port will show a prompt, but won’t accept additional commands after the serial port has taken control. Attempting to close the network port session and open a new one will fail; a network port connection cannot be re-established until the serial port has been closed. The following transcripts shows a ‘contest’ between a serial and a network port session:

Serial port session:

```
>f100 ic
f100 IP:192.168.46.150 SM:255.255.255.0 G:192.168.46.1

>NOTICE: A NEW TELNET SESSION HAS BEEN STARTED ON THE INTERNET PORT!

>f100 ic
NOTICE: THERE IS ALREADY A TELNET SESSION ON THE INTERNET PORT!
NOTICE: YOU HAVE TAKEN CONTROL AWAY FROM THE TELNET SESSION!
f100 IP:192.168.46.150 SM:255.255.255.0 G:192.168.46.1

>f100 ic
f100 IP:192.168.46.150 SM:255.255.255.0 G:192.168.46.1
>
```

Network port session:

```
WELCOME TO SYMMETRICOM NETWORK INTERFACE!
USER NAME: operator
PASSWORD: *****
NETWORK INTERFACE 192-8001      (c) 1998 - 2003 SYMMETRICOM
ALL RIGHTS RESERVED
LOGIN SUCCESSFUL!

>f100 ic
f100 IP:192.168.46.150 SM:255.255.255.0 G:192.168.46.1

>NOTICE: UTILITY MONITOR SESSION HAS TAKEN PRIORITY FROM THIS TELNET SESSION!

>f100 ic
NOTICE: CANNOT RESPOND TO COMMAND BECAUSE UTILITY PORT SESSION HAS PRIORITY!
```

Web Interface

The web interface makes most of the XLi's functions conveniently accessible using a browser.

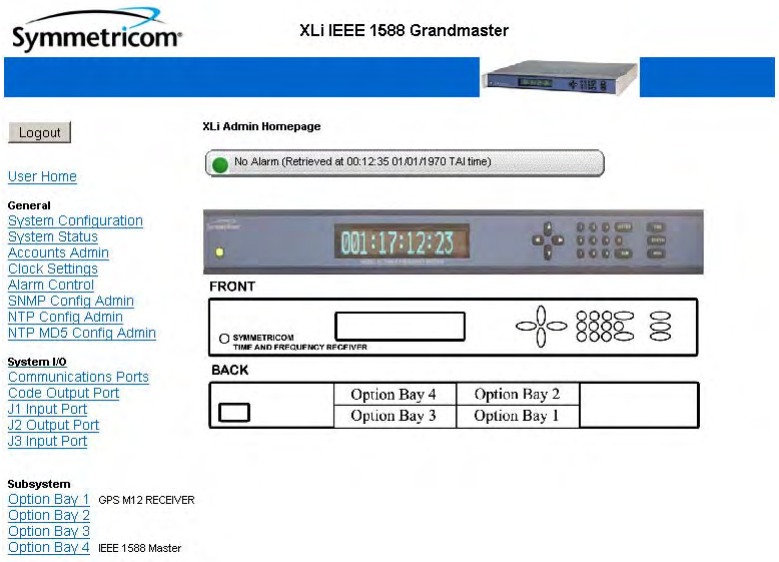


Figure 5. The web interface showing the *XLi Admin Homepage*

User Privileges

Administrative users can view status information and change the XLi's configuration. *Non-administrative* users can view status information, but cannot change the XLi's configuration.

The web interface manages this distinction by providing two sets of web pages. Pages available from the *XLi Admin Homepage* display status information and let the user change the XLi's configuration settings. Pages available from the *XLi User Homepage* only display status information.

Administrative users (e.g., operator1) have access to both the *XLi Admin Homepage* and the *XLi User Homepage* sets of pages. Non-administrative users (e.g., user1) only have access to the *XLi User Homepage* set of pages.

Sessions

Only one user can be logged into the web interface at a time. The web interface does not support concurrent web sessions. If a second user tries to log in, the browser displays a "503 Web Page Server Busy" message.

The XLi supports concurrent user sessions on the web and command line interfaces (on the network or serial port). However, Symmetricom recommends avoiding concurrent administrative user sessions.

The XLi's web server automatically closes inactive web sessions after 30 minutes of inactivity.

User Names and Passwords

The ten administrative user names, "operator1" through "operator10", have "zeus" as the factory set password.

The ten non-administrative user names, "user1" through "user10", have "ttm" as the factory set password.

Only administrative users can change the user names and passwords. User names and passwords must have 1 to 15 characters, and are limited to upper/lower case alphanumeric and underscore ("_") characters. No "special" characters.

Logging In

To log in, enter the IP address of the XLi's "NET" network port into the web browser's address field. At the *XLi Home Page*, click the **Login** button. Enter the appropriate user name and password and click the **Login** button with your mouse. The browser displays the *XLi Admin Homepage* or *XLi User Homepage*.

Navigating

Several notes about using the web interface:

- The home page presents an image of the XLi's front panel to assist with identification, should the user need to find it on a rack.
- The images of the 1U chassis show the position of the options bays *as seen from the rear of the unit*.

The links on the left navigation bar provide access to three different aspects of the XLi:

- *General* - the general status and configuration of the XLi system (e.g., user accounts, clock

settings, alarms, and SNMP).

- *System I/O* - the status and configuration of the input and output connectors on the rear of the main CPU card (e.g., communication settings, code out, J1, J2, and J3).
- *Subsystem* - configuration of the option cards located in the option bays

Under *Subsystem*, the XLi names CPU-aware option cards to the right of the option bay where they are located. Non-CPU aware cards can be present and fully operational in an option bay, but are not shown in the web interface. For more information, see F118 – Option Board Configuration (page 108).

Only option bays with CPU-aware option cards will have active links. Clicking the link of an unpopulated or non-existent option bay simply refreshes the web page.

When clicking on links, allow each page to load before clicking another link. Clicking links too quickly may cause the Login page to appear.

Submitting Changes

When submitting changes, only click the **Submit Changes** button once. Wait for the web page to load before navigating away from the page or submitting another change.

Logging Out

To log out, click the **Logout** button located in the upper left corner of the page.

If the user closes the browser without logging out, a new session will not be available until the XLi closes the inactive session after 30 minutes.

Notes

Notes for specific pages in the web interface:

- Units equipped with the GPS C/A Receiver (87-8028-2): When the user changes the *M12 GPS Mode* setting and applies the changes, the GPS C/A Receiver goes through several states before attaining the user-specified mode.
- *Change Login Page*: To change the Operator name, but not the password, leave the password field blank and submit the change.
- The NTP option, though mentioned in the Web Interface, is currently unavailable for the standard XLi IEEE 1588 clock.

5: Function Reference

Function Summary

The following summary lists all the XLi functions, identifies the user interfaces from which each one is available, and provides a brief description of the function.

Available from: K = keypad, N = Network Port (Telnet), S = Serial Port, W = Web

Function	Available From	Description
F1 – Time Zone Offset	K,N,S,W	Set the time offset for Standard and Local time
F2 – 12/24 Hour Format	K,N,S,W	Apply a 12 or 24-hour format to the Front Panel Display, to F8, F9, and F90.
F3 – Time & Date	K,N,S,W	Set the time and date (when not already provided by a reference source)
F4 – Serial Port Configuration	K,N,W	Configure the main serial port settings
F5 – Time-Quality Setup	K,N,S,W	Set the thresholds for each of the four time quality flags
F6 – Keypad Lock	K*,N,S	Lock keypad access to the XLi's functions. (When locked, F6 is the only function available from the keypad.)
F8 - Continuous Time Once-per-Second	N,S	Output the time once-per-second (to the command line)
F9 - Time On Request	N,S	Output the time when triggered (to the command line)
F11 - Time Output Format	N,S	Change the format of the time output by F8 and F9
F13 – Time Error	K,N,S,W	View the current estimated worst case time error
F18 – Software Version Request	K,N,S,W	View the XLi's software version information
F27 – FTM III Configuration	K,N,S,W	***Not supported.***
F42 – Multicode Output Configuration	K,N,S,W	***Not supported.***
F44 – N.8 Frequency Synthesizer	K,N,S,W	***Not supported.***
F50 – GPS Receiver LLA/XYZ Position	K,N,S,W	View the Latitude/Longitude/Altitude or geocentric X/Y/Z coordinates of one or more GPS antennas.
F51 – GPS Antenna Cable Delay	K,N,S,W	Compensate for the delay caused by the length of the GPS antenna cable. (Use F52 to adjust timing *outputs*.)
F52 – Distribution Cable Delay	K,N,S,W	Compensate for the length of the distribution cable on J2.
F53 – GPS Operation Mode	K,N,S,W	Operate specific GPS receivers in Time Mode for static applications, or in Dynamic Mode for mobile applications.
F60 – GPS Receiver Satellite List	K,N,S,W	View a list of current and tracked satellites.

F66 – Daylight Saving Time (DST) Mode	K,N,S,W	Schedule when DST starts and ends (Local time only)
F69 – Time Mode	K,N,S,W	Set the time scale (TAI, GPS, UTC, Standard, Local) output by the IEEE 1588 card and displayed on the front panel of the XLi. (TAI is the recommended setting).
F71 – Oscillator Statistics	K,N,S,W	Display the XLi oscillator's phase, offset, drift, and DAC values
F72 – Fault Status	K,N,S,W	View clock and power supply fault status
F73 – Alarm Control / Status	K,N,S,W	View the status of all the alarm indicators. Enable/disable alarms for each indicator. Set alarm thresholds. Enable or disable LED blink
F74 – Clock Source Control	K,N,S,W	Select the pattern of switching between reference sources
F90 – Code Output Configuration	K,N,S,W	Configure settings for CODE – time code output
F100 – Network Port Configuration & XLi Firmware	K,N,S,W	Configure the standard network port settings
F100 EA – Ethernet Address	K,N,S,W	Display the Ethernet (MAC) address
F100 IP – IP Address	K,N,S,W	Configure the IP address
F100 SM – Subnet Mask	K,N,S,W	Configure the subnet mask
F100 G – Gateway	K,N,S,W	Configure the default gateway
F100 IC – Network Port Settings	K,N,S,W	Display all the standard network port's settings
F100 L/LOCK/UNLOCK – Remote Lockout	K,N,S	Lock remote access to the XLi's standard network port
F100 L – Remote Lockout	K,N*,S	Display the status of F100 LOCK *Locked through the network port, serial port, and keypad. Can be unlocked only through the keypad or serial port.
F100 ST – Self Test Status	K,N,S	Display the XLi's self test results for Flash CRC, RAM, Serial Port, and NVRAM
F100 BH – Burn Host	N,S	Upgrading system firmware: select the FTP host, path, and filename of the system firmware
F100 BUB – Burn BootLoader	N,S	Upgrading system firmware: 'burn' the bootloader file (*.bt) selected using F100 BH to flash memory
F100 BU – Burn	N,S	Upgrading system firmware: 'burn' the system firmware file (*.bin) selected using F100 BH to flash memory
F100 BF – Burn File System	N,S	Upgrading system firmware: 'burn' the file system file (*.fs) selected using F100 BH to flash memory
F100 BUFP – Burn FPGA Firmware	N,S	Upgrading system firmware: burn the FPGA program file (*.bin) selected using F100 BH to the flash memory
F100 CONFIG – Configure NTP & SNMP	N,S,W*[a]	Transfer the SNMP configuration file between the XLi and an FTP server for editing
F100 J – Factory Mode Jumper	N,S	View the status of the factory mode jumper, which is used by factory technicians. Not of interest to most end users.

F100 K I L L – Reboot	N,S	Reboot the XLi
F100 P – Change User Password	N,S,W	Change the XLi password
F100 PI – PING	N,S	Ping from the XLi to another host on the network
F100 PN – Change User Name	N,S,W	Change the User Name
F108 – Oscillator Configuration	K,N,S,W	View the oscillator type
F110 – J1 Input (TIET)	K,N,S,W	Configure the J1 input connector. ***IRIG Time Code not supported.***
F111 – J2 Output (Rate)	K,N,S,W	Configure the J2 output connector. ***PPO not supported.***
F113 – J3 Input Configuration (Aux Ref)	K,N,S,W	Configure the J3 input connector. ***Freq Meas not supported.***
F116 – Display Brightness Level	K	Set the brightness of the display on the XLi's front panel
F117 – Factory Configuration	K,N,S,W	View some of the factory settings such as the serial number
F118 – Option Board Configuration	K,N,S,W	View the contents of each option bay. Only recognizes certain cards
F119 – GPS Receiver Configuration	K,N,S,W	Configure and display status for GPS Receivers
F120 - N.1 Frequency Synthesizer	K,N,S,W	***Not supported.***
F123 – Have Quick Input/1 PPS Sync Configuration	K,N,S,W	***Not supported.***
F126 – Options Key Entry	K,N,S	Enable an XLi option by entering a software key
F128 - Have Quick Output	K,N,S,W	***Not supported.***

a.The web interface makes it convenient to edit the SNMP configuration files directly in the browser. Symmetricom recommends this approach versus the more complicated approach of transferring configuration files to an FTP server.

Please note that the functions marked "Not Supported" are associated with options that are unavailable for the XLi IEEE 1588 clock. While those functions remain in the user interfaces, many references to them have been removed from this manual to avoid confusion. For additional information on these functions, consult the User Guide for the standard XLi Time and Frequency System, available from the XLi Product Information CD-ROM and from http://www.symmetricom.com/media/pdf/manuals/man-xli.pdf**.**

F1 – Time Zone Offset

Use function F1 to display and set the time zone offset between your Standard Time zone and Universal Time Coordinated (UTC). Refer to “F: World Map of Time Zones:” on page 193. F1 is the basis for Standard Time and Local Time used by F69. For an expanded explanation of Local, Standard, UTC, TAI, and GPS time, see “F69 – Time Mode” on page 65.

For example, to set the time zone for Pacific Standard Time (UTC –8 hours), set the value in F1 to –08:00. *Exclude the 1-hour Daylight Saving Time (DST) offset from this value*. DST is handled separately by “F66 – Daylight Saving Time (DST) Mode” on page 63.

Because the front panel display and Multicode Output card can be configured to display/distribute Local or Standard time, we recommended configuring F1 as described in the “3: Installation and Set-up” on page 15.

The factory setting for F1 is UTC –8:00 hours (Pacific Standard Time).

Related topics:

- “F2 – 12/24 Hour Format” on page 39
- “F11 - Time Output Format” on page 50
- “F27 – FTM III Configuration” on page 53

Command Line

To display the time zone offset, enter “**F1<CR>”** on the command line. The XLi responds with the following character string:

```
F1<S><SIGN><HH>:<MM><CR><LF>
```

where:

F	=	ASCII character F
01	=	function number
<S>	=	ASCII space character (one or more)
<SIGN>	=	either no character or + for positive offsets or – for negative offsets
<HH>	=	one – or two-digit hours offset from 00 to12 hours
:	=	ASCII character for a colon
<MM>	=	two-digit minutes offset
<CR>	=	carriage return character
<LF>	=	line feed character

For example, to set the time zone offset, enter:

```
F1 -8:00<CR>
```

XLi responds:

```
OK<CR><LF>
```

To verify the change, enter:

F1<CR>

XLi Responds:

```
F1 –8:00<CR><LF>
```

F2 – 12/24 Hour Format

Use function F2 to make 12 or 24-hour time notation available from:

- Keypad/Display Interface (page 25)
- F8 - Continuous Time Once-per-Second (page 46)
- F9 - Time On Request (page 49)

And separately from:

- CODE – Time Code Output (page 13)

F2 does not affect the output of the IEEE 1588 card.

The factory settings for F2 are 24-hour format for the display and 24-hour format for IRIG (F90)

The user *can* apply F2 regardless of the time scale selected using F69 (Local, Standard, TAI, GPS, UTC).

Typically, 12 hour notation only applied to Standard and Local time. Symmetricom *strongly* recommends using 24 notation when F69 is set to TAI, GPS, and UTC. Applying 12 hour notation to those time scales is non-standard and causes ambiguous representation of time. For example, if 12 hour notation is applied to TAI, the front panel displays “249:10:21:34” once in the morning, and once at night.

Note: Symmetricom strongly recommends using only 24 hour notation for the XLi IEEE 1588 Clock.

The 12-hour notation counts hours from 1 to 12 twice per day, like a conventional wall clock. The 24-hour notation counts hours from 0 to 23 once per day. For example, in the 24 hour notation, 18:00 is equivalent to 06:00 in the 12-hour notation (i.e., 18:00 – 12 hours = 06:00).

Command Line

To display the current hour format, send:

F2<CR>

The XLi responds:

```
F2<S>D<HH><SEP>I<HH><CR><LF>
```

where:

F	=	ASCII character F.
02	=	Function number.
<S>	=	ASCII space character (one or more).
D	=	ASCII character for Display format.
<HH>	=	12 or 24.
I	=	ASCII character for IRIG format
<CR>	=	Carriage return character.
<LF>	=	Line feed character.

For example, to display the current hour format, send:

```
F2<CR>
```

The XLi responds:

```
F2 D24 I24<CR><LF>
```

To set the hour format, send:

```
F2 D12 I24<CR>
```

XLi responds:

```
OK<CR><LF>
```

F3 – Time & Date

Use function F3 to set the XLi system clock's time and date. If the XLi is using GPS as its primary reference source, setting F3 manually is unnecessary. Following startup, the XLi synchronizes its time and date to the GPS reference source[1]. If the XLi doesn't have GPS as its primary reference source, use F3 to set the time for the IEEE 1588 option card.

F3 prompts the user for the Time Mode, the Date in `mm/dd/yyyy` format, and the Time in `hh:mm:ss` format. The hours in `hh:mm:ss` should be given using 24-hour notation (e.g., 6 pm = 18:00).

1. Normally, with the factory configured settings and a good GPS antenna placement.

TIME MODE selects which time scale (TAI, Local, Standard, GPS, UTC) is being entered by the user. The XLi, translates the user entry into its equivalents in other time scales. For example, if Local time is -5 hours relative to UTC, entering LOCAL - 07/14/2006 - 10:47:10 in F3 shows up on the front keypad display as UTC 198:15:47:10.

TIME MODE in F3 defines only the entry of time in F3; it does not control the time scale displayed or output by the XLi. F3's Time Mode should not be confused with F69 (see "F69 – Time Mode" on page 65). F69 controls the time scale displayed/output on the front panel display, F8 - Continuous Time Once-per-Second, F9 - Time On Request, and F90 – Code Output Configuration.

Notes:

- Avoid saving/applying new F3 settings while the XLi is locked to a reference source and distributing time information. Doing so allows the XLi to distribute the potentially incorrect time set by F3 for up to 8 seconds until the XLi re-synchronizes to the (GPS) reference source. If the user applies new F3 settings while the XLi is locked to the reference source, the XLi switches to the F3 time and then back to GPS reference *without generating an alarm*. With IEEE 1588 packets, for example, this means that the incorrect time would be distributed for a short period of time until the XLi resynchronized with the GPS reference source.

Command Line

To display the time and date, send:

F3<CR>

XLi responds:

F3<S><MM>/<DD>/<YYYY><SEP><hh>:<mm>:<ss><CR><LF>

where:

F3	=	ASCII string for function F3.
<S>	=	ASCII space character (one or more).
<TIME MODE>	=	the time mode the entered time refers to; LOCAL, STANDARD, GPS, UTC, and TAI
<SEP>	=	one or more separator characters: either space, comma or tab
<MM>	=	two-digit month
<DD>	=	two-digit day of month
<YYYY>	=	four-digit year
/	=	ASCII character for slash delimiter
:	=	ASCII character for a colon delimiter.
<hh>	=	one- or two-digit hours.
<mm>	=	two-digit minutes.

<ss>	=	two-digit seconds.
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, to display the date and time, send:

F3<CR>

XLi responds:

F3 UTC 01/01/2002 00:05:34<CR><LF>

To set the time and date, send:

F3 UTC 07/14/2002 18:20:30<CR>

Only valid times and dates are accepted. The XLi responds:

OK<CR><LF>

F4 – Serial Port Configuration

Use function F4 to change or display the serial port settings. The factory settings are:

- Interface – RS-232
- Baud rate – 9600
- Data bits – 8
- Parity – NONE (only available/valid when Data Bits is set to 8)
- Stop bits – 1

Command Line

To display the Serial Port settings, send:

F4<CR>

XLi responds:

F4<S><RS><SEP>
<SEP><DB><SEP><P><SEP><SB><CR><LF>

where:

F	=	ASCII character F.
04	=	function number.
<S>	=	ASCII space character (one or more).
<SEP>	=	One or more separator characters: either space, comma or tab.
<RS>	=	Interface type, RS-232 or RS-422
 	=	Baud Rate, with possible values 1200, 2400, 4800, 9600, or 19200
<DB>	=	Data Bits, with possible values 7 or 8
<P>	=	Parity, with possible values “even” or “odd” or “none”
<SB>	=	Stop Bits, with possible values 1 or 2.
<CR>	=	Carriage return character.
<LF>	=	Line feed character.

Note: Parity - NONE is only available/valid when Data Bits is set to 8.

For example, to display the serial port settings, send:

F4<CR>

The XLi responds:

F4 232 9600 8 none 1<CR><LF>

To set the serial port settings, send:

F4 422 9600 7 even 1<CR>

XLi responds:

OK<CR><LF>

F5 – Time-Quality Setup

Use function F5 to enable/disable time quality reporting, and to set the thresholds of the four time-quality flags.

How time quality reporting works in the XLi: When a reference source becomes unavailable, the XLi uses its own oscillator to keep track of time. Without the reference source, the XLi can no longer adjust, or steer, the oscillator to remain synchronized with the reference source. The rate at which the oscillator counts time is slightly faster or slower than the reference source. The resulting difference, *time error*, accumulates over time.

The XLi estimates the time error based on the oscillator-type and on the degree of steering (DAC value) applied to the oscillator before the reference source became unavailable. As time error grows and exceeds the thresholds of each *time-quality flag*, the XLi generates a different *time-quality indicator*. The time-quality indicator is represented as a *time quality character* in the following text-based time outputs:

- “F8 - Continuous Time Once-per-Second” on page 46
- “F9 - Time On Request” on page 49

In addition, a time quality indicator is encoded in IRIG-B time code generated by the following functions:

- “F90 – Code Output Configuration” on page 78

For more information on time quality indicators, see “IRIG Standard Format A” on page 192.

The XLi accepts threshold values from 200 ns to 40000000000 ns.

The factory settings for F5 are as follows:

- Time quality reporting - enabled
- First time quality flag 150 ns
- Second time quality flag 15,000 ns
- Third time quality flag 1,000,000 ns
- Fourth time quality flag 150,000,000 ns

The IEEE 1588 stratum of the PTP master is determined from the following relational table based on the XLi time quality flag settings:

- Stratum 1: 150 ns or better (GPS equivalent performance)
- Stratum 2: From 150 ns to better than 15,000 ns
- Stratum 4: From 15,00ns to better than 150,000,000 ns

Related topics (Time Error):

- “F13 – Time Error” on page 52 displays the current time error
- “F71 – Oscillator Statistics” on page 67 provides the DAC value

Command Line

To determine if the time quality characters are enabled and what the thresholds are, enter:

F5<CR>

XLi responds The XLi responds:

F5<S><STATE><SEP><FLAG><SEP><FLAG><SEP><FLAG><SEP><FLAG><CR><LF>

where:

F	=	ASCII character F
05	=	function number
<S>	=	ASCII space character (one or more)
<SEP>	=	one or more separator characters; either space, comma or tab
<STATE>	=	ENABLE or DISABLE
<FLAG>	=	one error threshold in nanoseconds, 1 to 11 digits with or without leading zeros
<CR>	=	carriage return character
<LF>	=	line feed character

For example, to display the time quality status and flags, enter:

F5<CR>

XLi responds:

F5 DISABLE 00000001000 00000010000 00000100000 00001000000<CR><LF>

To enable time quality reporting, and change the thresholds of the time quality flags, enter:

F5 ENABLE 2000 20000 200000 2000000<CR>

XLi responds:

OK<CR><LF>

Note: Leading zeros aren't required for to enter new settings, but are included in readouts of the settings.

F6 – Keypad Lock

F6 – Keypad Lock enables or disables the keypad, preventing accidental changes to the XLi's settings. When enabled, the display responds 'KEYPAD LOCKOUT BY FUNC 6' when the user attempts to access any function other than F6. F6 remains available through the keypad at all times. The factory setting for F6 – Keypad Lock is disabled.

Command Line

To display the Keypad Lock status, send:

F6<CR>

XLi responds:

```
F6<S><STATE><CR><LF>
```

where:

F	=	ASCII character F
6	=	function number
<S>	=	ASCII space character (one or more)
<STATE>	=	ENABLE or DISABLE
<CR>	=	carriage return character
<LF>	=	line feed character

For example, to display the Keypad Lock status, send:

```
F6<CR>
```

XLi responds:

```
F6 DISABLE<CR><LF>
```

To enable Keypad Lock, send the following string:

```
F6 ENABLE<CR>
```

XLi responds:

```
OK<CR><LF>
```

To disable Keypad Lock, send the following string:

```
F6 DISABLE<CR>
```

XLi responds:

```
OK<CR><LF>
```

F8 - Continuous Time Once-per-Second

The function F8 commands and outputs are available only on the command line interface (through the serial and network ports). They are not available through the keypad display or web interfaces.

Function F8 outputs the time-of-year once per second, conditionally followed by a time quality character.

F8 is affected by the following functions:

- F2 – 12/24 Hour Format (page 39)

- F5 – Time-Quality Setup (page 43)
- F11 - Time Output Format (page 50)
- F69 – Time Mode (page 65)

The Format of the F8 Output String

The factory setting for the output string format is as follows:

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

where:

<SOH>	=	ASCII Start-of-Heading character
<CR>	=	ASCII Carriage Return character
<LF>	=	ASCII Line Feed character
DDD	=	day-of-year.
HH	=	hours.
MM	=	minutes.
SS	=	seconds.
mmm	=	milliseconds.
:	=	colon separator.
Q	=	time quality character (see the following table)

The time quality character, "Q", is one of the following characters:

SPACE	=	Time error is less than time quality flag 1's threshold
.	=	Time error has exceeded time quality flag 1's threshold
*	=	Time error has exceeded time quality flag 2's threshold
#	=	Time error has exceeded time quality flag 3's threshold
?	=	Time error has exceeded time quality flag 4's threshold or a reference source is unavailable

The time quality characters can not be modified.

Use F11 - Time Output Format (page 50) to change the format of the F8 output string.

Use F5 – Time-Quality Setup (page 43) to set the four time quality thresholds.

While Synchronizing to a Reference Source

Following startup, the user should avoid using F8 outputs until the XLi has acquired and locked to a timing reference source such as GPS PRI (when F131 is set to PTP MASTER) or the IEEE 1588 card (when F131 is set to PTP SLAVE PRIMARY).

F8's output appears similar to the following example while the XLi locks and synchronizes to a reference:

```
001:00:13:45*
001:00:13:46?
...
001:00:14:05?
001:00:13:44
001:00:13:59
...
001:00:14:05
322:17:59:34
322:17:59:35
```

When the time quality characters clear, and the time-of-year synchronizes to the reference source time, the F8 output string should be considered accurate and reliable.

After Loosing a Reference Source

If the system clock comes unlocked from the reference source (no reference sources available), F8 continues generating time-of-year information based on the synchronized time. Gradually, as the estimated worst case time error ("F13 – Time Error", page 52) accumulates and exceeds each time quality threshold ("F5 – Time-Quality Setup", page 43), F8 appends the appropriate time quality character to the time-of-year string. This progression appears similar to the following example:

```
322:18:02:31
322:18:02:32.
322:18:02:33*
322:18:02:34*
```

Command Line

For example, to initiate Continuous Time once-per-second, enter:

```
F8<CR>
```

The XLi replies:

```
199:11:19:30<CR><LF>
199:11:19:31<CR><LF>
199:11:19:32<CR><LF>
```

To stop F8 Continuous Time Once-Per-Second, press Ctrl-C on your keyboard.

F9 - Time On Request

This function is available through the command line interface only. It is not available from the keypad.

Use function F9 to record the exact time the XLi receives a request from the user.

Enter the command "F9<CR>" to prepare the XLi for the user's request. At the desired moment, send the request to the XLi by entering an upper case "T". The XLi saves the current time-of-day, accurate to within 1μS, to a buffer, and then outputs it to the command line interface. The XLi continues to provide the time-of-day each time it receives a "T" until F9 is cancelled. To cancel F9, enter Ctrl-C on your keyboard. The command line disregards all input other than SHIFT-T and Ctrl-C.

The time-of-day output is only available on the network or serial port used to give the F9 command.

F9's factory set output string is as follows:

```
<SOH>DDD:HH:MM:SS.mmmQ<CR><LF>
```

where:

<SOH>	=	ASCII Start-of-Heading character
<CR>	=	ASCII Carriage Return character
<LF>	=	ASCII Line Feed character
YYYY	=	year
DDD	=	day-of-year.
HH	=	hours.
MM	=	minutes.
SS	=	seconds.
mmm	=	milliseconds.
:	=	colon separator.
Q	=	time quality character (see the following table)

The time quality character, "Q", is one of the following characters:

SPACE	=	Time error is less than time quality flag 1's threshold
.	=	Time error has exceeded time quality flag 1's threshold
*	=	Time error has exceeded time quality flag 2's threshold
#	=	Time error has exceeded time quality flag 3's threshold
?	=	Time error has exceeded time quality flag 4's threshold, or a reference source is unavailable

For example, to prepare Time on Request, enter:

F9<CR>

Then, to request the current time, enter SHIFT-T on your keyboard. ("T" does not appear). XLi responds:

<SOH>128:20:30:04.357*<CR><LF>

To exit F9 press Ctrl-C on your keyboard.

F11 - Time Output Format

Use function F11 to change the format of the F8 and F9 time output strings. The factory setting for F11 format is null, which reinstates the factory default time output formats for F8 and F9:

```
<SOH>DDD:HH:MM:SSQ<CR><LF>              (for F8)
<SOH>DDD:HH:MM:SS.mmmQ<CR><LF>          (for F9)
```

To display the default format for F11, enter:

F11

F11 responds:

F11 DDD:HH:MM:SS.mmmQ

where:

<SOH>	=	ASCII Start-of-Heading character
<CR>	=	ASCII Carriage Return character
<LF>	=	ASCII Line Feed character
DDD	=	day-of-year.
HH	=	hours.
MM	=	minutes.
SS	=	seconds.
mmm	=	milliseconds.
:	=	colon separator.
Q	=	time quality character (see the following table)

The time quality character, "Q", is one of the following characters:

SPACE	=	Time error is less than time quality flag 1's threshold
.	=	Time error has exceeded time quality flag 1's threshold
*	=	Time error has exceeded time quality flag 2's threshold
#	=	Time error has exceeded time quality flag 3's threshold
?	=	Time error has exceeded time quality flag 4's threshold, or a reference source is unavailable

Note: F8 does not display milliseconds, regardless of the format defined in F11.

Suppress the “DDD”, “HH”, “MM”, “SS”, “mmm”, and “Q” segments of F11 by placing an “X” (Shift-X) in the leading position of any segment, followed by any placeholder characters, and the following separator. For example, to suppress “DDD”, enter:

F11 X--:

To see the resulting change to F11, enter:

F11

F11, with “DDD” suppressed, responds:

```
F11 XDD:HH:MM:SS.mmmQ
```

With “DDD” suppressed, the output of F8 would look like this example:

```
:16:23:32
```

Ending a format string early (no “:” or “.” separator at the end) with a carriage return, enables the remaining un-typed characters. This makes it easy to restore the default F11 formatting.

To return F11 to its default format, enter:

F11 D

To display the restored defaults, enter “F11” again. F11 responds:

```
F11 DDD:HH:MM:SS.mmmQ
```

The “DDD”, “HH”, “MM”, “SS”, “mmm”, and “Q” segments can not be replaced with characters, they can only be suppressed.

The “:” and “.” separators *can be replaced with ASCII characters* or suppressed using “X”. For example, to replace the separators with characters, enter:

F11 ---D--H--M--S

When you check the results by entering “F11”, F11 responds:

```
F11 DDDDHHHMMMSSSmmmQ
```

With the new formatting, F8 displays:

```
128D16H41M27*
```

And F9 displays:

```
365D16H45M22S680*
```

F13 – Time Error

Use function F13 to request the estimated worst-case time error due to oscillator drift during periods of unlock from a reference source. See “System Time & Frequency Accuracy” on page 10 for more information on time error for different reference sources. Time error begins to accumulate when the receiver loses lock to a reference source. The XLi calculates the worst-case time error based on the stability of system clock’s oscillator type, and the time elapsed since loss of lock.

Command Line

The Command line interface will report time error when it receives the following string:

F13<CR>

The XLi responds:

```
F13<S><ERROR><CR><LF>
```

where:

F13	=	ASCII string for function F13
<S>	=	ASCII space character
<ERROR>	=	calculated worst-case error in seconds
<CR>	=	carriage return character
<LF>	=	line feed

For example, to display the time error, enter:

F13<CR>

XLi responds (example):

```
F13 TIME ERROR -0.002932863<CR><LF>
```

F18 – Software Version Request

Use function F18 to display the current firmware version numbers of the firmware in the XLi:

- Bootloader
- Software (firmware)
- File System
- Project Rev #
- FPGA

Command Line

Use Command Line Function F18 to obtain the system's firmware version information.For example, enter:

```
F18<CR>
```

The XLi responds:

```
F18 BOOTLOADER  192-8000
    SOFTWARE    192-8001
    FILE SYSTEM 192-8002v1.80
    PROJ REV #  1.80
    FPGA #      184-8000V50
```

F27 – FTM III Configuration

Note: The FTM III card is currently unavailable as an option for the standard XLi IEEE 1588 clock.

F42 – Multicode Output Configuration

Note: The Multicode card is currently unavailable as an option for the standard XLi IEEE 1588 clock.

F44 – N.8 Frequency Synthesizer

Note: The N.8 card is currently unavailable as an option for the standard XLi IEEE 1588 clock.

F50 – GPS Receiver LLA/XYZ Position

Use function F50 to display the current GPS position. Specifically, Use function F50 to:

- Display the option bay location of the GPS receiver(s). If multiple GPS receivers are available, use the UP/DOWN ARROW keys to select a receiver.
- Select the positional coordinate system, Latitude Longitude Altitude (LLA) or XYZ (Earth-Centered, Earth-Fixed XYZ coordinates).
- If LLA is selected, Altitude Mode shows the elevation in given meters.

Command Line

Use the following format to display the current settings display the current position for the GPS receiver in LLA coordinates:

F50<S>B<N><SEP>LLA<CR>

XLi responds with the coordinate information in the following format:

F50<S>B<N><SIGN><S><DEG>d<MIN>'<SEC>"<S><SIGN><S><DEG>d<MIN>'<SEC>"<S><ALT><UNITS><CR><LF>

where:

F50	=	Function 50
<S>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<SEP>	=	Separator
LLA	=	LLA mode
<CR>	=	carriage return character.
<SIGN>	=	N or S for latitude; E or W for longitude; – for negative altitude and <S> or + for positive altitude.
<DEG>	=	two-digit degrees for latitude or three-digit degrees for longitude.
d	=	ASCII character d
<MIN>	=	two-digit minutes.
'	=	ASCII character '
<SEC>	=	two-digit seconds + 1 digit 10ths of seconds.
"	=	ASCII character "
<ALT>	=	altitude in meters
<UNITS>	=	unit of altitude, “m” for meters
<LF>	=	line feed character.

For example, to display the LLA coordinates of the antenna connected to card #2, enter:

F50 B1 LLA<CR>

XLi responds:

```
F50 B1 N 38d23'51.3" W 122d42'53.2" 58m<CR><LF>
```

To display the present antenna position using ECEF XYZ coordinates in meters, use the following format:

F50<S>B<N><SEP>XYZ<CR>

XLi responds using the following format:

```
F50B<N><S><SIGN><S><MX>m<S><SIGN><S><MY>m<S><SIGN><MZ>m<CR><LF>
```

where:

F	=	ASCII character F
50	=	function number
<S>	=	ASCII space character
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<SIGN>	=	Either + or - for the position of the ECEF XYZ coordinates
<MX>	=	Antenna X-position in meters to tenths of a meter
<MY>	=	Antenna Y-position in meters to tenths of a meter
<MZ>	=	Antenna Z-position in meters to tenths of a meter
m	=	ASCII character m for Meters
<ALT>	=	altitude in meters
<CR>	=	carriage return character
<LF>	=	line feed character

For example:

F50 B1 XYZ<CR>

XLi responds:

```
F50  B1  X –4474331m Y 2668899m Z –3668099m<CR><LF>
```

F51 – GPS Antenna Cable Delay

Use function F51 to display or configure the GPS antenna cable delay. Setting a positive value for F51 compensates for the time the signal takes to travel the length of the cable from the GPS antenna to the receiver. When multiple GPS receivers are installed, a separate value can be set for each unique receiver. The factory setting for F51 is +60 ns, which corresponds to the 50-foot (15.24-meter) long RG-

59 GPS antenna cable supplied with the XLi. If the GPS antenna is connected using a different antenna length, calculate the new value using the multiple given below and adjust the value of F51. If using an optional Down/Up Converter, consult that product's documentation for directions on setting the correct cable delay.

F51 Guidelines:

- For RG-59: multiply the cable length by 1.24 ns/ft. to get the value for F51.
- For RG-58: multiply the cable length by 1.4 ns/ft. to get the value for F51.
- Don't use function F51 to adjust the XLi's *timing outputs*; use F52 Distribution Cable Delay instead.

Command Line

Use the following format to display the current Antenna Cable Delay setting:

F51<S>B<N><CR>

The XLi responds using the following format:

F51<S>B<N><SEP><SIGN><DELAY>ns<CR><LF>

where:

F	=	ASCII character F (f or F for input string).
51	=	the function number.
<S>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number of the GPS option card, 1 through 4.
<CR>	=	carriage return character.
<SEP>	=	one or more space characters.
<SIGN>	=	either + or blank
<DELAY>	=	1 to 6 digit delay from 0 ns to 999999 ns.
ns	=	nanoseconds (ns or NS for input string).
<LF>	=	line feed character.

For example, to see the antenna cable delay for the GPS card in option bay 4, enter:

F51 B4<CR>

XLi responds:

F51 B4 +000060ns<CR><LF>

To set the antenna cable delay for an option card, use the following format:

F51<S>B<N><S><DELAY>NS<CR>

For example, to set the antenna cable delay for the GPS card in option bay 4 to 100 ns, enter:

F51 B4 100NS<CR>

XLi responds:

OK<CR><LF>

F52 – Distribution Cable Delay

Use function F52 to display or set the distribution cable delay for the time code and 1 PPS outputs. F52 compensates for the signal's travel time from the XLi to its point of use. The distribution cable delay applies uniformly to all output ports. The as-shipped factory setting is +0 ns. The range of possible values is +999,999 ns to –999,999 ns. Positive values advance the timing signals, while negative values retard them.

To calculate what the setting should be, multiply the delay/foot by the length of the cable in feet. The typical delays for the following cable types are:

- RG-58 – approximately 1.4 ns/foot
- RG-59 – approximately 1.24 ns/foot

Command Line

To display the current distribution cable delay, enter:

F52<CR>

The XLi responds using the following format:

F52<SEP><SIGN><DELAY>ns<CR><LF>

where:

F	=	ASCII character F (f or F for input string).
52	=	the function number.
<S>	=	one or more space characters.
<SIGN>	=	either + or –
<D>	=	1 to 9 digit delay from +999999 ns to –999999 ns
ns	=	nanoseconds (ns or NS for input string)
<CR>	=	carriage return character
<LF>	=	line feed character

For example, to display the current distribution cable delay, enter:

F52<CR>

XLi responds:

F52 +000000ns<CR><LF>

To set the distribution cable delay to 60 ns, enter:

F52 +000060ns<CR>

XLi responds:

OK<CR><LF>

F53 – GPS Operation Mode

The GPS C/A Receiver (87-8028-2) has two modes:

- Select “Dynamic Mode” if the position of the receiver is subject to frequent change, or if it is in continuous motion. For example, use Dynamic Mode when the XLi is used in mobile vehicles such as ships, land vehicles, or aircraft. With Dynamic Mode selected, the receiver updates the position information repeatedly to arrive at the best time calculations for a mobile environment.
- Select “Time Mode” if the receiver used in a static environment such as a server room. With Time Mode, the receiver averages the position data over time to determine the antenna position and calculate the time precisely and accurately.

Keypad

While viewing the Status screen on the XLi front panel display, press the following keypad buttons:

ENTER 53 ENTER

If an GPS C/A Receiver is available, F53 displays:

```
GPS M12 AVAILABILITY
OPTION BAY #
```

Where # is the option bay number the card is located in. If more than one GPS C/A Receiver is present, use the UP/DOWN ARROW buttons to select the option bay location of a specific card.

To view the mode the GPS C/A Receiver is in, press **ENTER** again, and F53 displays the current mode:

```
GPS MODE SELECT
AUTO MODE (or DYNAMIC MODE)
```

To change the mode, use the **UP/DOWN ARROW** buttons and press **ENTER**. F53 asks:

```
SAVE CHANGES?
YES
```

To save changes, press **ENTER**.

Command Line

To request the GPS operation mode of the GPS C/A Receiver (87-8028-2), enter:

F53 B<N>

F53 responds using the following format:

F53<SP>B<N><SEP><STATUS><CR><LF>

where:

F	=	ASCII character F (f or F for input string).
53	=	the function number.
<SP>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<SEP>	=	one or more space characters.
<STATUS>	=	DYNAMIC MODE or AUTO MODE
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, enter:

F53 B1

Example response:

```
F53 B1 AUTO MODE       (or DYNAMIC MODE)
```

To set the GPS Operation Mode, enter a command using the following format:

F53<SP>B<N><SEP><MODE><CR><LF>

where <MODE> equals “DYNAMIC MODE” or “AUTO MODE”.

For example, enter:

F53 B1 DYNAMIC MODE

F53 responds:

```
OK<CR><LF>
```

F60 – GPS Receiver Satellite List

Use function F60 to display the identification number and signal strength of tracked or current satellites. ‘Tracked’ means a satellite’s signal is being received and interpreted by the receiver (or that the XLi has GPS data that suggests this satellite should be visible to the antenna).

GPS satellite are grouped into the following categories:

- Tracked: the XLi is receiving the GPS signal, but isn’t using it to calculate time and position.
- Current: the XLi is using the satellite’s GPS signal to calculate time and position.
- Bad: the GPS satellite is transmitting information that it has been removed from service.
- Rejected: the XLi M12 receiver’s TRAIM feature has detected anomalous signals from this satellite and has quarantined it from the timing solution for 12 hours.

GPS satellite signal strengths are reported in units of dBW. Signals below -170 dBW (e.g., -171 dBW) are not usable by the GPS receiver. See “GPS Signal Strength Requirements” on page 17.

If multiple GPS receivers are installed in the XLi, F60 identifies the GPS receiver by the option bay number in which it is located. For a diagram of option bay numbers, see “F118 – Option Board Configuration” on page 108.

If you’re using the keypad/display interface, use the UP/DOWN ARROWs to scroll through the list of satellites.

Command Line

Use Serial Function F60 to request a list of all, current, and tracked satellites. To display the list, enter a string using the following format:

F60<S>B<N><SEP><TYPE><CR>

XLi responds with approximately 32 lines that use the following format:

F60<S>B<N><S>prn<NN><S><STATE> tracked current<LEVEL><CR><LF>

where:

F60	=	ASCII string indicating function F60.
<S>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<SEP>	=	One or more separator characters; either space, comma or tab.
<TYPE>	=	ALL, CURRENT, or TRACKED.
<CR>	=	Carriage return character.
prn	=	Pseudo Random Number
<NN>	=	1 through 32 (prn<NN> identifies specific GPS satellites)
<STATE>	=	Good, Bad, or Unknown
tracked	=	Either “tracked” or blank
current	=	Either “current” or blank
<LEVEL>	=	Satellite signal strength in dBW
<LF>	=	Line feed character

For example, to display the complete GPS satellite list, enter:

F60 B1 ALL<CR>

XLi responds:

```
F60 B1 prn1 good current  -159dBW
F60 B1 prn2 good current  -162dBW
F60 B1 prn3 good current  -163dBW
F60 B1 prn4 unknown
F60 B1 prn5 unknown
F60 B1 prn6 unknown
F60 B1 prn7 unknown
F60 B1 prn8 good current  -161dBW
F60 B1 prn9 unknown
F60 B1 prn10 unknown
F60 B1 prn11 unknown
F60 B1 prn12 unknown
F60 B1 prn13 good current  -159dBW
F60 B1 prn14 unknown
F60 B1 prn15 unknown
F60 B1 prn16 unknown
F60 B1 prn17 unknown
```

```
F60 B1 prn18 unknown
F60 B1 prn19 unknown
F60 B1 prn20 unknown
F60 B1 prn21 unknown
F60 B1 prn22 good current  -164dBW
F60 B1 prn23 unknown
F60 B1 prn24 unknown
F60 B1 prn25 unknown
F60 B1 prn26 unknown
F60 B1 prn27 good current  -156dBW
F60 B1 prn28 unknown
F60 B1 prn29 unknown
F60 B1 prn30 unknown
F60 B1 prn31 unknown
F60 B1 prn32 unknown
```

Similarly, to display a list of the current or tracked satellites, enter:

F60 B1 CURRENT<CR>

Or

F60 B1 TRACKED<CR>

F66 – Daylight Saving Time (DST) Mode

Use function F66 to enable or disable Daylight Saving Time (DST), and to schedule when *Local time* enters and leaves DST. The factory setting for F66 is Manual (i.e., DST On). The hour for entering/leaving DST is given in the 24-hour format. Entering/leaving DST can be scheduled for any hour of the day, any day of the year. However, transitions scheduled within 24 hours of the beginning/end of the year may not occur at the desired time. This function also works for locations in the southern hemisphere, where DST spans the new year.

Command Line

To display the current status of F66, enter a command using the following format:

F66<CR>

XLi responds using the following format:

F66<S><STATE><ENTER/EXIT><CR>

where:

F	=	ASCII character F
66	=	function number
<S>	=	ASCII space character one or more.
<STATE>	=	Off or Manual.
<ENTER/EXIT>	=	If <STATE> is Manual, <ENTER/EXIT> are the dates it enters and exits DST.
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, to disable DST, enter:

F66 Off<CR>

XLi responds:

OK<CR><LF>

To enable DST and set the DST entry and exit times, use the following format:

F66 MANUAL<INHOUR><SEP><INWEEK><SEP><INDAY><SEP><INMONTH><OUTHOUR>
<SEP> <OUTWEEK><SEP><OUTDAY><SEP><OUTMONTH><CR>

where:

<INHOUR>	=	time to enter DST in 24-hour format.
<SEP>	=	one or more separator characters, either space comma or tab characters. For output strings this will be a single space character.
<INWEEK>	=	which week to enter DST, 1, 2, 3, 4 or 0 (for last).
<INDAY>	=	day of week to enter DST, 1 through 7 where Sunday is 1.
<INMONTH>	=	month to enter DST, 1 through 12 where 1 is January.
<OUTHOUR>	=	hour to exit DST, in 24 hour format.
<OUTWEEK>	=	which week to exit DST, 1, 2, 3, 4 or 0 (for last).
<OUTDAY>	=	day in to exit DST, 1 through 7 where Sunday is 1.
<OUTMONTH>	=	month to exit DST, 1 through 12 where 1 is January
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, enter:

F66 MANUAL 02 1 1 04 02 0 1 10

Meaning:

- Manual settings are in effect.
- The entry time is 02 a.m., week 1 (first), day 1 (Sunday), month 4 (April)
- The exit time is 02 a.m., week 0 (last), day 1 (Sunday), month 10 (October).

To leave the value of any item unchanged, insert a semicolon in its place. For example, to change the week DST begins, enter:

F66 MANUAL ; 0 ; ; ; ; ; ;<CR>

XLi responds to all changes with:

OK<CR><LF>

Meaning that Local time will enter DST on the last week of the month. All other parameters remain unchanged.

The XLi automatically reboots when the user changes the DST entry/exit times in F66.

If any of the items in an input string are invalid, an error message will be returned.

F69 – Time Mode

Use function F69 to select the time mode (time scale) shown or output by:

- The XLi's front panel display
- The following command line functions (network and serial port):
  - "F8 - Continuous Time Once-per-Second" on page 46
  - "F9 - Time On Request" on page 49
- The CODE output on the Main CPU card. ("F90 – Code Output Configuration" on page 78)
- The PTP packets output by the IEEE 1588 card's network port ("F131 - Precision Time Protocol Network Config" on page 119)

Select between the following time scales:

- **TAI (International Atomic Time)** is the basis for UTC and GPS time. TAI is the recommended time scale for IEEE 1588 standard.
- **UTC (Universal Coordinated Time)** differs from GPS Time by the addition of leap-second corrections to compensate for variations in the earth's rotation.
- **Standard Time** is UTC plus a time zone adjustment. For example, Pacific Standard Time is UTC minus 8 hours.
- **GPS Time** is derived directly from the GPS constellation and doesn't contain any leap-second adjustments or other GPS-to-UTC corrections.
- **Local Time** is UTC plus a time zone and a daylight saving time adjustment.

IMPORTANT interactions between F69 and the IEEE1588 card:

- When the IEEE 1588 card is operating as a **PTP master**, *if F69 is set to TAI, Local, or GPS*, the 1588 port outputs PTP with TAI time.[1]
- When the IEEE 1588 card is operating as a **PTP master**, *if F69 is set to Standard or UTC*, the 1588 port outputs PTP with Standard or UTC time respectively.
- When the IEEE 1588 card is operating as a **PTP slave**, *only TAI and GPS are valid settings for F69*. the reference source so can cause the XLi to output the incorrect time on the display, the CODE output, F8, and F9.[2]
- F69 has no effect on the IEEE 1588 card operating as a PTP slave. The IEEE 1588 card operating as a PTP **slave** expects TAI from PTP.

The factory default for the XLi IEEE 1588 clock is TAI.

---

1. When F69 is configured for *Local* or *GPS* time, the display, the CODE output, F8, and F9 all output *Local* or *GPS time* respectively. Only the IEEE 1588 card "redefines" Local and GPS from F69 as TAI.
2. The XLi requires the value of the offset between GPS and UTC in seconds to compute Local, Standard, and UTC time. This offset can change by one second, and can potentially be updated at two times during the year. The XLi typically obtains the offset from GPS while GPS is the primary reference source. The value of the offset isn't available from PTP should slave were the reference source). If a PTP slave is the reference source, a reference source doesn't obtain the offset from PTP and provide it to the XLi. If the PTP slave and GPS are both reference sources, the value of offset is not reliable because.

Related functions:

- “F1 – Time Zone Offset” on page 38
- “F66 – Daylight Saving Time (DST) Mode” on page 63
- “F8 - Continuous Time Once-per-Second” on page 46
- “F9 - Time On Request” on page 49

Command Line

Local Time modifies UTC time to include the Time Zone and Daylight Saving Time adjustments, if enabled by the user.

Use the following format to display the time mode currently used:

F69<CR>

The XLi responds using the following format:

F69<SEP><TT><CR><LF>

where:

F	=	ASCII character F.
69	=	Function number.
<SEP>	=	One or more separator characters, either space comma or tab characters. For output strings this will be a single space character.
<TT>	=	Time Type. Either GPS, UTC, TAI, LOCAL, or STANDARD.
<CR>	=	Carriage return character.
<LF>	=	Line feed character.

For example, enter:

F69<CR>

XLi gives one of the following responses:

```
F69 GPS <CR><LF>
F69 UTC <CR><LF>
F69 LOCAL <CR><LF>
F69 STANDARD <CR><LF>
F69 TAI <CR><LF>
```

To set the time mode, enter a command using the following format:

F69<S><TT><CR>

where:

F	=	ASCII character F.
69	=	Function number.
<S>	=	ASCII space character.
<TT>	=	Time Type. Either GPS, UTC, TAI, LOCAL, or STANDARD.
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, to change the time mode to local time, enter:

```
F69 LOCAL<CR>
```

Or, to change the time mode to UTC, enter:

```
F69 UTC<CR>
```

XLi responds to these changes with:

```
0K<CR><LF>
```

F71 – Oscillator Statistics

Use F71 to display the phase, frequency offset, drift rate, and DAC value of an internal or optional external oscillator.

Definitions:

The *phase* is the instantaneous error in seconds between the oscillator and the control loop zero servo point. The *frequency offset* is computed using an averaging time that is equal to the effective averaging time of the oscillator controller. The *oscillator Drift Rate* is computed using a 24-hour average and is the daily Drift Rate of the oscillator. The *oscillator DAC value* is the signed 16-bit integer that controls the DAC output voltage. It ranges from 0 to 65536.

Command Line

To display the F71 settings, enter:

```
F71<CR>
```

XLi responds using the following format:

```
F71<S>phase=<SIGN><MULT>E<SIGN><EXP><S>s<S><S>offset=<SIGN><MULT>E<SIGN><EXP><S><S>dr
ift=<SIGN><MULT>E<SIGN><EXP>/DAY<S><S>DAC=<SIGN><INT><CR><LF>
```

where:

F	=	ASCII string indicating function F71
<S>	=	ASCII space character one or more.
<MULT>	=	multiplier, 4 digits with decimal point.
E	=	ASCII character E for exponent.
s	=	ASCII character s for seconds abbreviation
<SIGN>	=	- for negative or <S> for positive.
<EXP>	=	2 digit exponent.
/DAY	=	ASCII characters, units of Drift Rate
<INT>	=	integer, 5 digits
<CR>	=	carriage return.
<LF>	=	line feed.

For example, enter:

F71<CR>

XLi responds:

```
F71 PHASE=-5.678E-09 s OFFSET=-1.986E-07 DRIFT= 6.013E-08/DAY DAC=24567<CR><LF>
```

F72 – Fault Status

Use function F72 to display the fault status of the clock.

- Clock PLL – Locked or unlocked
- Clock Status – Unlocked or locked plus one of the following reference types:
  - GPS Primary receiver
  - GPS Secondary receiver
  - PTP Primary (when configured as a PTP slave)
  - PTP Secondary (when configured as a PTP slave)
  - (IRIG-A, IRIG-B, NASA 36 not supported)
- Primary power supply – OK or failed
- Secondary power supply – OK or failed
- Rubidium oscillator (if installed) – OK or fault

Command Line

To display the status of the fault detectors, enter:

F72<CR>

The XLi responds:

```
F72<SP>PLL: <CLK PLL ><SP> CLK: <CLK STATUS><SP><CLK REF:><SP> PWR1:<PWR1 STATUS><SP>
PWR2: <PWR2 STATUS><SP>OSC: <OSC STATUS> <CR><LF>
```

where:

F	=	ASCII character F
72	=	function number
<SP>	=	ASCII space character one or more.
<CLK PLL>	=	Clock Phase Loop Lock status, LOCKED or UNLOCKED
<CLK STATUS>	=	Clock Status, LOCKED or UNLOCKED to the reference source shown. The LOCKED state is based on the F73 Time Threshold value entered by the operator. F73 Time Threshold sets the threshold in ns above which Time Error triggers an alarm. When the oscillator's predicted worst-case time error ("F13 - Time Error" on page 51) exceeds F73 Time Threshold, Time Error enters a fault state and the CLOCK STATUS becomes UNLOCKED. Otherwise the CLOCK STATUS is LOCKED.
<CLK REF>	=	Clock reference source GPS PRI, GPS SEC, PTP PRI, PTP SEC, (not supported: IRIG A, IRIG B, NASA 36) AUX REF.
<PWR1 STATUS>	=	Primary Power Supply status, OK or FAILED
<PWR2 STATUS>	=	Secondary Power Supply status, OK or FAILED
<OSC STATUS>	=	Rubidium oscillator status, OK or FAILED (if installed)
<CR><LF>	=	output line terminator

For example, enter:

F72<CR>

The XLi responds:

```
F72 CLOCK PLL               LOCKED
    CLOCK STATUS LOCKED GPS PRI
    PRIMARY POWER SUPPLY   OK
    SECONDARY POWER SUPPLY OK
```

F73 – Alarm Control / Status

Use function F73 to do the following:

- See the state of an indicator (“Locked/Unlocked” or “OK/Fault”)
- Enable or disable the alarm for each indicator

- See the state of the Alarm Latch for each indicator
- Clear the Alarm Latch for all indicators
- Enable or disable blinking of the Alarm Status LED on the front panel while it is green or amber
- Set the values for Time Threshold, Timeout Delay, and Power-On Alarm Suppress

The following table summarizes F73's alarm indicators and parameters, as well as the factory settings for an XLi with one GPS C/A receiver card. The factory settings vary depending on the options included at the XLi at the time it ships from the factory. For example, for an XLi with an GPS receiver, the GPS Primary Receiver indicator setting would be Alarm Enabled.

Update the alarm settings when adding or removing option cards from the XLi.

Indicator/Parameter Name	**Status**	**Factory Setting (for XLi without option cards)**
Clock Status	Locked/Unlocked	Always Enabled
PLL Locked	Locked/Unlocked	Alarm Enabled
Low Phase Noise (LPN) PLL Locked	Locked/Unlocked	Alarm Enabled
GPS Primary Receiver	OK/Fault	Alarm Enabled
GPS Secondary Receiver	OK/Fault	Alarm Disabled
IRIG Fault	OK/Fault	Alarm Disabled
Aux Ref Fault	OK/Fault	Alarm Disabled
Primary Power	OK/Fault	Alarm Enabled
Secondary Power	OK/Fault	Alarm Disabled
Rubidium oscillator (XLi w. optional Rubidium oscillator)	OK/Fault	Alarm Disabled
DAC	OK/Fault	Alarm Disabled
First Time Lock	OK/Fault	Alarm Enabled
Time Error	OK/Fault	Alarm Enabled
Time Threshold	(Range 0 to 99,999 ns)	0000 ns
Alarm LED Blink	n/a	Blink Enabled
Timeout	OK/Fault	Alarm Enabled
Timeout Delay	(Range 0 to 86,400 sec.)	300 sec.
Power-On Alarm Suppress	(Range 0 to 86,400 sec.)	300 sec.
NTP Fault (XLi w. NTP option)	OK/Fault	Alarm Disabled
Clear Alarm Latch	Yes/No	No

Note: The Rubidium Oscillator and NTP option are currently unavailable for the standard XLi IEEE 1588 clock.

Alarms - General Information

With Alarm Disabled, an F73 indicator does not trigger and alarm when it enters an Unlocked or Fault state.

With Alarm Enabled, an F73 indicator triggers an alarm when it enters an Unlocked or Fault state, and the following events take place:

- The Alarm Status LED changes color from green to amber or red (See “Alarm Status LED” on page 25.)
- The ALARM output on the rear panel changes from low Z to high Z (impedance).
- If configured, SNMP sends a trap out over the network port. (See “C: SNMP” on page 151.)

The following items may delay an unlocked or fault state from triggering an alarm immediately:

- Timeout and Timeout Delay postpone Time Error alarms for a user-configured interval. See “Timeout and Timeout Delay” on page 71.
- Power-on Alarm Suppress prevents alarms from being triggered for a user-configured interval after the XLi boots and starts. See “Power On Alarm Suppress” on page 72.

Time Error and Time Threshold

Time Threshold sets the threshold in ns above which Time Error triggers an alarm. When the oscillator’s predicted worst-case time error (“F13 – Time Error” on page 52) exceeds Time Threshold, Time Error enters a fault state.

Note: ***When Time Threshold is set to zero, it defaults to an appropriate value for the type of reference source***. For example, when Time Threshold is set to “0”, the XLi applies 150 ns as the value while the reference locked to a GPS reference.

LED Blink

When LED Blink is enabled, the Alarm Status LED on the front panel blinks when it is green or yellow. The LED does not blink when it is red, even if LED Blink is enabled. Some users disable LED Blink to ensure that the LED’s color (state) is displayed without interruption.

Timeout and Timeout Delay

Timeout and Timeout Delay allow you to add the dimension of time to the *Time Error indicator*. With Timeout disabled, a Time Error fault triggers an alarm immediately. With Timeout is enabled, a Time Error fault starts counting down the number of seconds specified by Timeout Delay. When the Timeout Delay countdown finishes, the Time Error fault triggers an alarm. (**Note:** the Alarm Status LED on the front panel turns amber while the Timeout Delay is counting down). If the Time Error fault returns to an OK state during the Timeout Delay countdown, the countdown clears. A new Time Error fault starts the Timeout Delay countdown from the beginning. In other words, Timeout Delay countdown does not keep track of the cumulative duration of multiple Time Error faults.

The keyboard/display interface shows the Alarm Latch as an asterisk next to an indicator, as follows:

```
GPS PRI OK     *
ALARM ENABLED
```

Power On Alarm Suppress

Power On Alarm Suppress prevents all F73 alarms from occurring for a specified interval after the unit starts up. The factory setting is 300 seconds (five minutes). When that interval ends, current and new alarms are reported normally.

Clear Alarm Latch

Each indicator has an Alarm Latch. The Alarm Latch shows that indicator that has been in an alarm state, *even if it presently reports as "Locked" or "OK"*. The Alarm Latch is useful for finding transient alarms. Clear the alarm latch settings after troubleshooting or fixing the cause of an alarm so new alarms can be distinguished from previous ones.

Note that an alarm latch only records the occurrence of an alarm if it the indicator's alarm is enabled. The alarm latch does not record the occurrence of a fault or unlocked state if the indicator's alarm is disabled.

Keypad

Note: The Alarm Latch asterisk is not the same as the "reference source unavailable" asterisk that can sometimes be seen on the STATUS display.

Command Line

To see the fault status of the alarm indicators, enter the following command:

F73<CR>

XLi replies:

F73<S>S<STATUS><SOURCE><S><123456789ABCDE><CR><LF>

where:

F	=	ASCII character F
7	=	ASCII character 7
3	=	ASCII character 3
<SP>	=	ASCII space character one or more.
<SEP>	=	one or more separators characters, space, tab, or comma.

S	=	ASCII character S, Status delimiter
<STATUS>	=	'L' Locked
		'U' Unlocked
<SOURCE>	=	'A' Clock IRIG A
		'B' Clock IRIG B
		'G' Clock IRIG G
		'N' lock NASA 36
		'P' Clock Primary
		'S' Clock Secondary
		'R' Clock to Aux Ref
		'F' None
1	=	'-' PLL Synthesizer Locked
		'C' PLL Synthesizer Unlocked
2	=	'-' LPN PLL Locked
		'L' LPN PLL Unlocked
3	=	'-' Primary OK
		'P' Primary Fault
4	=	'-' Secondary OK
		'S' Secondary Fault
5	=	'-' IRIG OK
		'I' IRIG Fault
6	=	'-' Aux Ref OK
		'A' Aux Ref Fault
7	=	'-' Primary Power OK
		'W' Primary Power Fault
8	=	'-' Secondary Power OK
		'w' Secondary Power Fault
9	=	'-' Rb oscillator OK
		'R' Rb oscillator Fault
A	=	'-' DAC OK
		'X' DAC Fault
B	=	'-' First time lock OK
		'a' Clock has locked since power on but still within the user defined power on time out
		'A' Clock has not locked since power on
C	=	'-' Time error OK

'U' Time error Fault

D = '-' Timeout OK

'T' Timeout Fault

E = '-' NTP OK

'N' NTP Fault

To see the states the Alarm Latches for all of the indicators, enter:

F73<S>LATCH<CR>

XLi replies:

F73<S>LATCH<SEP><123><CR><LF>

To clear the Alarm Latches, enter:

F73<S>CLEAR<SEP>ALARM<SEP>LATCH<CR>

XLi replies:

OK

The command line uses a ‘mask’ to enable or disable each indicator’s alarm. To see which indicators are Alarm Enabled, enter:

F73<S>MASK<CR>

XLi replies:

F73<S>MASK<SEP>M<12346789ABCDE><CR><LF>

where:

‘E’ = enabled

‘D’ = Disabled

The following reference table identifies the indicators that correspond to each position in F73 mask syntax. Use this table when entering or reviewing MASK settings. Table also provides the factory settings for a unit with one or two GPS receivers:

			One GPS receiver	Two GPS receivers
1	=	PLL Synthesizer Alarm Enabled	E	E
2	=	LPN PLL Alarm Enabled	E	E
3	=	GPS Primary Alarm Enabled	E	E
4	=	GPS Secondary Alarm Enabled	D	E
5	=	IRIG Alarm Enabled	D	D
6	=	Aux Ref Alarm Enabled	D	D
7	=	Primary Power Alarm Enabled	E	E
8	=	Secondary Power Alarm Enabled	D	D
9	=	Rb Oscillator Alarm Enabled	E	E
A	=	DAC Alarm Enabled	D	D
B	=	First time lock Alarm Enabled	E	E
C	=	Time error Alarm Enabled	E	E
D	=	Time out Alarm Enabled	E	E
E	=	NTP Alarm Enabled (if NTP present)	D	D

Note: Alarm Mask does not provide an setting for LED BLINK, which is not an alarm setting. Also, the Rb Oscillator Alarm Enabled setting is available even if a Rubidium oscillator is not present.

To change the Alarm Enabled setting for each indicator, enter to E (Enable), D (Disable), or “-” (Unchanged) using this format:

F73<S>MASK<SEP><123456789ABCDE><CR>

For example, to enter new mask settings, enter:

F73 MASK DDE-EEEEEEEEEE

XLi replies:

OK

To verify the changes, enter:

F73 MASK

XLi replies:

F73 MASK DDE-EEEEEEEEEE

To view the Time Threshold setting, enter:

F73<S>THRESHOLD<CR>

XLi replies:

F73<S>THRESHOLD<S><nanoseconds><S>ns<CR><LF>

where <nanoseconds> is the time error threshold in ns

To set a new Time Threshold, enter a new value for <nanoseconds> (Range 0 to 99,999 ns), as follows:

F73<S>THRESHOLD<SEP><nanoseconds><CR>

XLi replies:

OK<CR><LF>

To view Timeout Delay, enter:

F73<S>TIMEOUT<CR>

XLi replies:

F73<S>TIMEOUT<SEP><seconds><S>s<CR><LF>

To enter a new Time Delay, enter a value for <seconds> (Range 0 to 86,400 ns), as follows:

F73<S>TIMEOUT<SEP><seconds><CR>

XLi replies:

OK<CR><LF>

To enable LED Blink, enter:

F73<S>BLINK<SEP> ENABLE<CR>

XLi responds:

OK<CR><LF>

To disable LED Blink, enter:

F73<S>BLINK<SEP> DISABLE<CR>

To view the Power-On Alarm Suppress setting, enter:

F73<S>SUPPRESS<CR>

The XLi responds:

```
F73 POWER-ON MINOR ALARM SUPPRESS 300
```

To set a new Power-On Alarm Suppress value, enter the following string, replacing <SEC> with the number of seconds (Range 0 to 86,400 seconds), enter:

```
F73 SUPPRESS <SEC>
```

The XLi responds:

```
OK<CR><LF>
```

F74 – Clock Source Control

Use function F74 to select the primary and secondary reference sources and configure the fail-over sequences. The switching modes are:

- **PRI** or “Primary”: Ensures the unit remains connected to the primary source and doesn’t attempt to switch. PRI is the factory setting.
- **SEC** or “Secondary”: Ensures the unit remains connected to the secondary source and doesn’t attempt to switch.
- **PRI – SEC – SEC** or “Primary – Secondary – Secondary”: the clock synchronizes with the primary source. If the primary source becomes unavailable, it switches to the secondary source and stays there, even if the primary source becomes available again. It stays on secondary even if the secondary source becomes unavailable.
- **PRI – SEC – PRI** or “Primary – Secondary – Primary”: the clock synchronizes with the primary source. If the primary source becomes unavailable, it switches to the secondary source. When the primary source becomes available again, it switches back to the primary.
- **PRI – NSEC – PRI** or “Primary – No Secondary – Primary”: the clock synchronizes with the primary source. If the primary source becomes unavailable, it switches to the secondary source. If the secondary source becomes unavailable, **AND** the primary is available, switches back to the primary.

Clock source switching is affected by the setting in F73 Timeout. When a reference source becomes unavailable, or unlocked, the number of seconds set in F73 Timeout must elapse before the switch occurs. While the reference source is unavailable the clock relies on a frequency source, such as its own oscillator or Aux Ref, to keep time. (If Aux Ref is available and enabled, the XLi will use Aux Ref as its frequency source. See “F113 – J3 Input Configuration (Aux Ref)” on page 104 for more information.) After the timeout has elapsed, the switching sequence begins.

When a time reference becomes unavailable, the XLi switches to the other time reference, if available. The configuration of the time reference (e.g., Primary or Secondary) and the settings in F74 – Clock Source Control (page 77) determine if and how switching takes place. If no other time reference is available, the XLi will use an Aux Ref frequency input on J3 (“F113 – J3 Input Configuration (Aux Ref)”, page 104) as its reference. If references are available, the XLi “freewheels” on its internal oscillator.

Command Line

To display the current settings, enter:

F74<CR>

XLi responds, using the following format:

F74<S><CLK SOURCE><CR><LF>

where:

F	=	ASCII character F.
74	=	function number.
<S>	=	Space
<CLK SOURCE>	=	Clock Source: • PRI • SEC • PRI-SEC-SEC • PRI-SEC-PRI • PRI-NSEC-PRI
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, enter:

F74<CR>

XLi responds (example):

F74 PRI<CR><LF>

To select PRI-SEC-SEC as the new clock source/fail-over pattern, enter:

F74 PRI-SEC-SEC<CR>

XLi responds:

OK<CR><LF >

F90 – Code Output Configuration

Use function F90 to configure the time code output format (IRIG-A, IRIG-B, or NASA 36) and modulation type (AM or DC) on the XLi's standard CODE output.

The factory settings for F90 are IRIG-B and AM.

Although the factory configuration outputs UTC time in 24-hour format, the following can be used to modify the code output of F90 for non-standard applications:

- “F2 – 12/24 Hour Format” on page 39 selects between a 12 or 24-hour time format.
- “F69 – Time Mode” on page 65 selects between the following time scales: Local, Standard, GPS, UTC, and TAI.

Command Line

To display the current settings, enter:

F90<CR>

XLi responds using the following format:

F90<S><CODE OUTPUT><TYPE><CR>

where:

F	=	ASCII character F.
90	=	function number.
<S>	=	Space
<CODE OUTPUT>	=	IRIG-A, IRIG-B, NASA 36
<TYPE>	=	AM, DC
<CR>	=	carriage return character.
<LF>	=	line feed character.

For example, enter:

F90<CR>

XLi responds (example):

F90 IRIG-B AM<CR><LF>

To change the Code Output selection enter:

F90 IRIG-B DC<CR>

XLi responds:

OK<CR><LF>

F100 – Network Port Configuration & XLi Firmware

F100 provides two groups of commands:

- Group 1, available through the keypad/display and the command line, provides access to network port settings and hardware/Firmware status information.
- Group 2, available through the command line only, provides commands for changing system firmware, changing SNMP parameters, changing the user name/password, resetting the unit, and pinging other network devices.

Warning: The F100 commands have the capacity to remove the XLi from the network and disable the XLi's system firmware. Use judiciously.

Reboot Warning: Saving changes to any F100 parameter using the keypad/display will reboot the XLi. Some of the F100 command line commands also reboot the XLi. These are identified in the following documentation.

Group 1

You can use both the keypad/display and the command line interface to access the following parameters:

- **Ethernet address:** XLi contains a unique Ethernet or Media Access Control (MAC) address comprised of a unique number assigned to the manufacturer, and a unique number assigned to the unit. This is factory set and cannot be changed.
- **IP Address**: Sets a static Internet Protocol (IP) address for the unit.
- **Subnet Mask**: Sets a valid subnet-mask used in IP addressing. Subnetting allows for the more efficient allocation of network addresses and management of network traffic.
- **Default Gateway**: The address of the router that handles packets addressed to IP devices outside the local-area network.
- **10 100 BASE-T**: The network port bandwidth setting, 10 Base-T or AUTO. (10 Base-T only for earlier XLi hardware).
- **Remote Lockout**: Enables or disables remote access through the XLi's standard network port. Enabling Remote Lockout limits users to the front-panel keypad or Serial I/O port.
- **Flash CRC**: Status - Passed or failed.
- **RAM**: Status - Passed or failed.
- **Serial**: Status - Passed or failed.
- **Version Test**: Status - Passed or failed

The following table gives the command line equivalents for each of the preceding parameters:

Description	"F100" followed by:	Comments
Ethernet address (MAC address)	EA	Displays information
IP Address	IP	Displays, configures and reboots
Subnet Mask	SM	Displays, configures and reboots
Default Gateway	G	Displays, configures and reboots
IP Address, Subnet Mask, and Default Gateway	IC	Displays several IP parameters
10 100 BASE-T	BASET	Displays, configures and reboots
Remote Lockout	L (for status), LOCK, UNLOCK	Displays and configures
Flash CRC	ST	Displays information
RAM	ST	Displays information
Serial	ST	Displays information
Version Test (NVRAM Ver)	ST	Displays information

Group 2

The following expanded command set is available through the command line interface:

Description	"F100" followed by:	Comments
Burn Host	BH	Configure
Burn	BU	Commit action
Burn Bootloader	BUB	Commit action
Burn Filesystem	BF	Commit action
Configure SNMP Parameters	CONFIG	Move files
Factory Mode Jumper	J	Display only
Reboot	K I L L	Commit action – reboot the XLi
Change User Password	P	Configure
Ping	PI	Commit action
Change User Name	PN	Commit action

You can reconfigure two or more network parameters in a single entry by sending the F100 command and entering new values. Leading zeros may be omitted when entering IP Address, Subnet Mask, and Default Gateway. Any field may be omitted and order is not significant. Blanks are allowed on either side of a colon. The unit reboots after any network parameter is changed.

F100 EA – Ethernet Address

Use function F100 EA to display the Ethernet Address (MAC Address) (**Note**: An Ethernet or MAC Address is not the same thing as an IP Address), a fixed, six-byte, hexadecimal value specific to the unit's standard network port. The first three bytes are registered to Symmetricom Inc.; the last three bytes are the hex value identifying the network port.

To display the Ethernet address of the unit standard network port, enter:

F100 EA<CR>

The XLi responds:

F100 EA:00-A0-69-xx-xx-xx<CR><LF>

where "00-A0-69" is the portion of the address assigned to the manufacturer, and "xx-xx-xx" is unit's unique address (in hexadecimal).

An example of the response is:

F100 EA:00-A0-69-99-00-37

Attempts to set this field will be rejected with a syntax error message.

F100 IP – IP Address

Use function F100 IP to display or change the unit's IP Address.

Use the following format to display the IP address:

F100<S>IP<CR>

Use the following format to set the IP address and restart the unit, enter:

F100<S>IP<S><nnn.nnn.nnn.nnn><CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
IP	=	specify IP command
<nnn.nnn.nnn.nnn>	=	dotted decimal address (0 to 255)
<CR>	=	input line terminator

For example, enter:

F100 IP 206.54.0.21<CR>

XLi responds:

```
OK<CR><LF>
RESETING THE UNIT<CR><LF>
PLEASE WAIT…<CR><LF>
```

To obtain the IP address of the unit Standard network port, enter:

F100 IP<CR>

The XLi responds (example):

```
F100 IP 206.54.0.21<CR><LF>
```

The three commands, F100 IP, F100 SM, and F100 G, can be concatenated to set all three values simultaneously. To do so use the following format:

F100<S>IP<S><nnn.nnn.nnn.nnn><S>SM<S><nnn.nnn.nnn.nnn><S>G<S><nnn.nnn.nnn.nnn><CR>

Note: The three commands (i.e., IP, SM, G) can be used in any order relative to each other. A colon separator ":" can be used instead of <S> following IP, SM, and G (e.g., `IP:192.168.46.150`)

For example, using appropriate values for your network, enter something similar to:

F100 IP 192.169.46.150 SM:255.255.255.0 G 192.168.46.1<CR>

XLi responds:

```
OK<CR><LF>
RESETING THE UNIT<CR><LF>
PLEASE WAIT…<CR><LF>
```

F100 SM – Subnet Mask

Note: F100 SM can be used concurrently with F100 IP and F100 G. See the last example provided in the F100 IP – IP Address section, directly above this one.

Use function F100 SM to display or configure the Subnet Mask. To set the Subnet Mask and restart the unit, enter:

F100<S>SM<S><nnn.nnn.nnn.nnn><CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
IP	=	specify IP command
<nnn.nnn.nnn.nnn>	=	dotted decimal address (0 to 255)
<CR>	=	input line terminator

For example, enter:

F100 SM 255.255.255.240<CR>

XLi responds:

```
OK<CR><LF>
RESETING THE UNIT<CR><LF>
PLEASE WAIT…<CR><LF>
```

To obtain the Subnet Mask of the unit Standard network port, enter:

F100 SM<CR>

The XLi responds:

```
F100 SM <nnn.nnn.nnn.nnn><CR><LF>
```

where “<nnn.nnn.nnn.nnn>” is the dotted decimal address notation.

An example of the response is:

```
F100 SM:255.255.255.125<CR><LF>
```

F100 G – Gateway

Note: F100 G can be used concurrently with F100 IP and F100 SM. See the last example provided in the F100 IP – IP Address section, which starts on page 82.

Use function F100 G to display or configure the Default Gateway. To set the Default Gateway and restart the unit, enter:

F100<S>G<S><nnn.nnn.nnn.nnn><CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
IP	=	specify IP command
<nnn.nnn.nnn.nnn>	=	dotted decimal address (0 to 255)
<CR>	=	input line terminator

For example, enter:

F100 G 206.54.0.17<CR>

XLi responds:

```
OK<CR><LF>
RESETING THE UNIT<CR><LF>
PLEASE WAIT…<CR><LF>
```

To obtain the Default Gateway of the unit Standard network port, enter:

F100 G<CR>

The XLi responds:

```
F100 G <nnn.nnn.nnn.nnn><CR><LF>
```

where “<nnn.nnn.nnn.nnn>” is the dotted decimal address notation.

An example of the response is:

```
F100 G:206.54.0.1<CR><LF>
```

F100 IC – Network Port Settings

Use function F100 IC to review the entire configuration of the standard network port, enter:

F100<S>IC<CR>

An example of the response is:

```
F100 IP:206.54.0.21 SM:255.255.255.240 G:206.54.0.17<CR><LF>
```

F100 BASET – 10/100 BASE- T

The BASET command displays the data rate of the Ethernet port. On the current version of the Main CPU card (87-8000) running the current system software version, the user also has the option of

selecting between 10 Base-T and Auto. If you have questions about your unit, contact H: Sales and Customer Assistance (page 197).

To display the current Base-T setting, enter:

F100<S>BASET<CR>

where

F	=	ASCII character F
100	=	unit function number
<S>	=	Space
BASET	=	specify Base-T command
<CR>	=	input line terminator

The XLi responds:

```
F100 BASET 10T<CR><LF>
```

To set the Ethernet port to automatically negotiate the maximum connection speed, enter:

F100<SP>BASET<SP>AUTO

To set the Ethernet port's connection speed to 10Base-T, enter:

F100<SP>BASET<SP>10

XLi responds:

```
OK <CR><LF>
RESETING THE UNIT<CR><LF>
PLEASE WAIT…<CR><LF>
```

F100 L/LOCK/UNLOCK – Remote Lockout

Use function F100 LOCK or UNLOCK to enable/disable remote access to the command line interface through the network port. Use function F100 L to display the status of Remote Lockout. Remote Lockout can also be set using F100 on the keypad/display interface. The factory setting is "Unlocked". To unlock remote lockout, use the keypad/display or the serial port's command line interface (The network port is not available because it has been locked).

Warning: **F100 L and F100 LOCK terminates any active network sessions and prevents future network sessions. To unlock F100 L or F100 LOCK, use the serial port command line interface or the keypad display.**

To lock the unit from a remote location, enter:

F100 LOCK<CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
LOCK	=	specify LOCK command
<CR>	=	input line terminator

For example, enter:

F100 LOCK<CR>

To users on the serial port, XLi responds:

OK<CR><LF>

Or, to users on the network port, XLi gives the following response and then closes the port:

GOODBYE.<CR><LF>

To unlock remote lockout, use the command line interface on the serial port to enter:

F100 UNLOCK<CR>

Or use the keypad/display's F100.

F100 L – Remote Lockout

Command Line Only – Not available in display.

Use function F100 L to display the status of the remote lock. For more information, see F100 LOCK above.

To view the lock setting for remote access, enter:

F100 L<CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
L	=	specify L command
<CR>	=	input line terminator

XLi responds:

```
F100 L LOCKED<CR><LF>
```

or

```
F100 L UNLOCKED<CR><LF>
```

F100 ST – Self Test Status

Use function F100 ST to display whether the Self Test Status parameters passed or failed. The parameters include: flash-memory checksum test, nonvolatile (NV) RAM, Serial Port, and version check.

To query the self-test status, enter:

`F100<S>ST<CR>`

where:

`F`	=	ASCII character F
`100`	=	unit function number
`<S>`	=	space
`ST`	=	specify ST command
`<CR>`	=	input line terminator

The XLi responds:

```
F100<S>ST<S>FLASH/CRC:<S><STATUS>,<S>RAM:<S><STATUS>,<S>SERIAL:<S><STATUS>,
<S>NVRAM<S>VER:<S><STATUS><CR><LF>
```

where:

F	=	ASCII character F
100	=	Unit function number
<S>	=	Space
ST	=	Specify ST command
FLASH/CRC:	=	Specify flash checksum result
RAM:	=	Specify RAM test result
SERIAL:	=	Specify Serial Port test result.
NVRAM VER:	=	Specify version test result. This test compares the version of the code against the version recorded in Non-Volatile memory
<STATUS>	=	Is either ASCII PASS or FAIL
,	=	ASCII comma
:	=	ASCII colon
<CR><LF>	=	Output line terminator

An example of the response is:

```
F100 ST FLASH/CRC : PASS, RAM : PASS, SERIAL : PASS, NVRAM VER : PASS<CR><LF>
```

F100 BH – Burn Host

Use function F100 BH, when upgrading firmware, to select the FTP host and the file to be transferred.

To select the FTP host and file for upgrading, enter:

```
F100 BH <FTP HOST IP ADDRESS><S><UPGRADE FILE PATH>/<FILE NAME><CR>
```

Use UNIX style forward slashes ‘/’ in path and leave the drive letter (e.g., ‘C’) out of the path.

For example:

```
F100 BH 10.1.7.20 truetime/xli/192-8001.bin<CR>
```

The XLi responds:

```
BURN HOST IS READY!!!<CR><LF>
```

F100 BUB – Burn BootLoader

Note: See “B: Upgrading System Firmware” on page 145.

When upgrading the system firmware, use function F100 BUB to burn the BootLoader, to write the BootLoader to flash memory.

To write the BootLoader to the flash, send the F100 BH command with the FTP host, file path and name, and then enter:

```
F100 BUB<CR>
```

XLi responds:

```
OK<CR><LF>
```

For example:

```
>f100 bub
OK
BURNING FILE 192-8000.bt WITH SIZE 452164 TO PARTITION:0 SECTOR:0
SEC: 0 RE: 0
SEC: 1 RE: 0
SEC: 2 RE: 0
SEC: 3 RE: 0
SEC: 4 RE: 0
SEC: 5 RE: 0
SEC: 6 RE: 0
FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x9EFBE60A
```

If more than ten flash sectors are written during this process, you must rewrite both the bootloader sectors (0 to 9) and the program binary sectors (10 to 93).

F100 BU – Burn

Note: See “B: Upgrading System Firmware” on page 145.

Use function F100 BH when upgrading firmware, to write the file selected with F100 BH to the flash memory. Flash memory is checked to ensure that the correct file is used.

To write the file to the flash, send the F100 BH command with the FTP host, file path and name, and then enter:

```
F100 BU<CR>
```

XLi responds:

```
OK<CR><LF>
```

And, for example, displays the following text:

```
>f100 bu
OK

BURNING FILE 192-8001.bin WITH SIZE 803016 TO PARTITION:1 SECTOR:10
SEC: 10 RE: 0
SEC: 11 RE: 0
SEC: 12 RE: 0
SEC: 13 RE: 0
```

```
SEC: 14 RE: 0
SEC: 15 RE: 0
SEC: 16 RE: 0
SEC: 17 RE: 0
SEC: 18 RE: 0
SEC: 19 RE: 0
SEC: 20 RE: 0
SEC: 21 RE: 0
SEC: 22 RE: 0
FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x2D9A260A
```

F100 BF – Burn File System

Note: See “B: Upgrading System Firmware” on page 145.

Use function F100 BF to burn file system when upgrading firmware, to write a file system to the flash memory.

To write the file system to the flash, send the F100 BH command with the FTP host, file path and name, and then enter:

```
F100<S>BF<CR>
```

XLi responds:

```
OK<CR><LF>
```

For example:

```
>f100 bf
OK
BURNING FILE 192-8002.fs WITH SIZE 524288
SEC: 94
SEC: 95
SEC: 96
SEC: 97
SEC: 98
SEC: 99
SEC: 100
SEC: 101
SEC: 102
FILE SYSTEM FLASH BURN COMPLETED
```

F100 BUFP – Burn FPGA Firmware

Note: See “B: Upgrading System Firmware” on page 145.

F100 BUFP - Burn FPGA firmware from host to target flash

Use Serial/Network port F100 BUFP when upgrading FPGA firmware - to write the FPGA program file selected with F100 BH to the flash memory. Prior to issuing the F100 BUFP command, the host computer must be setup as an FTP server with the new FPGA program file stored on the FTP server.

The existence of the FPGA program file on the FTP server and an Ethernet connection is checked when the command is issued.

To write the FPGA program to the flash, send the F100 BH command with the FTP host, file path and name, and then send the following command:

```
F100 BUFP
```

This command is only valid for XLi with an 86-8000 Rev. G or higher CPU card. If the CPU card is of the wrong version, an error message “ERROR: INVALID COMMAND!” will be displayed.

This command is valid only via the command line interface in the following scenarios: (1) the terminal is communicating to the XLi directly via the serial port, or (2) the terminal is connected to the XLi network port and the user is logged in as an “operator”. If the terminal is connected to the XLi network port and the user is logged in as a “guest”, this command will be deemed invalid and an error message, “ERROR: ACCESS DENIED!” will be displayed.

Prior to burning the FPGA program to the target flash, another error checking step is performed. The new FPGA program size is checked against the designated memory sector in the target flash. If the memory sector is not big enough to store the FPGA program, the command will be aborted, an error message, “FILE FN, EXT (yyy BYTES) TOO LARGE FOR PARTITIONING (zzz BYTES), LOAD ABORTED” will be displayed, and the new program will not be loaded to the flash.

After all the requirements for burning the FPGA program are met, XLi will proceed to burn the FPGA program from the FTP host computer to the target flash by responding with the following output string.

```
OK<CR><LF>
```

Then, during the file burning process, output strings will be displayed on the terminal to provide status to the operator. The following is an example of a successful F100 BUFP command execution.

```
BURNING FILE 184-8000V57.bin WITH SIZE 97652 TO PARTITION:3 SECTOR:10

FILE: 97652 BYTES, PARTITION: 393204 BYTES (24% used)
SEC: 10 RE: 0
SEC: 11 RE: 0
FLASH SUCCESSFULLY PROGRAMMED
```

To load the FPGA program from the target flash to the FPGA, a reboot of the XLi is required for the new FPGA program to take effect. The XLi can be rebooted via power cycle or by issuing the F100 K I L L command on the serial port interface.

F100 CONFIG – Configure NTP & SNMP

Note: The NTP option is unavailable for the standard XLi IEEE 1588 clock. NTP-related information has been removed from this section of the manual.

Note: Symmetricom recommends using the Web Interface (versus than F100 CONFIG) as the most convenient method for editing the SNMP configuration file.

Notes:

- See “A: Using F100 Configuration” on page 141.

F100 CONFIG GET instructs the XLi unit to transfer its SNMP configuration file to an FTP server. After editing the SNMP configuration file on the FTP server, the user transfers them back to the XLi using the F100 CONFIG SET command.

Open a Telnet session with the XLi and enter the commands below. Replace <*IP Address*> with that of the workstation/FTP Server. Leave <*subdir*> blank (unless you have a specific reason for placing the files in a subdirectory of the anonymous user’s home directory).

To get the SNMP config file, type:

>f100 config snmp get host:<*IP Address*> dir:<*subdir*><CR>

Here’s an example of a successful SNMP config file transfer:

```
>f100 config snmp get host:192.168.0.1 dir:
Host config ip 192.168.0.1 already configured
Source file /config/snmp.conf bytes read: 1275
Dest file snmp.conf bytes written: 1275
Configuration files transferred successfully!
```

Note: The following steps cause the XLi to reboot.

Using the command line, enter the commands, replacing <*IP Address*> with the workstation/FTP server’s IP address.

To move the SNMP config file back onto the XLi, type:

>f100 config snmp set host:<IP Address> dir:<subdir><CR>

Here’s an example of a successful SNMP config file transfer:

```
>>f100 config set snmp host:192.168.0.1 dir:
Host config ip 192.168.0.1 already configured
Are you sure(y/N)?y
Source file snmp.conf bytes read: 1275
Dest file /config/snmp.conf bytes written: 1275
Configuration files transferred successfully!
Resetting...
```

After XLi receives the configuration files, it reboots, and goes through the normal startup process.

F100 J – Factory Mode Jumper

Use function F100 J command to test the state of the ‘factory mode’ jumper. A value of 1 means the jumper is installed and a value of 0 means the jumper is not. The factory mode jumper can be identified because it is the only three-prong jumper on the CPU card, and is labelled “J3”.

Units are shipped to the customer with no jumper installed. The jumper is used by Symmetricom technicians to test and configure the unit. With this jumper installed, the operation and integrity of the XLi are compromised.

Warning: **Please do not run the XLi with the jumper, unless specifically directed to do so by a qualified Symmetricom technician.**

To test the state of the factory mode jumper:

F100<S>J<CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
J	=	specify User Name command
<CR>	=	input line terminator

The XLi responds:

F100 J FACTORY MODE=1<CR><LF>

or

F100 J FACTORY MODE=0<CR><LF>

F100 K I L L – Reboot

Use function F100 K I L L to reboot the unit. Use F100 K I L L after upgrading the system firmware.

K I L L is a case-sensitive command. When entering this command, ***use all capital letters*** and ***put spaces between each letter***.

To reboot the unit, enter:

F100 K<S>I<S>L<S>L<CR>

For example:

F100 K I L L<CR>

XLi responds:

```
OK <CR><LF>
RESETING THE UNIT<CR><LF>
PLEASE WAIT…<CR><LF>
```

In a network port session, rebooting the XLi terminates the network port session; open a new network port session when the XLi has finished rebooting. In a serial port session, the XLi displays text *similar* to the following example when the XLi has finished rebooting and is ready to receive additional commands:

```
>SYSTEM POWER ON SELF TEST RESULTS:
SERIAL LOOPBACK TEST PASSED.
RAM TEST PASSED.
PROG CRC TEST PASSED
NETWORK INTERFACE 192-8001      (c) 1998 - 2003 SYMMETRICOM
ALL RIGHTS RESERVED
FLASH FILE SYSTEM MOUNTED.
SOURCE FILE /config/truetime.conf BYTES READ: 1210
FILE SYSTEM REV #  1.80

SCAN_FOR_OPT_CARD BEGINS.
FOUND @ ADDR 30004000H, ID NUM= 86H
SCAN_FOR_OPT_CARD ENDS.
INSTALL_SMART_OPTIONS BEGINS.
FOUND GPS CARD; QTY=1, ID#=8013H.
INSTALL_SMART_OPTIONS ENDS.

QUERYING FOR SYMMETRICOM DEVICE. PLEASE WAIT...
SYMMETRICOM GPS DEVICE.
XLi
INITIALIZATION SUCCESSFULLY COMPLETED.
>
```

F100 P – Change User Password

Use function F100 P to change a user password. In a network port session, F100 P changes the password of the user you logged in as; *operator* or *guest*. In a serial port session, F100 P changes the password of the *operator* user. See “Command Line Interface” on page 29.

Valid password size is from no characters to 64 characters. If more than 64 characters are entered, F100 P truncates the string to 64 characters. When selecting a password, use appropriate levels password security for the XLi’s operating environment. Examples include:

- Mixing random alpha and numeric characters
- Avoiding words or word combinations that can be found in a dictionary

To change the user password, enter:

F100<S>P<CR>

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
P	=	specify Password command
<CR>	=	input line terminator

The XLi responds:

```
ENTER NEW USER PASSWORD:
```

When you enter the new password, the XLi responds:

```
CONFIRM NEW USER PASSWORD:
```

Enter the same new password again, to confirm the spelling. If the same new password has been entered twice, The XLi responds:

```
OK<CR><LF>
```

In this case, the new password will be used for the next login. However, if the new password is entered differently the second time, The XLi responds:

```
ERROR: PASSWORDS DO NOT MATCH. NEW PASSWORD REJECTED.
```

F100 PI – PING

Use function F100 PI to ping a remote host to see if it is reachable. If no IP Address is provided, F100 PI uses the XLi's own IP Address, and tests whether the XLi's network port has a good network connection.

To ping a known host, enter:

```
F100 PI<S><IP Address><CR>
```

For example:

```
F100 PI 206.254.000.021<CR>
```

The unit responds (example):

```
PING 206.254.000.021: REMOTE HOST FOUND.<CR><LF>
```

or

```
PING 206.254.000.021 : REMOTE HOST NOT FOUND.<CR><LF>
```

To test if the XLi's network port has a good connection, enter the following using in a serial port session:

```
>f100 PI<CR>
```

The Xli responds:

```
PING : REMOTE HOST FOUND.<CR><LF>
```

or it responds:

```
PING : REMOTE HOST NOT FOUND.<CR><LF>
```

F100 PN – Change User Name

Use function F100 PN to change a user name. In a network port session, F100 PN changes the name of the user you logged in as; *operator* or *guest*. In a serial port session, F100 PN changes the name of the *operator* user. See "Command Line Interface" on page 29.

To change the user name, enter:

```
F100<S>PN<CR>
```

where:

F	=	ASCII character F
100	=	unit function number
<S>	=	space
PN	=	specify User Name command
<CR>	=	input line terminator

The XLi responds:

```
ENTER NEW USER NAME:
```

When you enter a new user name, The XLi responds:

```
CONFIRM NEW USER NAME:
```

Enter the same new user name again, to confirm the spelling. If the same new user name has been entered twice, The XLi responds:

```
OK<CR><LF>
```

In this case, the new user name will be used for the next login using the command line interface. However, if the new user name is entered differently the second time, The XLi responds:

```
ERROR: USER NAMES DO NOT MATCH. NEW USERNAME REJECTED!<CR><LF>
```

In this case, the old user name will be used for the next login using the command line interface.

If you have forgotten the operator or guest user name and/or password, use “Bootloader Mode” to change them. In Bootloader Mode, log in using the factory set user names (“operator”, ”guest”) and passwords (See “Command Line Interface” on page 29.). Then use F100 PN and F100P to set the new user names and passwords. Once this has been completed, reboot the unit and log in using the new username or password. See “F100 P – Change User Password” on page 95.

Bootloader Mode

To enter Bootloader Mode when resetting a forgotten user name (F100 PN) or password (F100 P):

- Reboot the XLi using the F100 K I L L – Reboot command.
- Immediately press the MENU key on the keypad and hold down while the XLi is rebooting. The XLi will display will ‘hang’ while displaying “BOOTING”.
- After a few moments, release the MENU key.
- Open a command line session with the XLi.
- Use the F100 PN or F100 P commands as needed and then reboot the XLi again.

F108 – Oscillator Configuration

Note: The standard XLi IEEE 1588 clock features a TCVCXO oscillator. Other oscillator types are unavailable as options for the standard XLi IEEE 1588 clock.

Use function F108 to display the type of oscillator being used:

- TCVCXO
- OCXO
- HIGH (High Stability OCXO)
- RUBIDIUM

For more information, see “Standard TCVCXO Oscillator” on page 5.

Command Line

The oscillator type is defined by the hardware configuration of the clock, and is not configured through the command line or keypad/display user interfaces. To request the oscillator configuration, enter:

```
F108<S><CR>
```

The XLi responds:

```
F108<S>OSCILLATOR<S>CONFIG<S><OSC><CR><LF>
```

where:

F	=	ASCII character F
108	=	Function number
<S>	=	ASCII space character one or more
<CR>	=	Carriage Return, equivalent to pressing the Enter key on a keyboard
<OSC>	=	Oscillator type: TCVCXO, OCXO, HIGH (High Stability OCXO), or RUBIDIUM

For example, enter the following string:

```
F108<CR>
```

The XLi responds (example):

```
F108 OSCILLATOR CONFIG TCVCXO<CR><LF>
```

F110 – J1 Input (TIET)

Note: The Time Interval - Event Time (TIET) option is included as a standard feature on the XLi IEEE 1588 clock.

Note: Using time code as a reference source is not supported for the XLi IEEE 1588 Clock.

F110 can configure the J1 input port on the Main CPU card as a time code reference source for the system clock, or it can configure J1 as the input for TIET operation.

Keypad

- **J1 Configuration**: (IRIG-A, **IRIG-B**, NASA 36, TIET) Set to match the type of time code input.
- **J1 Time Reference** (Available when J1 Configuration is IRIG-A, **IRIG-B**, NASA 36, not for TIET): (**Primary**, Secondary, Standby) Identify the time code input as a primary or secondary reference source. The function, “F74 – Clock Source Control” on page 77, uses this designation to for reference source switching. Standby disables and removes J1 Input as a valid reference source. Selecting Primary or Secondary automatically bumps another reference source with the same setting (e.g. F119 – GPS Receiver Configuration) to Standby.

Note: Configuring F110 for TIET forces **J1 Time Reference** to Standby. When reconfiguring the J1 as a time code reference source input, be sure to set J1 Time Reference to Secondary or Primary.

- **Configure Code**: (**AM**, DC) Set to the time code input signal type: AM for amplitude modulated, or DC level shift. See the time code definitions in “E: Time Code Formats” on page 189 for more information.
- **Input Impedance**: (For DC: **100 kΩ** or 50Ω. For AM: 100 kΩ only.) For DC code, set the appropriate impedance level for the length of the input cable. Short runs (<200 ft.) get 100 kΩ, and long runs (>200) get 50Ω.

- **Input Polarity**: Positive, Negative
- **Propagation Delay**: (Range 0 to 99999 μS in 1 μS steps) (Factory setting: **1 μS**) Compensates for delay caused by cable length on the J1 input.
- **IRIG Mode**: (Sync Gen)
- **Error Bypass**: (Off, 1-10 Frames) (Factory setting: **3 frames**) Is used when the IRIG input is intermittent or has a low signal to noise ratio (SNR). This allows the time code input to 'flywheel' for the specified number of invalid time code frames before F110 generates an alarm. **Off** means the F73 IRIG input alarm will alarm on the first invalid time code frame. **1-10** means the F73 IRIG input alarm will alarm after it detects 1-10 invalid *consecutive* time code frames.

When TIET is selected for J1 Input Configuration, F110 presents the following series of choices:

- **Input Impedance**: (100 kΩ or 50Ω) Short runs (<200 ft.) get 100 kΩ. Long runs (>200) get 50Ω.
- **Input Polarity**: Positive only

Upon changing the settings, the last display prompt asks:

- Save Changes?: (Yes, No) Yes applies the changes. No cancels the changes.

For J1 specifications, see "J1 Input – Time Interval - Event Time" on page 12.

Notes:

- Time Code: The XLi expects time code input that provides UTC in 24-hour format. If the time code does not provide UTC in 24-hour format (e.g., it uses standard, local, or GPS time, or is in 12-hour format), the XLi's internal clock will be set to the wrong time when it uses the time code reference, and its time outputs will be similarly affected.
- Time Code: IRIG and NASA 36 time code don't contain "year" information. Enter the current year using F3 before using IRIG as a primary or secondary reference source. Failure to do so can cause the incorrect time information to be distributed. See "F3 – Time & Date" on page 40.
- At the end of the year, the year increments by one (e.g., 2004 -> 2005) at the end of the year, provided the XLi is operating during the transition. If it is not operating during the transition, the time code reasserts the preceding year when used as a reference source.
- TIET: Put the F110 time code input on STANDBY first before configuring F110 for TIET.
- TIET: Stray capacitance loading on the J1 input adversely impacts TIET measurements.

Command Line

F110 can configure the J1 input port to IRIG-A, IRIG-B, NASA 36, TIET Time or TIET Event. Use F110 to enter or request the J1 Input Configuration.

To request the J1 Input Configuration, enter:

```
F110<CR>
```

The function responds with the ASCII character string:

```
F110<S><Code><S><Source><S><Impedance><S><Type><S><Sign><S><Delay><S><Mode>
<S><Bypass><CR><LF>
```

Or

```
F110<S>TIET<S><Impedance><S><Sign><CR><LF>
```

(when TIET option is enabled and J1 is set to TIET)

Where the F110 entry and request formats are defined as:

F	=	ASCII character F.
110	=	function number.
TIET	=	ASCII character string “TIET” for configuring J1 for TIET measurement
<S>	=	ASCII space character one or more
<Code>	=	Input Code: IRIG-A, IRIG-B, NASA 36 **Note:** F110 Input Code Notes: (1) IRIG doesn't contain “year” information. Enter the current date using F3 before using IRIG as a primary reference source. Failure to do so can cause the incorrect time information to be distributed
<MeasType>	=	TIET TIME, TIET EVENT **Note:** If TIET TIME or TIET EVENT is configured, the timestamp(s) of the rising edge of the J1 input signal will be displayed each second. Up to 100 timestamps can be spooled. ctrl-C exits this operation.
<Source>	=	Clock source: PRIMARY, SECONDARY, STANDBY (Set IRIG to STANDBY for TIET)
<Impedance>	=	100K, 50 (50 Ω impedance is selectable with DC type only) **Note:** If 50 Ω impedance is specified with AM modulation format, XLi will overwrite the impedance input 50 Ω with 100 kΩ.
<Type>	=	Code Type: AM, DC (AM type is selectable for 100 kΩ impedance only) **Note:** For DC code, set the appropriate level for the length of the input cable. Short runs (<200 ft.) get 100 kΩ, and long runs (>200 ft.) get 50 Ω.
<Sign>	=	Code Sign: POSITIVE, NEGATIVE (**Note:** negative not supported with TIET)
<Delay>	=	Propagation Delay: 0-99999 μS
<Mode>	=	IRIG Mode: SYNC GEN, (future: TRANSLATOR)
<Bypass>	=	Error bypass: OFF, 1 FRAME, 2 FRAMES, 3 FRAMES, 4 FRAMES, 5 FRAMES, 6 FRAMES, 7 FRAMES, 8 FRAMES, 9 FRAMES, 10 FRAMES
<CR><LF>	=	line terminator, either a carriage return and line feed for output strings or a carriage return only for input strings.

For example, enter:

F110<CR>

The XLi responds (example):

```
F110 IRIG B PRIMARY 50 DC NEGATIVE 66161 us SYNC GEN OFF<CR><LF>
```

Or

```
F110 TIET 50 POSITIVE<CR><LF>
```

To set the J1 Input Configuration, make a command line entry using the same format as the XLi response above. Only valid values are accepted. For example:

F110 IRIG A SECONDARY 50 DC POSITIVE 1234 US SYNC GEN 1 FRAME<CR>

Or, if the TIET option is available, ***first put the time code input on standby*** (example):

F110 IRIG A STANDBY 50 DC POSITIVE 1234 US SYNC GEN 1 FRAME<CR>

And then configure TIET (example):

F110 TIET 100K POSITIVE<CR>

The XLi responds:

```
OK<CR><LF>
```

To obtain TIET measurement from J1, enter:

F110 TIET TIME<CR>

The XLi responds:

```
OK<CR><LF>
.xxxxxxxxx<CR><LF>
```

(Time Interval (display continues until function termination with Ctrl+C)

Or, (example):

F110 TIET EVENT<CR>

The XLi responds:

```
OK<CR><LF>
ddd:hh:mm:ss.xxxxxxxxx<CR><LF>
```

(Event Timing display continues until function termination with Ctrl+C)

F111 – J2 Output (Rate)

Note: PPO is currently unavailable as an option for the standard XLi IEEE 1588 clock. PPO related information has been removed from this section.

Use function F111 to configure the J2 Output to generate rates (listed below). The following rates are available as a standard feature: 1 PPS, 10 PPS, 100 PPS, 1 kPPS, 10 kPPS, 1 MPPS, 5 MPPS, 10 MPPS. The factory setting is 10 MPPS.

For J2 specifications, see "J2 Output – Rate Out" on page 12.

Keypad

Selecting one of the Standard Rates: Using the keypad, press the **ENTER**, **111**, **ENTER** buttons. Select one of the standard rates using the up/down arrow buttons and press the ENTER button again. When prompted "**Save changes? Yes**", press the ENTER button one more time.

Command Line

Requesting the Current Configuration

To request the J2 Output Configuration, enter the following:

```
F111<CR>
```

The XLi responds in the following format:

```
F111<S><RATE><CR><LF>
```

Where:

F	=	ASCII character F
111	=	Function number
<S>	=	ASCII space character one or more
<RATE>	=	Output rate or type, RATE 1 PPS, RATE 10 PPS, RATE 100 PPS, RATE 1 kPPS, RATE 10 kPPS, RATE 100 kPPS, RATE 1 MPPS, RATE 5 MPPS, RATE 10 MPPS
<START> & <STOP>	=	Time-of-year with microsecond resolution in the format of yyy:hh:mm:ss.uuuuuu. Range: [001:00:00:00.000000, 366:23:59:59.999999] **Note:** Wildcard character: 'X' or 'x' can also be entered. See the section regarding time string with wildcard character. Colon separators (":") are required
<CR><LF>	=	Line terminator: a carriage return and line feed for output strings, or a carriage return for input strings

Depending what F111 is currently set up to do, the sample request:

```
F111<CR>
```

Displays a fixed 10 PPS rate output (example):

```
F111 RATE 10PPS<CR><LF>
```

Setting the J2 Output Configuration

To set the J2 Output Configuration, send a character string with the previously defined F111 entry format to the Serial/Network port. Only valid values are accepted. The J2 Output Configuration can be set to specify one of several predetermined rates. The following sections provide examples (and some explanations) for each.

Predetermined RATE output

For example, to produce a fixed 100 kPPS rate output, enter:

```
F111 RATE 100KPPS<CR>
```

The XLi responds:

```
OK<CR><LF>
```

F113 – J3 Input Configuration (Aux Ref)

Note: Freq Meas is currently unavailable as an option for the standard XLi IEEE 1588 clock. Most of the Freq Meas related information has been removed from this section.

Use function F113 to configure the J3 Input for one of the following settings:

- Auxiliary Reference (Aux Ref) input
- Disable all J3 inputs

F113 offers the following keypad settings:

- J3 Input Configuration: Aux Ref, Freq Meas, **Disabled**
- J3 Input Frequency: 1 MHz, 5 MHz, **10 MHz**
- J3 Input Impedance: **1k**Ω, 50 Ω

The factory settings are Disabled, 10 MHz, and 1kΩ.

For J3 Input specifications, see “J3 Input – Auxiliary Reference” on page 13.

Auxiliary Reference (Aux Ref) Input:

If an external frequency reference with better long-term stability than the XLi's own oscillator—such as a Cesium reference—is available, connect it to the J3 connector and enable Aux Ref using F113. Once this is done, the XLi will use the Aux Ref input (rather than its own oscillator) as its frequency source if the XLi's reference source(s) become unavailable.

For example, with a single GPS receiver card configured as PRIMARY in F119, and F74 – Clock Source Control set to PRI,

When the XLi reacquires a time reference source and is steering its own internal oscillator, it stops using Aux Ref as its frequency reference.

For Aux Ref to work:

- The Aux Ref frequency source must be connected to the J3 input.
- F113 Input Configuration must be set to Aux Ref
- F113 Input Frequency must be set to the correct frequency
- F113 Input Impedance must be set to the correct impedance

Command Line

To display the J3 Input Configuration, enter:

F113<CR>

The XLi responds using the following formats:

```
F113<S>DISABLE<CR><LF>
```

Or:

```
F113<S>AUX REF<S><FREQ><S><IMP><CR><LF>
```

Where the F113 entry and request formats are defined as:

F	=	ASCII character F.
113	=	function number.
SHOW	=	ASCII character string “SHOW” for displaying frequency measurements.
DISABLE	=	ASCII character string “DISABLE” to disable J3 as input port
AUX REF	=	ASCII character string “AUX REF” to set J3 to take auxiliary reference input
<S>	=	ASCII space character one or more.
<FREQ>	=	AUX REF Input Frequency: 1MHZ, 5MHZ, 10MHZ
<IMP>	=	Input Impedance: 1K or 50
<INT>	=	Frequency Measurement Interval. This is the gate time of the measurement. Range: [000001, 999999] in seconds.
<CR><LF>	=	line terminator, either a carriage return and line feed for output strings or a carriage return only for input strings.

For example, enter:

F113<CR>

The XLi displays the current configuration (example):

```
F113 AUX REF 1MHZ 50<CR><LF>
```

Or

```
F113 DISABLE<CR><LF>
```

To set the J3 Input Configuration, enter a character string ***using the same formats as the preceding XLi responses***. Only valid values are accepted.

For example, to enable an Aux Ref 5 MHz input frequency with 1 kΩ input impedance, enter:

```
F113 AUX REF 5MHZ 1K<CR>
```

Or, to disable F113, enter:

```
F113 DISABLE<CR>
```

To all of the above examples, the XLi responds:

```
OK<CR><LF>
```

F116 – Display Brightness Level

Use function F116 to adjust the brightness of the front panel display on a range from 1 to 10, with 1 being the dimmest and 10 being the brightest.

Note: F116 is available from the keypad/display only. It is not available using the command line interface.

F117 – Factory Configuration

Note: The standard XLi IEEE 1588 clock includes the TIET option as a standard feature. The other optional software features, NTP, FREQ MEAS, and PPO, are unavailable for the standard XLi IEEE 1588 clock.

Use function F117 to display the XLi factory Serial Number and the availability of optional software features. Send the string:

F117<CR>

XLi responds:

```
F117<S>SN<S><SERIAL#><CR><LF>
     NTP <STATE><CR><LF>
     FREQ MEAS <STATE><CR><LF>
     TIET <STATE><CR><LF>
     PPO <STATE><CR><LF>
```

where:

F	=	ASCII character F.
117	=	function number.
<S>	=	ASCII space character one or more.
NTP	=	NTP option
FREQ MEAS	=	FREQ MEAS option
TIET	=	TIET option
PPO	=	PPO option
<CR>	=	carriage return.
<STATE>	=	ENABLE or DISABLE
<LF>	=	line feed.

For example, enter:

F117<CR>

XLi responds:

```
F117 SN 31234<CR><LF>
     NTP ENABLE<CR><LF>
     FREQ MEAS ENABLE<CR><LF>
     TIET ENABLE<CR><LF>
     PPO ENABLE<CR><LF>
```

F118 – Option Board Configuration

Note: The standard XLI IEEE 1588 Clock includes a GPS C/A Receiver (87-8028-2) and an IEEE 1588 card. Other option cards are currently unsupported for the standard XLI IEEE 1588 clock.

Use function F118 to query the XLi for the option bay location of CPU-aware cards. The following figure shows the position of the option bays as seen when viewing the XLi from the rear.

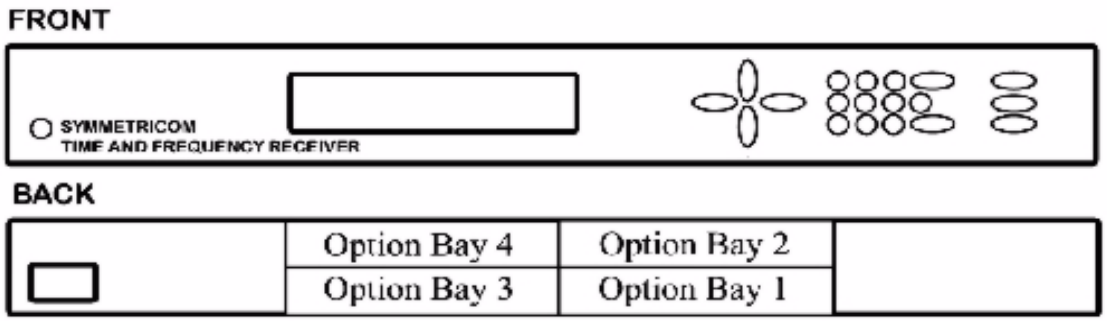


Figure 6: Option bay locations

The cards recognized by F118 are as follows:

- N.1 Frequency Synthesizer (87-8022)
- N.8 Frequency Synthesizer (86-708-1)
- GPS Receiver (86-8013)
- GPS C/A Receiver (87-8028-2)
- Frequency and Time Deviation Monitor (87-8023)
- Have Quick/1 PPS Time and Frequency Reference (87-8016-3)
- Have Quick Out (87-8016-6)

The cards *not recognized* by F118 are as follows:

- Multicode Output (87-6002-XL1)
- Low Phase Noise 5 MHz Output (87-8009-5)
- Low Phase Noise 10 MHz Output (87-8009-10)
- Enhanced Low Phase Noise 10 MHz Output (87-8040)
- 1, 5, 10 MHz Sine/MPPS Square Output (86-8008)
- T1 Telecom Interface Output (87-6000T1-8)
- E1 Telecom Interface Output (87-6000E1-6)

Command Line

To display the XLi option bay information, enter the following command:

```
F118<S>B<N><CR><LF>
```

The XLi responds:

```
F118<S>B<N><S><OC><CR><LF>
```

where:

F	=	ASCII character F.
118	=	function number.
<S>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<OC>	=	Option Card Name: • GPS RECEIVER or • GPS M12 RECEIVER or • N.1 FREQ SYNTHESIZER or • N.8 FREQ SYNTHESIZER or • FTM III MONITOR or • HAVE QUICK SYNC or • HAVE QUICK OUT or • NOT RECOGNIZED (or empty)
<CR>	=	carriage return.
<LF>	=	line feed.

For example, enter:

```
F118 B1<CR>
```

XLi responds:

```
F118 B1 GPS M12 RECEIVER
```

For a summary of all the option bays, exclude bay number (“B<N>”) from the command and enter:

```
F118<CR>
```

XLi responds:

```
F118 B1 GPS M12 RECEIVER
F118 B2 N.1 FREQUENCY SYNTHESIZER
F118 B3 NOT RECOGNIZED
F118 B4 GPS RECEIVER
F118 B5 NOT RECOGNIZED
F118 B6 NOT RECOGNIZED
F118 B7 NOT RECOGNIZED
F118 B8 NOT RECOGNIZED
F118 B9 NOT RECOGNIZED
F118 B10 NOT RECOGNIZED
```

F119 – GPS Receiver Configuration

Note: The standard XLi IEEE 1588 clock features the GPS C/A Receiver (87-8028-2). Other receiver types are currently unavailable as options for the standard XLi IEEE 1588 clock.

Summary

Use function F119 to select a specific GPS receiver, display its status information, and configure it as a reference source.

F119's functions apply to all models of GPS receiver option cards available for the XLi. Where differences exist, this manual refers to the card by its name and part number.

In F119, a GPS receivers are identified *by number of the option bay where they are located*. See Figure 1 on page 7 for a diagram of the option bay numbers.

F119 provides the following GPS receiver information and status:

- Availability (indicates the option bay location)
- Part Number
- Software Version
- FPGA Number
- GPS Status (Locked or Unlocked)
- GPS Antenna (Ok or Open)
- GPS Acquisition State (Dynamic Mode, Stop Site Survey, Stop TRAIM, Start Site Survey, Start TRAIM, Survey Position, Position Hold)

GPS Time Reference (Primary, Secondary, or Standby) Each of F119's information, status, and configuration items are explained below. Because F119 is an important function, this section explains the behavior of F119 and related functions in some detail.

Part Number, Software Version, and FPGA Number

This information is useful for identifying the option card.

GPS Status (Locked or Unlocked)

During normal operation, "Locked" means the receiver has a Time Figure of Merit (TFOM) less than or equal to 3, or less than 100 ns Estimated Time Error (ETE). Unlocked means the TFOM is greater than 3. For additional information on "good current" GPS satellites, see "F60 – GPS Receiver Satellite List" on page 60.

The GPS receiver serves as a time reference for the XLi system clock. To be a valid time reference, the receiver requires the following information:

- Current UTC time
- The current position of the receiver

Following power-up and initialization, the receiver requires at least four concurrent “good current” satellites to resolve its current position. In rare cases, when a pair of “good current” satellites are on intersecting paths, the receiver requires additional “good current” satellites or waits for the intersecting satellites to diverge before resolving the current position. Once resolved, the current position information is saved.

While resolving its current position, the GPS receiver also listens for the *UTC leap-second offs*et periodically transmitted by GPS satellites along with GPS time and position information. Up to thirteen minutes may elapse from the time the receiver acquires its *first* “good current” satellite to the time it receives the UTC leap-second offset. Once received, the UTC leap-second offset is saved.

When the receiver has *the UTC leap-second value*, it starts providing valid time to the XLi system clock. When the system clock is locked to the GPS time reference and is operating within specifications, the system status is locked. The interval from initialization to system status lock is typically under twenty minutes, under nominal conditions. This transition is illustrated below.

Following initialization, the front panel display of an XLi with only one GPS receiver (GPS Status: Unlocked) would show the following:

```
UNLOCKED   * GPS PRI
LOCAL      365:16:01:05 1969
```

With the GPS receiver as a valid time reference, the following changes would take place:

- The asterisk (“*”) indicating the absence of a valid reference would disappear
- The system status would change to locked

The front panel status display would look like this:

```
LOCKED      GPS PRI
LOCAL      233:18:21:29 2004
```

Once the GPS receiver is a valid time reference, it requires at least one “good current” satellite to remain a valid time reference. If “good current” GPS satellites become temporarily unavailable, GPS status changes to unlocked and the XLi stops using the receiver as a valid time reference.

Typically, when a “good current” satellite becomes available again, GPS status locks and the receiver becomes a valid time reference almost immediately. Typically, the receiver does not need extra time to resolve its current position unless it is being used in a very mobile/dynamic environment such as an aircraft.

If the unit is powered-cycled, the receiver repeats the complete position and leap-second acquisition process before GPS status locks.

Note: GPS satellite visibility and signal strength affect the ability of the GPS receiver to lock and provide valid time to the XLi. Therefore, it is very important to select the best possible antenna site.

GPS Antenna (Ok or Open)

The GPS antenna is powered by a 12-volt current from the ANTENNA connector on the rear of the XLi. If this circuit is complete (e.g., connected to an antenna) GPS Antenna status is OK. If the circuit is incomplete (e.g., no antenna, a cable break, or a splitter) the GPS Antenna status is Open. If circuit detects a short, the receiver opens a relay to disconnect power from the circuit, and the GPS Antenna status is Open.

GPS Time Reference (Primary, Secondary, or Standby)

Configure the GPS receiver as a Primary or Secondary time reference. This setting is used by F74 – Clock Source Control to control switching between reference sources. Selecting Standby makes the receiver unavailable as a reference source.

If one time reference is configured as Primary or Secondary, and another time reference is assigned the same priority, the first time reference is reset to Standby. For example, with GPS receiver 1 configured as Secondary, when an operator configures GPS receiver 2 as Secondary and saves changes, GPS receiver 1 is reset to Standby.

The XLi front panel status display identifies the reference source and its priority (e.g. "`GPS PRI`").

GPS Acquisition State

If the user has determined that the receiver will remain in a static location and sets the GPS operation mode to **Time Mode** (See "F53 – GPS Operation Mode" on page 58.), the C/A Receiver has the following acquisition states:

- **Survey Position**: The receiver is establishing an initial position following a reset. If the receiver had "current" satellites prior to being reset, it can establish the position in a matter of seconds; otherwise establishing the position takes a few minutes.
- **Start TRAIM**: (for Time Receiver Autonomous Integrity Monitoring) The receiver is in Position Hold and is monitoring the integrity of the time solution using redundant satellite measurements in order to eliminate unreliable signal information.
- **Stop TRAIM**: The receiver is ending TRAIM monitoring.
- **Start Site Survey**: The receiver is checking for changes in its saved static position (occurs after boot).
- **Stop Site Survey**: The receiver is ending site survey.
- **Position Hold**: The receiver has determined its most accurate position, and is using this static position to calculate its most accurate time solution.
- **Dynamic Mode**: The user has determined that the position of the system could change and has set F53 GPS operation mode to Dynamic Mode (see "F53 – GPS Operation Mode" on page 58). The system is resolving its position so that it can compensate for position changes.

Command Line

To obtain the status of the GPS Receiver, enter:

`F119<S>B<N><SEP>S<CR>`

For example, enter:

F119 B1 S

XLi responds (example):

```
F119 B1:
     GPS PART NUMBER 87-8028-02
     SOFTWARE 230-01510-04v1.17
     FPGA 184-8024v1
     GPS STATUS UNLOCKED
     GPS ANTENNA OK
     GPS ACQUISITION STATE: SURVEY POSITION
```

To obtain the configuration of the GPS receiver, enter the following:

To obtain the configuration of the GPS receiver, enter the following:

F119<S>B<N><S>C<CR>

where:

F	=	ASCII character F.
119	=	function number.
<S>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
C	=	ASCII character denotes reference configuration query
<CR><LF>	=	line terminator, either a carriage return and line feed for output strings or a carriage return only for input strings.

For example:

F119 B1 C<CR>

XLi responds:

```
F119 B1 PRIMARY<CR><LF>
```

To change the configuration of the GPS receiver as a primary or secondary reference source, enter:

F119<S>B<N><S>C<S><CONFIG><CR>

where:

F	=	ASCII character F.
119	=	function number.
<S>	=	ASCII space character.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<SEP>	=	one or more separator characters; either space, comma or tab.
C	=	ASCII letter denotes reference configuration to follow.
<CONFIG>	=	Reference Source Configuration: PRI, SEC or STBY

For example to make it a primary reference source, enter:

F119 B1 C PRI<CR><LF>

XLi responds:

OK<CR><LF>

F120 - N.1 Frequency Synthesizer

Note: The N.1 card is currently unavailable as an option for the standard XLi IEEE 1588 clock.

F123 – Have Quick Input/1 PPS Sync Configuration

Note: The HaveQuick/1 PPS Sync card is currently unavailable as an option for the standard XLi IEEE 1588 clock.

F126 – Options Key Entry

Note: The TIET option is included in the standard XLi IEEE 1588 clock. The Freq Meas, PPO, and NTP options are currently unavailable for the standard XLi IEEE 1588 clock.

Use function F126 to enter the Options Key, which enables certain functions (e.g., PPO, TIET, NTP, FREQ MEAS) if the correct key is entered. To check the status of these XLi options, see "F117 – Factory Configuration" on page 107. After entering the key code using F126, reboot the XLi.

To set the Options Key code, enter the following:

F126<S><KC><CR><LF>

where:

F	=	ASCII character F (f or F for input string).
126	=	the function number
<S>	=	ASCII space character one or more
<KC>	=	Key Code, 0 to 999999999999999. Entering all nines clears all Option Key enable flags.
<CR>	=	carriage return character
<LF>	=	line feed character

For example, enter:

F126<S>5674397586090<CR>

The XLi responds:

OK<CR><LF>

Use function F117 to verify that the correct code was entered. ***Then reboot the unit to activate the option.***

Please note that entering all nines, as shown below, disables all of the option keys:

F126<S>999999999999999<CR>

F128 – Have Quick Output

Note: The HaveQuick Output card is currently unavailable as an option for the standard XLi IEEE 1588 clock.

F130 - Precision Time Protocol Status

Note: The IEEE 1588 card becomes available in the user interface after the XLi IEEE 1588 Clock has been operating for approximately 3 to 5 minutes.

Use F130 to obtain the following information about the IEEE 1588 card:

- Firmware Version
- PTP card status

Keypad

To use F131, press the following keys on the front panel keypad:

ENTER 131 ENTER

Use the left/right arrow keys to position the cursor.

Use the up/down arrow keys to select an option or change a value.

Use the ENTER key to continue to the next screen. F130 is a status function and cannot be used to change settings.

The following screens are available the keypad (shown with example values):

- PTP AVAILABILITY - OPTION BAY 1
- PTP PART NUMBER - 87-8036
- SOFTWARE - 230-01520-15V1.3
- FPGA - 230-01510-14v001
- PTP PORT STATE - PTP MASTER (or one of the following:
  - PTP INITIALIZING
  - PTP FAULTY
  - PTP DISABLED
  - PTP LISTENING
  - PTP PRE-MASTER
  - PTP MASTER
  - PTP PASSIVE
  - PTP UNCALIBRATED
  - PTP SLAVE
  - UNKNOWN)
- SLAVE CLOCK SYNCHRONIZED - LOCKED (or UNLOCKED)
- PTP UUID (MAC ADDR) - 00:A0:69:00:E3:F4
- PTP TECHNOLOGY - ETHERNET
- PTP NO. OF PORTS - 1
- PTP STRATUM - 2

- PTP CLOCK ID - GPS

Command Line

To obtain the status of the PTP card, send a command using the following format:

F130<SP>B<N><SEP>S

where:

F	=	ASCII character F.
130	=	function number.
<SP>	=	ASCII space character one or more.
B	=	ASCII character to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<SEP>	=	A white space separator, such as a space or tab character
S	=	ASCII character for “Status Request”
<LT>	=	line terminator, either a carriage return and line feed for output strings or a carriage return only for input strings.

For example, enter:

```
F130 B4 S
```

The XLi responds (example):

```
F130 B4:
     PTP PART NUMBER 87-8036
     SOFTWARE 230-01510-15v1.19
     FPGA 230-01510-14v050
     PTP PORT STATE: PTP LISTENING
     SLAVE CLOCK SYNCHRONIZED: UNLOCKED
     PTP UUID (MAC ADDR): 00:A0:69:01:2F:B5
     PTP TECHNOLOGY: ETHERNET
     PTP NUMBER OF PORTS: 1
     PTP STRATUM: 255
     PTP CLOCK ID: DFLT
```

If this option card is a PTP SLAVE, the following information will be provided:

```
SLAVE CLOCK SYNCHRONIZED: LOCKED<CR><LF> ( or UNLOCKED)
PTP UUID (MAC ADDR) : 00:A0:69:00:E3:F4<CR><LF>
PTP TECHNOLOGY: ETHERNET<CR><LF>
PTP NUMBER OF PORTS: 1<CR><LF>
PTP STRATUM: 2<CR>LF>
PTP CLOCK ID: GPS<CR><LF>
```

where:

F	=	ASCII character F.
130	=	function number.
<SP>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
S	=	ASCII letter denotes PTP status to follow.
<LT>	=	line terminator, either a carriage return and line feed for output strings or a carriage return only for input strings.

F131 - Precision Time Protocol Network Config

Note: The IEEE 1588 card becomes available in the user interface after the XLi IEEE 1588 Clock has been operating for approximately 3 to 5 minutes.

Use F131 to view the status of and configure the following items on the IEEE 1588 card:

- Option bay location of the IEEE 1588 card (status only)
- Static IP address, subnet mask and default gateway for the network port
- DHCP enabled/disabled
- DHCP-assigned IP address, subnet mask and default gateway for the network port (status only)[1]
- PTP synchronization message interval
- PTP burst mode enabled/disabled
- PTP network port enabled/disabled
- PTP subdomain name
- Re-initialize the IEEE 1588 card, restore factory defaults
- Re-initialize the IEEE 1588 card, restore the current settings
- PTP Master or Slave. If slave, set as primary, secondary, or standby reference source
- PTP Slave Synchronization Threshold
- PTP Preferred Master Configuration

Option bay location of the IEEE 1588 cards

The option bay number identifies the physical location of the option card in the chassis. The factory configured location of the IEEE 1588 cards are option bay 4 (PTP master) and, when present for TBD option bay 2 (PTP slave). For units that have the second IEEE 1588 card (PTP slave), the card is located in option bay 2. See Figure 7.

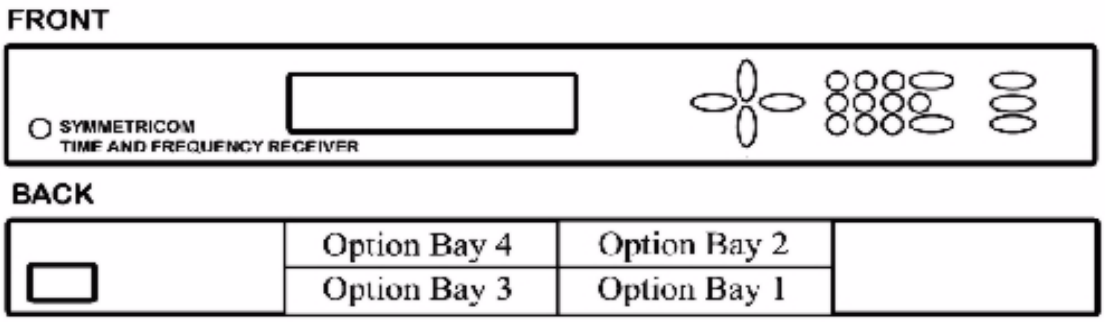


Figure 7: Option bay locations (as seen when looking from the side indicated)

Static IP address, subnet mask and default gateway for the network port

The static IP address, subnet mask and default gateway identify the 1588 port on the network.

1. Only displayed when PTP DHCP is set to ENABLE.

The IEEE 1588 card (PTP master) located in Option Bay 4 has the following network settings:

- IP address: 010.048.000.103
- Subnet mask: 255.255.000.000
- Gateway: 010.024.000.001

For units that have two IEEE 1588 cards, the second card (PTP slave) is located in Option Bay 2 has the following network settings:

- IP address: 010.048.000.105
- Subnet mask: 255.255.000.000
- Gateway: 010.024.000.001

Reconfigure these settings as needed for the 1588 port to operate on the timing network.

The user can reconfigure the static IP settings while DHCP is enabled. The instrument only uses the static IP settings if DHCP is disabled, or if DHCP is enabled but the 1588 network port hasn't received DHCP-assigned settings.

DHCP enabled/disabled

If DHCP is enabled, the IEEE 1588 card automatically obtains IP configuration settings from a DHCP server on the network. The default factory setting is "enabled". The DHCP-assigned settings take precedence over the static IP address settings. The command line interface and keypad display interface show the DHCP-assigned IP address, subnet, and gateway separately from the static settings.

Note: Enabling DHCP reboots the XLi IEEE 1588 Clock.

DHCP-assigned IP address, subnet mask and default gateway for the network port

The command line and keypad display interfaces display the DHCP-assigned IP address information separately from the static IP address information. The web interface does not display the DHCP-assigned IP address information.

Since DHCP is enabled in the factory default settings, if a DHCP server is available from the IEEE 1588 network port, the DHCP-assigned IP address values should be available on the command line and keypad display interfaces.

PTP Sync message interval

The PTP sync message interval setting determines the length of time between Sync messages multicast by the PTP master to the PTP slaves. Shorter synchronization intervals improve the timing accuracy of PTP slaves. Set the PTP Sync message interval to the same value on PTP masters and slaves. The default factory setting is "2 seconds".

IMPORTANT: If one of the PTP slaves on the timing network is a Symmetricom IEEE 1588 card, the interval for all PTP masters and PTP slaves must be set to 2 SECONDS.

PTP burst mode enabled/disabled

With Burst mode enabled, the PTP slave initiates a rapid exchange or PTP messages with the PTP master in order to synchronize rapidly. To work, Burst mode must be enabled on both PTP master and slave. This corresponds to the PTP_BURST_SYNC = TRUE in a standard ptpd implementation. Burst mode is recommended for rapid synchronization of timing networks upon startup and also with longer sync message intervals (e.g., 64 seconds). PTP burst mode consumes network bandwidth and places additional demand on PTP masters and slaves on the same timing network. It may saturate PTP masters and timing networks operating near capacity, particularly if the slaves are all reinitialized at the same time (e.g., a system wide power-cycle). The default factory setting is “disabled”.

PTP network port enabled/disabled

Enables or disables the PTP/1588 network port. This feature can be used to put specific PTP nodes offline without shutting them down. The default factory setting is “Enabled”.

PTP subdomain same

Makes it possible to establish up to four separate timing networks on the same physical subnet. PTP nodes only synchronize with PTP nodes of the same subdomain; they disregard PTP nodes that are part of a different subdomain. Configure the PTP masters and PTP slaves with the same subdomain in order for them to synchronize. The following four subdomain name settings are available: _DFLT, _ALT1, _ALT2, and _ALT3. The default factory setting is “_DFLT”.

Reset PTP settings to factory defaults

Re-initializes the PTP node and returns the following settings to their factory defaults:

- PTP SYNC INTERVAL - ***2***
- PTP BURST MODE - ***DISABLE***
- PTP PORT STATE - ***ENABLE***
- PTP SUBDOMAIN NAME - ***_DFLT***
- PTP CLOCK CONFIG, BAY 2 - ***MASTER***
- SLAVE SYNC THRESHOLD - ***5 microsec***
- PTP PREFERRED MASTER - ***DISABLE***

The other settings remain unchanged.

The default setting is “No”.

PTP initialize to user entered values

Re-initializes the PTP node and keeps the current parameter settings:

The default factory setting is “No”.

PTP Master or Slave (PRI/SEC/STBY)

Configures the PTP node as a PTP master or slave and determines its role as a reference source:

- PTP MASTER - the IEEE 1588 card gets its time from the XLi IEEE 1588 Clock and functions as a PTP master on the timing network.
- PTP SLAVE PRI - the IEEE 1588 card functions as a PTP slave on the timing network and operates as a *primary* reference source to the XLi IEEE 1588 Clock.
- PTP SLAVE SEC - the IEEE 1588 card functions as a PTP slave on the timing network and operates as a *secondary* reference source to the XLi IEEE 1588 Clock.
- PTP SLAVE STBY - the IEEE 1588 card functions as a PTP slave on the timing network but does not operate as a reference source to the XLi IEEE 1588 Clock.

See “F74 – Clock Source Control” on page 77 for more information about reference sources.

IMPORTANT: If one of the PTP slaves on the timing network is a Symmetricom IEEE 1588 card, the interval for all PTP masters and PTP slaves must be set to 2 SECONDS.

PTP Slave Synchronization Threshold

Sets the synchronization threshold for the PTP slave to lock to the PTP master, determining whether the F130 parameter SLAVE CLOCK SYNCHRONIZED reports LOCKED or UNLOCKED. Use the 5 microsecond setting for timing networks that traverse approximately 2 hubs or switches. Try the 1000 microsecond setting if the PTP slave is having difficulty synchronizing or remaining synchronized on timing networks with the following characteristics:

- Multiple layers of hubs and switches
- Routers
- Heavy or bursty network traffic levels

The default factory setting is “5 microseconds”.[1]

PTP Preferred Master Configuration

PTP slaves synchronize with PTP masters that have the preferred master setting enabled versus those that don’t. Enable this setting to ensure that PTP slaves remain synchronized to a particular PTP master or set of PTP masters.

The default factory setting is “Disable”.

Keypad (plus factory defaults and settings)

Guidelines for using the keypad:

- Use the left/right arrow keys to position the cursor
- Use the up/down arrow keys to change a value or select an option.

1. On the keypad display interface, this setting is only displayed when PTP CLOCK CONFIG is set to SLAVE.

- Use the ENTER key to continue to the next screen.
- When prompted with “SAVE CHANGES? YES”, press the ENTER key.

To use F131, press the following keys on the front panel keypad:

```
ENTER 131 ENTER
```

The keypad display interface displays the following sequence of screens:

- PTP AVAILABILITY - OPTION BAY #
- READING PTP OPTION CARD - PLEASE WAIT 5 SECONDS
- PTP IP ADDRESS (STATIC)
  - For PTP master, Option Bay 4 - 010.048.000.103
  - For optional PTP slave, Option Bay 2 - 010.048.000.105
- PTP SUBNET MASK (STATIC) - *255.255.000.000* (Range:0 to 255 for each 3 digit address.)
- PTP DEFAULT GATEWAY (STATIC) - *010.024.000.001* (Range:0 to 255 for each 3-digit address.)
- PTP DHCP - *ENABLE* (or DISABLE or DHCP) (if enabled, the next three screens provide the IP Address, Subnet Mask, and Gateway assigned by the DHCP server.)
- PTP SYNC INTERVAL - ***2*** (or 1, 8, 16, 64)
- PTP BURST MODE - ***DISABLE*** (or ENABLE)
- PTP PORT STATE - ***ENABLE*** (or DISABLE)
- PTP SUBDOMAIN NAME - ***_DFLT*** (or _ALT1, _ALT2, _ALT3)
- PTP RESET TO FACTORY DFLT? - *NO* (or YES)
- PTP INIT TO USER SETTINGS? - *NO* (or YES)
- PTP CLOCK CONFIG, BAY 2 - ***MASTER*** (or SLAVE PRI, SLAVE SEC, SLAVE STBY)
- SLAVE SYNC THRESHOLD - ***5 microsec*** (or 1000 microsec)[1]
- PTP PREFERRED MASTER - ***DISABLE*** (or ENABLE)
- SAVE CHANGES? - *YES* (or NO)

In the list above, factory settings are in *italics*, and factory defaults are in ***bold italics***.

Command Line

The following list is a summary of the F131 commands:

Request a summary of all PTP settings:

```
F131 B<N>

>F131 B4
ERROR: INVALID COMMAND!
```

1. Only displayed when PTP CLOCK CONFIG, BAY # is SLAVE PRI/SEC/STBY

Request the Internet Configuration (IP Address, Subnet Mask, Default Gateway) settings:

F131<SP>B<N><SP>IC<CR>

Set the IP Address:

F131<SP>B<N><SP>IP<SP>nnn.nnn.nnn.nnn<CR>

Set the Subnet Mask:

F131<SP>B<N><SP>SM<SP>nnn.nnn.nnn.nnn<CR>

Set the Default Gateway:

F131<SP>B<N><SP>G<SP>nnn.nnn.nnn.nnn<CR>

Request the DHCP settings.

F131<SP>B<N><SP>DHCP<CR>

Enable/disable DHCP:

F131<SP>B<N><SP>DHCP<SP>SET<CR>

Request the PTP Protocol settings.

F131<SP>B<N><SP>PROTOCOL<CR>

Enter the PTP Protocol Sync Interval, enable or disable Burst, and enable/disable the Port:

F131<SP>B<N><SP>PROTOCOL<SP>SI<SP>BS<SP>PO<CR>

Request the PTP Subdomain Name:

F131<SP>B<N><SP>SDN<CR>

Reset the PTP Parameters to the Factory Default settings:

F131<SP>B<N><SP>RFD<CR>

Initialize the PTP Protocol to the user-entered settings:

F131<SP>B<N><SP>INIT<CR>

Request the configuration of the PTP reference clock:

F131<SP>B<N><SP>C<CR>

Enter the PTP reference clock configuration for the PTP clock Master/Slave and Pri/Sec/Stby:

F131<SP>B<N><SP>C<SP>MS<SP>PSS<CR>

Request the PTP Slave Synchronization Threshold:

F131<SP>B<N><SP>SST<CR>

Enter the PTP Slave Synchronization Threshold in microseconds:

F131<SP>B<N><SP>SST<SP>MS<CR>

Request the PTP Preferred Master Clock Configuration:

F131<SP>B<N><SP>PM<CR>

Enable or disable the PTP Preferred Master Clock setting:

F131<SP>B<N><SP>PM<SP>ENA<CR>

Request the status of all PTP Network parameters:

F131<SP>B<N><SP>S<CR>

where

F	=	ASCII character F.
131	=	function number.
<SP>	=	ASCII space character one or more.
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
<CR>	=	Enter key, input line terminator.

Request a summary of the PTP card configuration

For example, enter:

F131 B<N> IC

The XLi responds:

```
F131  B4  IP:206.54.47.21  SM:255.255.255.0  G:206.54.47.1 (STATIC)<CR><LF>
```

Set Internet Configuration settings

To get the Internet Configuration (IC), enter:

F131<SP><N><SP>IC

For example, enter:

F131 B4 IC

Response (example):

```
F131 B4 IP:206.54.47.21 SM:255.255.255.0 G:206.54.47.1 (STATIC)<CR><LF>
```

Set the IP Address

To get the IP address, enter:

F131 B<N> IP

For example, enter:

F131 B4 IP

Response (example):

```
F131 B4 IP:206.54.47.21
```

To set the IP address, enter:

F131 B<N><SP>IP<SP>nnn.nnn.nnn.nnn

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
IP	=	specify Internet Protocol command
nnn.nnn.nnn.nnn	=	dotted decimal address

For example, enter:

F131 B4 IP 206.54.47.21

Response (one of the following lines):

```
OK - The IP Address has been received and applied by the PTP Option Card<CR><LF>
```

Set the Subnet Mask

To get the Subnet Mask, enter:

F131 B<N> SM

To set the Subnet Mask, enter:

F131 B<N><SP>SM<SP>nnn.nnn.nnn.nnn

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
SM	=	specify Subnet Mask command
nnn.nnn.nnn.nnn	=	dotted decimal address

For example, enter:

F131 B4 SM 255.255.255.0

Response (one of the following lines):

```
OK - The Subnet Mask has been received and applied by the PTP Option Card<CR><LF>
```

Set the Default Gateway

To get the Default Gateway, enter:

F131 B<N> G

To set the Default Gateway, enter:

F131 B<N><SP>G<SP>nnn.nnn.nnn.nnn

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
G	=	specify Default Gateway command
nnn.nnn.nnn.nnn	=	dotted decimal address

For example, enter:

F131 B4 G 206.54.47.1

Response (one of the following lines):

```
OK - The Default Gateway has been received and applied by the PTP Option Card<CR><LF>
```

Setting the Internet Configuration

The three commands, F131 IP, F131 SM, and F131 G, can be concatenated to set all three values simultaneously. To do so, enter:

F131<SP>B<N><SP>IP<SP><nnn.nnn.nnn.nnn><SP>SM<SP><nnn.nnn.nnn.nnn><SP>G<SP><nnn.nnn.nnn.nnn>

Note: The three commands (i.e. IP, SM, G) must be entered in the order of IP, SM and G. A colon separator ":" can be used instead of <SP> following IP, SM, and G (e.g., IP:192.168.46.150). A mixture of colon and <SP> separators cannot be used.

For example, using appropriate values for your network, enter something similar to:

F131 B4 IP:192.169.46.150 SM:255.255.255.0 G:192.168.46.1

Response:

```
OK - The Network Parameters have been received and applied by the PTP Option
Card<CR><LF>
```

The Response messages that the PTP option card can return for the Network Parameters entry include the OK response previously stated and all the ERROR responses previously stated.

Enable/Disable DHCP

To get the DHCP setting, enter:

F131 B<N> DHCP

Response (example):

```
F131 B4 DHCP ENABLE IP:10.13.0.100 SM:255.255.0.0 G:10.13.0.1<CR><LF>
```

Use the following format to enable or disable DHCP on the PTP card's network port:

F131 B<N><SP>DHCP<SP><SET>

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
DHCP	=	specify Dynamic Host Configuration Protocol command
<SET>	=	ENABLE or DISABLE

For example, enter:

F131 B4 DHCP ENABLE (or DISABLE)

Response (one of the following lines):

```
OK - DHCP enable setting has been received and applied by the PTP Option Card<CR><LF>
ERROR - DHCP dynamic setting request has Failed.
ERROR - DHCP dynamic settings has Failed, using Static IP.
```

Get PTP Protocol settings

To get PTP protocol settings, use the following format:

F131 B<N> PROTOCOL<CR>

For example, enter:

F131 B4 PROTOCOL

Response:

```
F131 B4 PROTOCOL 27 ENABLE ENABLE<CR><LF>
```

To set the PTP protocol settings, use the following format:

```
F131 B<N><SP>PROTOCOL<SP><SI><SP><BS><SP><PS>
```

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
PROTOCOL	=	specify PTP Protocol command
<SI>	=	Sync Interval in seconds, 1, 2, 8, 16 and 64
<BS>	=	Burst Setting, ENABLE or DISABLE
<PO>	=	PTP Port Setting, ENABLE or DISABLE

For example, enter:

```
F131 B4 PROTOCOL 16 ENABLE DISABLE
```

Response (one of the following lines):

```
OK - Protocol Settings have been received and applied by the PTP Option Card<CR><LF>
```

Request the PTP Subdomain Name

To request the PTP Subdomain Name, use the following format:

```
F131 B<N> SDN<CR>
```

For example, enter:

```
F131 B4 SDN
```

Response (example):

```
F131 B4 SDN _DFLT <CR><LF>
```

Set the PTP Subdomain Name

To set the PTP Subdomain Name, use the following format:

```
F131<SP>B<N><SP>SDN<SP>SUBDOMAIN
```

where:

F	=	ASCII character F
131	=	Unit function number
<SP>	=	Space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
SDN	=	Specify subdomain name command.
SUBDOMAIN	=	Specify one of the following: _DFLT, _ALT1, _ALT2, _ALT3

For example, enter:

F131 B4 SDN _ALT1

Response (example):

```
>f131 b4 sdn _ALT1
OK - The Subdomain Name been received and applied by the PTP Option Card
```

Reset the PTP Parameters to the Factory Default settings

To reset the PTP parameters to the factory default settings, use the following format:

F131 B<N> RFD<CR>

For example, enter:

F131 B4 RFD

Response (one of the following lines):

```
OK - The PTP Option Card Network Port has been set to Factory Default values<CR><LF>
```

Initialize the PTP Protocol to User-entered Values

Each time the user changes any PTP setting using F131, the user must enter this command for the changes to take effect.

To initialize the PTP Protocol to user-entered values, use the following format:

F131 B<N> INIT<CR>

For example, enter:

F131 B4 INIT

Response (one of the following lines):

```
OK - The PTP Option Card has been initialized to user entered values
```

Configuring the PTP Reference Clock Settings

To review the PTP reference clock configuration settings with respect to Master/Slave and reference clock Primary/Secondary/Standby settings, use the following format:

F131 B<N> C<CR>

For example, enter:

F131 B4 C

Response (example):

```
F131 B4 C SLAVE PRI<CR><LF>
```

To change the settings, use the following format:

F131 B<N><SP>C<SP><MS><SP><CONFIG>

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
C	=	specify PTP Configuration command
<MS>	=	MASTER or SLAVE (Factory Default is MASTER)
<CONFIG>	=	PRI, SEC or STBY, which must be entered if the <MS> is SLAVE. If the <MS> is MASTER, this field is not applicable.

For example, enter:

F131 B4 C SLAVE PRI

Response (one of the following lines):

```
OK - Ref Clock Configuration has been received and applied by the PTP Option Card
```

Note: The PTP reference clock configuration settings are saved in XLi NVRAM so they can be used to initialize the PTP option card with Master/Slave and Pri/Sec/Stby selections at XLi power-up.

Request the PTP Slave Synchronization Threshold

Use the following command to review the PTP-allowed slave synchronization threshold in microseconds. The PTP slave uses the synchronization threshold to determine if it is locked to the PTP master. The XLi system clock's frequency steering function also uses the synchronization threshold to determine if it is locked to its reference clock. To get the PTP slave sync threshold, use the following format:

F131 B<N> SST<CR>

For example, enter:

F131 B4 SST

Response (example):

```
F131 B4 SST 5 microsec<CR><LF>
```

Set the PTP Slave Synchronization Threshold

The following command sets the PTP Slave Synchronization Threshold of a 1588 card. This value can only be set when the 1588 card is configured as a PTP slave. To set the PTP Slave Synchronization Threshold, use the following format:

F131 B<N><SP>SST<SP><TM>

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
SST	=	specify PTP Slave Sync Threshold command
<TM>	=	Slave Sync Threshold, 5 or 1000 (microseconds)

For example, enter:

F131 B4 SST 5

Response (one of the following lines):

```
OK - Slave Sync Threshold has been received and applied by the PTP Option Card
ERROR - PTP Clock is not a slave, cannot set SST.
```

Note: The PTP slave sync threshold are saved in XLi NVRAM so they can be used to initialize the PTP option card with the allowed slave sync threshold at XLi power-up.

Request the PTP Preferred Master Clock Configuration

Use this command to review the PTP Preferred Master Clock configuration settings. To obtain the PTP Preferred Master Clock configuration setting, use the following format:

F131 B<N> C<CR>

For example, enter:

F131 B4 PM

Response (example):

```
F131 B4 PM ENABLE<CR><LF>
```

Enable or Disable the PTP Preferred Master Clock Configuration

Use this command to enable or disable the PTP Preferred Master clock configuration settings. To set the PTP Preferred Master clock configuration, use the following format:

F131 B<N><SP>PM<SP><CONFIG>

where:

F	=	ASCII character F
131	=	unit function number
<SP>	=	space
B	=	ASCII letter to denote Option Bay number follows
<N>	=	Option Bay Number, 1 through 4.
PM	=	specify PTP Preferred Master command
<CONFIG>	=	ENABLE or DISABLE.

For example, enter:

F131 B4 PM ENABLE

Response (one of the following lines):

```
OK - Preferred Master Clock Config has been received and applied by the PTP Option
Card
```

Request PTP Network Parameter Status

Use Serial/Network port F131 B<N> S command to review all of the PTP Option Card Protocol Parameters status. To obtain the PTP Network Parameters status, send the following command to the XLi serial/network port:

For example, enter:

F131 B4 S

Response:

```
F131 B4:<CR><LF>
PROTOCOL:        SI    BURST     PORT<CR><LF>
                 16    DISABLE   ENABLE <CR><LF>
SDN: _DFLT<CR><LF>
CLK CONFIG:  SLAVE PRI<CR><LF>
SLAVE  SYNC  THRESHOLD:  5  microsec<CR><LF>
PREFERRED MASTER:  ENABLE<CR><LF>
```

9: XLi-Generated Messages

Error Messages

ERROR 01 VALUE OUT OF RANGE

You entered a command using the correct format that contained a value, probably numeric, that was outside the range of acceptable values.

Recovery Action: Re-enter the command using an acceptable value.

ERROR 02 SYNTAX

You entered a valid command, but using the wrong format.

Recovery Action: Re-enter the command, using the correct format.

ERROR 03 BAD/MISSING FIELD

You entered a command that lacks a required field.

Recovery Action: Re-enter the command, using the required fields.

ERROR 04 - BAD DATA/TIMEOUT CONDITION

The GPS option card did not respond to the XLi soon enough.

Recovery Action: Re-enter the command, using the required fields.

ERROR: Invalid Command

You have entered an invalid command.

Recovery Action: Consult the manual for the correct command and re-enter.

ERROR: Can’t create netdevice <NAME>

The XLi can not create the device needed to map the host to a drive.

Recovery Action: Restart the Unit. If this error message persists, contact Symmetricom Technical Customer Service.

ERROR: Can’t set host <NAME> ip <ADDRESS>

You have incorrectly entered a parameter, or there is no room currently in the Host table for another IP Address.

Recovery Action: Verify correct parameter values. If correct, restart the XLi. If this error message persists, contact Symmetricom Technical Customer Service.

ERROR: Action (get or set) is not specified

You have omitted the “get” or “set” parameter from the F100 NTP Configuration command.

Recovery Action: Re-enter the command, specifying the desired action.

ERROR: Can’t open source file <NAME>

The file containing the needed data is unavailable.

Recovery Action: Check file location and directory names to verify the path is accurate, then re-enter the command.

ERROR: Can’t open dest file <NAME>

The destination file is unavailable.

Recovery Action: Check file location and directory names to verify the path is accurate, then re-enter the command.

ERROR: Can’t write file <NAME>

Data from the source file cannot be copied to the destination file.

Recovery Action: Check file location and directory names to verify the path is accurate, then re-enter the command.

ERROR: Configuration failed.

Your attempt to configure new parameters was unsuccessful.

Recovery Action: Verify parameter values, then re-enter the command.

ERROR: Configuration type is not specified

You did not specify the file type.

Recovery Action: Re-enter the command, specifying SNMP and/or NTP.

Informational Messages

Messages in this section inform you of an event and don't require any action on your part.

Deleted previously set IP host address

Your last action deleted the previously set IP host address.

NOTICE: Cannot respond to command because Utility Port session has priority.

A Utility Port session has started and takes precedence. Wait until it is over before logging in or expecting a response to an entered Telnet command.

Host <NAME> ip <ADDRESS> configured successfully!

Host configuration was successful.

Source file <NAME> bytes read: <NUMBER>

Source file was successfully read.

Dest file <NAME> bytes written: <NUMBER>
Configuration files transferred successfully!

Information was successfully transferred to the destination file.

Restarting the Unit
Please wait…

A command has just been executed that requires a soft restart of the XLi. The restart happens immediately after this message is sent.

OK

Command accepted and processed as specified.

Goodbye.

The XLi has just terminated a session.

This page was intentionally left blank.

A: Using F100 Configuration

Configuring SNMP Parameters

Note: The NTP option is currently unavailable for the standard XLi IEEE 1588 clock.

F100 CONFIG instructs the XLi unit to transfer SNMP configuration file to an FTP server so the user can edit it. When finished editing, the user transfers the config file back to the XLi using the F100 CONFIG command.

Overview of Steps

- Set up an FTP server on your workstation.
- Using the XLi's command line interface, enter the **`F100 CONFIG get`** command. The XLi transfers copies of its configuration files over the network to the FTP on your PC.
- Edit the configuration files.
- Give the XLi a new command, **`F100 CONFIG set`**. The XLi retrieves copies of the edited configuration files from the FTP and overwrites it's current config files with the newly edited ones.

Set up the FTP Server

To save time and trouble, download a ***pre-configured*** FTP server from http://www.ntp-systems.com/zip/warftpd1.zip and extract it to the C:\ drive on your workstation. Otherwise, customize your existing FTP server setup as described in this section.

When performing these operations, the user issues command line instructions to the XLi. The XLi responds to those commands by connecting to the FTP server and transferring files to and from the FTP. The XLi gives the FTP server 'Anonymous' as its user name, and uses a **null** password (e.g., the equivalent of pressing the Enter key on your keyboard instead of entering text). The FTP server must be configured as follows:

- Anonymous log-ins are enabled
- The password for Anonymous is disabled, or allows a null password
- Anonymous has read/write privileges to Anonymous's home directory.

Get the IP Address of the FTP Server/Workstation

If the FTP server is running on your Windows workstation, open a DOS command line window on the workstation:

- Click **Start**, **Run**, and type **cmd**, or
- Click **Start**, **Programs**, (and **Accessories** in some cases), and select **Command prompt** or **DOS prompt**.
- At the command line, type **ipconfig**
- Make note of the IP Address.

For other operating systems and configurations, consult the appropriate documentation for obtaining the FTP server's IP address.

Copy the Configuration Files to the FTP Server

Telnet to the XLi or open a terminal session to it over the serial port.

Using the command line, enter the commands below. Replace ***<IP Address>*** with that of the workstation/FTP Server. Leave ***<subdir>*** blank - the FTP server will save the files in anonymous's home directory.

Note: See "Command Line Interface" on page 29 if you need instructions for connecting to the command line interface

To get the SNMP config file, type:

```
>f100 config snmp get host:<IP Address> dir:<subdir>
```

Here's an example of a successful SNMP config file transfer:

```
>f100 config snmp get host:192.168.0.1 dir:
Host config ip 192.168.0.1 already configured
Source file /config/snmp.conf bytes read: 1275
Dest file snmp.conf bytes written: 1275
Configuration files transferred successfully!
```

If you get "`Error: Can't write file`" when you enter the get command, verify the following FTP server items:

- FTP server is running.
- Anonymous has a home directory.
- The home directory for Anonymous has read, write, and delete enabled (make sure to *apply* changes).

Edit the Configuration Files

In Windows, edit the configuration files using a text editor such as Notepad or Wordpad.

If using the pre configured FTP server (downloaded from http://www.ntp-systems.com/zip/warftpd1.zip), the FTP places the configuration files in C:\TrueTime, the default or home directory of "anonymous".

Note: Follow these guidelines when editing the configuration files:

- If the editor displays odd 'box' characters or the lines of text don't wrap properly, close the file without saving changes and switch to a different text editor.
- Don't rename or save the configuration files as a new file type.
- Some text editors encode end-of-line carriage returns that cause errors when XLi refers to the file. Notepad, WordPad, Microsoft Word, and Vim don't seem to have this problem.

- The configuration files are automatically transferred to/from the FTP server in binary format. They retain the DOS or UNIX file conventions of the editor. XLi works with either format.

Move the Configuration Files Back to the XLi

Reboot Warning: The following steps cause the XLi to reboot.

Using the XLi's command line, enter one of the commands below, replacing <*IP Address*> with the IP address of your workstation/FTP server.

To move the SNMP config file, type:

```
>f100 config snmp set host:<IP Address> dir:<subdir>
```

Here's an example of a successful SNMP config file transfer:

```
>>f100 config set snmp host:192.168.0.1 dir:
Host config ip 192.168.0.1 already configured
Are you sure(y/N)?y
Source file snmp.conf bytes read: 1275
Dest file /config/snmp.conf bytes written: 1275
Configuration files transferred successfully!
Resetting...
```

If you get "`Error: Can't open source file`", verify that the FTP server's <<Local Server>> is running.

After XLi receives the configuration files, it reboots, and goes through the normal startup process.

End of Procedure

B: Upgrading System Firmware

Caution: Consideration must be given to the firmware and the hardware version numbers of the XLi and it's optional components. Consult with Symmetricom's Customer Service department before performing upgrades.

This section explains how to completely upgrade the system firmware. This is done using the F100 BH, F100 BUB, F100 BU, and F100 BF commands.

Overview of Procedure

- Set up a network connection between your XLi and the FTP server.
- Set up an FTP Server with the firmware upgrade files.
- Open a command line session to the XLi.
- Install the firmware version 8 files.
- Reboot the XLi.

Note: If your system's and SNMP configuration file (snmp.conf) has been customized, make a backup copy and later re-install that configuration file. See "A: Using F100 Configuration" on page 141.

Set up the FTP Server

To save time and trouble, download a ***preconfigured*** FTP server from http://www.ntp-systems.com/zip/warftpd1.zip and extract it to the C:\ drive on your workstation. Otherwise, customize your existing FTP server setup as described in this section.

When performing these operations, the user issues command line instructions to the XLi. The XLi responds to those commands by connecting to the FTP server and burning the software to system memory. The XLi gives the FTP server 'Anonymous' as its user name, and uses a **null** password (e.g., the equivalent of pressing the Enter key on your keyboard instead of entering text). The FTP server must be configured as follows:

- Anonymous log-ins are enabled
- The password for Anonymous is disabled, or allows a null password
- Anonymous has read/write privileges to Anonymous's home directory.

Obtain the current system firmware files (E.g., 192-8001.bin, 192-8000.bt, 192-8002.fs) from Symmetricom's customer support website.

Place the system firmware upgrade files in home directory of the 'anonymous' user. *If you're using the preconfigured FTP server, C:\TrueTime is the default or home directory.*

Open a Command Line Session on the XLi

Note: The XLi and FTP server need to be connected by a TCP/IP network. Ideally they should be on an isolated subnet. Connecting them over a network with multiple 'hops' or one with heavy network traffic raises the possibility that the system software files could be corrupted, yielding the XLi inoperable.

Telnet to the XLi over the network. For example, at your workstations command line, type “telnet 192.168.46.10”.

When prompted, log in to the unit using the operator’s username and password; the user name and password are usually “operator” and “janus”.

Upgrade the Firmware

Command Format

When issuing the firmware upgrade commands, use the following format:

```
F100 <command> <ftp_server_ip_address> <relative_path>/<file.ext>
```

If the FTP server is on your workstation, <ftp_server_ip_address> is the IP address of your workstation.

<relative_path> is a subdirectory *inside* the anonymous user’s home directory on the FTP server. If there is no subdirectory (i.e., if the upgrade files are sitting in anonymous user’s home directory), drop <relative_path> from the command line.

For example, if c:/ftpworkfiles is the anonymous user’s home directory, and the upgrade files are in c:/ftpworkfiles/xli/, you would enter the command as follows:

```
F100 bh 192.168.49.120 xli/192-8000.bt
```

On the other hand, if the files are in c:/ftpworkfiles, the anonymous user’s home directory, you would drop the <relative_path> and enter the command as follows:

```
F100 bh 192.168.49.120 /192-8000.bt
```

Issuing the Upgrade Commands

Adapt the following examples as needed to match your system, such as differences in IP address, path, and filename).

Enter the following command:

```
F100 bh <IP_address> <relative_path>/<file.bt>
```

For example:

```
F100 bh 192.168.49.120 /192-8000.bt
```

XLi responds:

```
BURN HOST IS READY<CR><LF>
```

Then ‘burn’ the bootloader to the XLi’s flash memory by entering:

```
F100 bub
```

The XLi responds:

```
OK
BURNING FILE 192-8000.bt WITH SIZE 452164 TO PARTITION:0 SECTOR:0
SEC: 0 RE: 0
SEC: 1 RE: 0
SEC: 2 RE: 0
SEC: 3 RE: 0
SEC: 4 RE: 0
SEC: 5 RE: 0
SEC: 6 RE: 0
FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x9EFBE60A
```

Do the same for the ‘firmware’ (.bin) file:

F100 bh <IP_address> <relative_path>/<file.bin>

For example:

F100 bh 192.168.49.120 /192-8001.bin

The XLi responds:

```
BURN HOST IS READY<CR><LF>
```

Then enter:

F100 bu

The XLi responds:

```
OK
BURNING FILE 192-8001.bin WITH SIZE 803016 TO PARTITION:1 SECTOR:10
SEC: 10 RE: 0
SEC: 11 RE: 0
SEC: 12 RE: 0
SEC: 13 RE: 0
SEC: 14 RE: 0
SEC: 15 RE: 0
SEC: 16 RE: 0
SEC: 17 RE: 0
SEC: 18 RE: 0
SEC: 19 RE: 0
SEC: 20 RE: 0
SEC: 21 RE: 0
SEC: 22 RE: 0
FLASH SUCCESSFULLY PROGRAMMED CRC32 = 0x2D9A260A
```

Then do the same for the ‘file system’ (.fs) file:

F100 bh <IP_address> <relative_path>/<file.fs>

For example:

```
F100 bh 192.168.49.120 /192-8002.fs
```

The XLi responds:

```
BURN HOST IS READY<CR><LF>
```

Then enter:

```
F100 bf
```

The XLi responds:

```
OK
BURNING FILE 192-8002.fs WITH SIZE 524288
SEC: 94
SEC: 95
SEC: 96
SEC: 97
SEC: 98
SEC: 99
SEC: 100
SEC: 101
SEC: 102
FILE SYSTEM FLASH BURN COMPLETED
```

Then enter “K (space) I (space) L (space) L” as shown here:

```
F100 K I L L
```

The “K I L L” command reboots your unit. You have completed the firmware upgrade procedure

Troubleshooting

Most problems upgrading the firmware are due to problems with the configuration of the FTP server, such as:

- setting the server to accept a null password
- configuring the anonymous home directory
- setting the correct access rights
- entering the correct relative file path

The following error messages may provide some indication of the underlying problem:

Message: >Can't set the burn host - wrong IP address

Cause: The IP address entered for the FTP server is incorrect. Check that you've entered the IP address of the FTP server (not the XLi) and re-enter if necessary.

Message: >Can't open file: 192-####.##

Cause: There's a problem with the FTP server that is preventing access to the file. Verify the following:

- The FTP server is correctly configured.
- The anonymous user account is enabled.
- The anonymous user account password is “guest”.
- The anonymous user account has read access to the ftpworkfiles directory.
- The ftpworkfiles directory located in the anonymous user's home directory.
- The FTP server is running.
- There aren’t any other ‘anonymous’ users logged into the FTP server.

Try connecting to the FTP server as ‘anonymous’ using an FTP client. You should automatically see the product name directory (e.g., “XLi”) you created inside the anonymous users home directory (e.g., “c:\ftpworkfiles\”). Open the product name directory. You should see the firmware upgrade files you put there. If either the product name directory or the firmware upgrade files aren’t visible, there’s a problem with the FTP configuration.

Message: >Wrong File type

You may be using the wrong firmware files for the product being upgraded. This may be due to the incorrect files being place in the upgrade directory. It may also be that the wrong directory was entered (one for another product) in the path information on the F100 command line. ‘Wrong file type’ is also associated with ‘Can’t open file’ errors - see the preceding message.

Message: Unit hangs on “Burning Boot” message.

Check that your IP Address, Subnet Mask, and Default Gateway of the XLi are correctly configured.

FAQ

How does one check the unit’s firmware version number?

Log on to the XLi and enter the following command:

```
> F100 VER
```

An example XLi response is:

```
F100 VER
BOOTLOADER     192-8000
SOFTWARE       192-8001
FILE SYSTEM    192-8002v1.80
NVRAM VER      5
PROJ REV       #1.80
```

The “PROJ REV” number is the firmware version number. The “v” number in “FILE SYSTEM” is the file system version number, which may not be the same as the firmware version number.

How does one check the IP address, subnet mask, and default gateway of the XLi?

Log on to the XLi and enter the following command:

```
> F100 IC
F100 IP:192.168.47.156 SM:255.255.255.0 G:192.168.47.1
```

Is the null modem cable necessary? What if I'm upgrading a XLi remotely?

The null-modem cable is optional. If you decide to Telnet to the XLi over TCP/IP network, you don't need the null modem cable.

I'm using a null modem cable to connect to the XLi from my laptop and the XLi keeps rebooting?

An ungrounded voltage level on one of the pins in the null modem cable causes the unit to reset. Use one of the following work-arounds:

- Connect the laptop to a grounded power supply, if it has one, or ground the laptop's chassis.
- Do away with the null modem cable. Telnet to the unit over the network.

Use a regular PC instead of the laptop. The PC is connected to a grounded power supply and doesn't cause this problem.

C: SNMP

SymmetricomTtm-SMIv2.mib

```
SymmetricomTtm  DEFINITIONS ::= BEGIN

    IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, enterprises, Counter32
        FROM SNMPv2-SMI
        DisplayStringFROM SNMPv2-TC;

symmetricomTtm MODULE-IDENTITY
      LAST-UPDATED    "0302270000Z"
      ORGANIZATION    "SYMMETRICOM"
      CONTACT-INFO    "Technical Support"
      DESCRIPTION     "Symmetricom, Test Timing and Measurement Enterprise MIB"
      ::= { symmetricomTtmEnt 0 }

    symmetricomTtmEnt  OBJECT IDENTIFIER ::= { enterprises 1896 }
    trapMsg            OBJECT IDENTIFIER ::= { symmetricomTtmEnt 1 }
    ntp                OBJECT IDENTIFIER ::= { symmetricomTtmEnt 2 }
    ntsControl         OBJECT IDENTIFIER ::= { symmetricomTtmEnt 3 }
    gps                OBJECT IDENTIFIER ::= { symmetricomTtmEnt 4 }
    acts               OBJECT IDENTIFIER ::= { symmetricomTtmEnt 5 }
        products           OBJECT IDENTIFIER ::= { symmetricomTtmEnt 6 }
        xli                OBJECT IDENTIFIER ::= { products 1 }
        nic56k             OBJECT IDENTIFIER ::= { products 2 }

trapMsgColdStart OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP port 162 (or user defined) when
    the TrueTime time server reinitializes.  The message is Cold Start Trap
    PDU from: ###.###.###.###.  Where ###.###.###.### is the doted
    decimal notation of the IP address of the booting unit."
    ::= { trapMsg 1 }

trapMsgNtpAlarm OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
        STATUS deprecated
    DESCRIPTION
    "This is an ASCII-string sent to the UDP-trap port(162 or user defined) when
    the TrueTime time server's detects change of the NTP-status.
    This could be due to a line breakage in the timing
    source, loss of GPS satellites, etc.
    The message is 'NTP Status aaaaaaaa',
    where aaaaaaaaa can be NTP UNLOCKED,NTP client mode or NTP LOCKED"
    ::= { trapMsg 2 }
```

```
trapMsgSnmpAuthFail OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP port 162 (or user defined) when
    the TrueTime time server determines the SNMP authentication for a SNMP
    PDU is in correct.  The message is 'SNMP Authentication Failure Trap
    PDU from: ###.###.###.###'.  Where ###.###.###.### is the doted
    decimal notation of the IP address of the unit attempting the invalid
    access."
    ::= { trapMsg 3 }

trapMsgGpsAntennaFault OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port( 162 or user defined) when
    the TrueTime time server's GPS detects change in the antenna status.
    The status can be OK or FAULT"
    ::= { trapMsg 4 }

trapMsgGpsUnlocked OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port (162 or user defined) when
    the TrueTime time server's GPS detects change of the GPS status.
    The status can be is unlocked"
    ::= { trapMsg 5 }

trapMsgNewSyncType OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port (162 or user defined) when
    the TrueTime time server's GPS detects change of the GPS status.  The
    message is 'Time synchronization type is now ####' where #### can be
    GPS, ACTS or NTP."
    ::= { trapMsg 6 }

trapMsgCrossCheckAlarm OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is an ASCII string sent to UDP trap port (162 or user defined) when
    the TrueTime time server's detects a chan in time synchronization types.
    check peer and the server is not in a system alarm condition."
    ::= { trapMsg 7 }
```

```
ntpInPkts OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of NTP packets delivered to the NTP application
    layer from the transport layer."
    ::= { ntp 1 }

ntpOutPkts OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of NTP packets passed from the NTP application
    layer to the transport layer."
    ::= { ntp 2 }

ntpInErrors OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of NTP packets reject for any reason by NTP
    application layer."
    ::= { ntp 3 }

ntpAuthFail OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Total number of authentication failures.  This is a subset of
    ntpInErrors."
    ::= { ntp 4 }

ntpDesiredAcc OBJECT-TYPE
    SYNTAX INTEGER (0..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The desired (worst case time) accuracy in microseconds that the
    time server will attempt to steer to.  This variable is related to
    ntpEstError.  Should ntpEstError be greater than ntpDesiredAcc, the
    NTP alarm condition will be set (ntpSysLeap will be equal to 3).
    Note: outgoing NTP packets will have their leap indicator field set to
    ntpSysLeap."
    ::= { ntp 5 }

ntpEstErr OBJECT-TYPE
    SYNTAX INTEGER (0..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
```

```
        DESCRIPTION
        "The deprecated estimated (time) error in microseconds of the time
        server.  This variable is related to ntpEstError.  Usually, this value
        is small and constant for a given type of time server.  However, when
        primary synchronization is lost, this value will slowly increase with
        time as the time server's oscillator flywheels away from true time.
        Should ntpEstError be greater than ntpDesiredAcc, the NTP alarm
        condition will be set (ntpSysLeap will be equal to 3).
        Note: a primary time server's outgoing NTP packets will have its leap
        indicator field set to ntpSysLeap."
        ::= { ntp 6 }

    ntpSysLeap OBJECT-TYPE
        SYNTAX INTEGER (0..3)
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "This is a status code indicating normal operation, a leap second to
        be inserted in the last minute of the deprecated day, a leap second to be
        deleted in the last second of the day or an alarm condition indicating
        the loss of timing synchronization.  Note: a primary time server's
        outgoing NTP packet will have its leap indicator field set to
        ntpSysLeap."
        ::= { ntp 7 }

    ntpSysHostMode OBJECT-TYPE
        SYNTAX INTEGER (0..7)
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "The value of this variable indicates the mode that the host is
        operating in.  Note: this is the value of the time server's outgoing
        NTP packet mode field."
        ::= { ntp 8 }

    ntpSysStratum OBJECT-TYPE
        SYNTAX INTEGER (1..255)
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "This is an integer that ranges from 1 to 255 indicating the stratum
        level of the local clock. Note: a primary time server sets outgoing NTP
        packets stratum field and ntpSysStratum to 1."
        ::= { ntp 9 }

    ntpSysPoll OBJECT-TYPE
        SYNTAX INTEGER (6..10)
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "When the time server is in NTP broadcast mode, this is an integer
        indicating the maximum interval between successive NTP messages, in
        seconds to the nearest power of two.  For example a value of 6 means
        2^6 or 64 seconds. Note: a primary time server's outgoing NTP packet
```

```
        will have its poll field set to ntpSysPoll.  Note: this field is equal
        to 0 when not in NTP broadcast mode.  Note, unless this is a time
        server initiated NTP packet the value of the poll equals the value set
        in the in coming packet."
        ::= { ntp 10 }

    ntpSysPrecision OBJECT-TYPE
        SYNTAX INTEGER (-127..127)
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "This is an integer indicating the ultimate precision of the
        synchronizing clock, in seconds to the nearest power of two. Note: a
        primary time server's outgoing NTP packet will have its precision
        field set to ntpSysPrecision."
        ::= { ntp 11 }

    ntpSysRootDelay OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "This is a raw 32 bit number representing a signed fixed point 32-bit
        number indicating the total round-trip delay to the primary
        synchronization clock source in seconds with the fraction point
        between bits 15 and 16.  Note that this variable can take on both
        positive and negative values, depending on clock precision and skew.
        Note: a primary time server's outgoing NTP packet will have its root
        delay field set to ntpSysRootDelay."
        ::= { ntp 12 }

    ntpSysRootDisp OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "This is a raw 32 bit number representing a signed 32-bit fixed-point
        number indicating the maximum error relative to the primary reference
        source, in seconds with fraction point between bits 15 and 16. Only
        positive values greater than zero are possible.  Note: a primary time
        server's outgoing NTP packet will have its root dispersion field set
        to ntpSysRootDisp."
        ::= { ntp 13 }

    ntpSysRefClockIdent OBJECT-TYPE
        SYNTAX DisplayString (SIZE (0..4))
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "This is a four byte ASCII string identifying the particular reference
        clock.  In the case of stratum 0 (unspecified) or stratum 1 (primary
        reference), this is a four-octet, left-justified, zero-padded ASCII
        string. While not enumerated as part of the NTP specification, the
        following are suggested ASCII identifiers:
```

```
    Stratum    Code     Meaning
    -------    ----     -------
    0          DCN      DCN routing protocol
    0          NIST     NIST public modem
    0          TSP      TSP time protocol
    0          DTS      Digital Time Service
    1          ATOM     Atomic clock (calibrated)
    1          VLF      VLF radio (OMEGA, etc.)
    1          callsign Generic radio
    1          LORC     LORAN-C radionavigation
    1          GOES     GOES UHF environment satellite
    1          GPS      GPS UHF satellite positioning
    1          ACTS     ACTS telephone modem dial-up
    1          IRIG     Inter-Range Instrumentation Group signal

    Note, for TrueTime time servers only GPS, ACTS and IRIG are presently
    used. Further, a primary time server's outgoing NTP packet will have
    its reference identifier field set to ntpSysRefClockIdent."
    ::= { ntp 14 }

ntpControlInput OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-write
    STATUS deprecated
    DESCRIPTION
    "This variable emulates TrueTime's serial function command strings.
    The same commands issued to the serial port can be sent to this
    string.  Use this variable for SNMP sets of functions strings.
    Note, setting this variable clears ntpControlOutput to the null string.
    See ntpControlOutput below."
    ::= { ntsControl 1 }

ntpControlOutput OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This variable emulates TrueTime's serial function command strings.
    The same commands issued to the serial port can be sent to this string.
    This variable holds the output result string from the last setting of
    the above ntpControlInput variable.  Use this variable for SNMP gets
    of function strings.  See ntpControlInpuut above."
    ::= { ntsControl 2 }

gpsGroupValid OBJECT-TYPE
    SYNTAX INTEGER (0..1)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "A test flag indicating if data contained in this SNMP GPS group is
    valid or not.  This flag equals 1 when GPS is used as the time
    synchronization source and 0 for all other sources.  "
    ::= { gps 1 }
```

```
gpsNumTrackSats OBJECT-TYPE
    SYNTAX INTEGER (0..8)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION "The number of GPS satellites tracked."
    ::= { gps 2 }

gpsNumCurrentSats OBJECT-TYPE
    SYNTAX INTEGER (0..8)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Current number of GPS satellites used in position and time fix
    calculations.  The number of satellites available depends on how long
    the time server has been up, the time of day and the total amount of
    clear sky as seen from the GPS antenna.  Because of the high frequency
    of GPS radio signals, GPS antennas must have unobstructed line of sight
    from the antenna to the satellite to receive data."
    ::= { gps 3 }

gpsSatTrackMode OBJECT-TYPE
    SYNTAX INTEGER (0..3)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Mode of operation for satellite tracking.  See section 3.20 of the
    users manual for a complete description of these modes.  Generally,
    modes 0 and 1 are used for time applications.  Mode 2 is useful for
    more accurate position information when the unit is stationary, or
    slowly moving and mode 3 is for accurate position information when the
    unit is moving quickly."
    ::= { gps 4 }

gpsSatMaxSigStrength OBJECT-TYPE
    SYNTAX INTEGER (0..30)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Strongest signal strength of all tracking satellites in Trimble linear
    units. Generally, this number should be 4 or greater for good
    reception."
    ::= { gps 5 }

gpsAltitude OBJECT-TYPE
    SYNTAX INTEGER (-2147483647..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Altitude of the GPS antenna in centimeters above, or below the
    WGS-84 reference ellipsoid.  The reference ellipsoid is a rotated
    ellipse that is centered on the Earth's center of mass.  The surface
    of the ellipsoid is not necessarily the same as sea level.  The
    ellipsoid surface may be as much as 100 meters different from actual
```

```
    sea level."
    ::= { gps 6 }

gpsLongitude OBJECT-TYPE
    SYNTAX INTEGER (-2147483647..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Longitude location of GPS antenna where: +2147483647 is
    maximum east longitude, -2147483647 is maximum west longitude and 0 is
    Greenwich England.  To calculate the longitude in radians use the
    following formula (gpsLongitude * PI) / ((2^31)-1) = longitude in
    radians.  For degrees: (gpsLongitude * 180) / ((2^31)-1) = longitude
    in degrees.  Note: longitude varies from -PI to +PI in radians and
    -180 to +180 in degrees."
    ::= { gps 7 }

gpsLatitude OBJECT-TYPE
    SYNTAX INTEGER (-2147483647..2147483647)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Latitude location of GPS antenna where: +2147483647 is the
    North Pole, -2147483647 is the South Pole and 0 is the equator. To
    calculate the latitude in radians use the following formula
    (gpsLatitude * PI) / (2*((2^31)-1)) = longitude in radians.  For
    degrees: (gpsLatitude * 90) / ((2^31)-1) = latitude in degrees.
    Note: latitude varies from -PI/2 to +PI/2 in radians and -90 to +90 in
    degrees."
    ::= { gps 8 }

actsGroupValid OBJECT-TYPE
    SYNTAX INTEGER (0..1)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "A test flag indicating if data contained in this SNMP ACTS group is
    valid or not.  This flag equals 1 when ACTS is used as the time
    synchronization source and 0 for all other sources.  "
    ::= { acts 1 }

actsBaudRate OBJECT-TYPE
    SYNTAX INTEGER
        {
                baud300  (300),
                baud1200 (1200),
                baud9600 (9600)
        }
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Indicates the baud rate setting for the ACTS modem.  The ACTS
    dial-up service accepts 300 or 1200 baud.  Note: this is a rare case
    where faster is not better and 300 baud yields the best time accuracy."
```

```
    ::= { acts 2 }

actsFailRedial OBJECT-TYPE
    SYNTAX INTEGER (0..9999)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "When the dial-up session fails to connect this is the time in
    seconds to wait to try again."
    ::= { acts 3 }

actsMaxCallPeriod OBJECT-TYPE
    SYNTAX INTEGER (0..999)
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is the maximum time in minutes the ACTS unit will wait between
    successful calls to the ACTS service.  "
    ::= { acts 4 }

actsPhoneNum OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..25))
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "This is the phone number of the ACTS dial-up service, including
    any prefixes needed to reach an outside line or international dialing.
    Prefixes are separated by a comma from the main phone number."
    ::= { acts 5 }

actsNumberOfCalls OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Number of times the time server has called the ACTS dial-up
    service - weather the call was successful or not."
    ::= { acts 6 }

actsGoodCalls OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Number of times the time server called the ACTS dial-up service
    and successfully received the time."
    ::= { acts 7 }

actsBadCalls OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "Number of times the time server called the ACTS dial-up service
```

```
        and something was not right.  This variable is the sum total of all
        other ACTS failure types."
        ::= { acts 8 }

    actsFailedInit OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "Time server's internal modem failed to initialize.  If this is
        excessive, it may indicate a time server hardware failure.  "
        ::= { acts 9 }

    actsNoDialTone OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "Time server's internal modem found no dial tone.  This may be
        caused by a broken phone line to the time server.  "
        ::= { acts 10 }

    actsNoCarrier OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "Time server's internal modem found no carrier.  No modem was
        found at the other end and maybe the phone number for ACTS is wrong."
        ::= { acts 11 }

    actsBusyLine OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "Time server's internal modem found ACTS line busy."
    ::= { acts 12 }

    actsNoAnswer OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "The remote ACTS mode did not answer the call."
        ::= { acts 13 }

    actsBadReply OBJECT-TYPE
        SYNTAX Counter32
        MAX-ACCESS read-only
        STATUS deprecated
        DESCRIPTION
        "The syntax of the reply from remote modem was incorrect, possibly
        due to line noise."
```

```
    ::= { acts 14 }

actsNoOnTimeMark OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS deprecated
    DESCRIPTION
    "The reply from remote modem had no on time mark, possibly due to
    line noise."
    ::= { acts 15 }
END
```

xliMainCard-SMIv2.mib

```
XliMainCardMib DEFINITIONS ::= BEGIN

IMPORTS
        OBJECT-TYPE, MODULE-IDENTITY, Counter32
                                FROM SNMPv2-SMI
        DisplayString           FROM SNMPv2-TC
        xliMainCardFROM XliMib;

xliMainCardModule MODULE-IDENTITY
        LAST-UPDATED    "0205200000Z"
        ORGANIZATION    "SYMMETRICOM INC."
        CONTACT-INFO    "Technical Support"
        DESCRIPTION     "Symmetricom XLi Enterprise MIB"
        ::= { xliMainCard 0 }

        ntp                     OBJECT IDENTIFIER ::= { xliMainCard 1}

ntpInPkts OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "Total number of NTP packets delivered to the NTP application
    layer from the transport layer."
    ::= { ntp 1 }

ntpOutPkts OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "Total number of NTP packets passed from the NTP application
    layer to the transport layer."
    ::= { ntp 2 }

ntpInErrors OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
```

```
    DESCRIPTION
    "Total number of NTP packets rejected for any reason by NTP
    application layer."
    ::= { ntp 3 }

ntpAuthFail OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "Total number of authentication failures.  This is a subset of
    ntpInErrors."
    ::= { ntp 4 }

ntpDesiredAcc OBJECT-TYPE
    SYNTAX INTEGER (0..2147483647)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "The desired (worst case time) accuracy in microseconds that the
    time server will attempt to steer to.  This variable is related to
    ntpEstError. If ntpEstError is greater than ntpDesiredAcc, the
    NTP alarm condition is set (ntpSysLeap will be equal to 3).
    Note: Outgoing NTP packets will have their leap indicator field set to
    ntpSysLeap."
    ::= { ntp 5 }

ntpEstErr OBJECT-TYPE
    SYNTAX INTEGER (0..2147483647)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "The time server's current estimated time error, in microseconds.
    This variable is related to ntpEstError.  Usually, this value
    is small and constant for a given type of time server.  However, when
    primary synchronization is lost, this value slowly increases over
    time as the time server's oscillator flywheels away from true time.
    If ntpEstError exceeds ntpDesiredAcc, the NTP alarm
    condition is set (ntpSysLeap will be equal to 3).
    Note: a primary time server's outgoing NTP packets will have its leap
    indicator field set to ntpSysLeap."
    ::= { ntp 6 }

ntpSysLeap OBJECT-TYPE
    SYNTAX INTEGER
          {
                noLeapWarning           (1),
                lastMinuteHas61Secs     (2),
                lastMinuteHas59Secs     (3),
                alarmCondition          (4)
          }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
```

```
    "This is a status code indicating: 1- normal operation, 2- a leap
        second to be inserted in the last minute of the current day, 3- a leap
        second to be deleted in the last second of the day, or 4- an alarm
        condition indicating the loss of timing synchronization.  Note: a
        primary time server's outgoing NTP packet will have its leap indicator
        field set to ntpSysLeap."
    ::= { ntp 7 }

ntpSysHostMode OBJECT-TYPE
    SYNTAX INTEGER
          {
                hostModeIsReserved0        (1),
                hostModeIsSymmetricActive  (2),
                hostModeIsSymmetricPassive (3),
                hostModeIsClient           (4),
                hostModeIsServer           (5),
                hostModeIsBroadcast        (6),
                hostModeIsReserved6        (7),
                hostModeIsReserved7        (8)
          }
        MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "The value of this variable indicates the mode the unit is
    operating in.  Note: this is the value of the time server's outgoing
    NTP packet mode field."
    ::= { ntp 8 }

ntpSysStratum OBJECT-TYPE
    SYNTAX INTEGER (1..255)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "This integer (1..255) indicates the stratum level of the local
    clock. Note: A primary time server sets outgoing NTP packets stratum
        field, ntpSysStratum, to 1."
    ::= { ntp 9 }

ntpSysPoll OBJECT-TYPE
    SYNTAX INTEGER (6..10)
        MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "When the time server is in NTP broadcast mode, this integer
    indicates the maximum interval between successive NTP messages, in
    seconds, to the nearest power of two.  For example a value of 6 means
    2^6 or 64 seconds. Note: a primary time server's outgoing NTP packet
    will have its poll field set to ntpSysPoll.  Note: This field is equal
    to 0 when not in NTP broadcast mode.  Note: Unless this is a time
    server initiated NTP packet, the value of the poll equals the value set
    in the incoming packet."
    ::= { ntp 10 }

ntpSysPrecision OBJECT-TYPE
```

```
    SYNTAX INTEGER (-127..127)
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "This integer indicates the ultimate precision of the
    synchronizing clock, in seconds, to the nearest power of two. Note: A
    primary time server's outgoing NTP packet will have its precision
    field set to ntpSysPrecision."
    ::= { ntp 11 }

ntpSysRootDelay OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "This raw 32 bit number represents a signed fixed point 32-bit
    number. This is the total round-trip delay to the primary
    synchronization clock source, in seconds, with the fraction point
    between bits 15 and 16.  Note that this variable can take on both
    positive and negative values, depending on clock precision and skew.
    Note: A primary time server's outgoing NTP packet will have its root
    delay field set to ntpSysRootDelay."
    ::= { ntp 12 }

ntpSysRootDisp OBJECT-TYPE
    SYNTAX Counter32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "This raw 32-bit number represents a signed 32-bit fixed-point
    number. This is the maximum error relative to the primary reference
    source, in seconds, with fraction point between bits 15 and 16. Only
    positive values greater than zero are possible.  Note: A primary time
    server's outgoing NTP packet has its root dispersion field set
    to ntpSysRootDisp."
    ::= { ntp 13 }

ntpSysRefClockIdent OBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..4))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "This is a four byte ASCII string that identifies the particular reference
    clock.  In the case of stratum 0 (unspecified) or stratum 1 (primary
    reference), this is a four-octet, left-justified, zero-padded ASCII
    string. While not enumerated as part of the NTP specification, the
    following are suggested ASCII identifiers:

    StratumCode  Meaning
    -----------  -------
    0     DCN    DCN routing protocol
    0     NIST   NIST public modem
    0     TSP    TSP time protocol
    0     DTS    Digital Time Service
```

```
    1     ATOM  Atomic clock (calibrated)
    1     VLF   VLF radio (OMEGA, etc.)
    1     callsign Generic radio
    1     LORC  LORAN-C radionavigation
    1     GOES  GOES UHF environment satellite
    1     GPS   GPS UHF satellite positioning
    1     ACTS  ACTS telephone modem dial-up
    1     IRIG  Inter-Range Instrumentation Group signal

    Note, for Symmetricom time servers only GPS, ACTS, and IRIG are presently
    used. Further, a primary time server's outgoing NTP packet will have
    its reference identifier field set to ntpSysRefClockIdent."
    ::= { ntp 14 }

END
```

xli-SMIv2.mib

```
XliMib DEFINITIONS ::= BEGIN

IMPORTS
        MODULE-IDENTITY                 FROM SNMPv2-SMI
        xli             FROM SymmetricomTtm;

xliModule MODULE-IDENTITY
        LAST-UPDATED    "0205200000Z"
        ORGANIZATION    "SYMMETRICOM INC."
        CONTACT-INFO    "Technical Support"
        DESCRIPTION     "Symmetricom XLi Enterprise MIB"
        ::= { xli 0 }

    xliSystem               OBJECT IDENTIFIER ::= { xli 1 }
    xliMainCard             OBJECT IDENTIFIER ::= { xli 2 }
    xliTrap                       OBJECT IDENTIFIER ::= { xli 3 }

END
```

xliSystem-SMIv2.mib

```
XliSystemMib DEFINITIONS ::= BEGIN

IMPORTS
    OBJECT-TYPE, NOTIFICATION-TYPE, MODULE-IDENTITY, IpAddress, Unsigned32
        FROM SNMPv2-SMI
    DisplayString       FROM SNMPv2-TC
    xliSystem, xliTrap  FROM XliMib;

xliSystemModule MODULE-IDENTITY
        LAST-UPDATED    "0205200000Z"
        ORGANIZATION    "SYMMETRICOM INC."
        CONTACT-INFO    "Technical Support"
```

```
        DESCRIPTION     "Symmetricom XLi Enterprise MIB"
        ::= { xliSystem 0 }

    systemFault             OBJECT IDENTIFIER ::= { xliSystem 1 }
    systemStatus            OBJECT IDENTIFIER ::= { xliSystem 2 }

    systemAlarm             OBJECT IDENTIFIER ::= { systemFault 0 }
    systemAlarmData         OBJECT IDENTIFIER ::= { systemFault 1 }
    systemFaultConfig       OBJECT IDENTIFIER ::= { systemFault 2 }
    systemFaultHistory      OBJECT IDENTIFIER ::= { systemFault 3 }

    systemFaultConfigData   OBJECT IDENTIFIER ::= { systemFaultConfig 1 }
    systemFaultConfigMasks  OBJECT IDENTIFIER ::= { systemFaultConfig 2 }
    systemStatusGeneral     OBJECT IDENTIFIER ::= { systemStatus 1 }
    systemStatusDetail      OBJECT IDENTIFIER ::= { systemStatus 2 }

SystemAlarmType ::= INTEGER {
                                alarmPllSynthesizer             (1),
                                alarmLpnPll                     (2),
                                alarmPrimaryRefClk              (3),
                                alarmSecondaryRefClk            (4),
                                alarmIRIG                       (5),
                                alarmAuxRef                     (6),
                                alarmPrimaryPower               (7),
                                alarmSecondaryPower             (8),
                                alarmRbOsc                      (9),
                                alarmDac                        (10),
                                alarmFirstTimeLock              (11),
                                alarmTimeError                  (12),
                                alarmTimeout                    (13),
                                alarmNtp                        (14)
                }

FaultMaskType ::= INTEGER {
                            disabled(1),
                            enabled     (2)
                }

Boolean ::= INTEGER{
                            false       (1),
                            true        (2)
                }


alarmDataIpAddrOBJECT-TYPE
    SYNTAX IpAddress
    MAX-ACCESS accessible-for-notify
    STATUS current
    DESCRIPTION
    "The IP address of the unit generating the trap."
    ::= { systemAlarmData 1 }

alarmDataTimeStampOBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
```

```
    MAX-ACCESS accessible-for-notify
    STATUS current
    DESCRIPTION
    "The time, in UTC, at which the trap was generated."
    ::= { systemAlarmData 2 }

alarmDataCodeOBJECT-TYPE
    SYNTAX SystemAlarmType
    MAX-ACCESS accessible-for-notify
    STATUS current
    DESCRIPTION
    "The code of the event that generated the alarm."
    ::= { systemAlarmData 3 }

alarmDataStatusDescriptorOBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS accessible-for-notify
    STATUS current
    DESCRIPTION
    "A description of the the XLi system at the time the alarm was
        triggered. The format matches the output of the F73 command."
    ::= { systemAlarmData 4 }

alarmSystemNotification NOTIFICATION-TYPE
    OBJECTS
    {
          alarmDataIpAddr,
          alarmDataTimeStamp,
          alarmDataCode,
          alarmDataStatusDescriptor
    }
    STATUS current
    DESCRIPTION
    "A trap that indicates a change in system status. Refer to the list of
    OBJECTS, above."
    ::= { xliTrap 1 }

configDataLatchClear OBJECT-TYPE
    SYNTAX INTEGER {
                       latchClear   (1)
                  }
    MAX-ACCESS write-only
    STATUS current
    DESCRIPTION
    "Setting to <latchClear> clears the latched fault indicators."
    ::= { systemFaultConfigData 1 }

configDataThreshold OBJECT-TYPE
    SYNTAX Unsigned32 (0..99999)
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
    "The time error threshold, in nanoseconds, at which the time error
    fault is activated."
```

```
    ::= { systemFaultConfigData 2 }

configDataTimeout OBJECT-TYPE
    SYNTAX Unsigned32 (0..86400)
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
    "The timeout delay, in seconds, after which a time error fault
    becomes a timeout fault."
    ::= { systemFaultConfigData 3 }

configDataPowerOnSuppress OBJECT-TYPE
    SYNTAX Unsigned32 (0..86400)
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
    "The minor alarm power on timeout in seconds."
    ::= { systemFaultConfigData 4 }

maskPllSynthesizer OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the PLL
        synthesizer status changes."
    ::= { systemFaultConfigMasks 1 }

maskLpnPll OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the LPN PLL status
        changes."
    ::= { systemFaultConfigMasks 2 }

maskPrimaryRefClk OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the primary reference clock
        lock status changes."
    ::= { systemFaultConfigMasks 3 }

maskSecondaryRefClk OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the secondary reference
        clock lock status changes."
    ::= { systemFaultConfigMasks 4 }
```

```
maskIrig OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the IRIG lock
        status changes."
    ::= { systemFaultConfigMasks 5 }

maskAuxRef OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the auxiliary
        reference clock lock status changes."
    ::= { systemFaultConfigMasks 6 }

maskPrimaryPower OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the primary power
        status changes."
    ::= { systemFaultConfigMasks 7 }

maskSecondaryPower OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the secondary power
        status changes."
    ::= { systemFaultConfigMasks 8 }

maskRbOsc OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the rubidium
        oscillator status changes."
    ::= { systemFaultConfigMasks 9 }

maskDac OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the digital to audio
        converter status changes."
    ::= { systemFaultConfigMasks 10 }
```

```
maskFirstTimeLock OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the locking status of the
        clock since power on changes."
    ::= { systemFaultConfigMasks 11 }

maskTimeError OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the time error threshold
        is reached."
    ::= { systemFaultConfigMasks 12 }

maskTimeout OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm can be triggered when the timeout threshold is
        reached."
    ::= { systemFaultConfigMasks 13 }

maskNtp OBJECT-TYPE
    SYNTAX FaultMaskType
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "If enabled, an alarm will be triggered when NTP is in alarm."
    ::= { systemFaultConfigMasks 14 }

faultPllSynthesizerOBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a PLL synthesizer fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 1 }

faultLpnPllOBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a LPN PLL fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 2 }
```

```
faultPrimaryRefClkOBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a primary reference clock fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 3 }

faultSecondaryRefClk OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a secondary reference clock lock fault occurred since the
        fault latch was cleared."
    ::= { systemFaultHistory 4 }

faultIrig OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if an IRIG lock fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 5 }

faultAuxRef OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if an auxiliary reference clock fault occurred since
        the fault latch was cleared."
    ::= { systemFaultHistory 6 }

faultPrimaryPower OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a primary power fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 7 }

faultSecondaryPower OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a secondary power fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 8 }
```

```
faultRbOsc OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a rubidium oscillator fault occurred since the fault
        latch was cleared."
    ::= { systemFaultHistory 9 }

faultDac OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a digital to audio converter fault has occurred since the
        fault latch was cleared."
    ::= { systemFaultHistory 10 }

faultFirstTimeLock OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if the system clock has failed to lock since power on and the
        latched faults have not been cleared."
    ::= { systemFaultHistory 11 }

faultTimeError OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a time error fault occurred since the fault latch was
        cleared."
    ::= { systemFaultHistory 12 }

faultTimeout OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if a timeout fault occurred since the fault latch was
        cleared."
    ::= { systemFaultHistory 13 }

faultNtp OBJECT-TYPE
    SYNTAX Boolean
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "TRUE, if NTP was in an alarm since the fault latch was cleared."
    ::= { systemFaultHistory 14 }

statusClock OBJECT-TYPE
```

```
    SYNTAX INTEGER {
                         locked(1),
                       unlocked(2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the clock, locked or unlocked."
    ::= { systemStatusGeneral 1 }

statusClockSourceOBJECT-TYPE
    SYNTAX INTEGER {
                        clockIrigA              (1),
                        clockIrigB              (2),
                        clockIrigG              (3),
                        clockNasa36             (4),
                        clockPrimary            (5),
                        clockSecondary          (6),
                        clockAuxRef             (7),
                        clockNone               (8)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Identifies the current clock source."
    ::= { systemStatusGeneral 2 }

statusDescriptorStrOBJECT-TYPE
    SYNTAX DisplayString (SIZE (0..255))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
    "Describes the XLi system at the time the alarm was triggered.
    The format matches the output of the F73 command."
    ::= { systemStatusGeneral 3 }


statusPllSynthesizerOBJECT-TYPE
    SYNTAX INTEGER {
                        unlocked(1),
                        locked      (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Gives the current status of the PLL synthesizer."
    ::= { systemStatusDetail 1 }

statusLpnPllOBJECT-TYPE
    SYNTAX INTEGER {
                        unlocked(1),
                        locked      (2)
                }
    MAX-ACCESS read-only
```

```
    STATUS current
    DESCRIPTION
          "Gives the current status of the LPN PLL."
    ::= { systemStatusDetail 2 }

statusPrimaryRefClkOBJECT-TYPE
    SYNTAX INTEGER {
                      ok             (1),
                      fault          (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Gives the current status of the primary reference clock."
    ::= { systemStatusDetail 3 }

statusSecondaryRefClk OBJECT-TYPE
    SYNTAX INTEGER {
                      ok      (1),
                      fault   (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Gives the current status of the secondary reference clock."
    ::= { systemStatusDetail 4 }

statusIrig OBJECT-TYPE
    SYNTAX INTEGER {
                      ok      (1),
                      fault   (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Gives the current status of the IRIG."
    ::= { systemStatusDetail 5 }

statusAuxRef OBJECT-TYPE
    SYNTAX INTEGER {
                      ok      (1),
                      fault   (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Gives the current status of the auxiliary reference clock."
    ::= { systemStatusDetail 6 }

statusPrimaryPower OBJECT-TYPE
    SYNTAX INTEGER {
                      ok                (1),
                      fault       (2)
                }
```

```
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
          "Gives the current status of the primary power."
    ::= { systemStatusDetail 7 }

statusSecondaryPower OBJECT-TYPE
    SYNTAX INTEGER {
                        ok      (1),
                        fault   (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the secondary power."
    ::= { systemStatusDetail 8 }

statusRbOsc OBJECT-TYPE
    SYNTAX INTEGER {
                        ok      (1),
                        fault   (2)
                }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the rubidium oscillator."
    ::= { systemStatusDetail 9 }

statusDac OBJECT-TYPE
    SYNTAX INTEGER {
                        ok      (1),
                        fault   (2)
                        }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the digital to analog convertor."
    ::= { systemStatusDetail 10 }

statusFirstTimeLock OBJECT-TYPE
    SYNTAX INTEGER {
                        firstTimeLockedOnce                     (1),
                        firstTimeLockedOnceWithinTimeout        (2),
                        firstTimeNotLocked                      (3)
                        }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of clock since power on.
        (1)- indicates the clock has locked at least once since power on.
        (2)- indicates the clock has locked since power on but is still within
             the power on suppress timeout.
        (3)- indicates the clock has not locked since power on."
    ::= { systemStatusDetail 11 }
```

```
statusTimeError OBJECT-TYPE
    SYNTAX INTEGER {
                        ok      (1),
                        fault   (2)
                        }MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the time error indicator."
    ::= { systemStatusDetail 12 }

statusTimeout OBJECT-TYPE
    SYNTAX INTEGER {
                        ok      (1),
                        fault   (2)
                        }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the timeout fault indicator."
    ::= { systemStatusDetail 13 }

statusNtp OBJECT-TYPE
    SYNTAX INTEGER {
                        ok      (1),
                        fault   (2)
                        }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Gives the current status of the NTP alarm."
    ::= { systemStatusDetail 14 }

END
```

Editing snmp.conf

By default, SNMP is disabled. To enable SNMP or configure its parameters, follow the steps outlined below. Please open, edit, save, and close the snmp.conf file without changing its name or saving it as a new file type. An example “snmp.conf” file might look like the following, with each string that follows NAME= appearing as a single line in the text file:

```
MIB=/config/ttmib.o,
GenTraps=YES,
NAME=public,VIND=1,TRAP=YES,ACCESS=R,IP=010.001.007.065,IP=000.0
00.001.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,
NAME=private,VIND=1,TRAP=YES,ACCESS=W,IP=010.001.007.065,IP=000.
000.000.000,IP=000.000.000.000,IP=000.000.000.000,ENDC,
NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,IP=000.000.000.
000,IP=000.000.000.000,IP=000.000.000.000,ENDC,
```

```
[etc...]

NAME=,VIND=0,TRAP=NO,ACCESS=R,IP=000.000.000.000,IP=000.000.000.
000,IP=000.000.000.000,IP=000.000.000.000,ENDC,
END
```

Key:

`MIB=/config/ttmib.o,`	Don’t touch. This is a factory setting.
`GenTraps=YES,`	Global enable/disable setting for all SNMP traps. YES, the default setting, enables all traps. NO disables all traps. This setting overrides all the other TRAP parameter settings.
`NAME =`	the community name password. This should be the same as the community name being used by the administrator's
`VIND =`	View Index. This is a reserved term that has no effect and is currently unused in SNMP. This parameter should be set to “1”.
`TRAP =`	YES enables/NO disables SNMP traps for a particular community.
`ACCESS =`	Read and write privileges to members of a community. R sets read only privileges, and W sets read and write privileges.
`IP =`	Provide the IP address of the SNMP management stations within that community. These addresses are required in order for the management station to receive SNMP traps and to communicate with the XLi system using SNMP. **Note**: A special address of 255.255.255.255 grants any IP addressed unit access to the Enterprise MIB variables.

SNMP Private Enterprise MIB Structure

This section describes the top level structure & design of the XLi SNMP Private Enterprise MIB.

SNMP Addressing

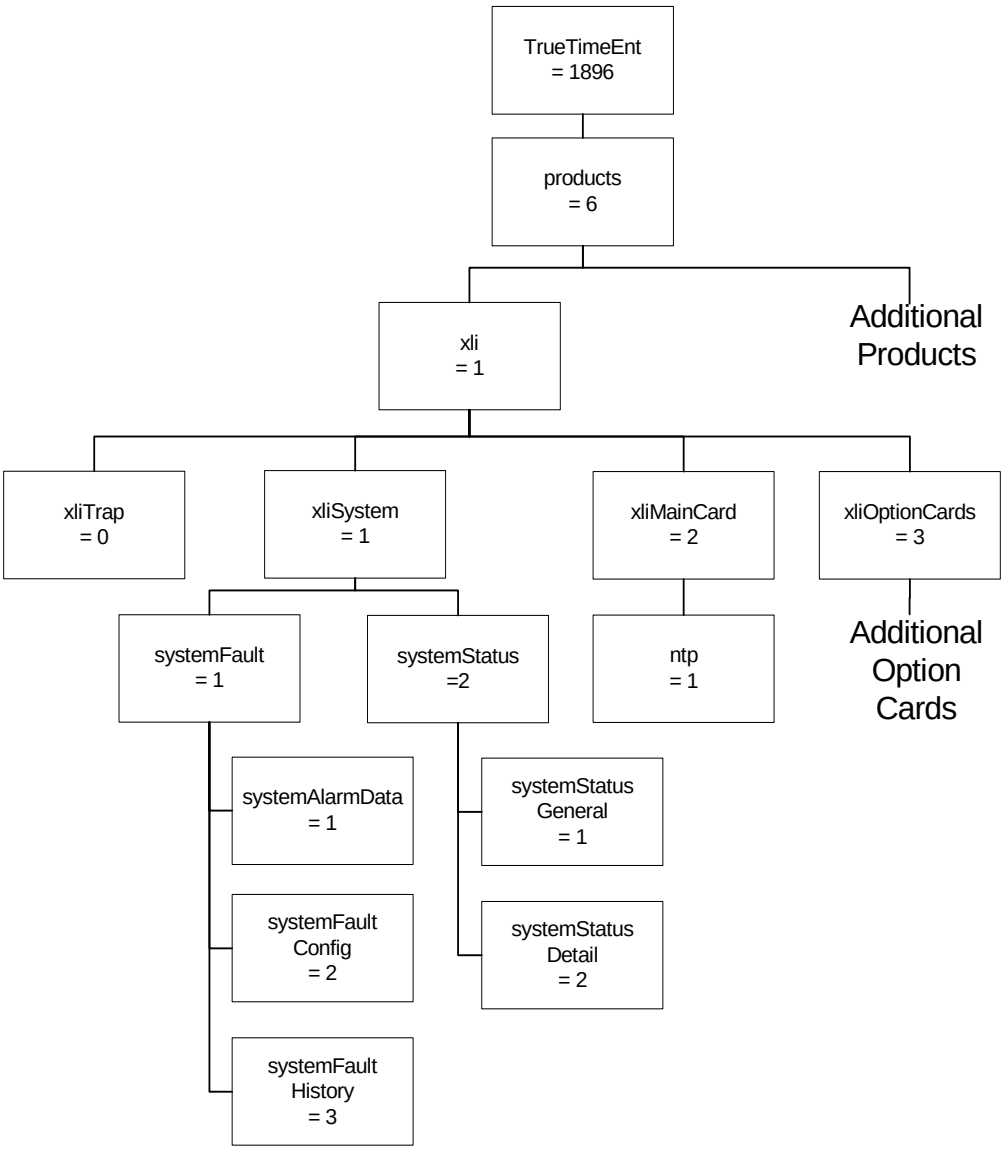
SNMP addressing is structured as a very large tree database. A root node address is an integer value that ranges from 0 to some very large number. Conceptually, there are no limits to the numbers of sub nodes either. SNMP addressing is written in “doted decimal” notation. For example the address of Symmetricom’s ntpInPkts Enterprise MIB variable is “1.3.6.1.4.1..1896.6.1.2.1.1.0”. The address fragment 1.3.6.1.4.1 is fixed by the IANA (Internet Assigned Number Authority) and is the address of the SNMP Private Enterprise MIB’s. The 1896 is the address assigned by IANA to Symmetricom for our Enterprise MIB’s. Symmetricom assigns the addresses after that at our discretion and design.

New Top Level Structure of Enterprise MIB for XLi

The former address structure of Symmetricom’s Enterprise MIB is as follows:

```
TrueTimeEnt = 1896
TrapMsg = 1    ntp = 2    ntsControl = 3    gps = 4    acts = 5
```

For the XLi, groups 1, 2, 3, 4 and 5 have been deprecated and a new group 6, products, has been added. For the XLi and future Symmetricom products, groups 1 through 5 will be absent from the XLi Enterprise MIB definition supplied with the unit. The top structure for the XLi is:



The level under the *xli* group is divided into four groups; the first two of which will be explained later. The *optionCardGroup* has all the available option cards under it. Under each option card is a table for that option card type because there may be multiple cards of that type within an XLi chassis.

The current *traps* message group is located under the *fault*. The *ntp* group is under the *xliMainCard* group as an option, and is related to only to NTP on the standard network port on the XLi's Main CPU card. For each instance of an NTP option card, the NTP group will be repeated under the *optionCards* group. GPS is located under the *optionCards* group, and is repeated for each GPS option card. The *ntsControl* and *acts* groups have not been implemented for the XLi.

This MIB structure also provides a useful definition for the system object ID. SNMP managers may use the system object ID to identify the class of object being accessed. With this structure, the system object ID is defined as Truetime.products.xli for the XLi product and Truetime.products.xxx for all subsequent products.

XLi System Group

The XLI system group contains the *xliFault* and the *xliStatus* groups. These groups contain information describing the operation of the XLI system as a whole. The *xliFault* group contains information concerning system faults that have occurred, as well as configuration parameters for the generation of system alarms, called traps in SNMP, resulting from those faults. The *xliStatus* provides two different views of the operational system. The first is a general view specifying if the clock is operational. The second is a detailed view containing the current status of each system component. The *xliFault* and *xliStatus* groups are described below.

The XLi Fault Group

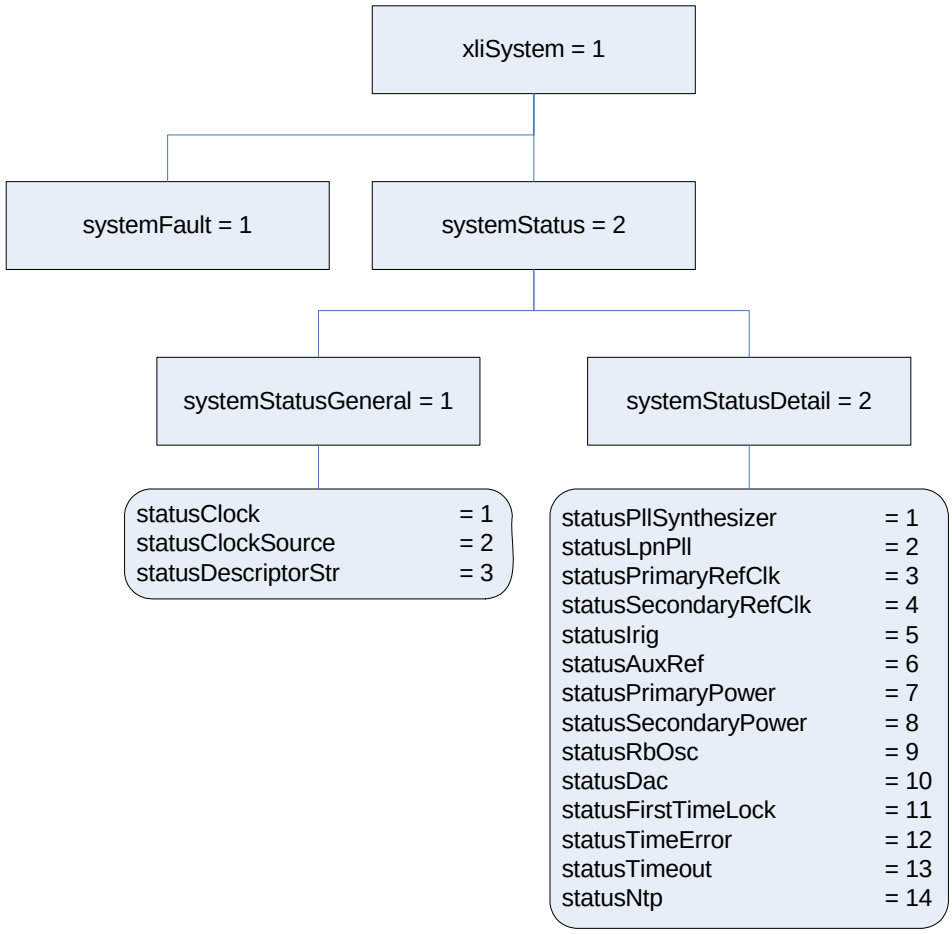


The XLI *systemAlarmData* group defines SNMP traps and cannot be directly retrieved by the SNMP manager. When a system alarm event occurs an SNMP trap *alarmSystemNotification* is sent to the SNMP managers previously configured to receive traps. Included in the trap message are the variables contained in the *systemAlarmData* group: IP address, timestamp, alarm code, and the F73 status string.

The *systemFaultConfig* sub-group contains parameters to control the generation of system alarms. The timeout, threshold and power on suppress values are contained in the *systemFaultConfigData* group. Also in this group is a method object *configDataLatchClear*. By setting this object the user clears all latched faults. Reading the *configDataLatchClear* object has no effect and its value is not defined. The *systemFaultConfigMasks* group contains masks for each possible system alarm event. When the status changes, for example if the primary GPS becomes unlocked, the associated mask is checked. Only if the mask is enabled will a system alarm be generated.

The *systemFaultHistory* group contains latched status indicators for each of the system alarm events. If a system alarm event goes into fault status, even if this status is transient, then the associated entry in the *systemFaultHistory* group will maintain a record of that fault occurrence until the latch is cleared, using the *configDataLatchClear* object, resetting all *systemFaultHistory* entries.

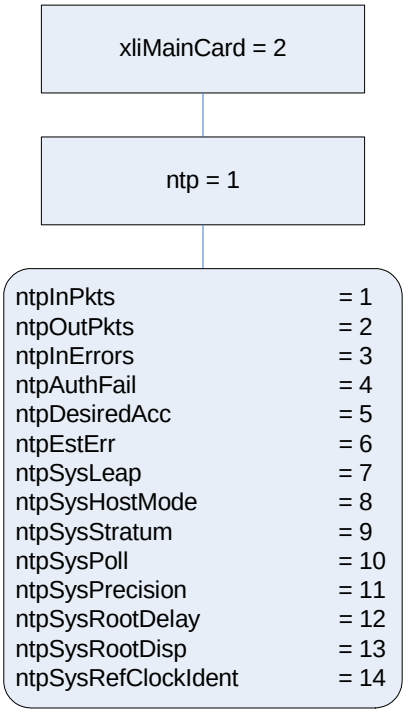
The XLi System Status Group



The XLI *systemStatus* group is used to provide a current operational view of the system. The *systemStatusGeneralGroup* gives on overview of the system status, including the status of the clock and

the reference clock source. The *systemStatusGeneralGroup* also contains the *statusDescriptorStr* object that returns a text string identical to the output of the F73 command on the command line interface. The *systemStatusDetail* group contains objects describing the current status of each system object. See the graph above and refer to the xliSystem-SMIv2.mib MIB for a complete description of each object.

XLi MainCard Group



At present the *xliMainCard* group contains only the NTP subgroup as shown above. Refer to the xliMainCard-SMIv2.mib MIB definitions for a description of each of the NTP statistics.

XLi Traps

All traps for the XLI product are defined under Truetime.products.xli.xliTraps. This is required to maintain compatibility with MIBS defined using the Structure of Management Information version 1 definitions.

The XLI SNMP agent will send SNMP version 1 traps. This is done to maintain compatibility with SNMPv1 managers.

The traps presently defined are: alarmSystemNotification

The *alarmSystemNotification* trap is sent when the state of an object in the *systemStatusDetail* group changes and the corresponding mask object in the *configDataMasks* group is enabled.

Future Expansion

This section outlines the possibilities for future expansion of the TrueTime Enterprise MIB. The general overview is that new objects may be added to any location. Existing objects may not be altered in order

to maintain backward compatibility. There are two varieties of expansions to consider: additional products and additional features within an existing product.

This model makes adding additional products and maintaining compatibility a straightforward process. Each additional product will be given a branch in the tree under enterprises.Truetime.products. For now, we have only enterprises.Truetime.products.xli and enterprises.Truetime.products.nic56k.

Future products will take the form enterprises.Truetime.products.product.XXX. Each product will use enterprises.Truetime.products.product.XXX as its system object identifier. Each product will also define an enterprises.Truetime.products.product.XXX.xxxTrap subgroup for the definition of all enterprise specific traps that can be generated by that product.

Making additions to the XLI product MIB is also a straightforward task with several caveats. The first is that additions may be made but the object identifier and the semantics of existing objects may not be altered. A likely place for additions is under the *systemStatusDetail* group as addition system objects are defined.

A place holder group xliOptionCards has been defined but currently has no accessible members. This group will be used for the management of optional add on cards. It is suggested that each sub-group under xliOptionCards be defined as a table to allow for the possibility of multiple option cards of a particular type.

Glossary of SNMP-Related Terms

Depreciation: In SNMP when an SNMP variable or group of variables is no longer recommended for use, they are listed as deprecated in the formal definition of the MIB. Users are often times still allowed to use this data, but the MIB's authors for one reason or another no longer recommend it.

Enterprise MIB: See Private Enterprise MIB.

IANA - Internet Assigned Number Authority: This is the group at IETF that is in charge of assigning Internet related numbers like Ethernet addresses, TCP/UDP port numbers and SNMP Private Enterprise MIB numbers.

IETF – Internet Engineering Task Force: The group responsible for standardizing numerous Internet communication protocols.

Management agent: An Internet connected remote host that accumulates the raw data that is entered into the MIB and Enterprise MIB for that host. This data is at some point transmitted to a Management station. In other network applications this would be called a network server of the SNMP protocol.

Management station: An Internet connected remote host that consumes SNMP data provided by a Management agent for the display of human network managers. In other network applications this would be called a client of the SNMP protocol.

MIB – Management Information Base: This is the data structure for the SNMP protocol. The current version of this standard, that is in general use, is MIB II defined by RFC's 1213 and 1212.

NTP – Network Time Protocol: A network time distribution protocol developed at the University of Delaware under the direction of Dr. Mills. NTP is a client / server based protocol where the server is the supplier of time and the client is the consumer of the time information.

Private Enterprise MIB: SNMP allows private organizations to define their own MIB extensions. The IANA of the IETF issues, for a fee, a unique number to an organization that is an address entry point from the MIB II into the private data for that organization. Only one Enterprise address is assigned to an organization. The Enterprise address for Symmetricom is 1896. This address space has grown to over 12,000 private addresses and Symmetricom is by comparison one of the earlier adopters of SNMP with an Enterprise MIB!

RFC – Request for Comments: A document reviewed and released by the IANA that defines the formal definitions of various Internet communication protocols and related information.

SNMP – Simple Network Management Protocol: This Internet communications protocol is used for the status and control of remote network devices. Numerous IANA standards committees starting in 1990 and continuing to day define this protocol.

Trap or Trap Message: A packet issued from an SNMP Management agent to an SNMP Management station. The message is intended to relay and important even that occurred within the agent that requires attention or notification.

Configuring and Testing SNMP

This section outlines the procedure to perform verification tests on the SNMP component of the XLi product.

Materials Needed

- XLi unit
- PC with HP OpenView installed

HP OpenView Configuration

Create the Network Map

1. Power on the XLi unit.

Note: The HP OpenView PC and the XLi unit should be on the same subnet.

2. Log on to the PC with HP OpenView installed as the “Administrator” user.

3. Start the HP OpenView Network Node Manager application.

4. Select the menu item Map->New

5. In the “Name” field, enter “XliTestMap”

6. Click the <Next> button 3 times and the <Finish> button 1 time to complete the Map definition and open the Map.

Load the TrueTime Enterprise MIBs

1. Select the menu item Options->Load/Unload MIBs: SNMP. A dialog box titled “Load/Unload MIBs:SNMP” will pop up.

2. In the dialog box click the <Load> button to load the MIBS: truetime-SMIv2.mib, xli-SMIv2.mib, xli-MainCard-SMIv2.mib, and xliSystem-SMIv2.mib

3. When xliSystem-SMIv2.mib is loaded a dialog box with the title “Load Trap-Type/Notification-Type macro?” will appear. Click the <OK> button to add the trap definition into the OpenView event system. Click the <OK> button again to confirm the action.

4. Click the <Close> button to exit the “Load/Unload MIBs:SNMP” dialogue box.

Configure Traps

1. Select the menu item “Options->Event Configuration”. A pop window titled “Event Configuration” will appear.

2. In the “Event Configuration” window, scroll through the “Enterprises” list to the bottom and select “xli”.

3. In the “Events for Enterprise xli” select the “alarmSystemNotification” entry. Then select the menu item “Edit->Events->Modify…”. A popup titled “Modify Events” will appear.

4. In the “Modify Events” popup click the “Event Message” tab. Under “Actions” select the “Log and display in category”. In the “Event Log Message” field, enter “XLI System Trap: $*” (without the quotation marks).

5. Select the menu item “Options->MIB Application Builder: SNMP”. A popup titled “MIB Application Builder: SNMP” will appear.

6. In the “MIB Application Builder: SNMP” popup select the menu item “Edit->New…” A popup titled “New MIB Application” will appear.

7. Enter “xlistatus” in the “Application ID:” field and the “Application Title:” field. Leave “Application Type:” as “Form”. Click the “Next” button.

8. The title of the popup will now be “New Application Builder – Display Fields”. Click the “Add” button. A popup titled “New Application Builder / Add MIB Objects will appear”.

9. In the “New Application Builder / Add MIB Objects will appear” popup descend the MIB tree by clicking on the plus symbol next to the entries “iso -> org -> dod -> private -> enterprises -> trueTimeEnt -> products -> xli -> xliSystem -> systemStatus -> systemStatusGeneral”. Select all items under “systemStatusGeneral”. Do this by clicking on the first item and then holding the “shift” key while clicking on the last item. Then click the “Add” button. Back up to “xli -> xliSystem -> systemStatus -> systemStatusDetail”. Select all items under “systemStatusDetail” and then click the “Add” button.

Then click the “Close” button.

10. In the “New Application Builder – Display Fields” popup click the “Next” button. In the “Menu Path” field enter “XLI->Status”. Click the “Finish” button.

11. Repeat steps 6 – 10 using the “Application ID:” of xliconfig selecting all items under “iso -> org -> dod -> private -> enterprises -> trueTimeEnt -> products -> xli -> xliSystem -> systemFault -> systemFaultConfig” and using the “Menu Path” of “XLI->Configuration”.

12. Repeat steps 6 – 10 using the “Application ID:” of xlifault selecting all items under ““iso -> org -> dod -> private -> enterprises -> trueTimeEnt -> products -> xli -> xliSystem -> systemFault -> systemFaultHistory” and using the “Menu Path” of “XLI->Fault History”.

Additional OpenView configuration

1. Select the menu item “Options->SNMP Configuration”. A popup titled “SNMP Configuration” will appear.

2. In the “SNMP Configuration” popup: set the “Community” field to “public” the “Set Community” field to “private” and the “Retries” field to 0.

XLi Configuration

SNMP Configuration

Follow the manual to load the snmp.conf configuration file into the XLi. The IP address of the HP OpenView PC must be in both the public and private communities.

Test Procedure

Testing “Get”

1. From the Network Node Manager root level double click the icon “Internet”. Select the icon corresponding to your test subnet, e.g. “192.168.11”, and double click. Double click the “Segment1” icon.

2. Select the icon labeled “NIC” by single clicking with the mouse.

3. Select the menu item “XLI->Status”, “XLI->Configuration”, then “XLI->Faults”. Verify the values by comparing with the output of the keypad display.

Testing “Set”

1. Follow “Get Testing” procedure steps 1-2.

2. Select the menu item “Tools->SNMP MIB Browser”. A popup titled “Browse MIB” will appear.

3. In the “Browse MIB” popup descend the MIB tree to “iso -> org -> dod -> private -> enterprises -> trueTimeEnt -> products -> xli -> xliSystem -> systemFault -> systemFaultConfig -> systemFaultConfigMasks” by clicking the “+” symbol next to each entry.

4. In the “Browse MIB” popup select the “maskPllSynthesizer” entry. In the “MIB Instance” field type 0. In the “SNMP set value” field type 1. Click the “Set” button.

5. Verify that a popup appears saying “Set has completed successfully”.

6. Select the menu item “XLI->Configuration”. In the popup “xliconfig” verify that the “maskPllSynthesizer” entry is set to “disabled”.

7. In the “Browse MIB” popup select the “maskPllSynthesizer” entry. In the “MIB Instance” field type 0. In the “SNMP set value” field type 2. Click the “Set” button.

8. Verify that a popup appears saying “Set has completed successfully”.

9. Select the menu item “XLI->Configuration”. In the popup “xliconfig” verify that the “maskPllSynthesizer” entry is set to “enabled”.

10. Repeat steps 4-9 in turn for each additional entry under systemFaultConfigMasks.

Trap Testing

1. 1. Perform an action to generate a trap.

2. 2. Select the menu item “Fault->Alarms”.

3. 3. Verify in the “All Alarms” popup that there is an entry of the form:

```
Normal  Thu Mar 21: 14:30.09 192.168.11.218 XLI system trap:
[1] private.enterprises.trueTimeEnt.products.xli.alarmDataIpAddr.0 (IpAddress)
192.168.11.218
[2] private.enterprises.trueTimeEnt.products.xli.alarmDataTimeStamp.0 (OctetString):
HH:MM:Ss UTC
[3] private.enterprises.trueTimeEnt.products.xli.alarmDataCode.0 (Integer):
alarmPrimaryPower
[4] private.enterprises.trueTimeEnt.products.xli.alarmDataDescriptorStr.0
(OctetString): F73 S LP LL----PSR---
```

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E: Time Code Formats

The following section provides a summary description of the three time code types used by the XLi. The definitive IRIG time code specification, the Range Commanders Council's IRIG Serial Time Code Formats, IRIG Standard 200-98, is available on the Web at http://jcs.mil/RCC/manuals/200/

Overview

Please refer to the Input and Output specifications in the front of the manual for details regarding the voltage amplitudes / modulation ratios of the following time codes provided or used by the Model XLi.

IRIG

Introduction

The document 200 95 "IRIG STANDARD TIME FORMATS" by the Telecommunications Working Group, Inter range Instrumentation Group, Range Commanders Council describes IRIG-B and IRIG-A time codes.

The standard time formats of IRIG codes were designed for use in missile, satellite and space research programs. Use of these codes facilitates efficient interchange of test data. These formats are suitable for recording on magnetic tape, oscillographs, film and for real time transmission in both automatic and manual data reduction. IRIG-B from the Model XLi is suitable for remote display driving, magnetic tape recording and many other uses. IRIG codes, in the strict sense, encode Universal Coordinated Time (UTC) in 24 hour format and not local time. Nonetheless, this instrument can encode UTC or local time in either 24 or 12 hour formats.

IRIG Code Format

Reference "IRIG Standard Format A" on page 192. The level shifted, pulse width modulated, serial formats of IRIG-B and IRIG-A are divided into three segments. The first segment encodes time of year in binary coded decimal (BCD) notation. The second segment encodes control functions. This segment is generally available for data of the user's choice. In the IRIG-B code output of Model XLi, this segment encodes worst case time error flags as explained below. The IRIG-A output from Model XLi does not include control functions. The third segment sometimes encodes time of day in straight binary seconds (SBS) notation. Both IRIG-B and IRIG-A encode SBS on the Model XLi.

The three code segments are contained within one "frame". The frame length for IRIG-B is 1 second long and contains 100 "elements" (pulses) each of which start every 10 milliseconds. The frame length for IRIG-A is 1/10 seconds and contains 100 elements each of which starts every 1 millisecond.

An element may represent either a binary zero, a binary one, a reference marker or a position identifier. A zero is 0.2 of the duration of an element, a one is 0.5 of the duration of an element and a position identifier or reference marker is 0.8 of the duration of an element. A reference marker locates the

beginning of each frame and a position identifier marks the end of every ten elements. IRIG-B and IRIG-A have ten position identifiers per frame.

The elements prior to position identifier P5 comprise the time of year segment. The first ten elements encode the seconds, the second ten elements encode the minutes and so on through days. Each element is a digit in a binary number with a place value sequence 1 2 4 8.

IRIG-B Time Quality Flags

Five flags are encoded in the control function segment of the IRIG-B code. The first flag encoded at element P5+40ms is the LOCK indicator. It is a binary 1 when the XLi is not locked to a reference. The second flag encoded at element P5+60ms is a binary 1 when the worst case time error exceeds threshold 1 (refer to "Function 5 -- Time Quality Enable/Setup"). Element P5+70ms is a binary 1 when the worst case time error exceeds threshold 2. Element P5+80ms encodes a binary 1 when the error exceeds threshold 3 and P5+90ms when the error exceeds threshold 4.

Output

The XLi provides the following IRIG time code outputs (refer to IRIG Standard 200-95):

IRIG-B:	B120	1 KHz sine wave amplitude modulated with BCD, CF, SBS
	B000	DC level shift, width coded with BCD, CF, SBS
IRIG-A:	A133	1 KHz sine wave amplitude modulated with BCD, SBS
	A003	DC level shift, width coded with BCD, SBS

Input

The XLi can also synchronize and lock to IRIG-B and IRIG-A input codes. The required input code does not need to have the CF or SBS elements. The XLi only decodes the BCD portion of the incoming code.

IRIG-B:	B122	1 kHz sine wave amplitude modulated with BCD
		B002 DC level shift, width coded with BCD
IRIG-A:	A132	10 kHz sine wave amplitude modulated with BCD, SBS
		A002 DC level shift, width coded with BCD, SBS

NASA 36

Introduction

The NASA 36 time code is similar to the previously mentioned IRIG codes. The NASA 36 code frame also contains 100 bit elements like the IRIG codes. In the strict sense, NASA 36 encodes Universal

Coordinated Time (UTC) in 24 hour format and not local time. Nonetheless, this instrument can encode UTC or local time in either 24 or 12 hour formats.

NASA 36 Code Format

The level shifted, pulse width modulated, serial format of NASA 36 is divided into two segments. The first segment encodes time of year in binary coded decimal (BCD) notation. The second segment encodes control functions (unused on Model XLi).

The two code segments are contained within one "frame". The frame length for NASA 36 is 1 second long and contains 100 "elements" (pulses) each of which start every 10 milliseconds.

An element may represent either a binary zero, a binary one, a reference marker or a position identifier. A zero is 2 ms, a one is 6 ms, a position identifier is 6 ms. A reference marker is 5 consecutive position identifiers. A reference marker locates the beginning of each frame.

Output

The XLi provides the following NASA 36 time code outputs:

NASA 36 (AM):1 KHz sine wave amplitude modulated BCD

NASA 36 (DC):DC level shift, width coded BCD

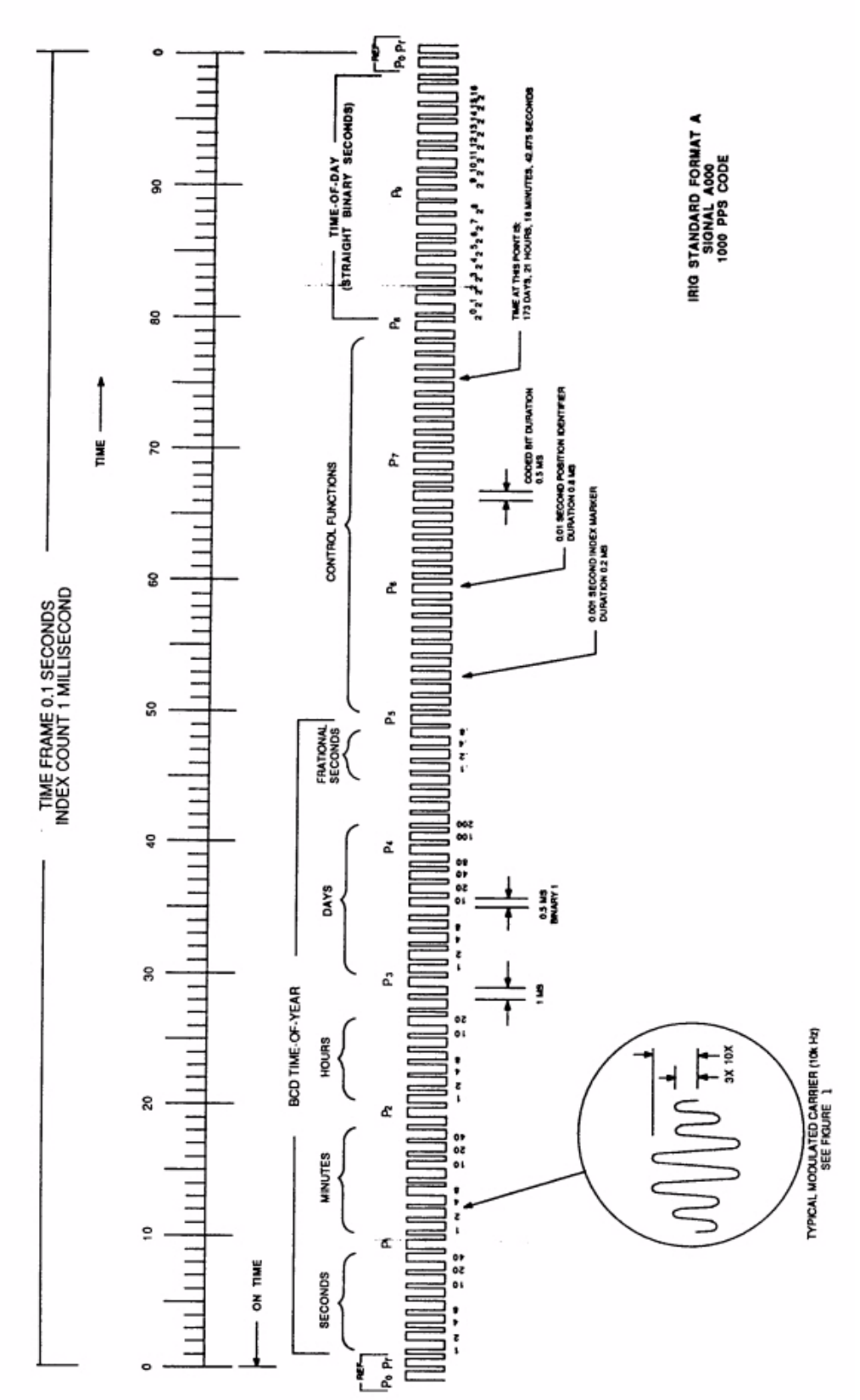
Input

The XLi can also synchronize and lock to the following NASA 36 input codes.

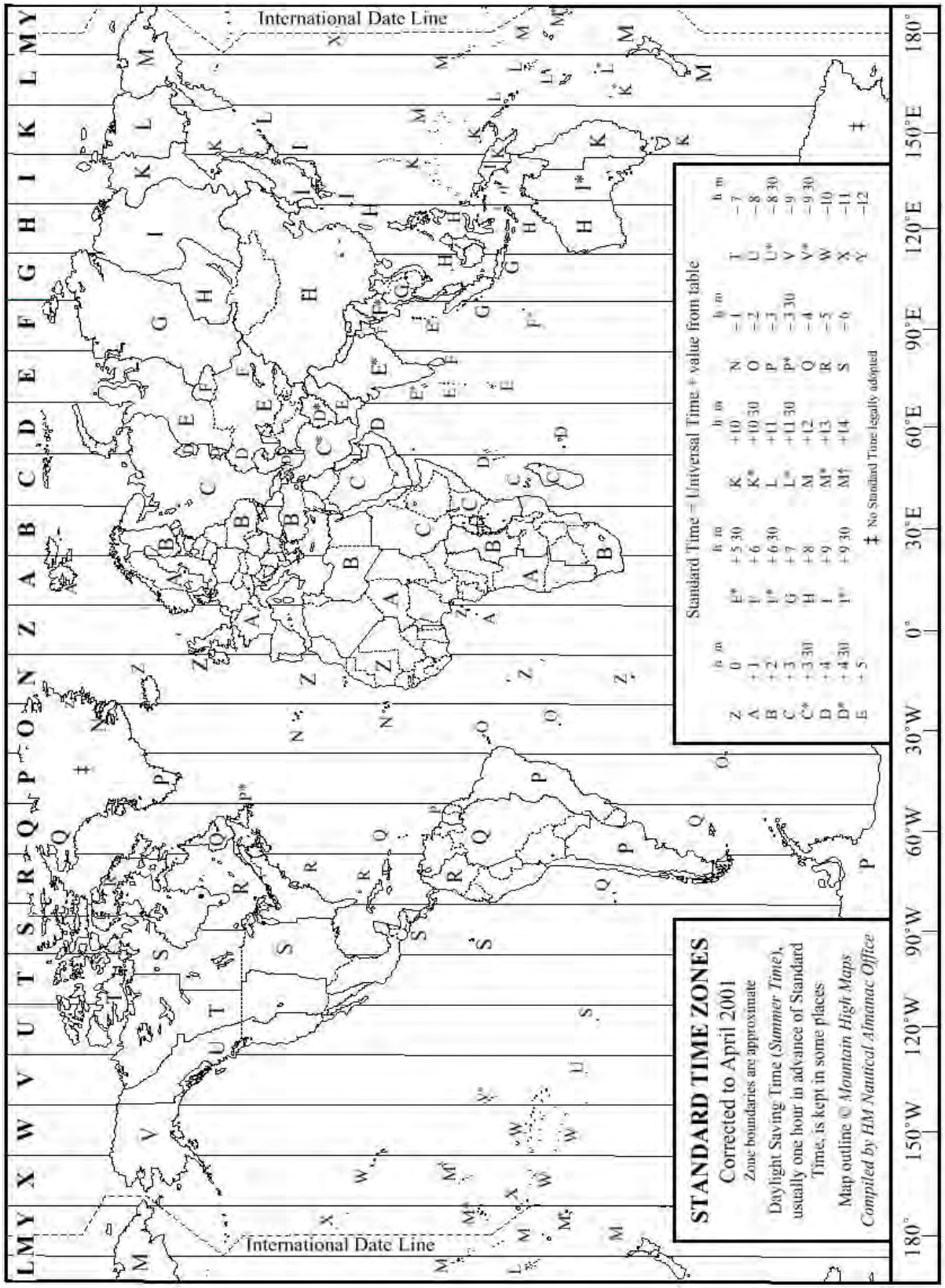
NASA 36 (AM):1 KHz sine wave amplitude modulated BCD

NASA 36 (DC):DC level shift, width coded BCD

Figure 8: IRIG Standard Format A



F: World Map of Time Zones:



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G: Part Numbers

Standard Chassis

- Model XLi 1U Chassis w. CPU, GPS, and 1 IEEE 1588 card 1510-602
- Model XLi 1U Chassis w. CPU, GPS, and 2 IEEE 1588 cards 1510-602

Software-Key Enabled Options

- Time Interval - Event Time (TIET) on Main CPU J1 87-8026

Plug in Options

- Main CPU Card 87-8000
- GPS C/A Receiver (w. TRAIM), Antenna, & Cable 87-8028-2

Rack Mount Kit

- 2 mounting brackets for 1 U chassis 206-719
- 4 flat-head, Phillips screws 241-008-005

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H: Sales and Customer Assistance

Symmetricom's Customer Assistance Centers are a centralized resource to handle your customer needs.

Customer Assistance Center Telephone Numbers

- Worldwide (Main Number): 1-408-428-7907
- USA, Canada, Latin America including Caribbean, Pacific Rim including Asia, Australia and New Zealand: 1-408-428-7907
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Customers who have purchased Technical Support Contracts may e-mail support requests to:

- support@symmetricom.com (Americas, Asia, Pacific Rim)
- emeasupport@symmetricom.com (Europe, Middle East, Africa)

Glossary of IEEE 1588-related Terms

Boundary Clock: Generally a switch with more than a single IEEE 1588 equipped port, which is a slave on one port and a master on all others.

Grandmaster Clock: Within an IEEE 1588 subdomain, a Grandmaster clock is the ultimate source of time for clock synchronization using the IEEE 1588 protocol.

IEEE 1588 Ordinary Clock: A IEEE 1588 clock with a single port. Precision Time Protocol (PTP): The protocol defined by the IEEE 1588 standard.

Transparent Clock: In IEEE 1588 terminology, it is a switch that compensates for its own queuing delays. Neither master or slave.

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