

# XLi/XLi SAASM Options

For Customizing the:  
XLi Time and Frequency System  
XLi SAASM Time and Frequency Receiver

## OPTIONS

### Software:

- Network Time Server
- Frequency Measurement
- Time Interval/Event Timing
- Programmable Pulse Output

### Hardware:

- Oscillator Upgrades
- 1, 5, 10 MHz/MPPS Frequency Outputs
- Low Phase Noise Frequency Outputs
- N.8 Frequency Synthesizer
- N.1 Frequency Synthesizer
- Have Quick/1PPS Time and Frequency Reference
- Have Quick Output
- Multicode Output for IRIG A, B, E, G, H; XR3/2137 and NASA 36
- DC Power Supplies
- Telecommunications Interface (T1/E1)
- Frequency and Time Deviation Monitor (FTM)

Symmetricom makes it easy to configure the XLi Time and Frequency System and XLi SAASM Time and Frequency Receiver (XLi SAASM) to meet your specific application needs with a variety of hardware and software options. Whether your application demands redundancy in power supplies, GPS, or any other function, all it takes is the proper configuration of cards.

Not sure how to achieve what you want? Simply call Symmetricom's time and frequency experts. You can also configure your own XLi and XLi SAASM system online at [www.symmetricom.com](http://www.symmetricom.com).

Our wide range of option cards also makes it easy to adapt your XLi and XLi SAASM configuration if your application needs change. Plug-and-play cards and built-in option card recognition software lets you swap out modules without modifying your operation system. The XLi/XLi SAASM is available in a 1U and 2U chassis that supports up to 4 and 10 option modules respectively.

For more than 30 years Symmetricom has defined premium time and synchronization solutions. Put our expertise to work for you.



XLi Time and Frequency System



XLi SAASM Time and Frequency Receiver

## Network Time Server on Standard Network Port



- Synchronize servers and workstations across the network
- High-bandwidth NTP capability
- High availability time referenced to XLi/XLi SAASM
- MD5 security protocol
- NTP broadcast mode
- SNMP Enterprise MIB
- Stratum 1 operation via GPS satellites

The high performance Symmetricom Network Time Server (NTS) represents a breakthrough in network synchronization technology. By combining a high-speed/high-capacity network interface and a wide range of network protocol support, XLi/XLi SAASM seamlessly integrates into existing networks.

The NTS distributes time to precisely synchronize client computer clocks over a network. Time is acquired from the host XLi/XLi SAASM and distributed over the network using the Network Time Protocol (NTP). Client computer clocks can be synchronized within milliseconds. Information on the health and status of the NTP server and the primary time synchronization source is available by using the SNMP protocol Enterprise MIB. Also, MD5 security protocol is included to authenticate NTP client-server communication. The standard network port, when factory enabled, serves as the NTP server via an RJ-45 Ethernet connector.

No additional hardware is needed for this option; it utilizes the XLi/XLi SAASM standard network port, leaving all option slots available.

### Specifications

#### NETWORK PROTOCOLS

- Network time protocols
  - NTP v3/v4 (RFC 1305)
  - SNTP (RFC 1769)
  - TIME (RFC 868)
  - MD5 (RFC 1321)
- Other protocols
  - Telnet (RFC 854)
  - FTP (RFC 959)
  - MIB II (RFC 1213)
  - SNMP v2 Enterprise MIB II (RFC 1157)
- Network transport protocol: TCP/IP
- Simple Network Management Protocol (SNMP)
  - SNMP provides the network administrator with network status and statistics. This feature implements SNMP versions 1 & 2 and Management Information Base (MIB) I and II.
- Network interface: 10/100 Base-T Ethernet
- Network time accuracy: 1 to 10 mS typical
- Accuracy: Function of input synchronization source (IRIG or GPS)

#### CLIENT SOFTWARE

An NTP client/daemon is required for client-side synchronization with any network time server. Included with the NTP option is Symmetricom's SymmTime NTP client for Windows® 95/98/NT/2000/XP. Comprehensive time client, server & management software for easy distribution, management and monitoring of time across the network is also available.

Visit <http://www.symmetricom.com> for an extensive list of software time clients for various operating systems.

#### OPTIONS

- Comprehensive time client, server & management software for easy distribution, management and monitoring of time across the network.

## Frequency Measurement

### (Standard with XLi SAASM)

The Frequency Measurement is a software option that provides the ability to precisely measure the frequency of an externally applied 1, 5, or 10 MHz signal. Measurement resolution is better than  $120 \times 10^{-12}$  with only a 1-second averaging time. It supports a periodic, zero dead-time mode of operation as well as a single-shot, measurement-on-demand mode. The measurement interval can be specified in integer seconds over the range of 1 to 100,000 seconds. Frequency measurement results appear on the front panel display and are output via the communication port.

### Frequency Measurement Specifications

#### INPUT FREQUENCIES

- Keypad selectable frequencies of 1, 5, 10 MHz.
  - Input Level: 1.0 to 10 Vpp
  - Input Impedance: 1k $\Omega$ , jumper selectable to 50 $\Omega$
  - Measurement Range:  $\pm 1 \times 10^{-5}$  maximum offset; compares the external frequency under test directly to the clock's disciplined oscillator
  - Input Frequency: 1 MHz, 5 MHz, 10 MHz
  - Resolution:
    - 120x10<sup>-12</sup> @ 1 second
    - 12x10<sup>-12</sup> @ 10 seconds
    - 1x10<sup>-12</sup> @ 100 seconds
- Accuracy: These specifications are subject to change depending on the specific oscillator installed in the XLi.\*
  - TCXO
    - 1x10<sup>-9</sup> @ 1 second
    - 2x10<sup>-10</sup> @ 100 seconds
    - 1x10<sup>-12</sup> @ 1 day
  - Ovenized quartz
    - 1x10<sup>-10</sup> @ 1 second
    - 1x10<sup>-10</sup> @ 100 second
    - 1x10<sup>-12</sup> @ 1 day
  - High-stability quartz
    - 3x10<sup>-11</sup> @ 1 second
    - 3x10<sup>-11</sup> @ 100 seconds
    - 1x10<sup>-12</sup> @ 1 day
  - Rubidium
    - 3x10<sup>-11</sup> @ 1 second
    - 4x10<sup>-12</sup> @ 100 seconds
    - 1x10<sup>-12</sup> @ 1 day
  - High-stability Rubidium
    - 3x10<sup>-11</sup> @ 1 second
    - 4x10<sup>-12</sup> @ 100 seconds
    - 1x10<sup>-12</sup> @ 1 day

\* For oscillator information, refer to Symmetricom's oscillator datasheet.

## Time Interval/Event Timing

### (Standard with XLi SAASM)

#### TIME INTERVAL

The Time Interval function is a software option that provides the user with the ability to precisely measure the interval between the time of occurrence of the clock-derived 1 Hz reference pulse and the rising edge of the user-supplied 1 Hz pulse.

#### EVENT TIMING

The Event Timing feature offers the capability of locating the time of occurrence of the rising edge of the applied pulse with respect to the time of year. A "burst" mode provides increased performance during short intervals. The collected data is available via the RS-232 or the Telnet port.

### Specifications

#### INPUT FREQUENCIES

- Rate: 1 PPS
- High level: Logic Hi >1.25V <10V
- Low level: Logic Low <1.25V >0V
- Active edge: Rising (Positive)
- Pulse width: 100 nS minimum
- Input impedance: >1k, jumper selectable to 50

#### TIME INTERVAL FEATURE

- Measurement
  - Rate: 1 per second
  - Resolution: 5 nS
  - Accuracy:  $\pm 5$  nS (+ clock accuracy\*\*)
  - Range: 0.0 to 1 year

\* Display: Time into the second, updated once per second, is displayed to the nanosecond until another event occurs or until the "TIME", "STATUS", or "POSITION" push-button is pressed.

#### EVENT TIMING FEATURE

- Measurement
  - Rate: 10/second or 100/second burst
  - Resolution: 5 nS
  - Accuracy:  $\pm 5$  nS (+ clock accuracy\*\*)
  - Range: 0.0 to 1 year

\* Display: Event Time occurrence, hundreds of days through nanoseconds, is displayed until another event occurs or until the "TIME", "STATUS", or "POSITION" push-button is pressed.

\*\* For clock accuracy see accuracy of host unit.

## Programmable Pulse Output

The Programmable Pulse Output option is a software option that provides a user configurable TTL level pulse output that can be used to supply a precisely synchronized “trigger” pulse at specific times or provide periodic pulse outputs. The rising edge of the trigger output may be programmed with microsecond resolution for fine control. The periodic pulse rates supports several popular frequencies such as 1 PPS, 1 PP 10 SEC, 1 PPM, 1 PP 10 MIN, 1 PPH, 1 PP 10 HR, 1 PPD, 1 PP 10 DAYS or 1 PP 100 DAYS are available. The pulse width is also programmable. The pulse is supplied via a rear panel BNC.

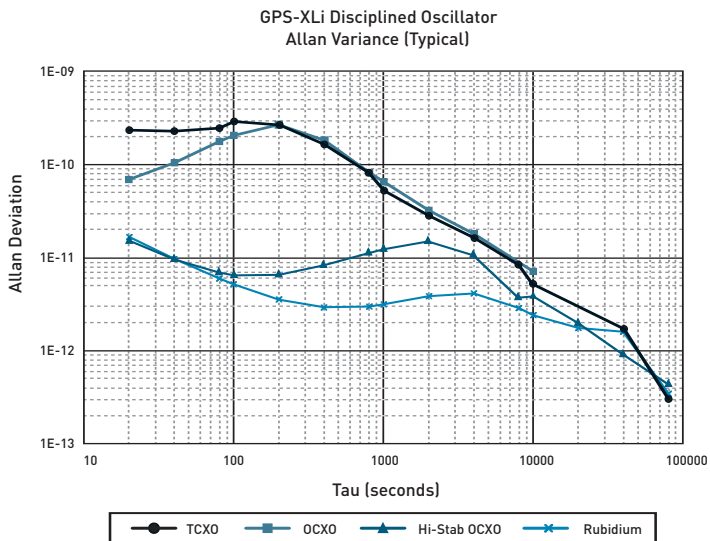
### Specifications

- Range: 500kHz to 1 PP Year (integer multiples of 1 uS)
- Pulse width: Programmable in 1 $\mu$ S steps up to 1 year
- On time edge: Rising
- Amplitude: TTL Levels into 50 $\Omega$
- Accuracy: 100nSec

# Oscillators

Symmetricom’s GPS receiver takes full advantage of the excellent long-term stability of the GPS system to steer or “discipline” the receiver’s local oscillator. This process dramatically enhances performance by removing the long-term aging and drift of the oscillator without operator intervention.

Symmetricom provides a full spectrum of ultra-precise frequency reference standards for every application. Upgrades to the XLi standard Temperature Compensated Voltage Controlled Crystal Oscillator (TCVCXO) are the Ovenized Crystal Oscillator (OCXO), High Stability Ovenized Crystal Oscillator (OCXO), Rubidium Oscillator, and the High Stability Rubidium Oscillator. The High Stability OCXO is standard in the XLi SAASM with upgrades to a Rubidium or High Stability Rubidium available.



## Oscillators Specifications

### TCVCXO (Standard in XLi)

- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
  - Frequency/timing Allan Deviation
  - Stability
    - 1 x 10<sup>-9</sup> @ 1 sec
    - 2 x 10<sup>-10</sup> @ 1000 sec
    - 1 x 10<sup>-12</sup> @ 24 hours
  - Temperature: 5 x 10<sup>-7</sup>, over 0°C to 50°C when not locked to a reference
- Note: Not available in XLi SAASM

### OCXO OSCILLATOR OPTION

- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Frequency/timing Allan Deviation
  - Stability:
    - 1 x 10<sup>-10</sup> @ 1 sec
    - 1 x 10<sup>-10</sup> @ 1000 sec
    - 1 x 10<sup>-12</sup> @ 24 hours
- Temperature: 1 x 10<sup>-8</sup>, over 0°C to 50°C when not locked to a reference
- Drift rate: 5 x 10<sup>-9</sup> per 24 hours

### HIGH STABILITY OCXO OSCILLATOR OPTION (Standard in XLi SAASM)

- Accuracy: Function of input synchronization source
- Frequency/timing Allan Deviation
  - Stability:
    - 3 x 10<sup>-11</sup> @ 1 sec
    - 3 x 10<sup>-11</sup> @ 1000 sec
    - 1 x 10<sup>-12</sup> @ 24 hours
- Temperature: 1 x 10<sup>-9</sup>, over 0°C to 50°C when not locked to a reference
- Drift rate: 1 x 10<sup>-10</sup> per 24 hours

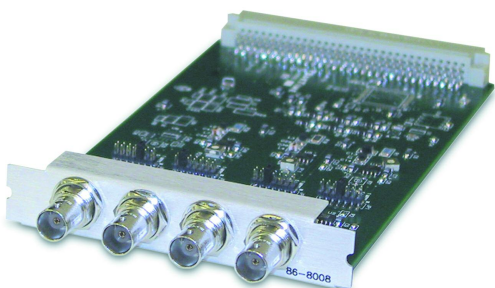
### RUBIDIUM OSCILLATOR OPTION

- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Frequency/timing Allan Deviation
  - Stability:
    - 3 x 10<sup>-11</sup> @ 1 sec
    - 4 x 10<sup>-12</sup> @ 1000 sec
    - 1 x 10<sup>-12</sup> @ 24 hours
- Temperature: 3 x 10<sup>-10</sup>, over 0°C to 50°C when not locked to a reference
- Drift rate: 5 x 10<sup>-11</sup> per month (720 hours)

### HIGH PERFORMANCE RUBIDIUM OSCILLATOR OPTION

- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Frequency/timing Allan Deviation
  - Stability:
    - 3 x 10<sup>-11</sup> @ 1 sec
    - 4 x 10<sup>-12</sup> @ 1000 sec
    - 1 x 10<sup>-12</sup> @ 24 hours
- Temperature: 3 x 10<sup>-10</sup>, over 0°C to 50°C when not locked to a reference
- Drift rate: 1 x 10<sup>-11</sup> per month (720 hours)

## 1, 5, 10 MHz/MPPS



The 1, 5, 10 MHz/MPPS Output card provides four precise sine wave or square wave through four BNC outputs. These outputs are phased-locked to the host receiver's disciplined reference oscillator. They are automatically enabled upon power-up, and are independently selectable by the user with no configuration setup required.

Outputs are preconfigured at the factory. Please specify desired outputs on the sales order.

### 1, 5, 10 MHz/MPPS Output Card Specifications

#### 1 MHz OUTPUT

- Amplitude: 1 Vrms into 50 $\Omega$
- Harmonic distortion: -30 dBc
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Connector: Female, BNC

#### 5 MHz OUTPUT

- Amplitude: 1 Vrms into 50 $\Omega$
- Harmonic distortion: -30 dBc
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Connector: Female, BNC

#### 10 MHz OUTPUT

- Amplitude: 1 Vrms into 50 $\Omega$
- Harmonic distortion: -30 dBc
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Connector: Female, BNC

#### 1 MPPS OUTPUT

- Amplitude: TTL into 50 $\Omega$
- Duty cycle: 50%
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)

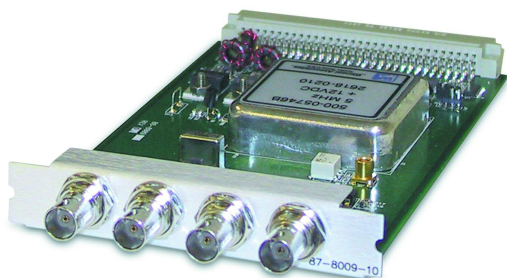
#### 5 MPPS OUTPUT

- Amplitude: TTL into 50 $\Omega$
- Duty cycle: 50%
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)

#### 10 MPPS OUTPUT

- Amplitude: TTL into 50 $\Omega$
- Duty cycle: 60/40%
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)

## Low Phase Noise Output



This card provides four isolated, 50 ohm frequency output signals with exceptional spectral purity. Isolation from the receiver's internal digital signal noise and power supply noise enables the same high-performance phase noise and spurious noise characteristics as the low noise oscillator source. The low phase noise option requires an oscillator upgrade to the XLi/XLi SAASM system, such as an OCXO, High Stability OCXO, Rubidium or High Stability Rubidium. The High Stability OCXO is standard in the XLi SAASM.

### Low Phase Noise Output Card Specifications

#### LOW PHASE NOISE 10 MHz OUTPUTS

- Provides four 10 MHz frequency output signals
- Signal type: Analog sine wave
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Amplitude: +13dBm ( $\pm 1$ dBm)
- Output impedance: 50 $\Omega$
- Quantity: 4
- Connector: BNC female
- Option Slots: 1
- Harmonic distortion: -30dBc (2nd harmonic)
- Spurious: -90dBc (10 Hz - 10 kHz SSB)
- Isolation: -70dBc
- Phase noise
  - 85dBc/Hz @ 1 Hz offset
  - 115dBc/Hz @ 10 Hz offset
  - 140dBc/Hz @ 100 Hz offset
  - 145dBc/Hz @ 1 kHz offset
  - 150dBc/Hz @ 10 kHz offset

#### LOW PHASE NOISE 5 MHz OUTPUTS

- Provides four 5-MHz frequency output signals
- Signal type: Analog sine wave
- Synchronization: Phase locked to the clock 10 MHz
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Amplitude: +13dBm ( $\pm 1$ dBm)
- Output impedance: 50 $\Omega$
- Quantity: 4
- Connector: BNC female
- Harmonic distortion: -30dBc
- Spurious: -90dBc
- Isolation: -70dBc
- Phase noise
  - 85dBc/Hz @ 1 Hz offset
  - 115dBc/Hz @ 10 Hz offset
  - 140dBc/Hz @ 100 Hz offset
  - 145dBc/Hz @ 1 kHz offset
  - 150dBc/Hz @ 10 kHz offset

## N.8 Frequency Synthesizer

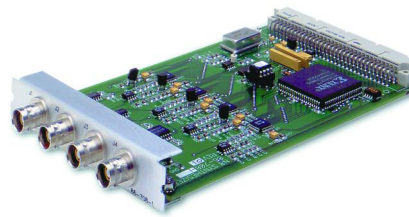


The N.8 Frequency Synthesizer provides pulse rates from 8 kPPS through 8192 kPPS in 8 kPPS steps, with the output frequency locked to the system oscillator. The output configuration is via the keypad/display, RS232/422, and the standard network port. This option card offers four independently programmable frequency synthesizers that provide pulse rates from 8 kPPS through 8192 kPPS in 8 kPPS steps.

### N.8 Frequency Outputs Specifications

- Channels: 4, independently programmable
- Output pulse rates: 8 kPPS through 8192 kPPS in 8 kPPS steps
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Output drive: RS-422 levels into 50 $\Omega$
- Wave form: Square wave
- Synchronization: Frequency locked to the clock 10 MHz
- Jitter cycle-to-cycle: <10 nS
- Connector: Triax female (Trompeter BJ-77)

## N.1 Frequency Synthesizer



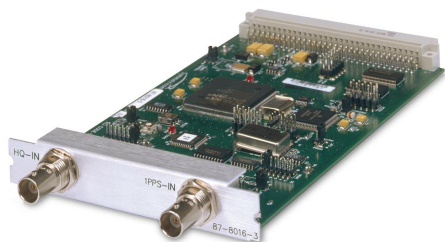
The N.1 Frequency Synthesizer provides pulse rates from 1PPS through 50 MPPS in 1PPS steps, with the output locked to the system oscillator. This option card offers four independently programmable frequency synthesizers.

### Specifications

- Channels: 4, independently programmable
- Input reference frequency: System 10 MPPS
- Output pulse rates: 1 PPS through 50 MPPS in 1 PPS steps
- Output drive: RS-422
- Wave form: Square wave
- Synchronization: Frequency locked to the clock 10 MHz
- Jitter cycle-to-cycle: <1nS
- Output connector: Triax female (Trompeter BJ-77)



## Have Quick/1PPS Time and Frequency Reference Input



The Have Quick and / or 1PPS Time and Frequency reference is configurable to synchronize the XLi/XLi SAASM as a primary or secondary reference source. It can be configured to synchronize the major and minor time to the Have Quick incoming code, minor time to the 1PPS input, or major time to the Have Quick incoming code with minor time synchronized by the 1PPS.

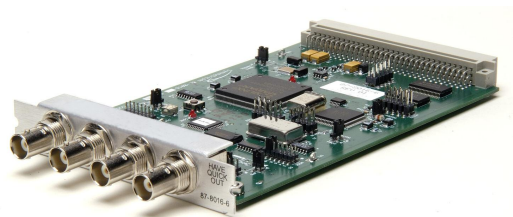
### 1PPS Input Specifications

- Frequency: 1 Hz
- Accuracy: 1 $\mu$ Sec
- Stability:
  - 1 x 10<sup>-9</sup> @ 1 sec
  - 2 x 10<sup>-10</sup> @ 1000 sec
  - 3 x 10<sup>-12</sup> @ 1 day
- High Level: >1.25V <10V
- Low Level: <1.25V >0V
- Synchronization edge: Positive
- Impedance: 1K  $\Omega$  to ground
- Connector: BNC female

### Have Quick Input Specifications

- Format: Have Quick II (ICD-GPS-060)
- Bit period: 600 $\mu$ s  $\pm$ 10 $\mu$ s
- Bit rate: Approximately 1667 BPS
- Frame rate: 1 frame/second
- Accuracy: 1 $\mu$ Sec
- Stability:
  - 1 x 10<sup>-9</sup> @ 1 sec
  - 2 x 10<sup>-10</sup> @ 1000 sec
  - 3 x 10<sup>-12</sup> @ 1 day
- High Level: >4.5 and Max 5.5V
- Low Level: < +0.5V and Min 0V
- Impedance: 1k  $\Omega$  to ground
- Connector: BNC female

## Have Quick Output



The Have Quick Output option provides time of day, day of year and year in the Have Quick II format conforming to ICD-GPS-060. Have Quick II output is typically used to synchronize military radio systems.

### Have Quick Output Specifications

- Format: Have Quick II (ICD-GPS-060)
- Bit period: 600 $\mu$ s  $\pm$ 10 $\mu$ s
- Bit rate: Approximately 1667 BPS
- Frame rate: 1 frame/second
- Frame length: 512 Bits
- Accuracy: 1  $\mu$ s
- Connector: 4 Isolated female BNC
- High Level: >4.5 and Max 5.5V
- Low Level: <0.5V and Min 0V

## Multicode Output



- Programmable formats
- Up to four code outputs
- Codes available: IRIG A, B, E, G, H; XR3/2137 and NASA 36

Select the various time code formats by using any of the three interfaces available: the front panel keypad and display, the RS-232/422 serial port, or the standard network port that is accessible from anywhere in the world. The available time code format menu contains IRIG A, B, E, G, H; XR3/2137, and NASA 36.

### Multicode Output Specifications

- Amplitude modulated;
  - Amplitude into  $50\Omega$ : 0–3 Vpp, adjustable via internally accessible potentiometer
  - Amplitude into  $600\Omega$ : 0–10 Vpp, adjustable via internally accessible potentiometer
  - Modulation ratio: 2:1 to 5:1 adjustable via internally accessible potentiometer
- Connector: BNC
- Quantity: 4
- Output impedance:  $25\Omega$
- Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)
- Time codes
 

IRIG A 130	IRIG A 133	IRIG B 120	IRIG B 123
IRIG E 111	IRIG E 112	IRIG E 121	IRIG E 122
IRIG G 141	IRIG G 142	IRIG H 111	IRIG H 112
IRIG H 121	IRIG H 122	2137	XR-3
NASA-36 (All codes in 24 hour format)			
- Time references: Standard, UTC, GPS, or Local

## DC Power Supplies



- Three voltage ranges: 12-18, 18-36, or 36-72 Vdc

The modular DC power supplies plug in the back of the XLi and can be used in place of the standard AC power supply, or in addition to it as a redundant power source. The DC power supplies will take two optional slots for the 1U chassis leaving only two for other options; however, in the 2U chassis, there is a dedicated bay only for the secondary power supply (DC included) leaving all 10 option slots available.

### DC Power Supplies Specifications

- Input connector: Three-position screw terminal block
- Isolation (ground): Input is fully floating. Either input polarity can be strapped to chassis ground at the input terminal block.
- Isolation input to output: 500 VAC, 710 VAC minimum
- Power supply status: The fault detector monitors all three output voltages and provides a visual (panel LED) and fault output if any output voltage decreases by 10%.
- Panel status LED: Green LED on with no fault and DC power applied. Green LED off with fault or no DC power applied.
- Output status line: Open collector. High impedance state with no fault. Low impedance state with power supply fault.
- Fan CFM: Exhaust 3–6 CFM

#### 12 Vdc POWER INPUT

- Input voltage range: 12–18 VDC for nominal 12 volt input
- Input current, maximum: 7.5 amps @ 12 volts input
- Output specifications:
  - +5 V  $\pm 2\%$ , 20 watts, 4 amps
  - +12 V  $\pm 2\%$ , 24 watts, 2 amps
  - 12 V  $\pm 2\%$ , 24 watts, 2 amps

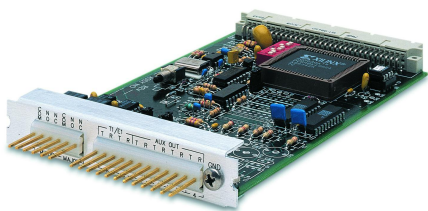
#### 24 Vdc POWER INPUT

- Input voltage range: 18–36 Vdc for nominal 24 volt input
- Input current, maximum: 6 amps @ 18 volts input
- Output specifications
  - +5 V  $\pm 2\%$ , 25 watts, 5 amps
  - +12 V  $\pm 2\%$ , 30 watts, 2.5 amps
  - 12 V  $\pm 2\%$ , 24 watts, 2 amps

#### 48 Vdc POWER INPUT

- Input voltage range: 36–72 VDC for nominal 48 volt input
- Input current, maximum: 3 amps @ 36 volts input
- Output specifications:
  - +5 V  $\pm 2\%$ , 25 watts, 5 amps
  - +12 V  $\pm 2\%$ , 30 watts, 2.5 amps
  - 12 V  $\pm 2\%$ , 24 watts, 2 amps

## Telecommunications Interface



- Provides T1, E1, and status alarm outputs for network synchronization
- Composite clock, logic level, RS-422, and sine wave

### T1 OUTPUT

The T1 output provides telecommunications timing signals meeting the requirements of ITU-T G.703 and ITU-T G.704 for both the 12-frame multiframe (D4 or SuperFrame) and 24-frame multiframe (ESF or Extended SuperFrame) formats. In addition, when the clock is configured with an appropriate high stability oscillator option, the requirements of ANSI T1.101-1994 and ITU-T G.811 pertaining to primary reference source operation are met.

### E1 OUTPUT

The E1 option card provides the user with telecommunications timing signals meeting the requirements of ITU-T G.703 and ITU-T G.704 for the 16-frame multi-frame. In addition, requirements of ANSI T1.101-1994 and ITU-T G.811 pertaining to primary reference source operation are met.

Note: Does not support SSM.

### T1 Option Specifications

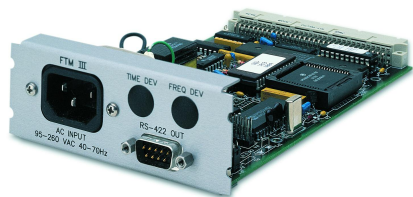
- Framed all 1s DS1/T1 1544 Kb/s outputs (Two outputs: A and B)
  - Format: SuperFrame (D4)
  - Line code: B8ZS/AMI (these are the same for all 1s)
  - Interface: Balanced,  $Z_0 = 100\Omega$ , on wire wrap pins
  - Wave shaping: T1 short loop (DSX-1; 0 – 655')
- Major and minor alarm relay closures
  - Format: Form-C normally open and normally closed contacts
  - Interface: Wire wrap pins
  - Contacts: Rated to 115 VAC/150 VDC at 2 A
- 64 Kb/s composite clock output (Aux Out 1)
  - Format: As per ITU-T G.703
  - Centralized Clock Interface, paragraph 1.2.2. AMI with 5/8 duty cycle. All 1s with bipolar violations at an 8 Kb/s rate.
  - Interface: Balanced, 2 V peak into  $135\Omega$ , on wire wrap pins
- Outputs (Aux Out 2, 3, 4)
  - Frequency: 1544 Kb/s
  - Interface: Balanced, RS-422 levels into  $100\Omega$ , on wire wrap pins
- Synchronization
  - Phase locked to the clock 10 MHz
  - Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)

### E1 Option Specifications

- Framed all 1s CEPT E1 2048 Kb/s outputs (Two outputs: A and B)
  - Format: 16 frame multiframe
  - Line code: HDB3/AMI (these are the same for all 1s)
  - Interface: Balanced,  $Z_0 = 120\Omega$ , on wire wrap pins
  - Wave shaping: CEPT G.703 pulse template requirements
- Major and minor alarm relay closures
  - Format: Form-C Normally Open and Normally Closed contacts
  - Interface: Wire wrap pins
  - Contacts: Rated to 115 Vac/150 Vdc at 2 A
- 64 Kb/s composite clock output (Aux Out 1)
  - Format: As per ITU-T G.703
  - Centralized Clock Interface, paragraph 1.2.2. AMI with 5/8 duty cycle. All 1s with bipolar violations at an 8 Kb/s rate.
  - Interface: Balanced, 2 V peak into  $135\Omega$ , on wire wrap pins
- 2048 Kb/s sine outputs (Aux Out 2, 3, 4)
  - Frequency: 2048 Kb/s
  - Interface: Balanced RS-422 levels on wire wrap pins
- Synchronization
  - Phase locked to the clock 10 MHz
  - Accuracy: Function of input synchronization source (GPS, IRIG, 1PPS, Have Quick)

# Frequency and Time Deviation Monitor (FTM)

(Available for XLI Only)



This plug-in card meets the specific needs of the electrical power industry. It provides a digital display and computer-compatible outputs of the following parameters:

- Frequency Deviation – The instantaneous difference between the locally generated frequency (typically 50 or 60 Hz) and the precision frequency of the host Synchronized Clock.
- System Frequency – The user's locally generated frequency.
- Time Deviation – The accumulated difference in time between a clock locked to the locally generated frequency and the precise time of the Synchronized Clock.
- System Time – (Hours, minutes and seconds) as defined by a clock running off the user's locally generated frequency.
- Local Time – Local corrected UTC time seconds through days.

Both the display port and the communication port have user-selectable baud rates, parity and the number of data bits and stop bits.

The monitored frequency and time deviation values are available via the front panel display(s), the communication port, and the remote display driver RS-422 port.

## Displays for XLI-FTM

MODEL	SIZE	DISPLAY DATA*
820-247	RD-2	Local Time HH:MM:SS
820-240	RD-4	System Frequency
820-258	RD-4	Delta Frequency
820-259	RD-4	Delta Time
820-260	RD-4	System Time
820-261	RD-4	Local Time
820-251	RD-1	Delta Time
820-251-1	RD-1	Delta Frequency
820-251-2	RD-1	System Frequency

## Specifications

### GENERAL SPECIFICATIONS

- Measurement input: 95–260 VAC, 40–70 Hz; user-selectable 50 or 60 Hz operation.
- Signal conditioning: RFI input filter; multistage low-pass filter. Line fused; varistor protected 2500 VAC rms isolation. Transformer coupled.
- Remote display port: RS-422. Each output term has individual address codes.

### FREQUENCY DEVIATION

- Current deviation of the measurement input frequency from the nominal frequency (50 or 60 Hz). Measurement Sample Rate: 1 sample per second
  - Range:  $\pm 9.999$  Hz
  - Measurement resolution: 30  $\mu$ Hz
  - Output data resolution: Resolution to 1 mHz

### TIME DEVIATION

- Accumulated time drift due to user's local frequency difference as compared to the host clock. The user can enter an initial time offset.
  - Measurement sample rate: 1 sample per second
  - Range:  $\pm 99.999$  seconds
  - Measurement resolution: 500 nS
  - Output data resolution: 1 mS
  - Time offset input:  $\pm 99.999$  seconds maximum. Entry via keypad or communication port.

### SYSTEM FREQUENCY

- Current measurement of input reference frequency.
  - Range: 40 - 70 Hz
  - Measurement Resolution: 30  $\mu$ Hz
  - Output Data Resolution: 1 mHz

### SYSTEM TIME

- Arithmetic value calculated from local time, plus user-entered offset, plus time deviation.

\* Input to displays are from FTM III serial display port. FTM displays are not driven from time codes such as IRIG B, etc.



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