



# StarSync 5850E

## GPS E1 Primary Timing Reference Source

### Highlights

- Can be used as a primary reference source in front of existing BITS (Building Integrated Timing System) clocks already deployed in the network, meeting ITU-T G.811 PRC specifications
- Uses a GPS constellation to synthesize accurate E1 references for use by existing BITS clock systems, SDH Network Elements (NEs), Intelligent Multiplexers, Personal Communications Service (PCS) System, and other equipment requiring synchronization
- Quartz or rubidium reference oscillator for removal of Selective Availability (S/A) and Jitter from outputs
- **Outputs:**
  - (4) E1 outputs per CCITT (ITU-T) G.703/ G.704 Synchronization Status Messaging per G.704 CAS or CCS Framing, CRC-4 ON or OFF
  - (4) RS-422 1.544MHz Square wave
  - (2) Sine wave outputs, 5 or 10MHz
  - (2) 2.048MHz Square wave
  - (2) 64Kbps Composite Clock (CC)
  - (1) 1 PPS (one pulse per second)
  - (1) Time of Day
- Antenna, 50 feet of coax to receiver (with built-in Low Noise Amplifier (LNA) included)
- RS-232 and Ethernet Information Management Ports
- Performance or monitoring through TL-1 or Menu, Software selectable. Now available in one version!
- Local indicators and pushbuttons for operational verification
- 24/48 VDC A & B power inputs, + or - ground
- 19-inch (48.3cm) or 23-inch (58.4cm) Rack mount

The CXR Larus StarSync 5850E™ E1 GPS Primary Timing Reference Source receiver represents an optimal solution to the problem of local synchronization for the new distributed network. By utilizing GPS Universal Time Coordinated (UTC) information to measure an ultra stable ovenized reference oscillator, or the optional rubidium reference oscillator, the information derived by Least Means Squares Estimation (LMSE) and Kalman filtering is used to develop a frequency connection by means of a 48 bit Direct Digital Frequency Synthesizer (DDFS). The outputs have less than 150nS of Maximum Time Interval Error (MTIE) over 1000 seconds for the crystal based reference and less than 5nS of MTIE over 1000 seconds for the rubidium based receiver. All outputs comply with Bellcore Technical Reference GR-2830-CORE and CCITT G.703/ G.704.



The **StarSync 5850E** is fully connectorized so that removal and replacement may be accomplished in minutes. Ethernet and RS-232 interfaces allows for network management, as well as local troubleshooting and performance information gathering. Outputs are used to time BITS clocks, SDH NEs or other equipment requiring synchronization.

**Benefit:** *PRC performance at a greatly reduced cost over a Cesium Beam Reference*

### Specifications

#### PHYSICAL

Nominal Input Power:	24/48 VDC, +/- ground
Input Voltage Power:	±20 VDC to ±57 VDC
Dimensions (W x D x H):	17-in (43.2cm) X 10-in (25.4cm) X 3.5-in (8.9 cm)
Weight:	10 lbs (4.54 kg)
Standards:	Meets Bellcore NEBS TR-EOP-000063 and 1089
Connectors:	Output connections on 25-pair telco style ribbon connector

#### ENVIRONMENTAL

Operating Temperature:	32° to 131°F (0° to 55°C) Slew rate not to exceed 8°C per hour
Storage Temperature:	-40° to 167°F (-40° to 75°C)

#### RELATIVE HUMIDITY

Humidity:	0% to 95%, noncondensing
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#### BRIDGING OSCILLATOR (Transit Node Clock)

Rubidium Oscillator:	Exceeds ITU-T G.812 specs
Holdover Drift (after 1 month stabilization):	<7.50 x 10 <sup>-11</sup> in one day over ±5°C temperature range
	<1 x 10 <sup>-10</sup> in one month over ±5°C temperature range
Traceability:	<1 x 10 <sup>-11</sup> per ITU-T G.811

#### BRIDGING OSCILLATOR (Local Node Clock)

Ovenized Crystal Oscillator:	Exceeds ITU-T G.812 Specs
Holdover Drift:	<5 x 10 <sup>-9</sup> in one day over 50°F (±10°C) temperature range

# CXR Larus StarSync 5850E

## ALPHANUMERIC DISPLAY

Scrolls alarm status, when no alarms, displays date and time

## ALARM REPORTING

Autonomous alarm reports when selected thresholds are exceeded  
 LED indicators for thresholds exceeded  
 Local alarm contacts (major/minor)  
 Through TCP/IP Interface

## COMMUNICATION PORTS

EIA RS-232 for local access by a terminal  
 EIA RS-232 for remote access, supporting standard modem control leads  
 Ethernet: 10Base-T, TCP/IP Protocol

Message formats (Software selectable): Menu or TL1

## ALARM OUTPUTS

Four floating relay contact closures (form A) for summary major, minor, audible, and visual alarms  
 Major alarms: GPS unacceptable  
                   > 2 weeks for TNC unacceptable  
                   > 24 hours for LNC

OR Clock loss of output  
 OR Outputs in alarm

Minor alarms: GPS degraded or unacceptable

## ALARM RELAY CONTACT RATINGS

1 A @ 220 VAC or VDC max

## CONTROLS

ACO push-button: Disables audible alarm relays but not front indicators. Auto reset on next alarm.

## OUTPUTS

(4) E1 Drivers  
 Output Signals: E1 framed all ones, CAS or CCS framing, CRC-4 ON or OFF

Output Load Impedance: 120 ohms, resistive  
 Output Pulse Amplitude: 3 V ±0.3 V peak; CCITT G.703/ G.704 requirements

Synchronization Status Messaging (SSM) per G.704

## (4) RS-422 DRIVERS

Output Signals: 1.544MHz square wave, true and complement

Output Load Impedance: 100 ohms, nominal  
 Output Pulse Amplitude: EIA RS-422 specifications

(2) SINE WAVE (BNC connector [female]):  
 5MHz sine wave: 1 volt RMS ±10%, 50 ohms,  
 OR  
 10MHz sine wave: 1 volt RMS ±10%, 50 ohms

(2) COMPOSITE CLOCK  
 64Kbps 5/8 duty cycle pulses, Waveform meets CCITT G.703 Standard  
 Outputs are synchronized with E1 output training  
 Output Load Impedance is 133 ohms, ±5%

(2) 2.048MHz SQUARE WAVE Meets CCITT G.703 Standard  
 Output Load Impedance is 120 ohms, ±5%

ONE PULSE PER SECOND OUTPUT  
 Pulse leading edge to correlated UTC to 1ms  
 Exceeds the Bellcore GR-2861 specification  
 TTL output to BNC connector

TIME OF DAY OUTPUT  
 RS-232 level, ASCII, 9600 Baud, 8 bits, no parity, one stop bit RJ-11 Connector. Issued every 10 sec. 1ms accuracy to UTC

## CERTIFICATION (COMPLIANCE/REGULATORY)

FCC Part 15 Class A, UL 1459, NEBS Level 3 Certified, GR-63 and GR-1089



**020-02722-000 120 Ohm/75 Ohm Adapter**

## Ordering Configurations:

Model	Description
5850E-21	GPS E1 Primary Reference Source with TNC Bridging (Rubidium oscillator)
5850E-23	GPS E1 Primary Reference Source with LNC Bridging (OCXO)
020-02722-000	Adapter, E1, 120 Ohm balanced to 75 Ohm unbalanced, BNC Connectors