

## SecureSync® LMR

### Time and Frequency Synchronization System For Land Mobile Radio



- Synchronized CTCSS outputs
- 10 MHz and 5 MHz outputs
- 5 MPPS/1PPS (composite) outputs
- Configurable 1PPS offsets
- A wide variety of input/output signals supported
- Internal precision timekeeping via OCXO or Rb oscillator
- Multiple, prioritized input references - GPS, PTP, internal
- Multi-GNSS synchronization (GPS, Galileo, GLONASS, BeiDou, QZSS)
- BroadShield GPS jamming and spoofing detection option
- Industry-leading low phase noise capability
- Modular (configure-to-order) ruggedized shock and vibration tested chassis
- Exceptional operating temperature range of -30°C to +65°C
- PTP master
- Secure network management: Enable or disable protocols for encryption, authentication, and authorization
- Best-in-class 5-year limited warranty

SecureSync® combines Orolia's precision master clock technology and secure network-centric approach with a compact modular hardware design to bring you a powerful time and frequency reference system at the lowest cost of ownership. Public Safety LMR, military and commercial applications alike will benefit from its reliability, security and flexibility for synchronizing critical operations.

An important advantage of SecureSync is its unique rugged and flexible modular chassis, which can be configured for your specific needs. Built-in time and frequency functions are extended with up to 6 input/output modules. Included with the base unit is an extremely accurate 1PPS timing signal aligned to a 10 MHz frequency signal without any phase discontinuity. A variety of internal oscillators (typically locked to GPS or GNSS) are available depending on your requirement for holdover and phase noise. Choose from a variety of configurable option cards, each with a variety of input/output timing signal types and quantity, including 10 MHz, 5 MHz, synchronized CTCSS, 5MPPS/1PPS (composite), additional 1PPS, other frequencies (1.544 MHz, 2.048 MHz), telecom T1/E1 data rates, multi-network NTP, and PTP. Modules can be installed to meet your exact requirements.

To support time synchronization, SecureSync supports the latest features of precision time protocol (PTP, IEEE-1588v2) and network time protocol (NTP).

The unit can be powered by AC, or DC, or AC with DC as backup.

SecureSync is a security-hardened network appliance designed to meet rigorous network security standards and best practices. Features can be enabled or disabled based on your network policies. Installation is aided by DHCP (IPv4), AUTOCONF (IPv6), and a front-panel keypad and display.

## Specifications

### 10 MHz Frequency Output:

	OCXO	Low Phase Noise OCXO	Rubidium
Accuracy (Average over 24 hours when GPS locked)	2x10 <sup>-12</sup>	1x10 <sup>-12</sup>	1x10 <sup>-12</sup>
Medium Term Stability (Without GPS after 2 weeks of GPS lock)	5x10 <sup>-10</sup> /day	2x10 <sup>-10</sup> /day	5x10 <sup>-11</sup> /month
Short Term Stability (Allan variance)			
1 SEC	5x10 <sup>-10</sup>	5x10 <sup>-11</sup>	2x10 <sup>-11</sup>
10 SEC	5x10 <sup>-11</sup>	2x10 <sup>-11</sup>	2x10 <sup>-12</sup>
100 SEC	1x10 <sup>-11</sup>	1x10 <sup>-11</sup>	2x10 <sup>-12</sup>
Temperature Stability (peak-to-peak)	5x10 <sup>-9</sup>	1x10 <sup>-9</sup>	1x10 <sup>-10</sup>
Phase Noise			
@1 Hz	-95 dBc/Hz	-100 dBc/Hz	-80 dBc/Hz
@10 Hz	-123 dBc/Hz	-128 dBc/Hz	-98 dBc/Hz
@100 Hz	-140 dBc/Hz	-148 dBc/Hz	-120 dBc/Hz
@1 KHz	-145 dBc/Hz	-153 dBc/Hz	-140 dBc/Hz
@10 KHz	-150 dBc/Hz	-155 dBc/Hz	-140 dBc/Hz
Signal Waveform & Levels: +13 dBm into 50 ohm, BNC			
Harmonics: -40 dBc minimum			
Spurious: -70 dBc minimum			

### 1 PPS Output:

	OCXO	Low Phase Noise OCXO	Rubidium
Accuracy to UTC (1-sigma locked to GPS)	±50 ns	±25 ns	±25 ns
Calculated Holdover (constant temp after 2 weeks of GPS lock)			
After 4 hours	<1 µs	<0.5 µs	<0.2 µs
After 24 hours	<25 µs	<10 µs	<1 µs
Signal Waveforms and Levels: TTL (5v p-p), into 50 ohm, BNC			

## Network Management

### Network Protocols:

- IEEE-1588v2 (PTP)
- SNMP: Supports v1, v2c, and v3 (no auth/auth/priv) with Enterprise MIB
- NTP v2, v3, v4: Conforms with or exceeds RFC 1305. Supports Unicast, Broadcast, Multicast, MD5 encryption, Peering, Stratum 2, Autokey
- SNTP v3, v4: Conforms with or exceeds RFC 1769, 2030, and 4330
- IPv4/IPv6: Dual stack
- DHCP/DHCP6 (AUTOCONF): Automatic IP address assignment
- HTTP: Browser-based configuration and monitoring
- LDAP: Authentication
- RADIUS: Authentication
- Telnet: Remote configuration
- FTP Server: Access to logs
- Syslog: Logging



Base unit includes 10 MHz and 1PPS output signals and a network port.

## GNSS Receivers

- Connector: Type N, +5V to power active antenna
- Frequency: GPS L1 (1575.42 MHz), Galileo E1 (1575.42 MHz), GLONASS L1 (1602.0 MHz), BeiDou B1 (1561.1 MHz), QZSS L1 (1575.42 MHz)
- Satellite tracking: 1 to 72, T-RAIM satellite error management
- Synchronization time: Cold start < 15 minutes (includes almanac download), warm start < 5 minutes (assumes almanac downloaded)
- Antenna system: Sold separately

## Communications

### Network Port

- RJ-45, 10/100-baseT

### Serial Set-up Interface

- RS-232 communications on DB-9

### Front Panel

- LED segments displays date/time
- Lockable keypad and configurable LCD display for network set-up
- Power/Status LEDs

## Power

### Choice of:

- 100-240 VAC, 50/60 Hz, ±10% from IEC60320 connector; power cord included
- 12-17 VDC, -15% to +20% or 21-60 VDC, -15% to +20%, secure locking device
- Auto-failover in the case of AC and DC (AC used if present)

### Power Draw:

- OCXO and low phase noise OCXO: 40W normal (50W start-up)
- Rb: 50W normal (80W start-up)

## Environmental

	Operating	Storage	MIL-STD-810F
Temperature	-30 to +65°C -20 to +65°C startup (+55°C for Rb)	-40 to +85°C	501.4, 502.4
Humidity	10%-95% RH non-condensing @ 40°C		507.4
Altitude	100-240 VAC to 6,560 ft (2,000 M),	45,000 ft (13,700 M)	500.4
Shock	15g, 11ms half sine wave	50g, 11ms half sine wave	516.5
Vibration	10-55Hz/0.07g <sup>2</sup> /Hz 55-500Hz/1.0g <sup>2</sup> /Hz	10-55Hz/0.15g <sup>2</sup> /Hz 55-500Hz/2.0g <sup>2</sup> /Hz	514.5

## Agency Approvals

UL, CE, FCC part 15 class A, CSA, cUL, ROHS, WEEE

## Physical & Environmental

### Size/Weight:

- Designed for EIA 19" rack  
16.75" W x 1.72" H (1U) x 14.33" D actual  
(425 mm W x 44 mm H x 364 mm D actual)
- Weight: 6.5 lbs. (3 kg)
- Rack mount hardware included (assembly required)

## North America Warranty

### Five-Year Limited Warranty

- Oscillator for Rubidium option is warranted for two years
- Extended warranty is available for purchase

## Ordering Information

### Base Units

#### SecureSync 1200-XYZ

Select power, internal oscillator and reference options. Then, order option modules for additional input/output functions.

X=Power	Y=Internal Oscillator	Z=Primary Reference
0=AC 1=AC/DC (12 VDC) 2=AC/DC (24 or 48 VDC) 3=DC (12 VDC) 4=DC (24 or 48 VDC)	1=OCXO 2=Low phase noise OCXO 3=Rubidium	1=No GPS/No Multi-GNSS 3=GPS/Multi-GNSS

#### Example:

SecureSync 1200-013 is an AC powered unit with internal OCXO oscillator and GPS as the primary reference. It comes with a 10/100 Base-T network port and 1 each 1PPS and 10 MHz output signals. For three (3) additional 10 MHz outputs a 1204-1C 10 MHz option module should be ordered.

## Available Option Modules

Up to 6 option modules can be accommodated per unit.

Description	Signal Type	Outputs	Inputs	Model No.
10MHz	Sine	3	0	1204-1C
5MHz	Sine	3	0	1204-08
LMR outputs	RS-485	4	0	1204-14
1PPS out	TTL	4	0	1204-18
Programmable TTL (5MPPS/1PPS)	TTL	4	0	1204-17
PTP Interface - Master	10/100 baseT	1		1204-32
PTP Interface - Slave	10/100 baseT	1		1204-3B
Revertive Selector	Sine or TTL	1	2	1204-2E
Programmable Frequency Output	Sine	4	0	1204-13
Alarms	Relay	3	0	1204-0F
T1/E1	per GR-499-CORE (10.3)	2 DS1 plus 1544 kb/s	0	1204-0A

Additional modules available, see manual.



Add the features you need through option modules, up to 6 option modules per unit

## Option Module Cards

Add only the features you need by selecting SecureSync option cards. Up to six (6) cards can be accommodated per unit. In a few cases, the number of cards of any one type are restricted. See maximum number of cards for each type.

### Programmable TTL Output - Composite 5 MPPS/1 PPS

The Programmable TTL Output option module card provides four (4) programmable square wave outputs. At top of second, pulse width can be configured to create a 5 MPPS/1PPS (aka composite) output.

#### Specifications:

	Output
Quantity	4
Signal Type and Connector	TTL (BNC into 50 ohms)
Programmable Period	100 ns to 1,000,000,000 ns in 5 ns steps 100 µs to 60,000,000 µs in 1 µs steps
Pulse Width Range	20 ns - 900 ms in 20 ns steps
Rise Time to 90% of Level	< 40 ns

#### Ordering Information

1204-17: Programmable TTL output module (6 maximum)

### Frequency Output (10, 5 MHz)

The 10 and 5 MHz SecureSync option cards provide three (3) sine wave BNC outputs. These outputs are phased-locked to the SecureSync's disciplined oscillator to supply precise waveforms with minimal distortion.

#### Specifications:

	Frequency Output
Quantity	3
Signal Type and Connector	+13 dBm (10 MHz) into 50 ohm, BNC +10 dBm (5 MHz) into 50 ohm, BNC
Spurious	-70 dBc (10 MHz) -55 dBc (5 MHz)
Harmonics	-40 dBc
Maximum Number of Cards: 4 total (10 MHz or 5 MHz)	

#### Ordering Information

1204-1C: 10MHz output module (4 maximum of 10MHz + 5MHz modules)

1204-08: 5 MHz output module (4 maximum of 10MHz + 5MHz modules)

### LMR (Simulcast) Outputs

Generates EIA CTCSS clock rate (exact tone or nearest 1/3 Hz) or custom LMR frequencies (1PPS, 18 kHz, 9.6 kHz, 33 1/3 Hz, 26 2/3 Hz, 17 2/3 Hz), as well as alarm outputs at RS-485 levels.

#### Specifications:

	Signals	Alarms
Quantity	4	3
Signal Type (and Connector)	RS-485 (DB-9/RJ-12)	ground/open (DB-9/RJ-12)

#### Ordering Information

1204-14: LMR module (6 maximum) for synchronized CTCSS. Note: One 1118-2 CTCSS filter assembly required per base station

### Alarm Contact Outputs

The Relay option module card provides three (3) configurable relay outputs for the SecureSync platform.

**Specifications:**

Alarms	
Quantity	3
Signal Type and Connector	NO/NC Relays (terminal block) Contacts with under max. load of 30 VDC, 2A Contacts rated to switch 220VDC Breakdown voltage of 1000 VDC between contacts Switch time 4 ms, max.

**Ordering Information**

1204-OF: Alarm module (1 maximum)

### 1PPS

The 1PPS option card is the ideal solution when 1PPS distribution is necessary.

**Specifications:**

1PPS Output	
Quantity	4
Signal Type and Connector	TTL (BNC into 50 ohms)
Programmable Phase Shift	±5 ns to 500 ms with 5 ns resolution
Programmable Pulse Width	100 ns to 500 ms with 20 ns resolution
Rise Time to 90% of Level	<10 ns
Absolute Phase Error	±50 ns (1σ)

**Ordering Information**

1204-18: Quad 1PPS output module (6 maximum)

### Programmable Frequency Output

The Programmable Frequency Output option module provides four (4) independently programmable frequency synthesizers that provide sine wave frequencies from 1 to 25 MHz in 0.1Hz steps, with the output frequency locked to the SecureSync system disciplined oscillator.

**Specifications:**

Sine Wave Output	
Quantity	4, independently programmable
Signal Type and Connector	+13 dBm (BNC into 50 ohms)
Output Pulse (frequency) Rates	1 Hz to 25 MHz in 0.1 Hz steps
Wave Form	Sine Wave
Synchronization	Output Frequency locked to SecureSync disciplined 10 MHz
Phase Noise	-120 dBc/Hz @ 1kHz offset -130 dBc/Hz @ 10kHz offset -140 dBc/Hz @ 100kHz offset
Harmonics	≤30 dBc
Spurious	≤60 dBc

**Ordering Information**

1204-13: Programmable Frequency Output Module (Sine Wave (6 maximum))

Modular option cards provide enhanced functionality for your application.



### T1/E1 Balanced Output

The T1 / E1 Balanced Output option card provides one (1) 1.544 MHz or 2.048 MHz frequency output and two (2) E1 or T1 data rate outputs.

**Specifications:**

	Frequency Output	Data Rate Output
Frequency	1.544 or 2.048 MHz	1.544 or 2.048 Mb/sec
Quantity	1	2
Signal Type	RS-485	Differential T1 into 100 ohms or differential E1 into 120 ohms
Connector	Terminal block	

**Ordering Information**

1204-OA: T1-1.544 or E1-2.048 module (6 maximum)

### Revertive Selector

Output follows selected input. Inputs can be 1PPS or 10 MHz or 5 MHz. A is selected if present and valid. If input A disappears, or if power to host SecureSync is interrupted, input B is presented at output. When input A becomes valid again, output switches back to use A as source.

**Specifications:**

	Output	Inputs
Quantity & Connectors	(1) BNC	(2) BNC
Signal Types	Same as input	10 MHz or 5 MHz or 1PPS
Signal Levels	As selected input	Up to 30 VDC

**Ordering Information**

1204-2E: Revertive Selector Module (6 maximum)

### Precision Time Protocol (PTP)

The Precision Time Protocol (PTP) option module cards support PTP Version 2, as specified in the IEEE 1588-2008 standard. PTP v2 is provided to the SecureSync via one (1) PTP port (on the 1204-3B).

**Specifications:**

Mode	Ordinary clock, automatic slave or master selection, 1-step or 2-step operation
Time Resolution	±4ns packet time-stamping
Accuracy	30ns (3s) master to slave via crossover cable
Master Capacity	Sync rate above 512 syncs/sec
Network	Multicast, unicast, hybrid modes
Delay Mechanism	End to end
Connector	10/100 Mb Ethernet, RJ45 (1 port per card)

**Ordering Information**

1204-32: PTP Grand Master module (6 maximum)  
1204-3B: PTP Slave module (6 maximum)