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Symmetricom

SSU 2000

Intelligent NEBS-Compliant Sync Supply Unit

KEY FEATURES

- Dynamic Control Algorithms for Superior Performance
- Intelligent Software for Ease of Maintenance and Turn up
- Each Input Reference May be Assigned a Priority for Reference Use or Set as Monitor Only
- Each Input Provides Full Performance Monitoring of the Input Signal Compared Against Both Clocks
- Output: 160-1120x DS1/E1, Composite Clock all Fully 1:1 Redundant
- Communications: 1x Ethernet (10 Base-T), 3x EIA-232 Ports
- Management: AutoReconfig, SNMP, Interactive ASCII, TL1, Local Windows Manager

APPLICATIONS

- Synchronization Supply Unit (SSU)
- Primary Reference Source (PRS)
- Building Integrated Timing Supply (BITS)
- Subtending Timing Signal Generator

INTRODUCTION

Symmetricom's SSU 2000™ is an intelligent, fully manageable Synchronization Supply Unit or Timing Signal Generator. It's used for telecom network operators to generate and distribute superior synchronization signals for advanced network services. Designed in a NEBS-compliant package, it utilizes the latest hardware and software integration technologies.

INDUSTRY STANDARDS COMPLIANCE

The SSU 2000 is designed to meet the latest and evolving industry standards, including ANSI, Telcordia, ITU-T, ETSI and CE/AS.

ARCHITECTURE

The SSU 2000 architecture is designed to integrate intelligent functional modules into a flexible, fully redundant system to seamlessly satisfy current and future requirements.

Up to 160 outputs are available in the main unit.

Up to 1120 additional outputs are available through four expansion shelves, providing a capacity of 280 outputs per shelf.

Expansion shelfs are designed with redundant connections for reliable uptime. Output modules may be configured in redundant pairs thus providing twenty 1:1 fully protected outputs per pair.

Auto-Reconfiguration: If a module is removed and a like module installed in the same slot, the new module will be automatically configured to the same settings as the previous module.

Input signals are passed through in case of multiple internal failures, including clock failures.

INTELLIGENT MODULES

Each SSU module has an integrated CPU with software for superior reliability, flexibility and functionality. Modules can be removed or inserted while the unit is oper-



The SSU 2000 Synchronization Supply Unit.

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ating without any degradation of the output signals. Each intelligent module supports the management of critical, major and minor alarms. Powerful management can be performed to and within each module through the communication module.

INPUT MODULE

The SSU 2000 accepts up to nine input modules, available in a one-port or three port version, thus providing up to twenty-seven inputs. Each modules is fully user configurable through software to support the following signals:

- DS1/E1
- SSM quality
- 1 MHz (sine or square)
- 1.544 MHz (sine or square)
- 2.048 MHz (sine or square)
- 5 MHz (sine or square)
- 10 MHz (sine or square)

DS/E1 input signals are passed through in case of internal clock failure.

Various input impedance panels are available to support the following balanced or unbalanced signal impedances:

- 50 ohms (sine)
- 75 ohms (DS1/E1)
- 100 ohms (DS1)
- 120 ohms (E1)
- 133 ohms (CC)
- High impedance for timing extraction only (bridging model)
- Specific panel/adapter connection interfaces:
  - Wire wrap
  - COAX
  - BNC
  - Siemens
  - DE-9

GPS MODULE

The SSU accepts single or dual GPS primary receiver modules to meet primary reference clock requirements, which provides the following key benefits:

- Flattens the number of levels in the sync distribution hierarchy
- Improves the overall performance of the network
- Lowers the overall OAM&P costs (Operation, Administration, Maintenance, and Provisioning).
- Single unit Primary Reference Source (PRS)
- Time Of Day (TOD) through the Network Time Protocol (NTP)

INTELLEGENT CLOCK MODULE

The SSU accepts single or dual clocks. A selection of mixed SynClock technologies is available to meet specific holdover requirements.

- Enhanced Rubidium-Stratum 2E
- Enhanced Quartz-Stratum 3E

SUPERIOR HOLDOVER PERFORMANCE

In case of loss of GPS and input references, the SSU 2000 uses intelligent software to provide enhanced output performance beyond the required holdover stability. Its superior holdover performance retains stratum 1/G.812 for 2 weeks during holdover with rubidium clock.

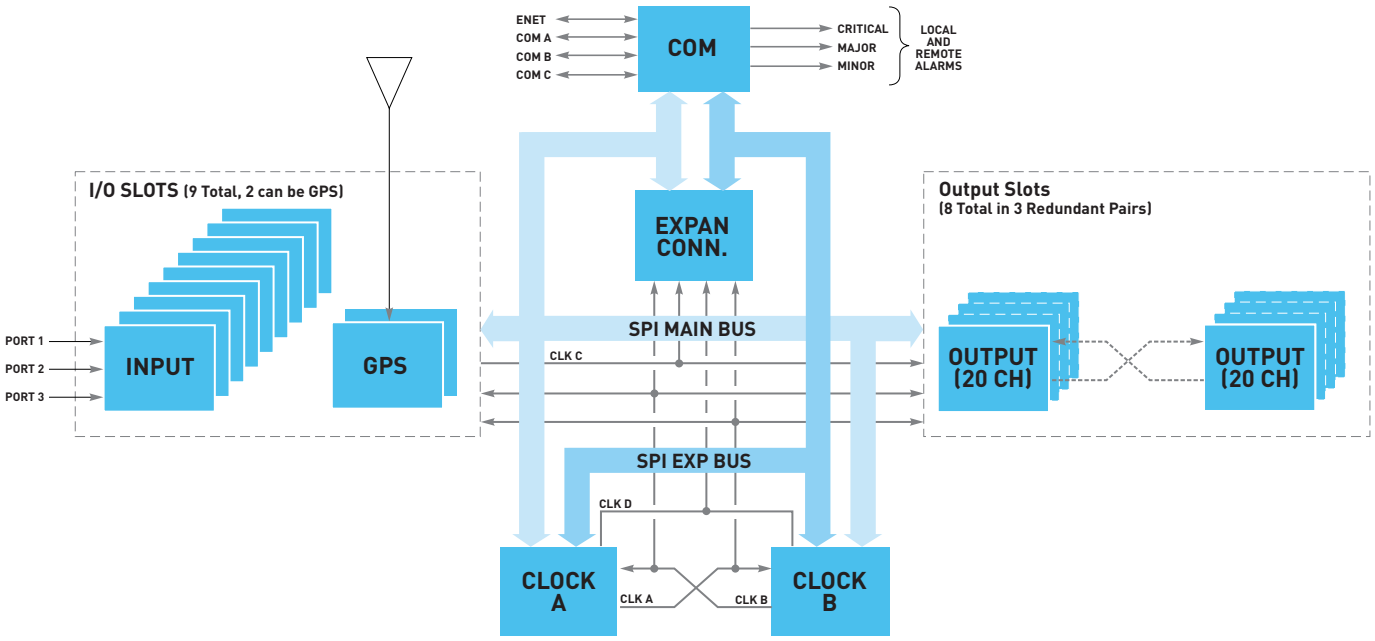
OUTPUT MODULE

The SSU's main unit accepts up to eight output modules, providing 160 outputs. Up to four expansion shelves can be added, providing up to 1120 additional outputs. The output modules may also be configured for redundant operation that supplies 20 protected outputs per pair. Various output modules are available to meet specific signal and interconnection requirements. The activation of the outputs ports are fully user controllable.

SUBTENDING MODE OF OPERATION

The SSU 2000 configured as a Subtending SSU broadens the Symmetricom SSU 2000 family of products by providing subtending clock functionality when referenced to a master TSG/BITS equipped with a Stratum 3E or better clock. The Subtending SSU is used when there is a need for more timing outputs or longer distribution paths than can be supplied by a single TSG. The Subtending SSU receives redundant Composite Clock reference signals directly from the master BITS clock. These CC signals are used for primary and secondary inputs, and the SSU phase locks to the selected reference to ensure proper DS0 phase alignment throughout the office. If both CC reference inputs fail, the shelf provides Stratum 3E holdover stability. If both 3E clock modules fail, the Subtending SSU uses the CC reference input for clock bypass operation to maintain uninterrupted outputs.

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EXPANSION SHELF (SDU)

The SDU 2000 Synchronization Distribution Unit, is an expansion shelf that is connected to an SSU 2000 Synchronization Supply Unit and is used to provide additional output signals. The expansion shelf uses the framing and synchronization features of the main shelf to drive an array of output modules. Each expansion shelf in the system can accept 14 output modules, and two buffer modules. Any combination of DS1, E1, Composite Clock, RS-422, or 2048 kHz output modules may be installed. Each pair of output modules produces 20 outputs, thus providing up to 280 output signals. Up to four expansion shelves can be connected together to produce an additional 1120 output signals. These output modules may also be configured as redundant pairs to provide 1:1 fully protected outputs. The last expansion shelf in the chain can be located up to 200 feet away from the main shelf.

SYNCHRONIZATION STATUS MESSAGES (SSM)

The Input Module reads and processes Sync Status Messages (SSM) in accordance with ITU-T and ANSI Standard T1.403 to determine the traceability of inputs. This traceability information is then used by the clock modules in selecting a reference signal, and is embedded into the system's outputs. An embedded editable table allows upgrades as standards evolve.

NEBS LEVEL 3 CERTIFICATION

The SSU 2000 is fully Network Equipment Building System (NEBS) certified. This ensures the SSU 2000 meets established safety and reliability standards.

COMMUNICATION MODULE

The SSU utilizes a single communication module. Coupled with the GUI-based NetSync Manager or Local Management Terminal software, the communication module provides powerful fault, configuration, accounting/inventory, performance, security, and other optional management functions.

The communication module supports the following management interfaces:

- Interactive ASCII
- TL1
- SNMP (optional)
- NTP

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SSU 2000 Specifications

ARCHITECTURE
- Main unit modules: 2 clock, 1 comm, 9 mixed input/output
- Each output expansion shelf will accept up to 14 output modules of various types, thus providing an additional 280 outputs per shelf. The SSU 2000 will accomodate up to four expansion shelves, for a total of 1120 additional outputs. The last expansion shelf in the chain can be located up to two hundred feet away from the main shelf
- The SSU 2000 is a fully automated and software manageable system. Firmware upgrades can be remotely installed, thus negating the necessity of site visits for update purposes.

GPS PERFORMANCE
- Compliant with Stratum 1 PRS (Primary Reference Source) per ANSI T1.101-1999, ITU-T G.811, Telcordia GR-2830/1244-CORE, and ETS 300 462-6

CLOCK PERFORMANCE
- Compliant with clock levels per ANSI T1.101-1994 & 1997 draft, ITU-T G.812, Telcordia GR-2380/1244-CORE and ETS 300 462-4

SYNC STATUS MESSAGING (SSM)
- Compliant with SSM specification per T1X1.3 TR33, ANSI T1.101-1997 draft, ITU-T G.704, and Telcordia GR-253-CORE

NETWORK TIME PROTOCOL (NTP)
- Compliant with RFC 1305 (V3); Stratum 1 server with GPS module(s)
- Supports client and server modes in unicast and broadcast

COMMUNICATIONS & MANAGEMENT
- 3x EIA-232 and 1x Ethernet ports, supporting interactive ASCII, TL1, and SNMP

REDUNDANCY
- For any pair of output modules, it is possible to connect all of the outputs from module "A" to the outputs of module "B", thus providing 1:1 output protection (1:1 redundancy). This feature is user configurable

EVENT LOG
- Stores up to 500 events from any system faults, user interventions, and system actions. Events are time & date stamped to less than 1 msec.

Input

SLOT
- 9
- Slots 3 through 11 are Input/Output slots.Additionally, slots 3 and 5 will also accept GPS modules.

PORT
- 1 or 3 ports/module, reference or monitoring capability
- Up to 27 inputs for monitoring or references
- Embedded Sync Status Messaging (SSM)
- Integrated performance measurements (TIE, MTIE,TDEV, ERROR RATES) on all inputs

TYPE
- DS1, E1, 1 MHz, 1.544 MHz, 2.048 MHz - G.703/13, 5 MHz, 10 MHz (user settable)

GPS
- Integrated single or dual GPS modules. Slots 3 and 5. If slot 5 is not occupied by a secondary GPS module, any other input module may be installed there.

SELECTION MODE
- Priority, SSM, Performance Mask

REALTIME CPU
- Intelligent software for real-time MTIE, TDEV and TIE performance monitoring

Performance Measurement

RESOLUTION
- Measurements are provided for each input versus each clock at a resolution of 1ns

SAMPLING RATE
- 40 Hz

Calculations

MTIE
- Exceeds the latest ITU-T, ANSI and Telcordia standards with measurement intervals of 0.5 to 100,000 seconds

TDEV
- Exceeds the latest ITU-T, ANSI and Telecorida standards with measurement intervals of 0.1 to 10,000 seconds

PHASE
- 1, 100, 1000, and 10,000 second phase averages and history are available

FREQUENCY
- Frequency measurements can be viewed via user selectable calculation periods from 10 to 10,000 seconds

Clock

HOLDOVER TYPE
- Enhanced Rubidium (Type II)
- Enhanced Quartz (Type I for ITU-T Standards)
- Enhanced Quartz (Type III)

CONTROL
- DDS (Direct Digital Synthesis) technology for cost-effective calibration-free operation and precise frequency control

Output

SLOT
- Main unit: 9 single or redundant
- Expansion shelf: 14 output modules and 2 buffer modules

PORTS PER MODULE
- 20 ports/module for DS/E1, 6 ports/module for analog and 2 in-&-out ports/module for retimed DS1/E1

TYPE
- DS1, E1, 1 MHz, 1.544 MHz, 2.048 MHz - G.703/13, 5 MHz, composite clock
- RS-422/TTL that provides output frequencies from 8 kHz to 4096 kHz in 8 k steps

SYNC STATUS MESSAGING (SSM)
- Fully supported per above-listed standards

MAX. CAPACITY
- Main shelf: up to 160 outputs
- Up to 1120 outputs, 4 expansion shelves, 280 ports per shelf

Communication & Management

COMMUNICATION PORT
- 3x EIA-232
- 1x Ethernet, 10 Base-T, TCP/IP

MANAGEMENT INTERFACE
- Simple fault, visual & contact closures
- Embedded Interactive ASCII
- Embedded TL1
- Embedded SNMP (optional)

LOCAL MANAGEMENT
- Windows GUI-based Local Management Terminal

Environmental

POWER (VDC)
- Dual -40.5 to -75
- Less than 120 watts power consumption per shelf

SIZE (HXWXD)
- 19.7"x18.9"x9" (500x480x229mm) or 19.7"x20.9"x9" (500x530x229mm) with rack ears

WEIGHT (MAX.)
- 26.7lbs (12.1kg) main unit, 22.3lbs (10.1kg) for each expansion unit

OPERATING TEMPERATURE
- 0 to 50 Degrees Centigrade
- EMC: Radiated emissions are 6dB below the Class B requirement

Symmetricom

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