

# SSU 2000e

## Intelligent ETSI-Compliant Synchronization Supply Unit

### KEY FEATURES

- Dynamic Control Algorithms for Superior Performance
- Intelligent Software for Ease of Maintenance and Turnup
- Each Input Signal May be Assigned a Priority for Reference Use or Set as Monitor Only
- 20 Outputs Per Module in 2048 kHz or 2048 Kbit/s Format
- Communications: 1x Ethernet (10 Base-T), 3x EIA-232 Ports
- Multiple Management Options: SNMP, Interactive ASCII, TL1, Local Windows Manager
- Auto Reconfiguration

### MAJOR APPLICATIONS

- Primary Reference Clock (PRC)
- Synchronization Supply Unit (SSU)
- Stand Alone Synchronization Equipment (SASE)
- Building Integrated Timing Supply (BITS)

### INTRODUCTION

Symmetricom's SSU 2000e is an intelligent, fully manageable Synchronization Supply Unit. It is used by network operators to generate and distribute superior synchronization signals for advanced network services. Designed in a ETSI-compliant package, it utilizes the latest hardware and software integration technologies to meet all current and future synchronization requirements.

The SSU 2000e conforms to specifications for International, European, and North American applications as a Primary Reference Source (PRS), Synchronization Supply Unit, and Timing Signal Generator. The SSU 2000e allows for the integration of a variety of synchronization reference schemes including GPS and land line DS1 or E1. A selection of hot-pluggable modules and powerful software allow users to easily reconfigure, upgrade, or expand the SSU 2000e to meet a wide variety of telecommunications synchronization application requirements.

### INDUSTRY STANDARDS COMPLIANCE

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

### ARCHITECTURE

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

Up to 60 fully redundant, protected outputs are available in the main unit.

Up to 400 1:1 protected additional outputs are available through four expansion shelves, providing a capacity of 100 1:1 protected outputs per shelf. Expansion shelves are designed with redundant connections for reliable uptime.

Input signals are passed through in case of multiple internal failures, including clock failures. The unit accepts dual DC power and provides independent power conversion on each module.

All modules are individually fused to protect the system in case of a short circuit on any one module.



The SSU 2000e Synchronization Supply Unit

## EQUIPMENT MOUNTING

The SSU 2000e can be mounted on either a standard ETSI mounting rack or 300mm deep equipment cabinet. The SSU 2000e chassis occupies 500mm vertically, 229mm of depth, and a width of 431.8mm.

The SSU 2000e supports up to four expansion shelves and the last expansion in the chain can be located up to 60m away from the main shelf.

## INTELLIGENT MODULES

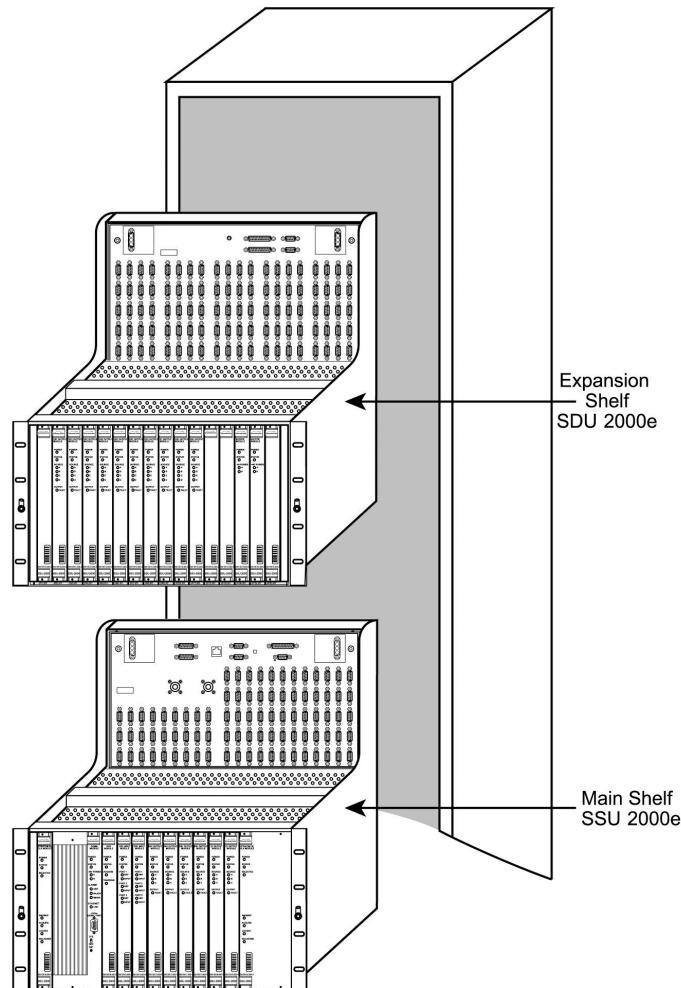
Each SSU module has an integrated CPU with software for superior reliability, flexibility and functionality. Modules can be removed or inserted while the unit is operating without any degradation of the output signals. Each intelligent module supports the management of critical, major and minor alarms. Powerful management can be performed to and within each module through the communication module including in-service upgrades to software and programmable logic devices.

## INPUT SECTION

The SSU 2000e accepts up to three input modules, available in a one-port or three port version, thus providing up to nine inputs. Each input provides full performance monitoring of the input signal compared against both clocks. Each module is fully user configurable through software to support the following signals:

- G.703 compliant 2048 kbit/s 2048 kHz
- DS1
- SSM quality status
- 1 MHz (sine or square)
- 1.544 MHz (sine or square)
- 5 MHz (sine or square)
- 10 MHz (sine or square)

Each input slot supports connections for termination, bridging, monitoring and traffic pass-thru. These connectors provide performance monitoring, impedance termination and traffic passthrough to network elements and input references.



The SSU 2000e can be mounted on either a standard ETSI mounting rack or 300mm deep equipment cabinet.

## INTELLIGENT CLOCK MODULE

The SSU accepts single or dual clocks. A selection of mixed SynClock technologies is available to meet specific holdover requirements. Clock modules are available to meet various International Standards; ITU-T Type 1 (ETSI Slave Clock), Type II (Stratum 2E), and Type III (Stratum 3E).

## SUPERIOR HOLDOVER PERFORMANCE

In case of loss of GPS and DS1/E1 input references, the SSU 2000e uses intelligent software that incorporates temperature compensation and aging corrections to provide enhanced output performance beyond the required holdover stability. Performance meets G.812 accuracy in holdover for up to three weeks with Symmetricom rubidium technology.

## GPS MODULE

The SSU accepts single or dual GPS 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 Option)

## COMMUNICATION MODULE

The SSU incorporates a dedicated Communications Module that is available in four different software configurations. Coupled with Symmetricom's advanced management software solutions, 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

The communications module offers four versions of operational software:

- Basic
- Basic with NTP
- Basic with SNMP
- Basic with NTP and SNMP

## OUTPUT SECTION

The SSU's main unit accepts up to 6 fully redundant, protected output modules, providing 60 outputs. Any output module can be removed or inserted while power is applied without affecting the operation of any other module or the system.

## RS-422 OUTPUT MODULE

The RS-422 Output module generates 10 balanced square-wave outputs (T1TIP and T1RING signal pairs) and 10 single-ended (Ring) square-wave outputs. Each output can be turned off independently of other ports: relays on each output disconnect the driver output from the output pins. A squelch feature turns off selected ports when the input signal falls below predetermined quality levels.

## E1/2048 kHz OUTPUT MODULE

The E1/2048 kHz Output module generates and monitors 20 independent port selectable E1 or 2048 kHz output signals. If the module is inserted into an SDU-2000 expansion shelf, a fourth 4 kHz clock (D clock) is available. If the input signal PQL drops below a user-specified level, then the outputs can be squelched.

## EXPANSION SHELF (SDU)

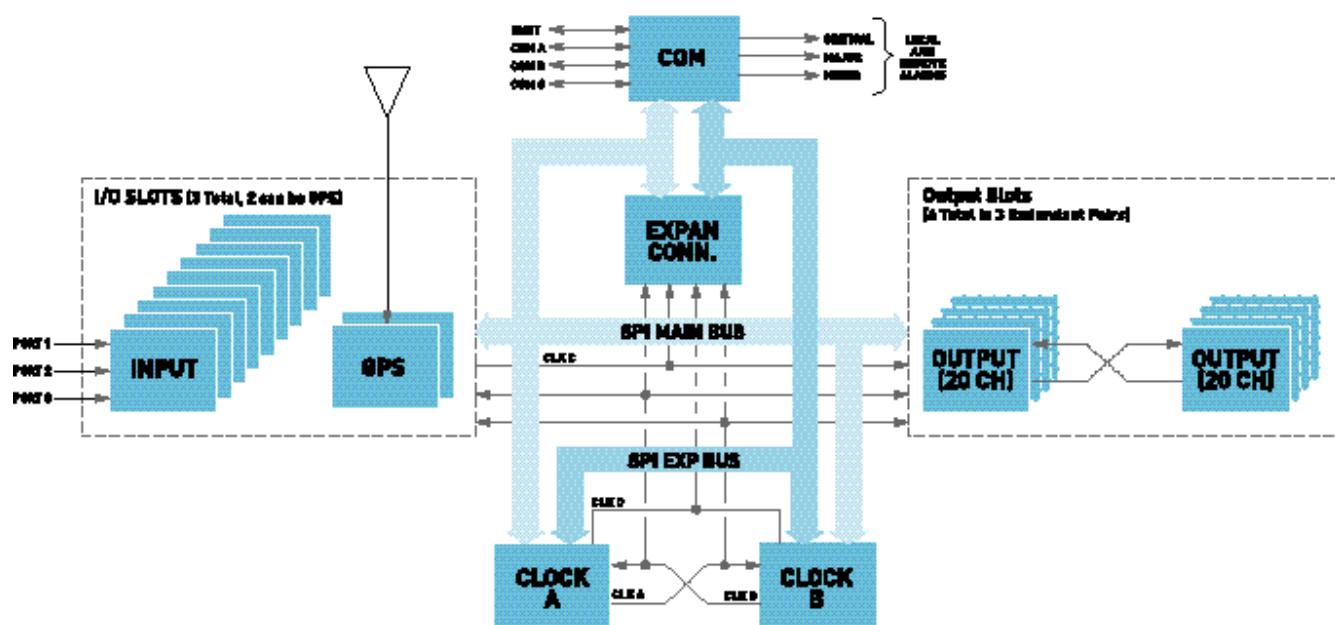
The SDU 2000e Synchronization Distribution Unit is an expansion shelf that is connected to an SSU 2000e Synchronization Supply Unit and is used to provide additional output signals.

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 10 output 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 redundant or protected outputs, thus providing up to 100 summed (1:1 protected) output signals. Up to four expansion shelves can be connected together to produce an additional 400 full protected output signals. The last expansion shelf in the chain can be located up to 60 meters 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.



## SSU 2000e Specifications

### ARCHITECTURE

- Main unit modules: two clocks, one comm, three input and six output modules
- Output expansion shelf: up to four expansion shelves with each shelf supporting 100 output ports, five modules in unprotected operation, ten modules in fully redundant operation

### GPS PERFORMANCE

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

### CLOCK PERFORMANCE

- Compliant with ITU-T G.812 Type 1-VI, ETSI 300 462-4, ANSI T1.101-1999 and Telcordia GR-378/1244-CORE

### SYNC STATUS MESSAGING (SSM)

- Compliant with SSM specification ITU-T G.704, T1X.3 TR33, ANSI T1.101-1999 and Telcordia GR-253-CORE

### NETWORK TIME PROTOCOL (NTP)

- (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, SNMP and NTP
- RS-232 ports support ASCII and TL1, and the Ethernet supports all of the above
- The Ethernet supports four telnet sessions, two TL1 sessions, five SNMP messages, and NTP

### REDUNDANCY

- Output modules paired in adjacent slots provide redundant operation via internal signal summing

### 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

- Slots three, four, and five will support line inputs. Additionally, slots three and five support GPS input modules

#### PORT

- One or three ports/module, reference or monitoring capability

#### TYPE

- 2048 kbit/s G.703/9, 2048 kHz G.703/13, DS1, 1/1.544/5/10 MHz (sine or square, user settable)

#### GPS

- One or two GPS modules per shelf. Slots three and five

### 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 Telcordia 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

- Six output slots available in the main shelf
- Up to ten output modules in each expansion shelf

#### PORT

- 20 independent ports per module

### TYPE

- Dedicated G.703 compliant 2048 kbit/s and 2048 kHz, User select 2048 kbit/s and 2048 kHz, DS1, TOD through NTP, NTP through the Ethernet port, Select rate RS-422/TTL that provides output frequencies from 8 kHz to 4096 kHz in 8 k steps

### MAX. CAPACITY

- Main shelf: up to 60 fully redundant outputs
- Up to 400 1:1 protected outputs, four expansion shelves, 100 protected outputs 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 100 watts power consumption per shelf

#### SIZE (HXWxD)

- 500 x 480 x 229 mm (19.7" x 18.9" x 9") or 500 x 530 x 229 mm (19.7" x 20.9" x 9") with rack ears

#### WEIGHT (MAX.)

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

#### OPERATING TEMPERATURE

- 0°C to 50°C

#### EMC

- Radiated emissions are 6dB below the Class B requirement



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