

General Specifications

GS 33P02N80-31E

Model LPC6900, LPC6910,
LPC6920, LPC6930
SEM Sequence of Events
Manager (for FIO and Vnet/IP)



GENERAL

This GS (General Specifications) describes the specifications of the Sequence of Events Manager (SEM). The SEM captures, records and displays in chronological order the sequence of events (SOE) prior to and during a plant trip. The SEM provides a means of recording activities leading to a potential plant upset or trip.

The SEM offers the following benefits:

- High-speed capturing of events with one millisecond time stamp resolution
- SOE inputs available for use as control and or monitoring signals
- Accurate system time synchronization across a Vnet/IP system without additional hardware
- Time synchronization with Simple Network Time Protocol (SNTP) server (Option)
- Trip Report for a specified time period upon occurrence of user defined triggers
- Long-term data storage and automatic trip report generation
- SOE data output to OPC clients (e.g. Exaquantum)
- SOE viewing and reporting at multiple Human Interface Stations (HIS) and/or any other PCs via Ethernet
- SOE viewing and reporting that integrate SOE messages with process alarms and other process related events

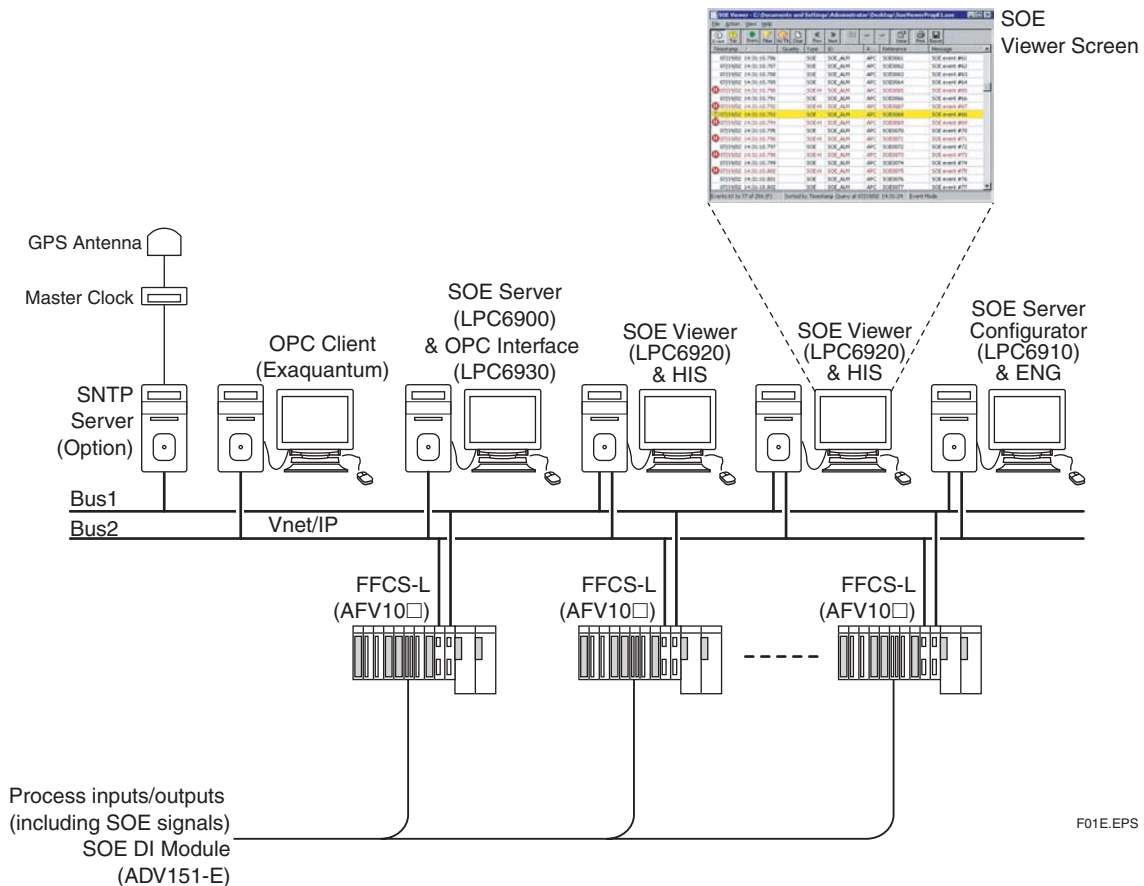


Figure: Example of SEM System Basic Configuration

SYSTEM COMPONENTS AND SOFTWARE

The SEM is designed to capture the events using SOE digital input modules (ADV151-E). These modules apply time stamp and send the SOE data from the Field Control Station (FFCS-L) to the SOE Server via Vnet/IP. An open communication bus of Vnet/IP is used for SOE data transmission. The SOE data is sent to the SOE Server, stored in the SOE Server and displayed in chronological order on the SOE Viewer screen. As the SEM employs a Server/Client (Viewer) architecture, the SOE data stored in the SOE Server can be easily accessed from multiple HISs and/or any other PCs via Vnet/IP. The SEM consists of the following system components with the appropriate SEM software.

Field Control Station (Model: AFV10□)

The following FFCS-L models can provide an interface to transfer time-stamped SOE data from SOE digital input modules to the SOE Server.

- AFV10S Field Control Unit (for Vnet/IP, for FIO, 19" rackmountable)
- AFV10D Duplexed Field Control Unit (for Vnet/IP, for FIO, 19" rackmountable)

For the specifications of these models, see the "Hardware Specifications" of GS 33P06C10-31E.

SOE Digital Input Module (Model: ADV151-E)

The ADV151-E has 32 digital input channels with an SOE capturing feature. Each input on state change can be configured individually whether or not to allow a SOE time stamp. All ADV151-E inputs can be used as control and monitoring signals in the control scheme. The ADV151-E modules can also be used in pairs to provide redundant inputs where high reliability is required. The ADV151-E has the same basic specification as ADV151. See the corresponding section of GS 33Q06Q45-31E "Digital I/O Modules (for FIO)" and GS 33P06Q01-31E "FIO System Overview (for AFV10□).

SOE Server (Model: LPC6900)

The SOE Server is designed to acquire and store SOE data from multiple FFCS-Ls and make available this data to multiple HIS or PCs running SOE Viewer software. The SOE Server is configured in a dedicated server PC connected to an open communication bus (Bus 2) of Vnet/IP. The SOE Server can also be configured in an HIS under the some conditions specified in "SPECIFICATIONS OF SOE SERVER". Microsoft SQL Server is used for database management. Long-term data storage is limited only by hard disc capacity.

SOE Viewer (Model: LPC6920)

The SOE Viewer is designed to access and query the SOE Server. It displays the SOE data with filtering as specified by the user. The SOE Viewer generates and prints trip reports, and exports them to CSV (comma-separated value) format files. The SOE data from other data sources, such as messages stored in HISs, can also be displayed on the SOE Viewer. Each SOE point can be viewed with its associated time stamp, alarm class, equipment name, event message along with other configured in formation.

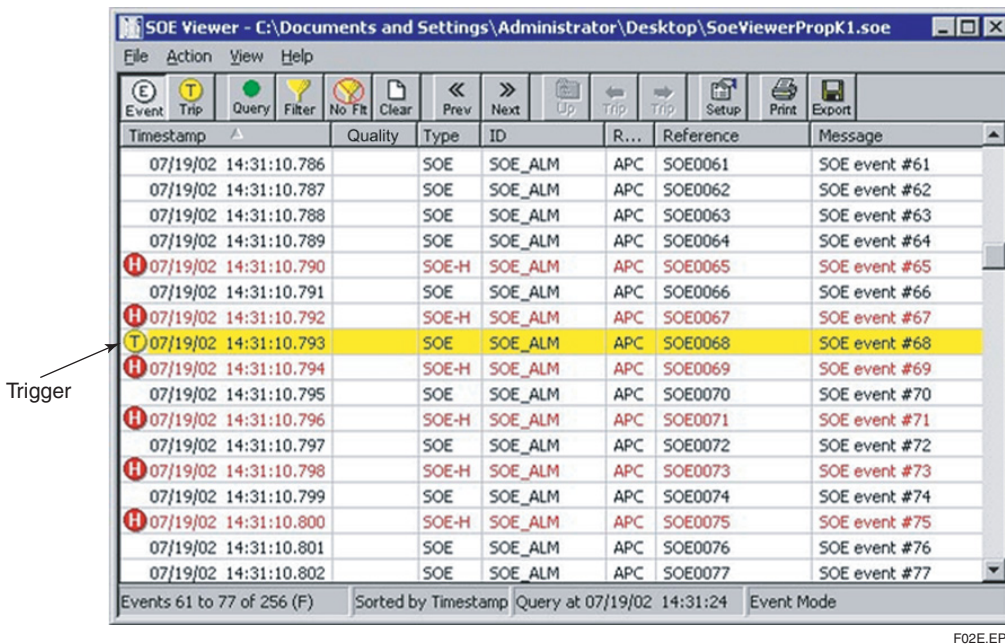


Figure: SOE Viewer Screen

● **SOE Server Configurator (Model: LPC6910)**

The SOE Server Configurator is designed to configure the SOE Server. The configurator is used to define various settings such as the station configuration, SOE input terminals and the trip report configuration.

● **SEM OPC Interface (Model: LPC6930)**

The SEM provides the OPC interface function which OPC clients such as Exaquantum can access the SOE data stored in the SOE server through Ethernet. The OPC interface works as an OPC Alarm and Events (A&E) server and an OPC Historical Data Access (HDA) server.

● **Human Interface Stations (HISs)**

Using the SOE Viewer Software an HIS can be used to access the SOE data stored in a SOE Server via Vnet/IP. The status of SOE modules, ADV151-E can be displayed on the Station Status Display window of the HIS.

● **Vnet/IP Network**

The CENTUM CS 3000 system synchronizes the system time across Vnet/IP using own time synchronization protocol. When the time synchronization with an external master clock is required, the Vnet/IP system allows connection with a Simple Network Time Protocol (SNTP) server. A SNTP server incorporating a Global Positioning System(GPS) receiver or similar is used for more accurate time reference.

■ **SYSTEM SPECIFICATIONS**

- Number of SOE inputs: Up to 2000 points per SOE Server
- Number of SOE Servers: One server per SEM system
- Number of FCSs per SOE Server: Up to 16
- Number of ADV151-E: Up to 78 modules per FCS with Application Capacity Expansion Package LFS1530
- Number of Events retained in SB311 event buffer: Up to 10,000 events
- Number of Events retained in ADV151-E event buffer: Up to 500 events per two seconds
- Time stamp resolution: One millisecond
- Time-stamp delay compensation setting: Zero to 100 milliseconds
- Automatic event deletion: Selection from among 15 options from no auto-deletion to auto-deletion of the five oldest events occurring within the last 3.5 seconds.
- Software filter setting: 4 to 512 milliseconds (can be set increments of two milliseconds).

When the number of SOE inputs or FCSs exceeds the limitations for a single SEM system, multiple SEM systems can be installed, up to eight servers.

The SOE Viewers can access the SOE stored data from multiple SOE Servers via an Ethernet and display the SOE data on a single SOE Viewer window.

■ **SPECIFICATIONS OF SOE SERVER**

SOE Server PC: Dedicated server for the installation of SOE Server, SOE Viewer and SOE Server Configurator packages. It is not allowed to install any CENTUM CS 3000 software packages other than SOE software packages.

Event acquisition rate: Up to 2000 events per second
Number of Clients for SOE Viewer and SOE Server Configurator: Up to the number allowed by the licenses purchased for Microsoft SQL Server 2000, and Microsoft Windows 2000 Server or Microsoft Windows Server 2003

Hard disk size: 20 gigabytes (GB) or more recommended (for installation of the Microsoft Windows operating system, SQL Server 2000, and Yokogawa SOE Server Packages)

Database capacity: 6 GB for retaining a total of 7,300,000 historical events (e.g., the events of 20 years assuming 10,000 events occur per day)

Installation in an HIS: The SOE server packages are allowed to install an HIS under the following conditions.

Total number of SOE inputs: Up to 500 points

Event acquisition rate: Up to 500 events per second

PC Operating system for HIS: Microsoft Windows 2000 Server SP4 or Windows Server 2003

Database system: Microsoft SQL Server 2000 Standard or Enterprise, SP3a or later (Microsoft MSDE 2000 is also possible to use)

Hard disk space for SEM related software: More than 7 Gbytes

Other specifications for SEM and HIS: Same specifications as standard

■ SPECIFICATIONS OF SOE VIEWER

- Number of data acquisition sources: Up to eight data sources or up to eight SOE Servers
- Data acquisition source types: SOE Server, historical messages in HIS, Unified Operator Interface (UOI) messages
- Number of events displayed: Up to 99,999 events
- Display items in the SOE Viewer screen:
 - Time stamp: Date and time of occurrence of the corresponding event signal
 - Quality: Single letter indicating the time synchronization state at the event occurrence
 - Type: Importance level of the corresponding event, either "SOE" (ordinary) or "SOE-H" (important)
 - ID: Either "SOE_ALM" (occurrence of the alarm state) or "SOE_RTN" (return to normal state)
 - Resource: Equipment name (plant hierarchy name) associated with the corresponding SOE event signal
 - Reference: Reference number (tag name) of the corresponding SOE event signal
 - Message: Message text of the corresponding SOE event signal

■ SPECIFICATIONS OF SOE SERVER CONFIGURATOR

- Number of SOE input assignments: Selection from 100, 500, and 2000 input points
- Number of Trip trigger assignments: Up to 50 triggers

■ NETWORKING SPECIFICATIONS

The SEM uses an open communication network adopting IEEE802.3 standards on the bus 2 of Vnet/IP for SOE Server, SOE Viewers and SOE Server Configurator.

When the Simple Network Time Protocol (SNTP) server is required for the time synchronization with an external master clock, the server can be also connected on the bus 1 of Vnet/IP.

For the networking specifications of SEM, see the "Vnet/IP network specifications" of GS 33P01B10-31E.

■ OPERATING ENVIRONMENT

● Hardware Requirements

SOE Server

The SOE Server function runs on a PC which meets the following requirements:

- PC: A general-purpose personal computer (IBM PC/AT-compatible) following the basic specifications of HIS. For details of HIS, see GS 33Q02C10-31E.
- Hard disk: 20GB or bigger
- Network: One Ethernet network on the bus2 of Vnet/IP for the SOE Server PC. For details of Vnet/IP network specifications, see GS 33P01B10-31E.
- Peripherals: CD-ROM drive
Tape drive for data backup (optional)

SOE Viewer and/or SOE Server Configurator

- PC: A general-purpose personal computer (IBM PC/AT-compatible) following the basic specifications of HIS. For details of HIS, see GS 33Q02C10-31E.
- Network: One Ethernet network on the bus2 of Vnet/IP for the SOE Server PC. For details of Vnet/IP network specifications, see GS 33P01B10-31E.
- Peripherals: CD-ROM drive

● Software Requirements

SOE Server

- Operating system: Microsoft Windows 2000 Server SP4 or later,
or Microsoft Windows Server 2003
- Database system: Microsoft SQL Server 2000 Standard or Enterprise Edition, SP3a or later
- SOE software packages:
 - LPC6900 SOE Server Package
 - LPC6910 SOE Server Configurator Package
 - LPC6920 SOE Viewer Package
 - LPC6930 SEM OPC Interface Package

The number of client licenses to be purchased for Microsoft SQL Server 2000 and Microsoft Windows 2000 Server or Microsoft Windows Server 2003 is determined by counting the number of clients (SOE Viewers and SOE Server Configurator) to be connected to the SOE Server.

SOE Viewer and/or SOE Server Configurator

- Operating system: Follow the requirements for the HIS.
- SOE software packages:
 - LPC6910 SOE Server Configurator Package
 - LPC6920 SOE Viewer Package

HIS

One OPC package is required for receiving the SOE Server system messages on to the HIS.

OPC software package: LHS2411 Exaopc OPC Interface Package

For the general specifications of the HIS, see GS 33Q02C10-31E.

CENTUM CS 3000 System Software

The version must be R3.06 or later.

■ LIMITATION OF INSTALLATION AND NOTICES

● **Limitations of ADV151-E Installation**

The SOE capture function of ADV151-E can be used only when it is installed in the FIO local node. When the ADV151-E is installed in the remote node, it works only status input detection without SOE capture function.

See General Specifications GS 33Q06Q45-31E “Digital I/O Modules (for FIO)” and GS 33P06Q01-31E “FIO System Overview (for AFV10□)” for other limitations and precautions for installation.

■ MODEL AND SUFFIX CODES

Digital Input Module with SOE Capture

		Description
Model	ADV151	Digital Input Module (32-channel, 24 V DC, Isolated)
Suffix Codes	-E	With SOE capture
	0	Without status display
	1	With status display
	0	Basic type
	3	With ISA Standard G3 option and temperature (-20°C to 70°C) option
Option Codes	/D5A00	With KS Cable Interface Adapter for 32-channels digital [Model: ATD5A-00]
	/B5S00	With Pressure Clamp Terminal Block for Digital [Model: ATB5S-00]
	/B5S10	With Pressure Clamp Terminal Block for Digital (surge absorber) [Model: ATB5S-10]
	/B5D00	With Dual Pressure Clamp Terminal Block for Digital [Model: ATB5D-00]
	/B5D10	With Dual Pressure Clamp Terminal Block for Digital (surge absorber) [Model: ATB5D-10]
	/CCC01	With Connector Cover for MIL Cable [Model: ACCC01]

T01E.EPS

SOE Server Package (for new installation)

		Description
Model	LPC6900	SOE Server Package (for new installation) [Media model: LHSM02-C11]
Suffix Codes	-S	Basic software license
	-C	Multiple software license (for 2 or more)
	1	For PC
	1	English version
Option Codes	/N0001	Total number of SOE input point is 100 or less
	/N0005	Total number of SOE input point is 500 or less
	/N0099	Total number of SOE input point is 2000 or less

T02E.EPS

- *1: This package can be used in the software version of R3.06 or later.
- *2: One System ID License is required per license of this package for the ordering.
- *3: This package is able to run in the PC with Microsoft Windows 2000 Server or Microsoft Windows Server 2003.
- *4: This package uses Microsoft SQL Server 2000 for the database.
- *5: The number of client licenses for Microsoft Windows 2000 Server or Microsoft Windows Server 2003 and Microsoft SQL Server 2000 is determined by counting the number of clients (SOE Viewers and SOE Server Configurator) to be connected to the SOE Server.

SOE Server Package (for addition)

		Description
Model	LPC6900	SOE Server Package (for addition) [Media model: LHSKM02-C11]
Suffix Codes	-A	Software license for SOE input points addition
	3	To add the number of SOE input points (for PC)
	1	English version
Option Codes	/N0105	From (100 SOE inputs or less) to (500 SOE inputs or less)
	/N0199	From (100 SOE inputs or less) to (2000 SOE inputs or less)
	/N0599	From (500 SOE inputs or less) to (2000 SOE inputs or less)

*1: The information of existing System ID License is required for the ordering.

T03E.EPS

SOE Server Configurator Package

		Description
Model	LPC6910	SOE Server Configurator Package [Media model: LHSKM02-C11]
Suffix Codes	-S	Basic software license
	-C	Multiple software license (for 2 or more)
	1	For PC
	1	English version

*1: This package can be used in the software version of R3.06 or later.

*2: One System ID License is required per license of this package for the ordering.

*3: This package is able to run in the HIS, SOE Server PC, Builder PC or PC.

T04E.EPS

SOE Viewer Package

		Description
Model	LPC6920	SOE Viewer Package [Media model: LHSKM02-C11]
Suffix Codes	-S	Basic software license
	-C	Multiple software license (for 2 or more)
	1	For PC
	1	English version

*1: This package can be used in the software version of R3.06 or later.

*2: One System ID License is required per license of this package for the ordering.

*3: This package is able to run in the HIS, SOE Server PC or PC.

T05E.EPS

SEM OPC Interface Package

		Description
Model	LPC6930	SEM OPC Interface Package [Media model: LHSKM02-C11]
Suffix Codes	-S	Basic software license
	1	For PC
	1	English version

*1: This package can be used in the software version of R3.06 or later.

*2: One System ID License is required per license of this package for the ordering.

*3: This package is installed on the SOE Server PC running with LPC6900.

T06E.EPS

ORDERING INSTRUCTIONS

Specify the model and suffix codes when ordering.

TRADEMARKS

- CENTUM, Exaquantum and Vnet/IP are registered trademarks of Yokogawa Electric Corporation.
- Windows and Microsoft are registered trademarks of Microsoft Corporation in the United States and/or other countries.
- Other company and product names appearing in this document are trademarks or registered trademarks of their respective holders.