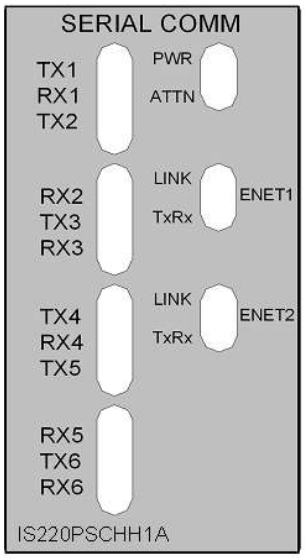
8 PSCH Specialized Serial Communication

8.1 PSCH Specialized Serial Communication I/O Pack

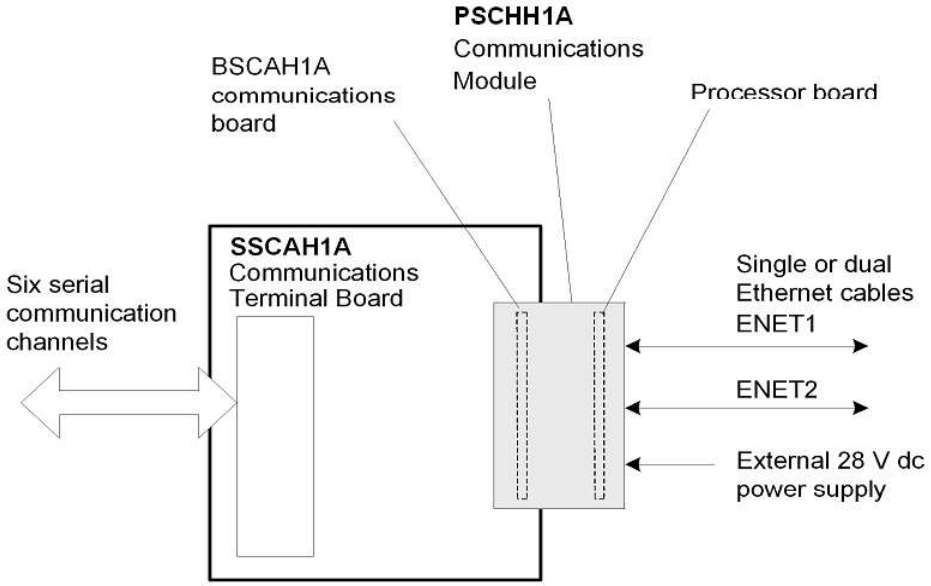


For configuration of I/O points, refer to GEH-6763, Mark VIe Control PSCH Specialized Serial Communication Module Instruction Guide.*

The Serial Communication Input/Output (PSCH) pack provides specialized communication support for GE Drilling equipment, including the blowout preventer (BOP). The PSCH can have one or two I/O Ethernet networks and mounts to the serial communications terminal board (SSCA). Several unique communication devices (protocols) can be configured to manage I/O points during scans.

The PSCH I/O pack contains a processor board used with most distributed I/O modules and a serial communications board (BSCA). The BSCA contains six serial transceiver channels, each of which can be individually configured to comply with RS-232C, RS-422, or RS-485 half-duplex standards. Input to the I/O pack is through dual RJ-45 Ethernet connectors and a 3-pin power input. Output is through a DC-62 pin connector that connects directly with the associated terminal board connector. Visual diagnostics are provided through indicator LEDs.

The PSCH does not support frame periods less than 40 ms.



8.1.1 Installation

➢ **To install the PSCH I/O pack**

1. Securely mount the SSCA terminal board inside the distributed I/O cabinet. Refer to GEH-6721_Vol_II, the chapter PSCA Serial Communication Module, the section SSCA Simplex Serial Communication Terminal Board.
2. Directly plug one PSCH I/O pack into the SSCA terminal board connector.
3. Mechanically secure the I/O pack using the threaded inserts adjacent to the Ethernet ports. The inserts connect with the mounting bracket specific to the terminal board type (H1 or H2). The bracket location should be adjusted such that there is no right angle force applied to the DC-62 pin connector between the PSCH I/O pack and the terminal board. This adjustment should only be required once in the service life of the PSCH.
4. Plug in one or two Ethernet cables depending on the system configuration. The PSCH operates over either port. If dual connections are used, standard practice is to attach ENET1 to the network associated with the R controller. However, the PSCH is not sensitive to Ethernet connections, and will operate correctly over either port.
5. Apply power to the PSCH by plugging in the connector on the side of the I/O pack. It is not necessary to remove power from the cable before plugging it in because the PSCH has inherent soft-start capability that controls current inrush on power application.
6. From the ToolboxST* application, add the PSCH I/O module and communication devices. Refer to GEH-6700, the chapter *Special I/O Functions*.

8.1.1.1 Rules and Restrictions

A summary of device restrictions and configuration rules for the PSCH is as follows:

- Maximum number of subsea POD serial channels per PSCH is 1
- Maximum number of surface test POD serial channels per PSCH is 2
- No other device types or serial protocols may be used with a POD device
- Every POD in the system must have a unique POD with Subsea Electronics Module (SEM) configuration setting
- Maximum number of GPS serial channels per PSCH is 1
- No other device types or serial protocols may be used with a GPS device
- Maximum number of other BOP serial channels per PSCH is 4
- PSCH is limited to 4 input exchange buffers and 3 output exchange buffers. Refer to the following table for the number of input and output exchanges used per I/O device.

Number of Exchanges Required

I/O Device	Output Exchange Ethernet Buffers	Input Exchange Ethernet Buffers
FTI (Panametrics)	1	1
ASK	1	–
FTD (OTEK display)	1	–
ERA	–	1
UPS	–	1

The following are examples of valid configurations:

- PSCH with one ERA, one ASK, and two UPS
- PSCH with two FTIs and one FTD
- PSCH with one subsea POD
- PSCH with two surface test PODs
- PSCH with one GPS

Redundancy

Protocol	Simplex	HotBackup
FTI, FTD, and GPS	Yes	No
POD, ASK, ERA, and UPS	Yes	Yes

8.1.2 Operation

Refer to the following sections in the *GEH-6721_Vol_II*, the chapter, *Common Module Content*:

- *Auto-reconfiguration*
- *BPPx Processor*
- *Processor LEDs*
- *Power Management*
- *ID Line*
- *Common Module Alarms*

8.1.2.1 Serial Channels

The BSCA board in the pack contains six independently configurable serial channels. The processor board configures the channels with one of three mode inputs as follows:

Mode	Transceiver
0	RS-232C
1	RS-422
2	RS-485 half duplex only
3	Default/resent state (fail safe)

Jumpers on the SSCA terminal board are used to set up the terminal scheme for the selected communication mode.

8.1.2.2 Data Flow

For most applications, the system is normally configured to use dual Mark VIe controllers and PSCHs with redundancy configured as *HotBackup*. The following specialized communication devices provide data flow between equipment, PSCHs, and Mark VIe controllers:

- Automatic Station Keeping (ASK)
- Electronic Riser Angle (ERA)
- Flow Totalizer Display (FTD)
- Flow Totalizer Input (FTI)
- Global Positioning System (GPS)

Note FTD, FTI, and GPS communication devices do not support HotBackup redundancy.

- POD
- Universal Power Supply (UPS)

Note Refer to *GEH-6763, Mark VIe Control PSCH Specialized Serial Communication Module Instruction Guide* for more information on these communication devices.

8.1.2.3 Connectors

- DC-62 located on the underside of the I/O pack connects directly to a discrete output terminal board.
- RJ-45 Ethernet connector – ENET1 located on the I/O pack side is the primary system interface.
- RJ-45 Ethernet connector – ENET2 located on the I/O pack side is the redundant or secondary system interface.

Note The terminal board provides fused power output from a power source that is applied directly to the terminal board, not through the I/O pack connector.

8.1.3 Specifications

Item	PSCH Specification
Channels	Six independently configurable serial channels One Ethernet Modbus Channel (simplex network)
Communication choices	RS-232C Mode RS-422 Mode RS-485 Mode half duplex only Ethernet Modbus Mode
RS-232C Mode	Cable distance: 50 ft (15.24 m) Communication Rate: 115.2 kbps maximum
RS-422 Mode	Cable distance: 1000 ft (304.8 m) Communication Rate: 375 kbps maximum Number of Drops: 8
RS-485 Mode	Cable distance: 1000 ft (304.8 m) Communication Rate: 115.2 kbps maximum Number of drops: 8
Size	8.26 cm high x 4.19 cm wide x 12.1 cm deep (3.25 in x 1.65 in x 4.78 in)
Technology	Surface-mount
† Ambient rating for enclosure design	Operating: -30 to 65ºC (-22 to 149 ºF)

Note † For further details, refer to the *Mark VIe and Mark VIeS Control Systems System Guide, Volume I* (GEH-6721_Vol_I), the chapter *Technical Regulations, Standards, and Environments*.

8.1.4 Diagnostics

The I/O pack performs the following self-diagnostic tests:

- A power-up self-test that includes checks of RAM, flash memory, Ethernet ports, and most of the processor board hardware
- Continuous monitoring of the internal power supplies for correct operation
- A check of the electronic ID information from the terminal board, acquisition board, and processor board to confirm that the hardware set matches, followed by a check that the application code loaded from flash memory is correct for the hardware set

Details of the individual diagnostics are available from the ToolboxST application. The diagnostic signals can be individually latched, and then reset with the RESET_DIA signal if they go healthy.

8.1.5 Configuration

For configuration of I/O points, refer to *GEH-6763, Mark VIe Control PSCH Specialized Serial Communication Module Instruction Guide*.

8.2 PSCH Specific Alarms

The following alarms are specific to the PSCH.

32-67

Description Comm Port #[ ] Device/Station #[ ] Communication Failure - No Response

Possible Cause

- A command was sent to a field device, but no response was received.
- The connected device is powered-off or rebooting.

Solution

- Verify that the serial or Ethernet cable is connected to the field device.
- Verify that the device is powered-on and configured for the correct station ID.
- For serial connections, verify that the baud rate and parity are set correctly.
- For Ethernet connections, verify that the IP address is set correctly.
- Cycle power on the field device.
- Troubleshoot the field device for internal errors, referring to its manual. If the problem persists, replace the field device.

72-107

Description Comm Port #[ ] Device/Station #[ ] Communication Failure - Bad Data

Possible Cause The field device responded, but could not provide data for one or more points.

Solution

- For serial connections, verify that the baud rate and parity are set correctly.
- Cycle power on the field device.
- Troubleshoot the field device for internal errors, referring to its manual. If the problem persists, replace the field device.
- Verify that the slave device is the one expected to be communicating with.

108-113

Description Configuration Problem Port #[ ]

Possible Cause The configuration file downloaded from the Toolbox ST application contained an error.

Solution

- Verify that the I/O and configuration compatibility codes agree between the ToolboxST configuration and the PSCH.
- Build and download the firmware and the configuration to the PSCH.
- If diagnostic persists, restart the PSCH.