



SEL-2890 Ethernet Transceiver

Communicate With SEL Devices Using Ethernet Networks



The SEL-2890 Ethernet Transceiver is an EIA-232 serial-to-10BASE-T converter. The SEL-2890 is powered by 5 Vdc provided on Pin 1 of the serial communications ports on most SEL devices. Convert existing SEL products to Ethernet capability simply by using the SEL-2890.

Major Features and Benefits

- **Easily connect your SEL devices to an Ethernet network.**
- **Use your Ethernet infrastructure to interact with SEL devices.** Use the Telnet capability that comes bundled with Microsoft® Windows®, or another Telnet client. Emulate serial terminal connections with the relay to check the status, read metering data, or to examine history or event records. Telnet processing can also be disabled.
- **Simplify your data access by using web browser software.** The SEL-2890 is a web server for the connected device. Customize the webpage by loading the webpage with File Transfer Protocol (FTP), modifying it, and downloading with FTP.
- **Use email to notify appropriate personnel of power system faults,** and to send the fault type and location. Set the SEL-2890 to send SEL automatic messages to a specified email address.
- **Connect two serial devices through an Ethernet network using a serial tunnel.** Use an SEL-2890 for each device to simulate a serial connection. Through the technologies of Binary Telnet, Binary Telnet Commanded, or Transmission Control Protocol (TCP), the SEL-2890 allows you to connect serial devices to serial PC software or to communications processors.

Application

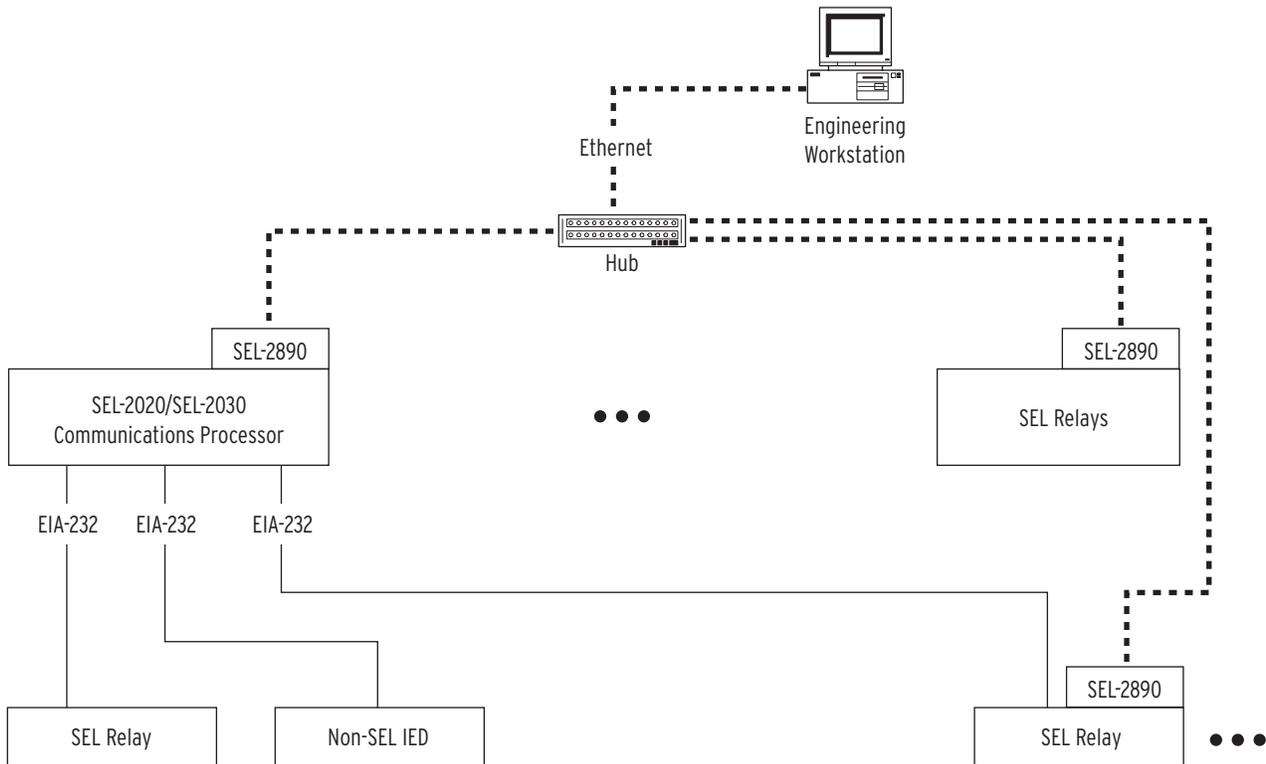


Figure 1 Telnet Session

Remote Access

Establish serial communications between a PC or terminal and an SEL relay over an Ethernet network. Use standard SEL ASCII commands as if you are connected locally with a direct serial communications cable. All that is required to establish a connection is the Internet Protocol (IP) address or the host name (when supported). Use Telnet to establish a session or disable the Telnet processing and connect directly over TCP. Telnet application software comes standard with the Windows 95 and higher operating systems. *Figure 1* depicts a typical system connection diagram.

Webpage Server

Use your current browser software to view the user configurable webpage hosted by the SEL-2890. *Figure 2 on page 3* shows the default SEL-2890 webpage. All relay reports can be viewed using the command menu tree.

Enter the IP address or device host name into the address line of your browser software and you are connected. Use FTP to download and customize the webpage. Edit the browser tree to add/delete commands or create your own tree using specific phrases and titles that match your company's practices and guidelines. Incorporate your own company logo and change browser tree icons.

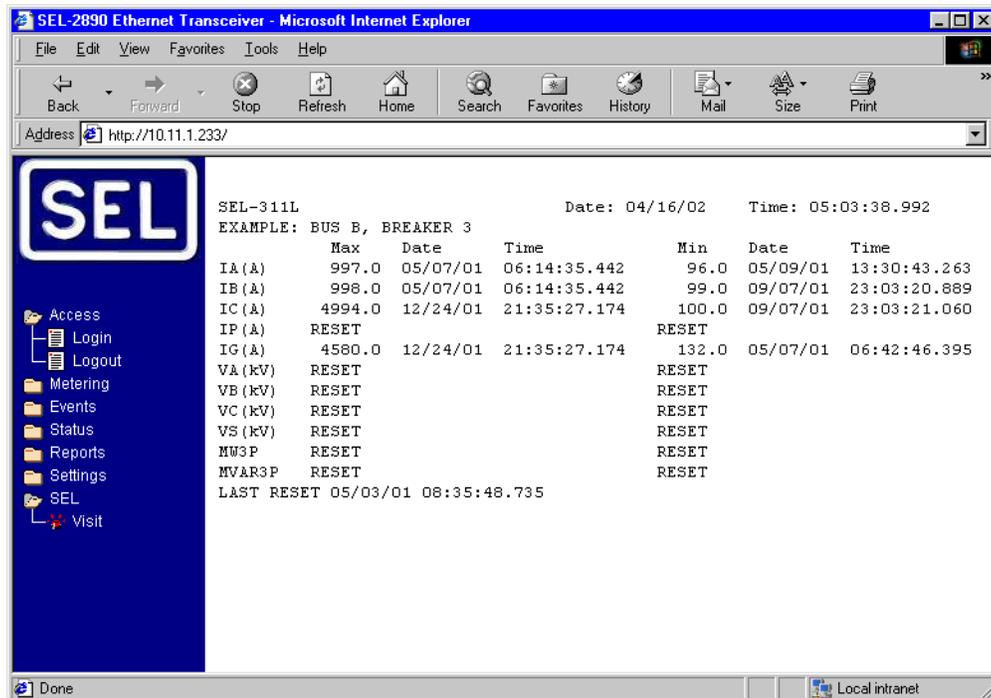


Figure 2 Webpage Server

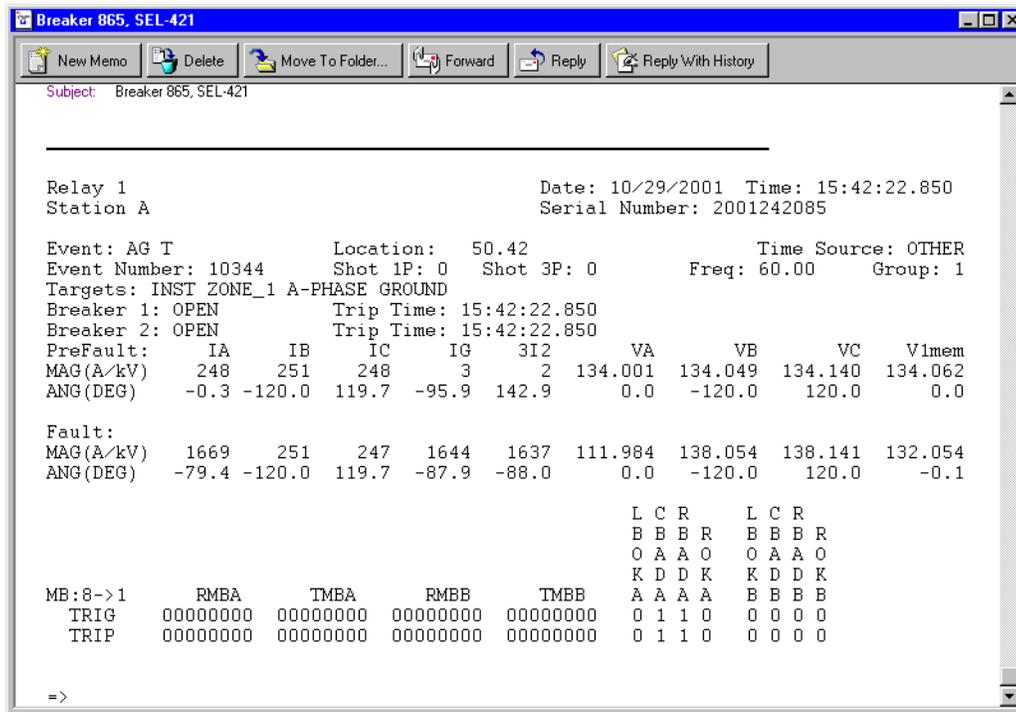


Figure 3 SEL Relay Example Email

Email

SEL relays include a feature called Serial Port Automatic Messages. When enabled, this feature automatically sends a summary event report to the serial port. When

that port is connected to an SEL-2890, the SEL-2890 recognizes that there is an unsolicited serial port message and includes the message in the body of an email to a preset email address. *Figure 3* is a sample of an email message from an SEL-421 Relay.

Serial Tunneling

Serial tunneling is the ability to make a virtual serial connection between two Intelligent Electronic Devices (IEDs) across an Ethernet network, see the example in *Figure 4*. The object is to create a “virtual” serial cable that passes all data from point to point across an Ethernet network and have this connection appear to be completely transparent to the end serial devices. You can serial tunnel between the SEL-2890 and port servers, serial hubs, SEL-2701s, and other SEL-2890s.

Different serial tunnel options are available in the SEL-2890: Commanded, Telnet, TCP, and BTCP.

Commanded Mode

The Commanded mode of a serial tunnel provides the ability to make and remake serial tunnels dynamically with a command rather than with settings. This provides a convenient way for software to control a network of serial tunnels.

Telnet Tunnel

A fixed point-to-point serial connection across an Ethernet network is established with a Telnet tunnel. Use this

method when a point-to-point connection is desired for Modbus[®], DNP, or other serial protocols.

TCP and BTCP Tunnel

A BTCP (Broadcast Transmission Control Protocol) tunnel functions like a multipoint serial network. The poll request is broadcasted to all nodes on a single subnet. This request is passed through all SEL-2890s on that subnet and response is left up to the serial device. The TCP tunnel is established between two SEL-2890s, then data is transmitted and received, and lastly the connection is terminated.

Serial Routing

The basic principle of serial routing is the ability to examine unsolicited data coming into the serial port, compare the first 8 bytes of the message with a pre-defined mask, and then route the message to a specified IP address depending on the examined information. Effectively, you can send messages out of a serial port through the SEL-2890 and they can be routed to different destinations depending on the first 8 bytes of the message, see the example in *Figure 5*. Up to three different routing masks are available in the SEL-2890. Note that the receiving IEDs cannot respond.

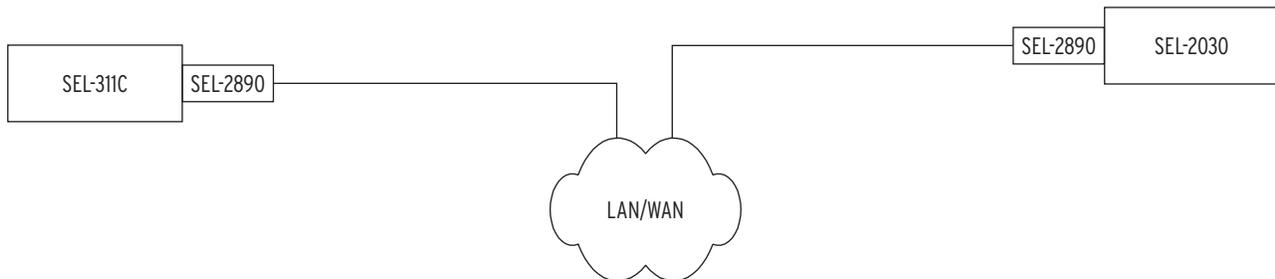


Figure 4 Serial Tunnel from a Relay Directly to an SEL Communications Processor

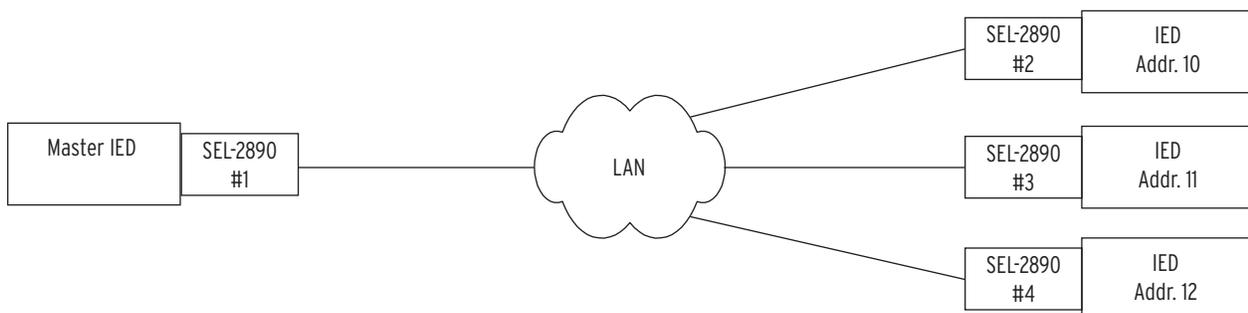


Figure 5 Route Serial Messages To Different Communications Processors Depending on Message Content

Accessories

Configuration Cable

For security purposes, the IP address, network mask, and network gateway settings are only permitted via the serial port. The SEL-C663 or SEL-C642 cable is designed for this purpose. This cable includes an AC power supply for the SEL-2890, and connects between a personal computer serial port and the serial port of the SEL-2890, see *Figure 6*.

Category 5 Cables

SEL provides the following Category 5 (CAT 5), Shielded Twisted Pair (STP) Ethernet cables to connect the SEL-2890 to an Ethernet hub or switch:

- 240-1520 CAT 5, STP Cable, 1 meter
- 240-1521 CAT 5, STP Cable, 5 meters
- 240-1523 CAT 5, STP Cable, 15 meters

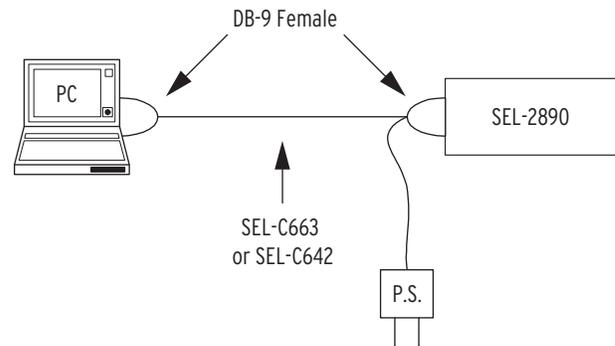


Figure 6 Configuration Cable

Guideform Specification

When connected to a compatible SEL relay the following minimum features shall be available.

- **Ethernet Connection Ability.** The transceiver shall provide an EIA-232 serial-to-10BASE-T Ethernet connection. The Ethernet transceiver shall have a microprocessor and insulate the host Intelligent Electronic Device (IED) or intermediate device from network problems or changes.
- **IED Telnet Server Communications.** A user shall be able to use the Ethernet network and Telnet client software to establish a bi-directional binary communications connection with the connected relay. Through this connection, users shall be able to use command and report dialogues, identically to their use of a direct terminal serial connection to the IED. There shall be a setting to allow the user to disable the Telnet client.
- **Protocol Stacks.** The transceiver shall support communications using Transmission Control Protocol/Internet Protocol (TCP/IP) and User Datagram Protocol/Internet Protocol (UDP/IP).
- **HTTP Server.** The transceiver shall provide a simple webpage server interface that will allow the connected relay serial port to be accessed with standard Internet browser software.
- **Email.** The transceiver shall provide an Simple Mail Transport Protocol (SMTP) client that will allow unsolicited messages from the connected relay to be sent via email to a specific email address.
- **Serial Tunneling.** The transceiver shall provide the ability to establish a serial point-to-point tunnel between two devices over an Ethernet network. Three versions of tunneling shall be available.
 - **Commanded Mode.** Provides the ability to make and remake serial tunnels dynamically with a command rather than a setting.
 - **Telnet Tunnel.** This is a fixed point-to-point serial connection across a network by setting the target IP address and port number.
 - **BTCP Tunnel.** This provides the ability to operate multipoint serial network applications over an Ethernet network on the same subnet.
 - **TCP Tunnel.** This tunnel is established between two SEL-2890s, then data is transmitted and received, and lastly the connection is terminated.
 - **Telnet Disable.** This provides a raw mode enabling the SEL-2890 to work with third party OPC servers.
- **Serial Routing.** The transceiver shall be able to compare the first 8 bytes of an unsolicited message and compare that information with a user selectable mask. When there is a match, the message is sent to a specific IP address. There is the ability to have up to three different addresses.

Specifications

Compliance

ISO 9001:2008 Certified

General

Indicators

Red LED: Receive Data
Green LED: Link

Ethernet Port

Connector: RJ45
Data Rate: 10 Mbps
Interface: 10BASE-T

Communications Protocols

Protocol Stack: TCP/IP
File Exchange: FTP
Terminal Server: Telnet
Terminal Client: Telnet
Web Server: HTTP
Email Client: SMTP
DHCP Client: DHCP

Serial Port

Connector: DB-9 Male
Data Rate: 300 bps to 115200 bps
Interface: EIA-232

Power Requirements

4.5 to 5.5 Vdc: <250 mA
supplied through Pin 1 of the DB-9 connector

Operating Temperature Range

-40° to +85°C (-40° to +185°F)
5 to 95% humidity (non-condensing)

Dimensions

1.25 inches wide
3.425 inches deep
0.85 inches high

Type Tests

Electromagnetic Compatibility

Radiated Emissions: IEC 60255-25-2000, Class A

Electromagnetic Compatibility Immunity

Conducted RF Immunity: ENV 50141-1993, 10 Vrms
IEC 61000-4-6-1996, 10 Vrms
Digital Radio Telephone RF: ENV 50204-1995, 10 V/m at 900 MHz and 1.89 GHz
Electrostatic Discharge: IEC 60255-22-2-1996, IEC 61000-4-2-1999, [EN 61000-4-2-1995], Levels 1, 2, 3, 4
Fast Transient Disturbance: IEC 61000-4-4-1995, IEC 60255-22-4-1992, 4 kV at 2.5 and 5 kHz (Shielded Twisted Pair Category 5 cable required for compliance)
Radiated Radio Frequency: ENV 50140-1993, IEC 60255-22-3-1989, 10 V/m
IEEE C37.90.2-1995, 35 V/m
Type Test Compliance Criteria:
1) That the SEL-2890 does not damage or impede relay operation.
2) The SEL-2890 is allowed to lose data during testing events.
3) The SEL-2890 must recover without external intervention.

Environmental

Cold: IEC 60068-2-1-1990
[EN 60068-2-1-1993],
Test Ad: 16 hrs @ 0°C
Dry Heat: IEC 60068-2-2-1974
[EN 60068-2-2-1993],
Test Bd: 16 hrs @ +70°C
Damp Heat, Cyclic: IEC 60068-2-30-1980,
Test Db: 25°-55°C,
6 cycles, 95% humidity
Vibration: IEC 60255-21-1-1988, Class 1
IEC 60255-21-2-1988, Class 1
IEC 60255-21-3-1993, Class 2

Notes

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This product is covered by the standard SEL 10-year warranty. For warranty details, visit www.selinc.com or contact your customer service representative.

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