SEL-3301
Protocol Gateway

Reference Manual

20070214

SCHWEITZER ENGINEERING LABORATORIES, INC.

PM3301-01

⚠CAUTION

Equipment components are sensitive to electrostatic discharge (ESD). Undetectable permanent damage can result if you do not use proper ESD procedures. Ground yourself, your work surface, and this equipment before removing any cover from this equipment. If your facility is not equipped to work with these components, contact SEL about returning this device and related SEL equipment for service.

⚠DANGER

Disconnect or de-energize all external connections before opening this device. Contact with hazardous voltages and currents inside this device can cause electrical shock resulting in injury or death.

⚠DANGER

Contact with instrument terminals can cause electrical shock that can result in injury or death.

⚠WARNING

Have only qualified personnel service this equipment. If you are not qualified to service this equipment, you can injure yourself or others, or cause equipment damage.

⚠WARNING

Use of this equipment in a manner other than specified in this manual can impair operator safety safeguards provided by this equipment.

⚠WARNING

This device is shipped with default passwords. Default passwords should be changed to private passwords at installation. Failure to change each default password to a private password may allow unauthorized access. SEL shall not be responsible for any damage resulting from unauthorized access.

⚠WARNING

Never use standard null-modem cables with the SEL-3301. Using any non-SEL cable can cause severe power and ground problems involving Pins 1, 4, and 6 on the SEL-3301 communications ports.

⚠ATTENTION

Les composants de cet équipement sont sensibles aux décharges électrostatiques (DES). Des dommages permanents non-décelables peuvent résulter de l'absence de précautions contre les DES. Raccordez-vous correctement à la terre, ainsi que la surface de travail et l'appareil avant d'en retirer un panneau. Si vous n'êtes pas équipés pour travailler avec ce type de composants, contacter SEL afin de retourner l'appareil pour un service en usine.

⚠DANGER

Débrancher tous les raccordements externes avant d'ouvrir cet appareil. Tout contact avec des tensions ou courants internes à l'appareil peut causer un choc électrique pouvant entraîner des blessures ou la mort.

⚠DANGER

Tout contact avec les bornes de l'appareil peut causer un choc électrique pouvant entraîner des blessuers ou la mort.

⚠AVERTISSEMENT

Seules des personnes qualifiées peuvent travailler sur cet appareil. Si vous n'êtes pas qualifiés pour ce travail, vous pourriez vous blesser avec d'autres personnes ou endommager l'équipement.

⚠AVERTISSEMENT

L'utilisation de cet appareil suivant des procédures différentes de celles indiquées dans ce manuel peut désarmer les dispositifs de protection d'opérateur normalement actifs sur cet équipement.

⚠AVERTISSEMENT

Cet appareil est expédié avec des mots de passe par défaut. A l'installation, les mots de passe par défaut devront être changés pour des mots de passe confidentiels. Dans le cas contraire, un accés non-autorisé á l'équipement peut être possible. SEL décline toute responsabilité pour tout dommage résultant de cet accés non-autorisé.

⚠AVERTISSEMENT

Ne jamais utiliser de cables standards à inversion de signaux ("null-modem") avec le SEL-3301. L'utilisation d'un cable d'une autre provenance que SEL peut causer de sérieux problèmes de neutre et d'alimentation impliquant les fiches 1, 4 et 6 sur les ports de communication du SEL-3301.

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List of Figures

Preface

Manual Overview

The SEL-3301 Protocol Gateway manual includes necessary information to properly install the product.

The scope of the manual covers specifications, installation and mechanical information, operating system configuration, self-monitoring, alarming, and IRIG-B generation. Please refer to included software manuals or Quick-Start guides for proper use of the application software.

Additional information on the Microsoft® Windows® XP operating system may be desired. This information is readily available at most bookstores and online.

An overview of each manual section and topics follows:

Preface. Describes the manual organization and conventions used to present information.

Section 1: Introduction and Specifications. Describes the basic features and functions of the SEL-3301; lists the specifications.

Section 2: Installation. Describes how to mount and wire the SEL-3301; illustrates wiring connections for various applications.

Section 3: Microsoft Windows System Configuration. Describes the features of Windows XP that is used in the SEL-3301.

Section 4: IRIG, Status, and Alarms. Describes custom functions built into the SEL-3301. These functions are assessed by using a custom IRIG-B, Status, and Alarms Control Panel.

Section 5: Troubleshooting. Lists common operating and troubleshooting questions.

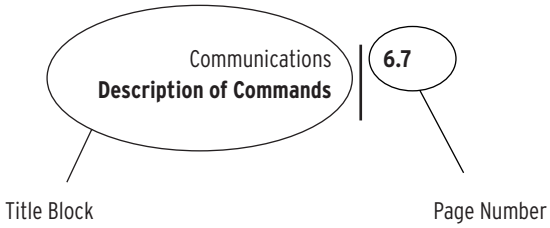
Appendix A: Software and Manual Versions. Details differences between manual versions. Provides a record of changes made to the manual since the initial release.

Appendix B: Device Update Agent. Describes the use and general concept of the Microsoft update mechanism for Windows XP Embedded.

Appendix C: Resetting BIOS. Describes the original BIOS settings and steps needed to reset the BIOS.

Page Numbering

This manual shows page identifiers at the top of each page; see the figure below.



Page Number Format

The page number appears at the outside edge of each page; a vertical bar separates the page number from the page title block. The page numbers of the SEL-3301 Protocol Gateway Reference Manual are represented by the following building blocks:

- Section number
- Actual page number in the particular section

The section title is at the top of the page title block, with the main subsection reference in bold type underneath the section title.

Conventions

Safety Information

This manual uses three kinds of hazard statements, formatted as follows:

⚠CAUTION
Indicates a potentially hazardous situation that, if not avoided, **may** result in minor or moderate injury or equipment damage.

⚠WARNING
Indicates a potentially hazardous situation that, if not avoided, **could** result in death or serious injury.

⚠DANGER
Indicates an imminently hazardous situation that, if not avoided, **will** result in death or serious injury.

Section 1
Introduction and Specifications

Overview

The SEL-3301 Protocol Gateway is a system of hardware and software representing the best features of the PC-AT compatible computer architecture, embedded microcontroller architecture, feature-rich Microsoft® operating system, and highly regarded commercial off-the-shelf software. The SEL-3301 provides an easily configurable graphical interface for mapping serial and network data between numerous clients and servers. Refer to the SEL website (www.selinc.com) for an up-to-date list of implemented and available protocols.

Features

The SEL-3301 provides a rugged, easy-to-use, flexible protocol conversion device for substation or other harsh environments. The SEL-3301 is based on a PC-AT compatible computing platform and a separate microcontroller. The following features and enhancements are included in the system:

- **Operating System**

  Windows® XP Embedded provides extreme flexibility and functionality along with increased security which provides specific aspects and features of Windows XP Professional. Windows features that allow direct access to files or hardware have been eliminated.

- **Watchdog Timer**

  A separate system watchdog microcontroller provides an extra level of computer system reliability. The microcontroller reboots the computer if there is an operating system problem or a problem with selectable specific software services running on Windows XP Embedded.

- **IRIG Updated System Clock**

  The microcontroller decodes an IRIG-B signal from an external IRIG-B source and updates the computer system clock.

- **IRIG Generation**

  Demodulated IRIG-B is generated by the microcontroller from the PC-AT computer system clock when an external IRIG-B signal is absent. Synchronize this system clock with a network time server, if desired.

➤ **Connected Device Time Synchronization**

Demodulated IRIG-B is provided to the connected Intelligent Electronic Devices (IEDs) using the connected EIA-232 cable. Demodulated IRIG-B output is also provided on a separate BNC connector.

➤ **Local or Remote Configuration**

Use a VGA monitor, keyboard, and mouse to locally configure the SEL-3301 Protocol Gateway, or configure it remotely over the Ethernet network using Windows Remote Desktop. Configure the protocol conversion software on the same SEL-3301 that is used during run-time application.

Models and Options

Models

Complete ordering information is not provided in this reference manual. See the latest SEL-3301 Model Option Table at www.selinc.com, under **SEL Literature > Ordering Information** (Model Option Tables).

Options

The SEL-3301 has the following options and features:

- Power Supply Ranges
  - 24/48 Vdc
  - 48/125 Vdc or 120 Vac
  - 125/250 Vdc or 120/230 Vac
- Communication Options
  - Eight or sixteen serial ports, EIA-232, byte oriented protocols.
  - Ethernet 1, 10/100BASE-T copper or 100BASE-FX fiber-optic port, jumper selectable (standard).
  - Ethernet 2, 100BASE-FX fiber-optic Ethernet port with a MAC address that is separate from Ethernet 1 (standard).
  - Four Universal Serial Bus (USB) ports (standard).
- IRIG-B time-code input
  - modulated
  - demodulated
- Mounting
  - horizontal panel
  - horizontal 19-inch rack
- Software
  - GUI based protocol conversion software

Applications

Figure 1.1 shows a typical protocol conversion configuration using the SEL-3301. The protocol gateway supports numerous serial servers and clients. The system shown below only depicts the real-time SCADA data collection connections. Other connections may be desired for engineering access.

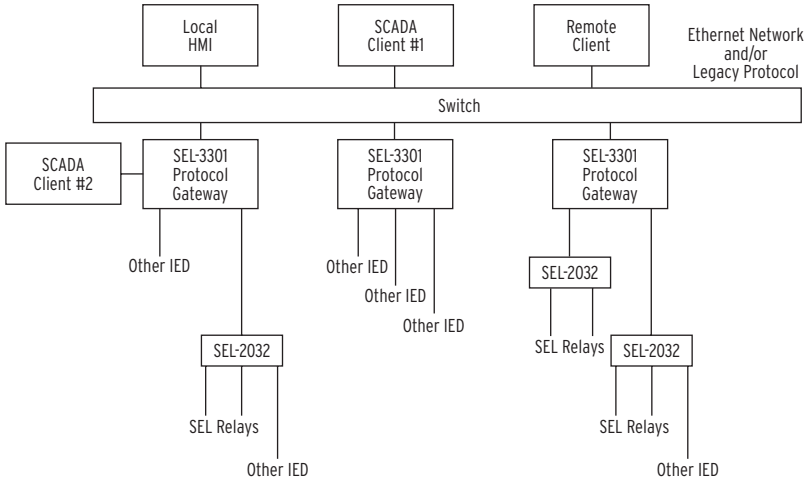


Figure 1.1 Functional Model

Specifications

General

Master Protocols

DNP3 Serial, DNP3 LAN/WAN, OPC Client, SEL Fast Messaging, MODBUS®, MODBUS TCP/IP

Slave Protocols

DNP3 Serial, DNP3 LAN/WAN, Harris 5000/6000, OPC Server, IEC 60870-5-101, IEC 60870-5-104, Recon, LG 8979

Terminal Connections

Rear Screw-Terminal Tightening Torque

Minimum:	0.8 Nm (7 in-lb)
Maximum:	1.4 Nm (12 in-lb)

User terminals and stranded copper wire should have a minimum temperature rating of 105°C and a minimum insulation thickness of 0.4 mm. Ring terminals are recommended.

Power Supply

Option:	125/250 Vdc or 120/230 V 50/60 Hz
DC Range:	85–300 Vdc
AC Range:	85–264 Vac
Frequency Range	30–120 Hz
Burden:	<40 W
Option:	48/125 Vdc or 120 V 50/60 Hz
DC Range:	38–140 Vdc
AC Range:	85–140 Vac
Frequency Range:	30–120 Hz
Burden	<40 W
Option:	24/48 Vdc
DC Range:	20–60 Vdc polarity dependent
Burden:	<40 W

Operating Temperature, Performance

–40° to +75°C (–40° to +167°F)

Operating Temperature, Safety

–40° to +75°C (–40° to +167°F)

Storage Temperature

–40° to +85°C

Relative Humidity

5 to 95% non-condensing

Maximum Altitude

2000 m

Atmospheric Pressure

80 ... 110 kPa

Overvoltage Category

Category II

Pollution Degree

2

Weight (Maximum)

5 kg (11 lbs)

Serial Ports

16 rear-panel ports, DB-9 connectors

USB Ports

2 rear-panel ports, 2 front-panel ports

Ethernet Ports

2 rear-panel fiber-optic ports, 1 copper port

Fiber-Optic

Max TX Pwr.	–14 dBm
Min TX Pwr.	–19 dBm
RX Sensitivity	–32 dBm
System Gain	13 dB
Wavelength	1300 nm
Source	LED
Connector Type	ST

Serial Data Speed

300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps (Meets EIA/TIA-562 specifications)

Time-Code Input

Connector:	Female BNC
Time-Code:	Modulated IRIG-B Demodulated IRIG-B TTL compatible.

Note: Automatically sets SEL-3301 real-time clock/calendar.

Time-Code Output

Pinout:	DB-9 port connectors Pin 4 TTL-level signal Pin 6 chassis ground reference Female BNC
Connectors:	16 rear DB-9 port connectors Female BNC

Note: Outputs are generated from IRIG-B input (when present) or generated by SEL-3301.

Type Tests

Electromagnetic Compatibility Immunity

Electrostatic Discharge:	IEC 60255-22-2:1996 IEC 61000-4-2:1995 IEEE C37.90.3–2001 Severity Level: 2, 4, 6, 8 kV contact discharge; 2, 4, 8, 15 kV air discharge
Fast Transient Disturbance:	IEC 61000-4-4:1995 IEC 60255-22-4:2002 Severity Level: Class A 4 kV, 2.5 kHz on power supply and outputs; 2 kV, 5kHz on communication lines
Radiated Radio Frequency:	IEC 61000-4-3:1998 IEC 60255-22-3:2000 Severity Level: 10 V/m IEEE C37.90.2–1995 Severity Level: 35 V/m

Surge Withstand:	IEEE C37.90.1–2002, Severity Level: 4 kV, 2.5 kHz on power supply and outputs; 2 kV, 5kHz on communication lines
Conducted Emissions	EN 55011:1998 Level: Class A IEC 60255-25:2000
Radiated Emissions	EN 55011:1998 Level: Class A IEC 60255-25
Voltage Fluctuations and Flicker	IEC 61000-3-3:2002
Harmonic Current Emissions	IEC 61000-3-2:2001 Level: Class A
Surge Withstand Capability Immunity	IEC 60255-22-1:1988 Severity Level: Power supply and outputs 2.5 kV peak common mode 1.0 kV peak differential mode Communications ports 1.0 kV peak common mode
Surge Immunity	IEC 61000-4-5:1995 IEC 60255-22-5:2002 Severity Level: 0.5 1.0 kV Line-to-Line; 0.5, 1.0, 2.0 kV Line-to-Earth
Conducted Immunity	IEC 61000-4-6:1996 IEC 60255-22-6:2001 Severity Level: 10 Vemf
Power Frequency Magnetic Field Immunity	IEC 61000-4-8:1993 1000 A/m for 1 s 100 A/m for 1 min.
Pulse Magnetic Field Immunity	IEC 61000-4-9:1993 Severity Level: 1000 A/m, Level 5
Power Supply Variation and Interruption	IEC 61000-4-11 IEC 60255-11

Environmental

Cold:	IEC 60068-2-1:1990 Test Ad: 16 hours at –40°C
Dry Heat:	IEC 60068-2-2:1974 Test Bd: 16 hours at +75°C
Damp Heat, Cyclic:	IEC 60068-2-30:1980, Test Db: (12 + 12-hour cycle), 95% r.h. 25° to 55°C, 6 cycles
Object Penetration:	IEC 60529:2001, IP30 from front of unit.
Vibration:	IEC 60255-21-1:1988, Endurance Class 1 Response Class 1 IEC 60255-21-2:1988, Shock Withstand, Bump Class 1 Shock Response Class 1 IEC 60255-21-3:1993 Quake Response Class 2

Safety

Dielectric Strength:	IEC 60255-5:2000, 3100 Vdc on power supply 2500 Vac on contact output Type tested for one minute. IEEE C37.90–1989, 3100 Vdc for 1 min. on power supply 2500 Vac on contact output Type tested for one minute. IEEE Std 1613–2003
Impulse:	IEC 60255-5:2000 IEEE Std 1613–2003 IEEE C37.90–1989 Severity Level: 0.5 Joule, 5 kV
LED	IEC 60825-1:1993 + A1:1997 + A2:2001

Real-Time Clock/Calendar

Battery Type:	IEC No. BR2335 Lithium
Battery Life:	10 years with power 2 years without power

Memory

RAM:	256 MB
CompactFlash:	512 MB

Plug-In Card Slots

Second CompactFlash card.

Certifications

ISO: SEL-3301 is designed and manufactured using ISO 9001 certified quality program.

UL: UL 61010C-1

CSA: CSA C22.2 No. 61010-1

CE: CE Mark
EN50263:1999-EMC Directive, Low Voltage Directive
EN 61010-1-Low-Voltage Directive (Safety)

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Section 2
Installation

Overview

The first steps in applying the SEL-3301 Protocol Gateway are installing and connecting the unit. This section describes common installation features and requirements. A successful installation requires an understanding of both the physical and software functions.

To install and connect the Protocol Gateway safely and effectively, you must be familiar with the device configuration features and options. Carefully plan unit placement, cable connections, and Intelligent Electronic Device (IED) communications during initial design.

This section contains connection drawings for mouse, keyboard, monitor, Ethernet, USB, EIA-232, IRIG-B, and power. Use these drawings as a starting point for planning your particular protocol gateway application.

Unit Placement and Maintenance

Proper placement of the SEL-3301 helps make certain that you receive years of trouble-free operation. Use the following guidelines for proper installation of the SEL-3301.

Physical Location

Mount the SEL-3301 in a sheltered indoor environment (a building or an enclosed cabinet) that does not exceed the temperature and humidity ratings for the unit (see *Specifications on page 1.4*). The unit is rated Installation/Overvoltage Category II and Pollution Degree 2. This rating allows mounting of the unit indoors or in an outdoor (extended) enclosure where the unit is protected against exposure to direct sunlight, precipitation, and full wind pressure, but temperature and humidity are not controlled.

Unit Mounting

Panel mount and 19-inch rack mount options are available. The following diagrams show dimensions and panel cutout size for the unit.

Cleaning

Use care when cleaning the SEL-3301. Use a mild soap or detergent solution and a damp cloth to clean the unit chassis. Allow the unit to air dry, or wipe dry with a soft, dry cloth. Do not use abrasive materials or polishing compounds on any unit surface. Be careful cleaning the front and rear panels because a permanent plastic sheet covers each panel; do not use harsh chemical solvents such as xylene or acetone on these surfaces.

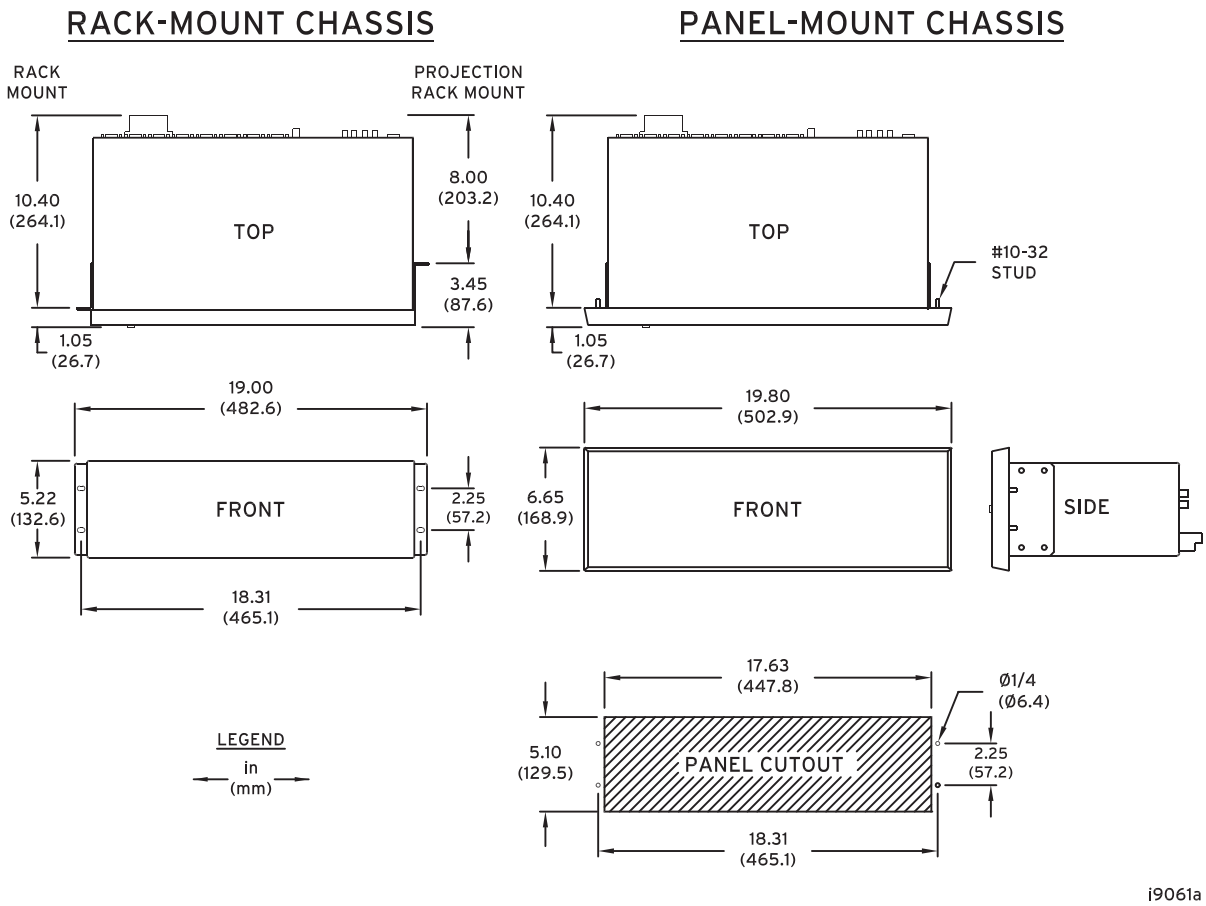


Figure 2.1 Dimensions Diagram

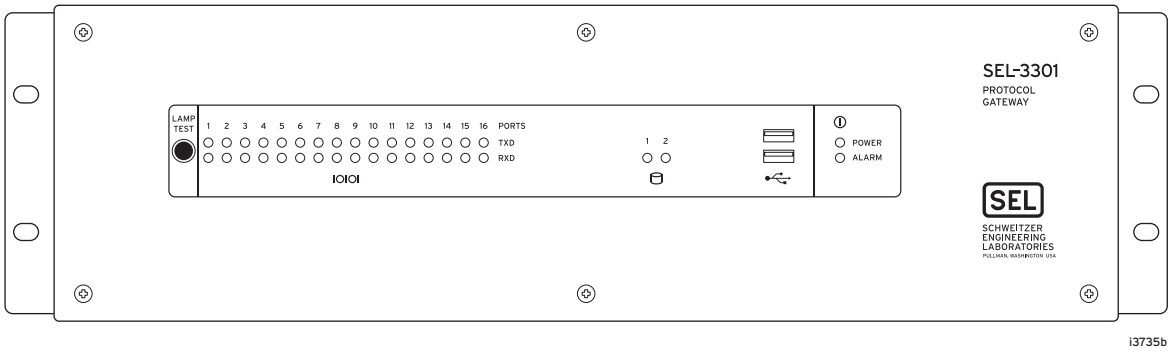


Figure 2.2 Front Rack-Mount Diagram

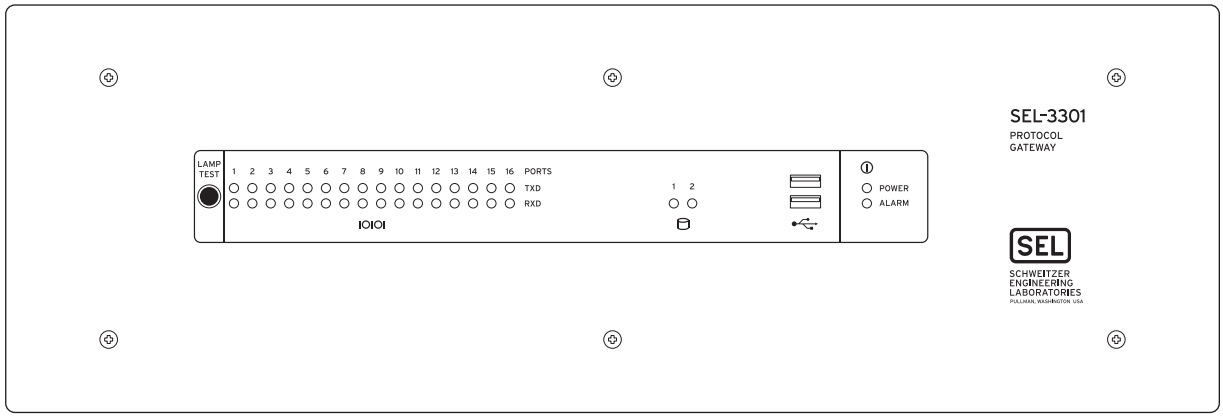
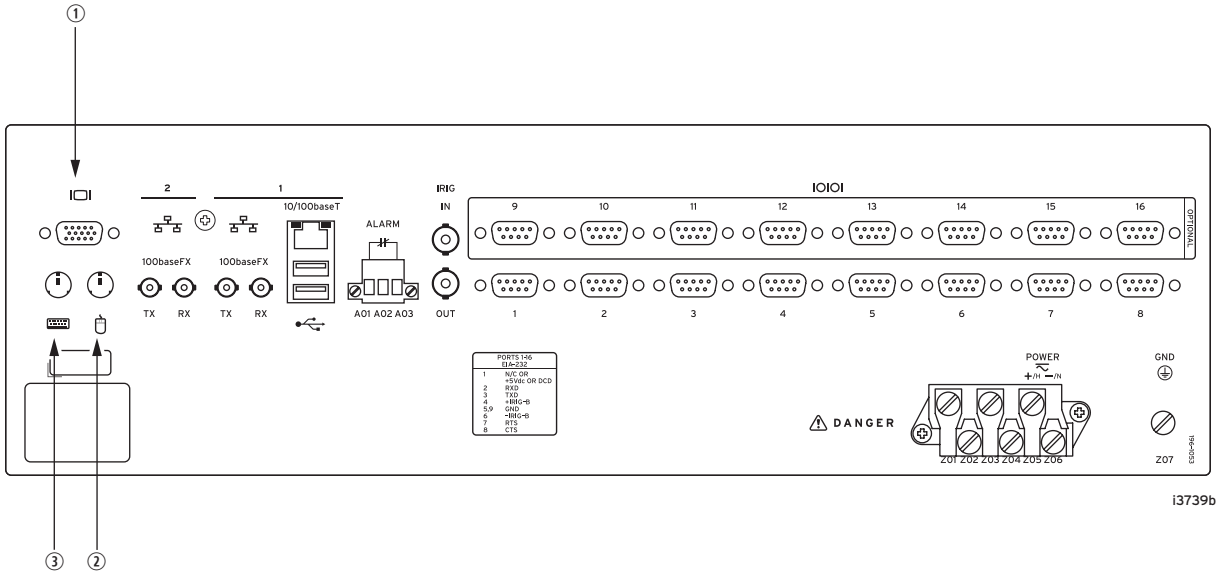


Figure 2.3 Front Panel-Mount Diagram

Rear-Panel Connections



① Monitor connection is optional. If desired, connect a standard DB-15 monitor cable into the monitor port. Otherwise, the SEL-3301 is accessible through the Remote Desktop Connection. See Section 3: Microsoft Windows System Configuration for operational details regarding the Remote Desktop Connection. Connect a VESA compliant monitor. The maximum supported resolution is 1600 by 1200 dpi.

② Mouse connection is optional. If desired, connect a standard PS/2 mouse into the mouse port or connect a USB compatible mouse into a USB port. See Table 2.2 for compatible mouse pointing devices. Otherwise, the mouse functionality is applied through the Microsoft® Remote Desktop Connection.

③ Keyboard connection is optional. If desired, connect a standard PS/2 keyboard into the keyboard port or connect a USB compatible keyboard into a USB port. See Table 2.2 for compatible keyboards. Otherwise, the keyboard functionality is applied through the Microsoft Remote Desktop Connection application.

NOTE: A USB mouse/keyboard is highly recommended over a PS/2. The PS/2 mouse/keyboard ports do not pass RFI and fast transient and emissions tests. PS/2 ports are for setup only, not for long-term use.

Figure 2.4 Rear-Panel Diagram

The physical layout of the connectors on the rear panel of an SEL-3301 is shown in *Figure 2.4*.

Ethernet Connection

Ethernet connection to the SEL-3301 is optional. It is not required for serial port protocol conversion. Ethernet connection is only required if Remote Desktop Connection or an Ethernet protocol connection is desired.

The SEL-3301 is equipped with dual Ethernet. Ethernet 1 is jumper selectable between copper 10/100BASE-T or fiber-optic 100BASE-FX (see *Figure 2.8* and *Table 2.4*). Ethernet 1 contains only one MAC address. The Ethernet 1 copper and fiber interface cannot be used at the same time. Changing from copper to fiber requires a power cycle.

Ethernet 2 is 100BASE-FX only. Ethernet 2 has a separate MAC address from Ethernet 1.

A full discussion of MAC addresses is beyond the scope of this manual. See your network administrator for questions or concerns.

The LEDs on the copper Ethernet 1 jack apply to both copper and fiber connections. The left LED illuminates orange for a 10 Mbaud connection and green for a 100 Mbaud connection. The LED on the right flashes yellow during data transfer.

The dual Ethernet function of the SEL-3301 is the same as a standard dual Ethernet PC-AT compatible computer.

Alarm Contact Connection

The SEL-3301 provides a normally closed, dry alarm contact driven by the microcontroller. The microcontroller closes or pulses the alarm contact during certain operational events. The contact closes if the system computer BIOS, hardware, software, and operating system malfunctions. The Alarm Contact also pulses during a log on or log off. Ratings for the contact are 30 A make, 6 A continuous, and 0.5 A or less break (depending on circuit voltage). The Alarm Contact has a maximum safety rating of 250 Vac/330 Vdc.

IRIG-B Connections

The SEL-3301 accepts modulated (B122) or demodulated (B002) IRIG-B input. Demodulated IRIG-B is provided on the BNC IRIG-B output connector and on Pins 4 and 6 of the serial communications ports.

The IRIG-B signal preference is given to the BNC connector, IRIG-B input. When this signal is not present, then IRIG-B is generated from the system computer clock and distributed to the IRIG-B output connections. The system computer clock is either free running or can be updated from the local area network (LAN) by using network time protocol (NTP). The Microsoft® Windows XP Embedded operating system uses Network Time Protocol Version 3 with algorithmic enhancements from NTP4. The SEL-3301 is able to generate demodulated IRIG-B output from NTP.

The system clock and the microcontroller decoded or encoded IRIG-B are synchronized when they are greater than 900 ms apart. Therefore, the system clock is accurate to ± 900 ms.

IRIG-B input is ***not*** available on any serial communications ports. Refer to *Table 2.4* and *Figure 2.8* for IRIG-B jumper selections.

The IRIG-B signal includes code for day-of-the-year and time-of-day. It does not include a code to identify the year. To set the device calendar to the proper year, you need to set the date on each device receiving an IRIG-B signal. Most SEL IEDs store the year for the set date with the relay settings in nonvolatile memory. So once the date is properly set, the relay will maintain the proper year even if relay power is cycled off and on.

Serial Port Communications

Eight or sixteen serial ports are available on the SEL-3301, depending on ordering options. Each serial port has a communications port number assigned in the operating system similar to a standard PC-AT compatible computer.

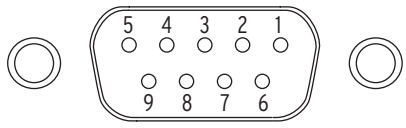
The serial communications ports function as standard EIA-232 ports with the additions of IRIG-B and +5 V power. See *Figure 2.5* for EIA-232 DB-9 Female Connector Pin Numbers. See *Table 2.1* for EIA-232 Serial Port Pin Functions.

Table 2.1 Serial Port Connector Pin Definition

Pin	Ports 1–16
1	N/C or +5 Vdc or DCD[a]
2	RXD
3	TXD
4	+IRIG-B
5, 9	GND
6	-IRIG-B (GND)
7	RTS
8	CTS

[a] Jumper configurable

Pin 1 on the ports can provide as much as 0.6 A at 5 V (3 W) total for all 16 ports.



Female chassis connector, as viewed from outside panel.

Figure 2.5 EIA-232 DB-9 Connector Pin Numbers

The communications circuits have internal surge protection.

Common serial cable configurations are shown in the following figures. Refer to SEL-5801 Cable Selector Software for the most recent cable configurations.

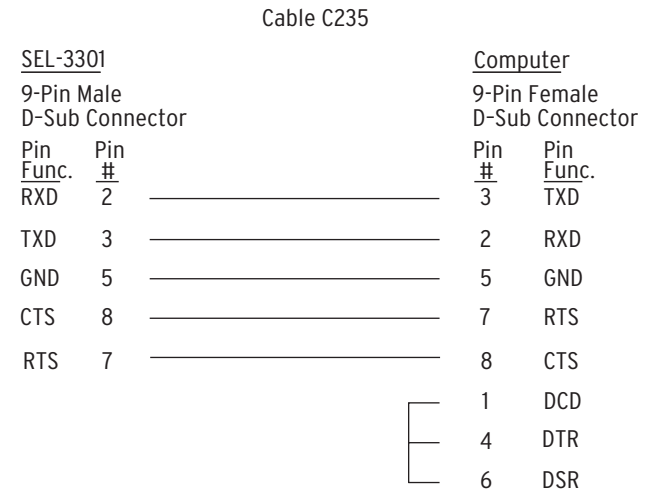


Figure 2.6 SEL Cable C235

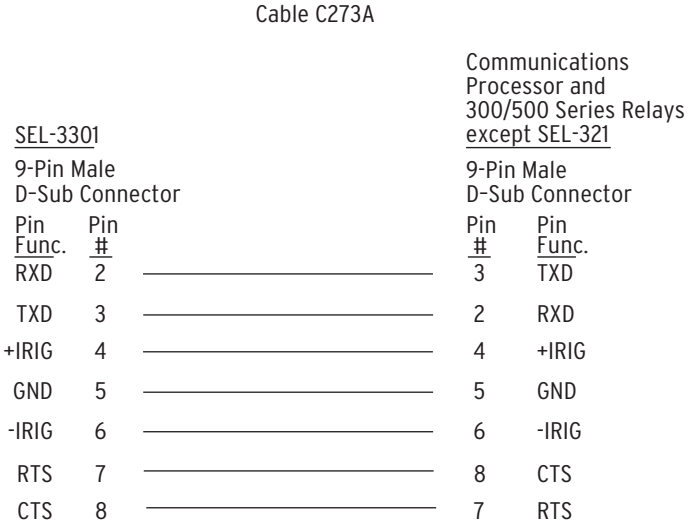


Figure 2.7 SEL Cable 273A

⚠WARNING
Never use standard null-modem cables with the SEL-3301. Using any non-SEL cable can cause severe power and ground problems involving Pins 1, 4, and 6 on the SEL-3301 communications ports.

The following list provides additional rules and practices you should follow for successful communication using EIA-232 serial communications devices and cables:

- You should keep the length of the communications cables as short as possible to minimize communications circuit interference and also to minimize the magnitude of hazardous ground potential differences that can develop during abnormal power system conditions.
- EIA-232 communications cable lengths should never exceed 50 feet, and you should always use shielded cables for communications circuit lengths greater than 10 feet.
- Modems or fiber optics are required for communication over long distances and to provide isolation from ground potential differences between device locations.
- Route communications cables away from power and control circuits. Switching spikes and surges in power and control

circuits can cause noise in the communications circuits if not adequately separated.

- Lower baud rate communication is less susceptible to interference and will transmit greater distances over the same medium than with higher baud rates. You should use the lowest baud rate that provides adequate data transfer speed.

Port Isolators

SEL offers a data-line-powered isolator for use with EIA-232 ports and metallic communications cables. The SEL-2910 Port Isolator also isolates IRIG-B time code inputs on the same communications port. These isolators break cable ground loops and are useful in existing applications of metallic cables in switchgear. SEL does not recommend using port isolators for circuits outside the control house. Fiber should be used in such applications. Refer to SEL Application Guide AG2001-06, *Avoiding Magnetic Induction Issues in Communication Cabling*, for detailed information.

Fiber-Optic Cables

One benefit of applying the SEL-3301 as the hub of a star topology is it enables low cost, point-to-point fiber-optic connections. The SEL-2800 family of fiber-optic transceivers connects directly to the serial port connectors on the rear of the SEL-3301. Fiber-optic links improve safety by isolating the equipment from hazardous and damaging ground-potential rise, eliminate instrumentation system ground-loop problems, reduce susceptibility to RFI and EMI, and allow longer signal paths than metallic EIA-232 connections.

USB Connections

The SEL-3301 provides four USB 1.1 connections. Two USB ports are located on the front and two are located on the rear of the product. Most USB 2.0 peripheral devices are compatible with USB 1.1. However, a very limited subset of USB device drivers have been included in the Windows XP Embedded operating system. Limiting the number of available drivers reduces the risk of driver and software incompatibilities.

Refer to *Table 2.2* for a list of compatible USB devices. Obtain an updated list from the SEL website.

Table 2.2 USB and PS/2 Compatible Devices (Sheet 1 of 2)

Hub
Generic USB Hub
Mouse
HID Mouse
Key Tronic® USB Keyboard
Logitech USB Wheel Mouse
Logitech PS/2 Port Mouse
Microsoft PS/2 Mouse
Microsoft USB Wheel Mouse Optical
Microsoft USB IntelliMouse
Microsoft USB IntelliMouse Optical
PS/2 Compatible Mouse

NOTE: A USB mouse/keyboard is highly recommended over a PS/2. The PS/2 mouse/keyboard ports do not pass RFI and fast transient and emissions tests. PS/2 ports are for setup only, not for long-term use.

Table 2.2 USB and PS/2 Compatible Devices (Sheet 2 of 2)

Keyboard
HID Keyboard
Microsoft USB Internet Keyboard
Microsoft Office Keyboard
Memory Stick
Most USB Memory Sticks

Serial Board Jumpers

The serial board jumpers are set at the factory. Do not modify the jumper positions. The following table lists the jumper positions.

Table 2.3 Serial Board Jumpers

Bottom Board	
Jumper 1	Second Position
Jumper 2	All on
Jumper 3	All on
Jumper C[a]	9 (IRQ)
Top Board	
Jumper 1	Not jumpered
Jumper 2	All on
Jumper 3	All on
Jumper C[a]	5 (IRQ)

[a] All other jumpers are in the Off position.

Main Board Jumpers

Set the main board jumpers to meet your requirements. See *Table 2.4* for jumper functions and positions. See *Figure 2.8* for jumper location on the main board.

Table 2.4 Main Board Jumper Positions (Sheet 1 of 2)

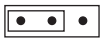
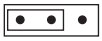
Function	Jumper Position	Access From Front
JMP1	Fixed in position B	No
JMP2 Serial Port Pin 1	DCD Connection–Default 	No
	No Connection 	
	+5 Vdc Connection 	
JMP3 IRIG-B	Demodulated–Default 	No
	Modulated 	

Table 2.4 Main Board Jumper Positions (Sheet 2 of 2)

Function	Jumper Position	Access From Front
JMP4 Microcontroller Reset	Reset Enabled–Default  Reset Disabled 	No
JMP5 Ethernet 1 Fiber-Optic Selection	10/100BASE-T Enabled–Default  100BASE-FX Enabled 	Yes

Jumper 1 is a hard-soldered jumper that modifies the alarm contact function from normally closed to normally open.

Jumper 2 connects serial port pin 1 to a +5 Vdc source, no connection, or Data Carrier Detect (DCD). DCD is asserted when an external modem establishes a connection to another modem over a telecommunications network.

Do not move jumpers 3 or 4 from their default positions in the SEL-3301.

Jumper 5 position determines the Ethernet 1 media. Off position enables copper and On position enables fiber-optic Ethernet connection. The Off or On position is read during boot. Changing position requires a reboot.

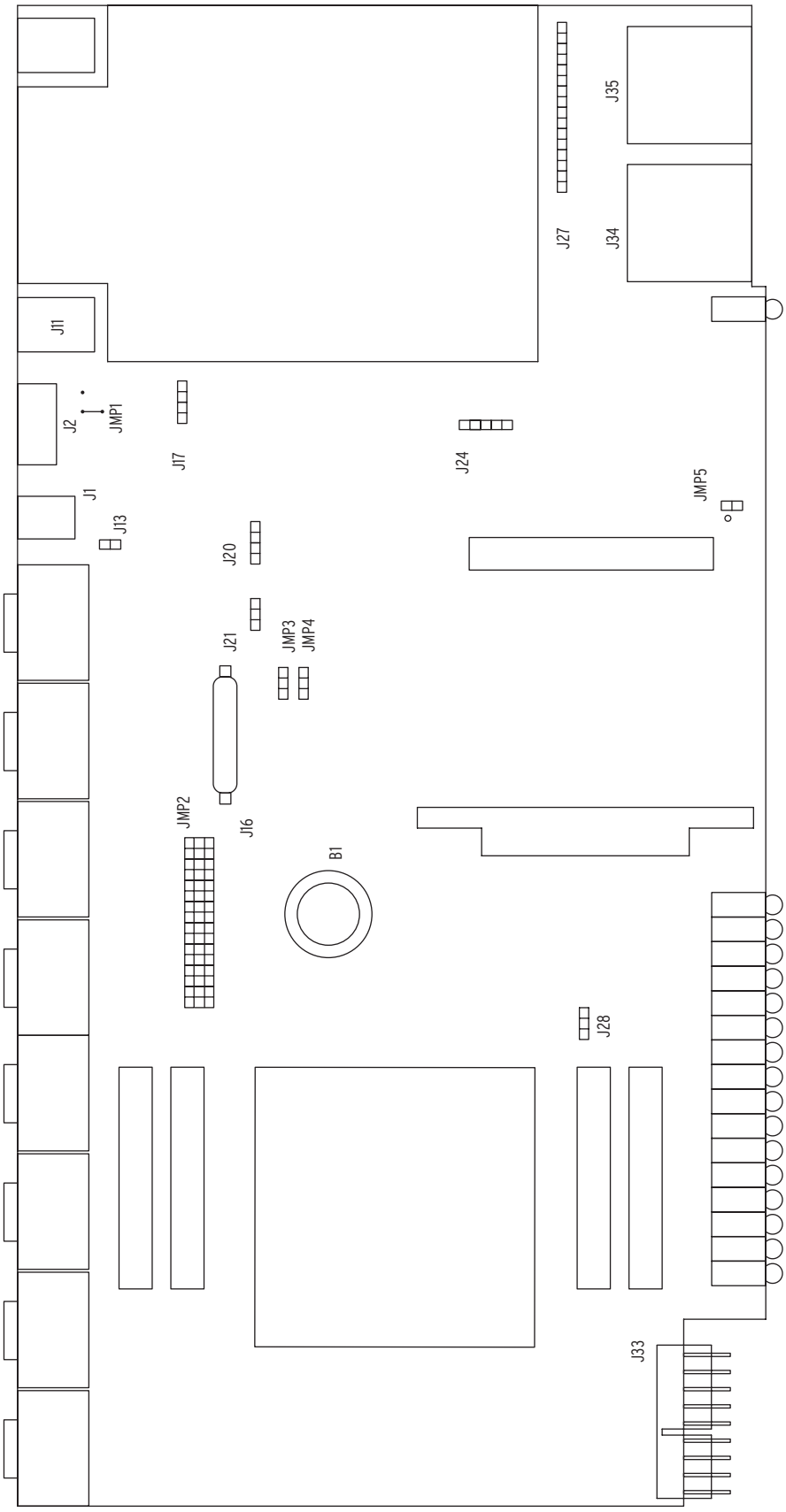


Figure 2.8 Jumper Locations

Grounding

Connect the grounding terminal (**#Z07**) labeled **GND** on the rear panel to a rack frame ground or main station ground for proper safety and performance. Use 12 AWG (4 mm^2) or heavier wire less than 6.6 feet (2 m) in length for this connection. This terminal connects directly to the internal chassis ground of the SEL-3301.

Power Connections

Connect the power terminals on the rear panel (**Z05(+/H)** and **Z06(-/N)**) to the proper ac or dc power source. Ensure the connected voltage is with the rated range for the power supply ordered. Routed voltages are indicated on the serial number label.

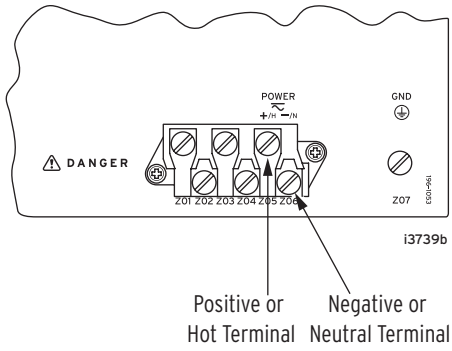


Figure 2.9 Power Connections

⚠WARNING
Do not operate device unless properly grounded.

⚠WARNING
Failure to ensure proper voltage levels can cause equipment damage.

The power terminals are isolated from the chassis ground. Use 16 AWG (1.5 mm^2) size or larger wire to connect to the power terminals.

Place an external switch, circuit breaker, or other overcurrent protection device in the power leads. The overcurrent protection device must interrupt both the hot and neutral power leads if dc powered. The maximum current rating for the overcurrent protection device must be no greater than 20 A. Be sure to locate this device within 9.8 feet (3.0 m) of the SEL-3301. Disconnect devices must comply with IEC 60947-1 and IEC 60947-3.1.

Operational power is internally fused on the power supply. Replacing the internal power supply fuse is not recommended unless indicated otherwise by your local SEL representative. An internal fuse failure indicates possible circuit board or electronic failure that may cause sporadic or incorrect device operation.

Initial Checkout and Startup

The initial checkout and startup is broken into two operating methods. The first method uses the Microsoft Remote Desktop Connection application and an Ethernet connection as the initial interface to the SEL-3301. The second method utilizes a monitor, mouse, and keyboard as the initial interface to the SEL-3301. Unlike other SEL products, the SEL-3301 functions like a standard, single-function computer rather than an embedded menu driven device. You cannot set up the SEL-3301 by using a serial connection and ASCII commands.

Checkout Using Remote Desktop Connection (Method 1)

NOTE: Each SEL-3301 ships with a unique computer name. The computer name is the SEL serial number located on the rear of the unit (for example, SEL2004050009).

Step 1. Verify that you are using Windows 95 or later on your personal or work computer.

Step 2. Verify with your network administrator that your network has a functioning DHCP and DNS server.

Step 3. Connect the SEL-3301 to your Ethernet network.

Connecting a keyboard, mouse, and monitor to the SEL-3301 is not necessary and will not affect using the Remote Desktop Connection.

Step 4. Apply power to the SEL-3301.

There is not a power switch. The SEL-3301 is designed to be continuously powered without the need for customer intervention.

Step 5. Wait for approximately three minutes after applying power while the SEL-3301 boots. Allow up to 15 minutes to boot at the extreme temperature limits.

Step 6. Verify Alarm LED goes out.

Step 7. Ping the SEL-3301 from your computer to ensure that it is visible on the network.

To ping the SEL-3301, open a command prompt and type **ping** followed by the computer name. See *Figure 2.10*.

Contact your network administrator if you cannot ping the SEL-3301. Do not proceed to Step 8 if you cannot successfully ping the SEL-3301.

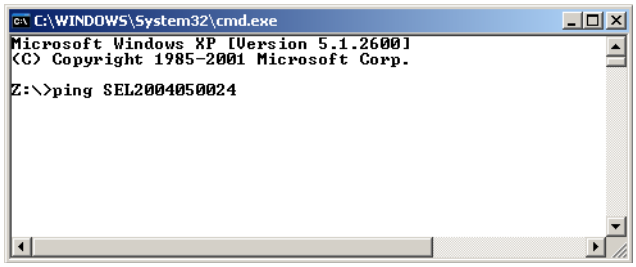


Figure 2.10 Ping Command

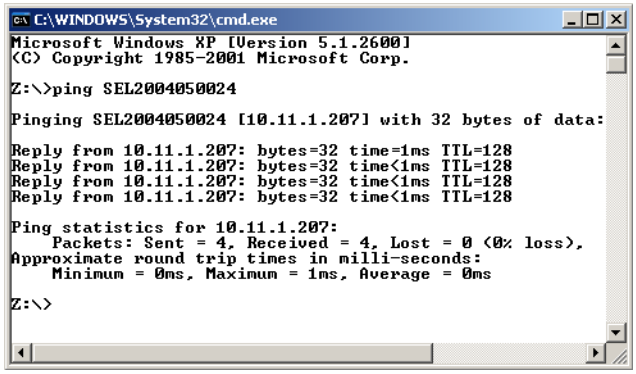


Figure 2.11 Ping Response

Step 8. Make a shortcut to the Remote Desktop Connection application **mstsc.exe** on your personal or work computer.

The application is usually located in the C:\WINDOWS\system32 or C:\WINNT\system32 folder. Contact your computer administrator if you are unable to locate the application.

Step 9. Launch **mstsc.exe** on your personal or work computer.

This should start the Remote Desktop Connection.

Step 10. Enter the computer name of the SEL-3301 to which you want to establish a connection.

Step 11. Click **Options**.

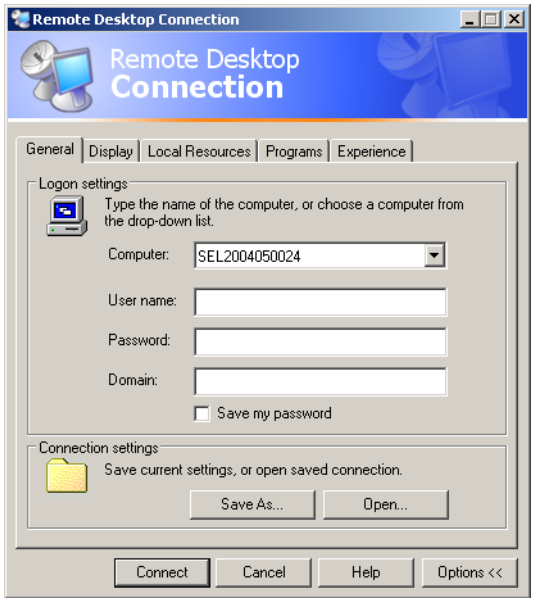


Figure 2.12 SEL-3301 Remote Desktop Connection

Step 12. Open the **Experience** tab to choose the connection speed.

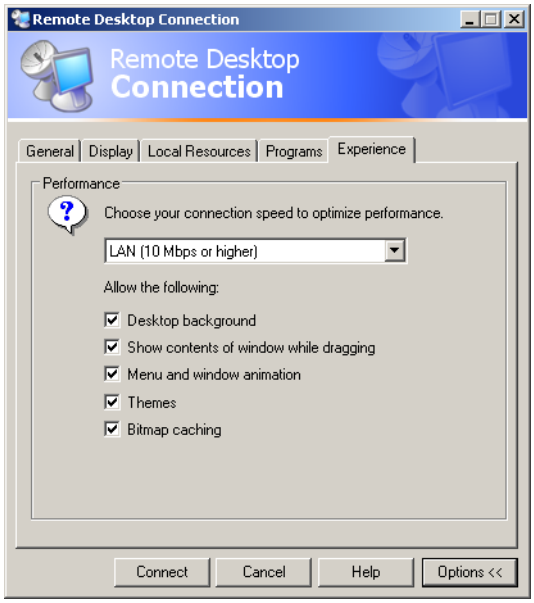


Figure 2.13 Experience Tab Showing LAN Connection

NOTE: Each SEL-3301 ships with a unique computer name. The computer name is the SEL serial number located on the rear of the unit (for example, SEL2004050009).

Step 13. Press the **Connect** button on the bottom of the dialog box. This should connect you to the SEL-3301.

NOTE: Passwords and user names should be changed during initial setup to ensure device security. Forgetting the Administrator user name or password will require reinstallation of the factory image. See User Accounts and Passwords on page 3.2 for instructions on setting user names and passwords.

Step 14. Enter the default user name and password that shipped with the unit.

User name: Administrator

Password: SEL3301

The SEL-3301 Control Bar is displayed after successful logon. See *Figure 2.14*.

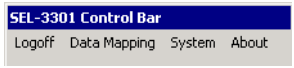


Figure 2.14 SEL-3301 Control Bar

Proceed to *Section 3: Microsoft Windows System Configuration* or proceed to the software application manufacturer's manual to continue with protocol translation configuration. Specific protocol conversion software is launched from the Control Bar. Select **Data Mapping > SUBNET Solutions Inc. > SubstationSERVER.NET**.

Checkout Using Monitor, Keyboard, and Mouse (Method 2)

Step 1. Connect a monitor, keyboard, and mouse to the SEL-3301 as described in *Figure 2.4*. *Table 2.2* provides a list of compatible peripherals.

Step 2. Power up the monitor.

Step 3. Apply power to the SEL-3301.

A power switch is not available. The SEL-3301 is designed to be continuously powered without the need for customer intervention.

Step 4. The SEL-3301 will go through the initial BIOS boot followed by the Windows XP Embedded boot.

A successful boot ends with the Windows logon dialog box as shown in *Figure 2.15*.

Figure 2.15 Logon Window

NOTE: Passwords and user names should be changed during initial setup to ensure device security. Forgetting the Administrator user name or password will require reinstallation of the factory image. See User Accounts and Passwords on page 3.2 for instructions on setting user names and passwords.

Step 5. Enter user name and default password.

User name: Administrator

Password: SEL3301

The SEL-3301 Control Bar is displayed after a successful logon. See *Figure 2.16*.

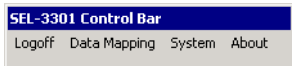


Figure 2.16 SEL-3301 Control Bar

Proceed to *Section 3: Microsoft Windows System Configuration* or proceed to the software application manufacturer's manual to continue with protocol translation configuration. Specific protocol conversion software is launched from the Control Bar. Select **Data Mapping > SUBNET Solutions Inc. > SubstationSERVER.NET**.

Field Serviceability

The SEL-3301 is designed to give years of trouble-free and maintenance-free operation. However, this section enumerates the items that are field serviceable. SEL recommends contacting your local SEL representative before performing any of the service items in this section. Contacting SEL allows necessary feedback for SEL to determine if a common failure mode is developing. It also allows SEL to provide any recent suggestions or clarifications to the following procedures.

Fuse Replacement

⚠CAUTION
Equipment components are sensitive to electrostatic discharge (ESD). Undetectable permanent damage can result if you do not use proper ESD procedures. Ground yourself, your work surface, and this equipment before removing any cover from this equipment. If your facility is not equipped to work with these components, contact SEL about returning this device and related SEL equipment for service.

⚠DANGER
Disconnect or de-energize all external connections before opening this device. Contact with hazardous voltages and currents inside this device can cause electrical shock resulting in injury or death.

To replace the power supply fuse, perform the following steps:

Step 1. De-energize the device by disconnecting or removing power.

Be sure proper tagging is applied to the power source to avoid accidental reenergization.

Step 2. Remove all connections from the rear of the device.

Step 3. Remove the device from the panel or 19-inch rack.

Step 4. Remove the front panel.

Step 5. Remove the top cover.

Step 6. Remove the side and rear screw connections (see *Figure 2.17*) between the heatsink and the case.

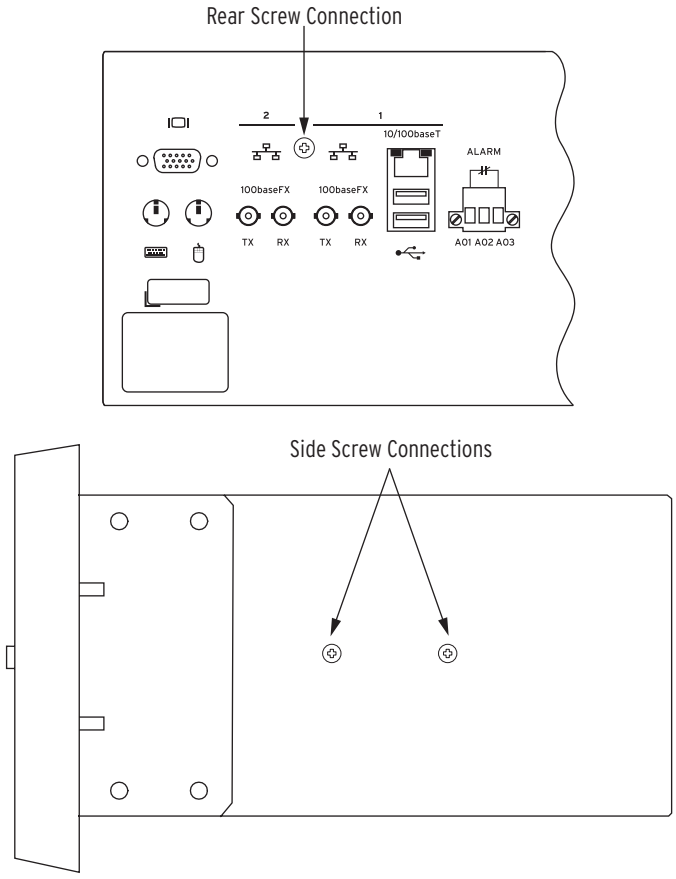


Figure 2.17 Screw Connections

Step 7. Disconnect the power supply cable.

Step 8. Gently slide out the top tray.

Step 9. Locate the power supply mounted on the bottom of the chassis.

Step 10. Locate the fuse on the power supply.

Step 11. Replace the fuse with fuse types listed in *Table 2.5*.

Table 2.5 Fuse Requirements for the SEL-3301 Power Supply

Nominal Power Supply Voltage Rating	Fuse F1	Fuse Description
24/48 V	T6.3A H250V	5x20 mm, time-lag, 6.3 A, high break capacity, 250 V
48/125 V 120 V 50/60 Hz	T3.15A H250V	5x20 mm, time-lag, 3.15 A, high break capacity, 250 V
125/250 V 120/230 V 50/60 Hz	T3.15A H250V	5x20 mm, time-lag, 3.15 A, high break capacity, 250 V

Follow the provided steps to reassemble the tray.

Step 1. Gently slide in the top tray.

Step 2. Replace the side and rear screws.

Step 3. Connect the heatsink to the case.

Step 4. Connect the power supply cable.

Step 5. Replace the top cover.

Step 6. Replace the front panel.

Step 7. Replace the device from the panel or 19-inch rack.

Step 8. Replace all connections on the rear of the device.

Step 9. Connect the power.

Real-Time Clock and BIOS Battery Replacement

A lithium battery powers the clock (date and time) if the external power source is lost or removed. The battery also maintains the configured system computer BIOS settings. See *Appendix C: Resetting BIOS* for setting the BIOS settings. The battery is a 3 V lithium coin cell, Ray-O-Vac® BR2335 or equivalent. At room temperature, the battery will operate nominally for 2 years at rated load with no external power source present. When the device is powered from an external source, the battery experiences a low self-discharging rate. Thus, battery life may extend well beyond 10 years. The battery cannot be recharged.

NOTE: The unit may not boot if the battery is dead.

Step 1. De-energize the device by disconnecting or removing power.

Be sure proper tagging is applied to the power source to avoid accidental reenergization.

Step 2. Remove all connections from the rear of the device.

Step 3. Remove the device from the panel or 19-inch rack.

Step 4. Remove the front panel.

Step 5. Remove the top cover.

Step 6. Locate the battery.

Step 7. Carefully remove the battery from underneath the retaining clip.

Properly dispose of the battery.

Step 8. Locate the power supply that is fixed mounted on the bottom of the chassis.

Step 9. Install a new battery with the positive (+) side up.

Step 10. Replace the top cover.

Step 11. Replace the front panel.

Step 12. Reinstall the device into the panel or 19-inch rack.

Step 13. Replace the cable connections in the rear of the device.

Step 14. Reapply power to the device but do **not** let it boot into Windows.

Step 15. Press **F1** to access BIOS settings.

Interrupt the boot cycle to reset the BIOS settings. See *Appendix C: Resetting BIOS* for BIOS settings and instructions.

Step 16. After BIOS settings have been reset and saved, cycle power and allow a full boot into Windows XP Embedded.

CompactFlash Upgrade

The SEL-3301 utilizes an industrial rated CompactFlash® card for the primary IDE hard drive. The device is designed to eliminate repeated writing to the CompactFlash card which preserves the card for many years of trouble-free service. RAM is used to store settings until the user decides to commit the complete, current configuration to Protected Storage. A detailed discussion of Protected Storage is covered in *Protected Storage on page 3.17*.

Under normal operation there should be no need to replace the CompactFlash card for the lifetime of the product.

⚠WARNING

Forgetting the Administrator user account name or password will require reinstallation of the original image onto the CompactFlash card. There are no secret or back-door passwords that will offer access if you forget your Administrator password. See Section 5: Troubleshooting for image

Step 1. De-energize the device by disconnecting or removing power.

Be sure proper tagging is applied to the power source to avoid accidental reenergization.

Step 2. Remove the front panel.

Step 3. Remove the CompactFlash card by gently pulling it straight out.

Step 4. Place the new CompactFlash card obtained from SEL into the SEL-3301.

Step 5. Reinstall the front cover.

Step 6. Reapply source power to reboot the SEL-3301.

The initial boot process will take up to five minutes or more. Do not interrupt the initial reboot.

The original factory settings are now restored to the device. The original user account and password are applied.

Section 3

Microsoft Windows System Configuration

Overview

⚠WARNING
The Windows XP Embedded operating system used in the SEL-3301 has been minimized as much as possible to achieve reliability, security, and stability. It is not hack proof. Do not attempt to add or remove software or hardware.

This section describes the subset of Microsoft® Windows® features in the SEL-3301 Protocol Gateway. These features operate and function like the full version of Windows XP. Standard Windows dialog boxes were retained whenever possible. However, not all features in a standard dialog box will be enabled.

Windows XP Embedded operating system offers the best balance between security, reliability, functionality, and maintainability.

- **Security**

  Implementation of Windows XP Embedded in the SEL-3301 has been verified against common security verification tools to minimize vulnerabilities.

- **Reliability**

  Reliability is built into the SEL-3301 by limiting which Windows components are available and installed. Reliability is also achieved by restricting the device to a limited set of software and drivers that are thoroughly tested for compatibility and stability.

IMPORTANT: The SEL-3301 uses a write filter to protect the operating system from inadvertent setting changes. Alterations to the operating system, including User account, Security, and Network setting changes, must be committed to Protected Storage for permanent activation. See Protected Storage on page 3.17 for more information.

- **Functionality**

  Microsoft Windows is the industry leader in functionality. Most networks, software, and hardware are Windows compliant.

- **Maintainability**

  PC-AT compatible hardware and Windows compatible software provide virtually limitless opportunity for future growth and backward compatibility.

Control Bar Functions

Once logged on, the SEL-3301 provides access to Windows functions and software through the SEL-3301 **Control Bar** (see *Figure 3.1*). Using a custom control panel provides added security and reliability by limiting access to files and folders.

Figure 3.1 SEL-3301 Control Bar

The SEL-3301 Control Bar appears on the initial Windows desktop screen. To maintain a common and orderly interface, users are prevented from saving data files to the SEL-3301 desktop screen. Select other user directories for storing program data files.

Logging On and Off

The SEL-3301 maintains the standard Windows logon methods. *Figure 3.2* shows the Standard Windows logon dialog box.

NOTE: Passwords and user names should be changed during initial setup to ensure device security. Forgetting the Administrator user name or password will require reinstallation of the factory image. See User Accounts and Passwords for instructions on setting user names and passwords.

Figure 3.2 Logon Dialog Box

To log off, simply select the **Log Off** item from the **Control Bar** and select **Commit**, **Logoff**, or **Cancel** in the dialog box. Selecting **Yes** will open the confirmation dialog box. Selecting **Cancel** will not commit changes. Select **Shutdown** or **Restart** to commit your current setup to Protected Storage. See *Protected Storage on page 3.17* for more information.

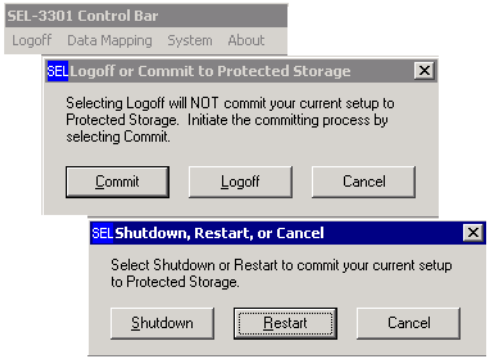


Figure 3.3 Logoff Dialog Boxes

User Accounts and Passwords

The SEL-3301 contains the standard Windows XP User Accounts dialog box as shown in *Figure 3.5*. Simply select **System > User Accounts** from the SEL-3301 **Control Bar** (see *Figure 3.4*).

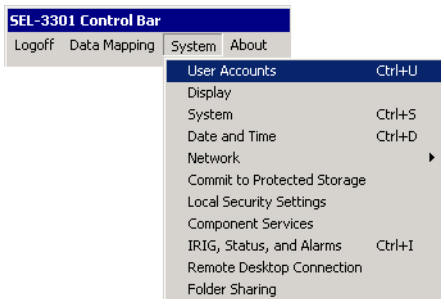


Figure 3.4 Selecting User Accounts From Control Bar

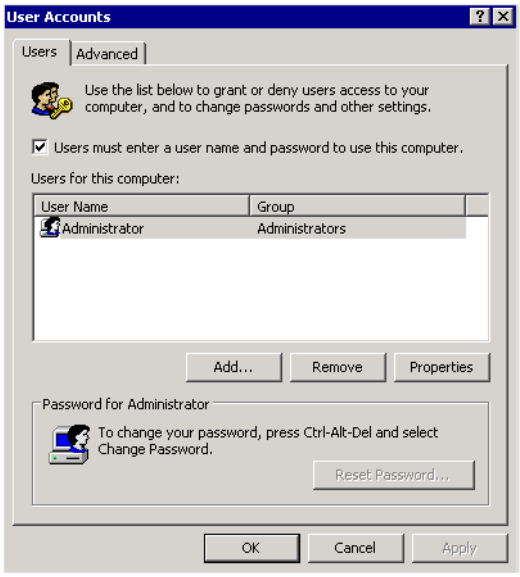


Figure 3.5 User Accounts Dialog Box

The Administrator account is predefined. Administrators have complete and unrestricted access to the following computer/domain functions:

- Upgrade the operating system
- Install Windows or software updates from SEL
- Configure critical computer-wide operating system parameters
- Take ownership of objects
- Network configuration

The management of passwords is controlled in the **User Accounts** windows. Password selection follows the same principles as those in Windows XP:

- Passwords can be up to 127 characters in length.

  However, if you are operating on a network that also uses Windows 95 or Windows 98, consider passwords no longer than 14 characters. Otherwise, you may not be able to logon to the network.
- Uppercase/lowercase letters, numerals, and symbols may be used.

⚠WARNING

This device is shipped with default passwords. Default passwords should be changed to private passwords at installation. Failure to change each default password to a private password may allow unauthorized access. SEL shall not be responsible for any damage resulting from unauthorized access.

To update the Administrator password, press **Ctrl+Alt+Del** from a keyboard locally connected to the SEL-3301 then select the **Change Password** button.

To update user passwords, select **System > User Accounts** (see *Figure 3.6*). Highlight the user name then click on the **Reset Password** button.

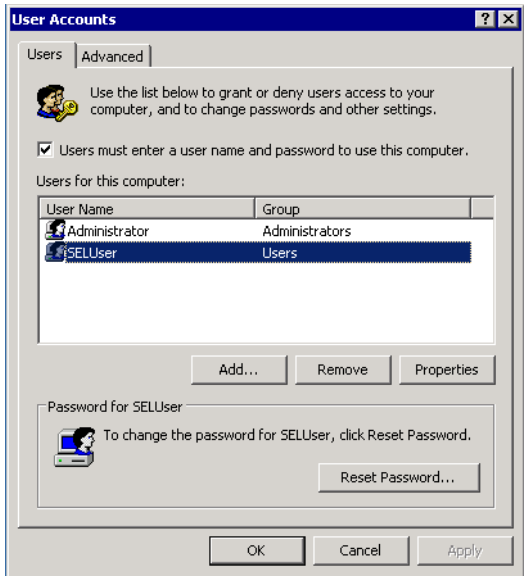


Figure 3.6 Selecting a User in the User Accounts Window

Enter the new password in both the **New password** and **Confirm new password** text boxes (see *Figure 3.7*). Follow your company's policies regarding user accounts and passwords. Contact your network or computer administrator if you are unsure of which options or settings need to be made.

Figure 3.7 Reset Password Window

Display

The SEL-3301 offers the display options of the Windows XP Embedded operating system. However, these options cannot be utilized if you are using the Remote Desk Connection function.

To access the display property options on the SEL-3301, select **System** from the SEL-3301 **Control Bar**. Select **Display**.

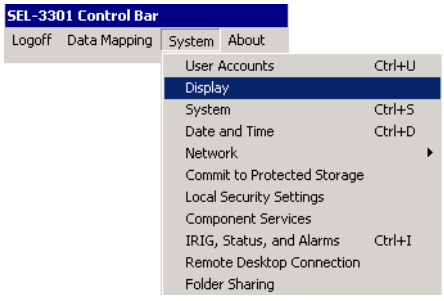


Figure 3.8 Selecting Display Options

The standard Windows display features are available. Refer to Windows XP operating system information available at most bookstores and online.

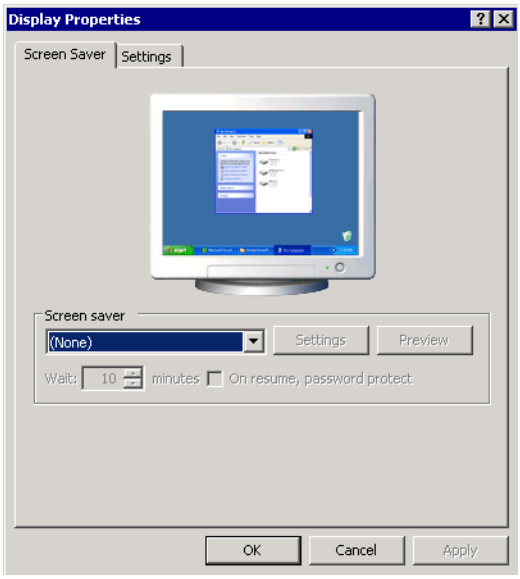


Figure 3.9 Display Properties Window

Computer Name

Rename your computer during initial setup. Every computer on an Ethernet network must have a unique computer name. The SEL-3301 ships with an automatically generated, unique computer name. This computer name should be changed to something meaningful and easy to remember. The default, unique computer name is **SEL** followed by the serial number with no separating spaces. The serial number is located on the rear of the SEL-3301.

The following figures illustrate how to set the computer name. From the SEL-3301 **Control Bar**, select **System** and **System** (see *Figure 3.10*). Under the **Computer Name** tab, select **Change** (see *Figure 3.11*). Follow your company's policies for computer naming. Contact your network or computer administrator for assistance in setting a computer name.

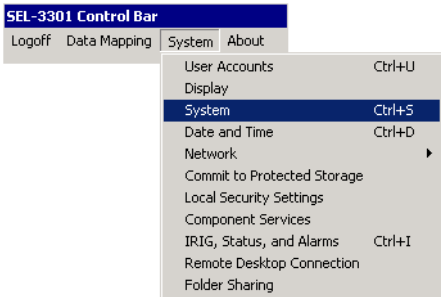


Figure 3.10 Selecting System Option From Control Bar

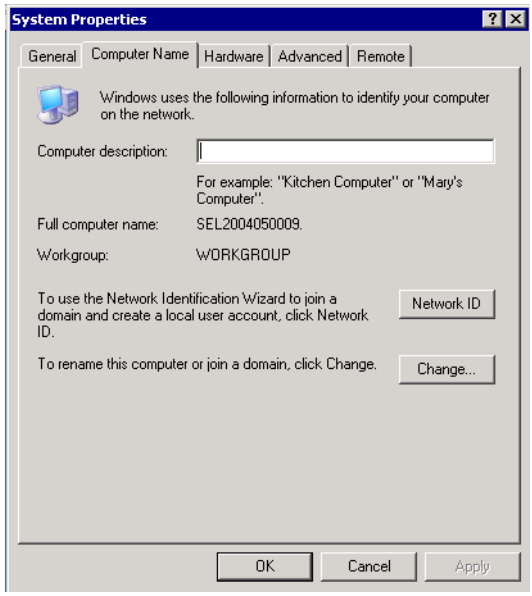


Figure 3.11 Setting Computer Name

Network Identification Wizard

The Standard Windows XP Network Identification Wizard assists you in installing the SEL-3301on your network. From the **Control Bar**, select **System > System** (see *Figure 3.10*). Under the **Computer Name** tab, select **Network ID** (see *Figure 3.11*) to start the wizard. Contact your network or computer administrator for assistance.

Hardware

The **Hardware** tab is part of the Windows **System Properties** dialog box. The selection options under this tab are not implemented. Do not attempt to install additional hardware on your SEL-3301. A list of acceptable hardware peripherals is provided in *Table 2.2* and on the SEL website.

Performance

The **Performance** options located under the **Advanced** tab (see *Figure 3.12*) should not be adjusted. The SEL-3301 has been thoroughly tested with the default settings.

User Profiles

Options for User Profiles are located under the **Advanced** tab (see *Figure 3.12*). In the **User Profiles** area, select **Settings**. Some functionality of Windows User Profiles is retained. *Figure 3.12* and *Figure 3.13* illustrate how to gain access to user profiles. Contact your computer administrator for guidance regarding User Profiles.

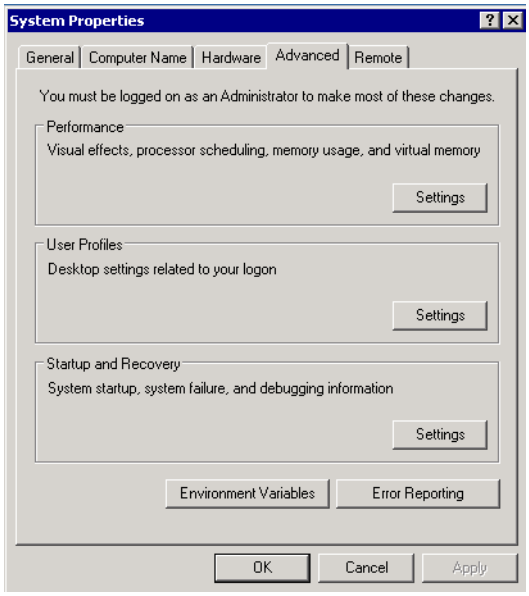


Figure 3.12 Advanced Options Window

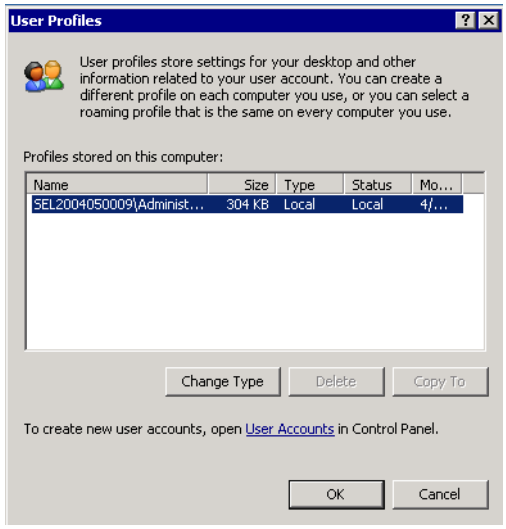


Figure 3.13 User Profiles Window

The User Accounts hyperlink has been removed due to a secure access limitation.

Startup and Recovery

Do not modify any settings located in the **Startup and Recovery** portion under the **Advanced** tab.

Environment Variables

Create a path for Device Update Agent (see *Appendix B*) by accessing Environment Variables. See *Appendix B* for details on the software update mechanism. Do not modify Environment Variables until you have read *Appendix B*.

To set an Environment Variable, select **System > System** (see *Figure 3.10*). Select the **Advanced** tab (see *Figure 3.12*). Select the **Environment Variables** option (see *Figure 3.14*). Highlight the variable and value line to be modified and select **New**. Paths may be modified (select **Edit**) or deleted (select **Delete**).

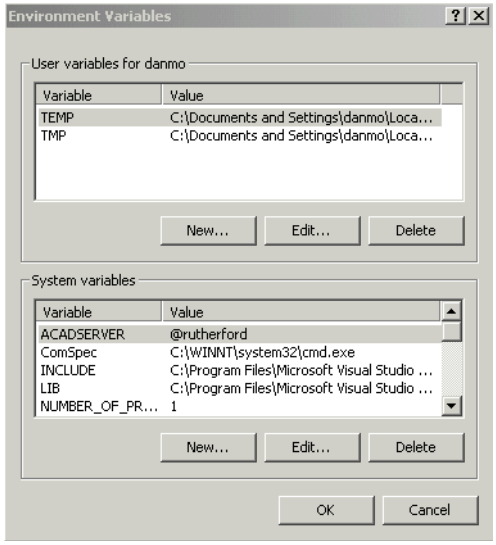


Figure 3.14 Environment Variables

Remote Assistance

Remote Assistance is located under the **Remote** tab (see *Figure 3.15*). Remote Assistance is disabled because of security and reliability concerns. Selecting the **Remote Assistance** check box will not enable this function.

Remote Desktop Server

Remote Desktop may be enabled to permit connections using Windows Remote Desktop Connection from your personal or work computer.

The Select Remote Users function is not implemented in the SEL-3301. Remote access is permitted to anyone who has access to the network, knows the computer name or IP address, knows a user account name, and knows the respective password.

Remote Desktop is enabled by default.

To allow access via the Remote Desktop, select the **Remote** tab (see *Figure 3.15*). Use the **Select Remote Users** function to limit who may have access to the SEL-3301.

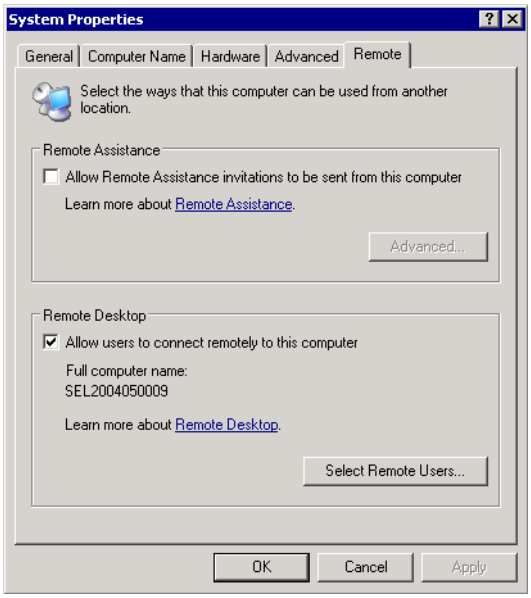


Figure 3.15 Remote Desktop Window

To enable Remote Desktop connections for a particular user, select the **Select Remote Users** function and select **Add** to access remote user rights.

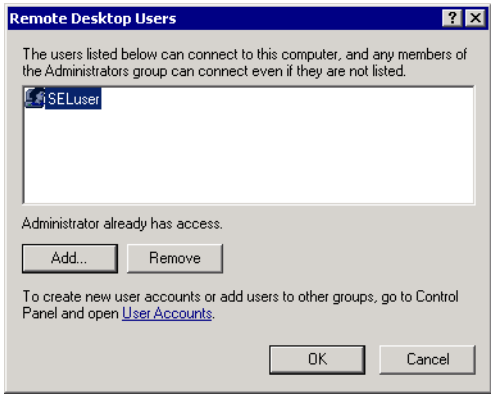


Figure 3.16 Remote User Setup

Redirection of the clipboard, drives, and communication ports have been disabled for security purposes.

Use a shared folder to move files between the SEL-3301 and other computers.

Remote Desktop Client

Use the SEL-3301 to remotely connect to another computer to view files or other information.

A detailed example of using Windows Remote Desktop Connection is given in *Section 2: Installation*. The example in *Section 2* depicts using a personal or work computer to connect to an SEL-3301. However, the function is the same when using the SEL-3301 to remotely connect to another PC or SEL-3301.

Date and Time

The SEL-3301 System Date and Time is adjusted to stay in synchronization with the IRIG-B signal obtained from an external IRIG clock. You will not be able to manually set the System Date and Time when an IRIG-B signal is present.

The computer system clock becomes the master system clock if IRIG-B input is lost or is not connected. Demodulated IRIG-B will then be generated from the computer system clock. The IRIG-B signal generated by the SEL-3301 is set by the **Date and Time Properties** dialog box (see *Figure 3.20*) when an external IRIG source is not available.

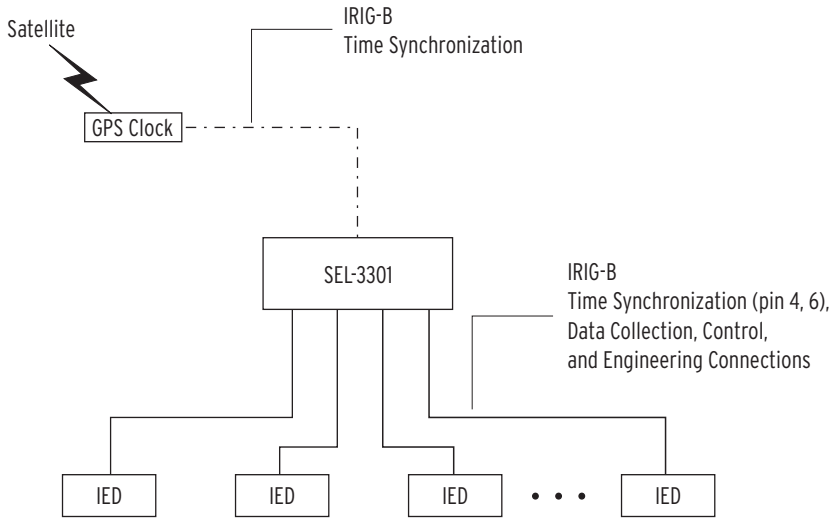


Figure 3.17 Time Synchronization With IRIG-B

The SEL-3301 allows connection to a Network Time Server. The network time updates the system clock. Then demodulated IRIG-B is generated from the system clock to synchronize connected Intelligent Electronic Devices (IEDs). This is only true when a local IRIG-B signal is not present. The local IRIG-B signal is dominant.

Contact your network or computer administrator to determine the acceptable method to connect to a Network Time Server.

The following figures illustrate how to set the system Date and Time. Select **System > Date and Time** (see *Figure 3.18*). Under the **Date & Time** tab, set the date and time, as necessary (see *Figure 3.19*).

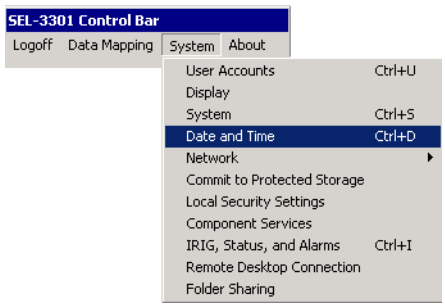


Figure 3.18 Selecting Date and Time Option

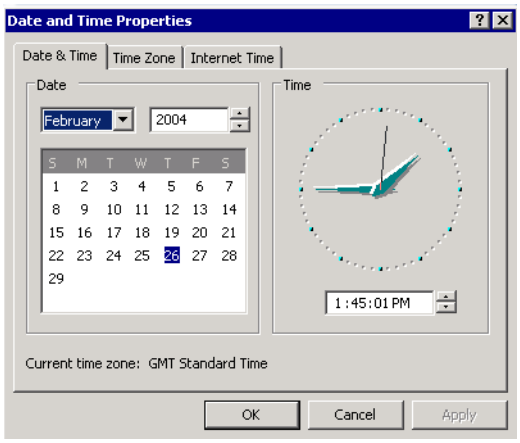


Figure 3.19 Setting System Date and Time

Network Properties

Instructions on setting up Windows based networks are beyond the scope of this manual. Refer to your network or computer administrator for assistance. Also, there are many good references online that provide overviews of computer networking.

The SEL-3301 has dual Ethernet. A separate MAC address is associated with each Ethernet connection. Therefore, each Ethernet connection may have a separate IP address and may belong to a separate domain.

Local Area Connections

Figure 3.20 and *Figure 3.21* show how to access the **Local Area Connection Properties** dialog box. Select **System > Network**. Select either **Local Area Connection 1** or **Local Area Connection 2** (see *Figure 3.20*).

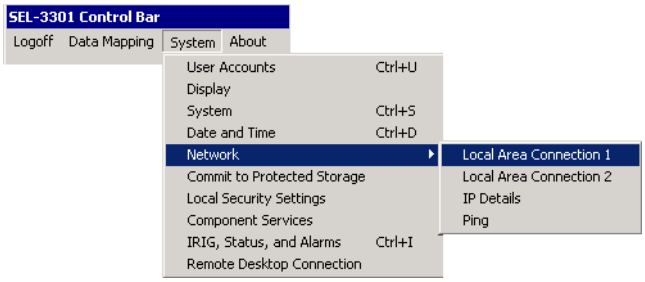


Figure 3.20 Accessing Network Properties

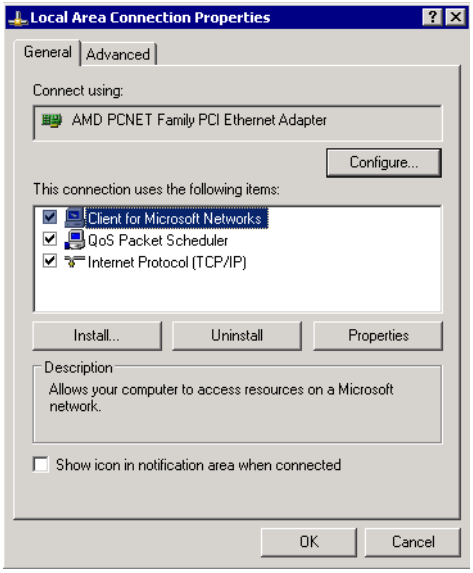


Figure 3.21 Local Area Connection Properties

IP Details

To view the current SEL-3301 network configuration, select **System > Network > IP Details**.

Ping

To ping another computer select **System > Network > Ping**.

Services

The standard Windows Task Manager is excluded from the SEL-3301 to enhance security by limiting access to files and folders.

The Windows Services interface lists all of the processes that are running on the Windows XP Embedded operating system.

Access the Windows Services interface by selecting **System** from the SEL-3301 Control Bar. Select **Component Services** (see *Figure 3.22*). *Figure 3.23* illustrates the **Component Services** window viewing the standard tab.

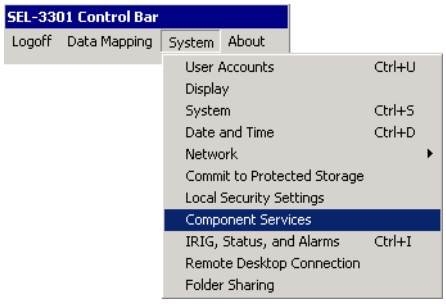


Figure 3.22 Accessing Component Services

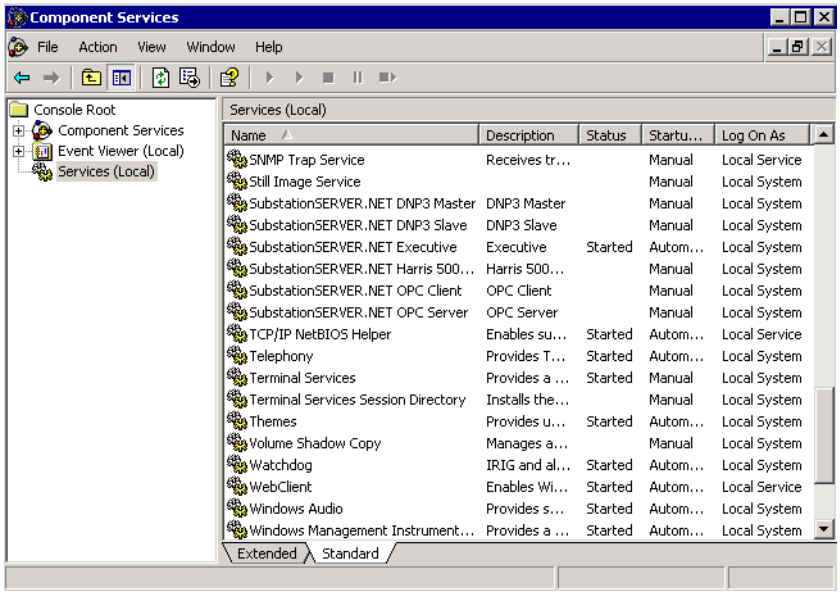


Figure 3.23 Component Services Window

Use the **Services** interface to specifically decide what action the SEL-3301 takes during a trouble or failure condition associated with a service.

Use the following steps to set a service to pulse or set the alarm contact.

Step 1. Select a service row.

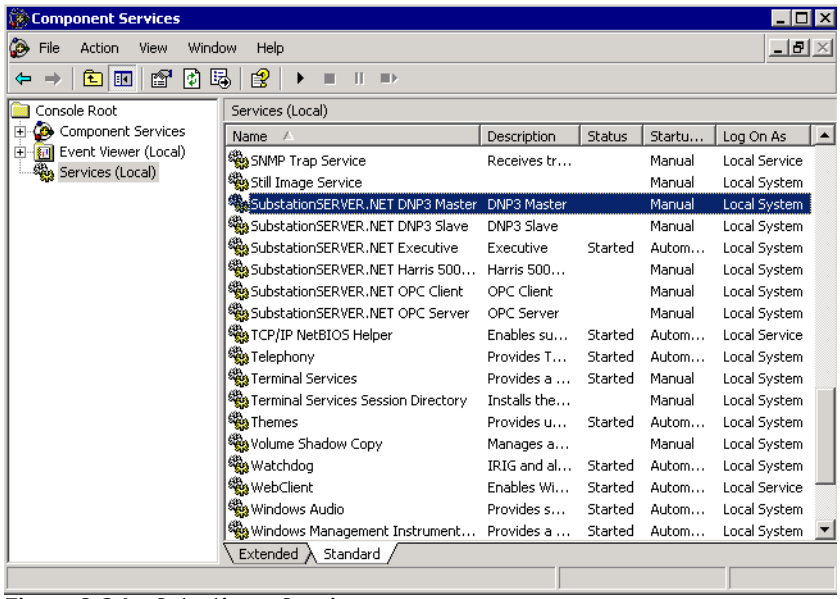


Figure 3.24 Selecting a Service

Step 2. Right-click the highlighted row.

Step 3. Select **Properties**.

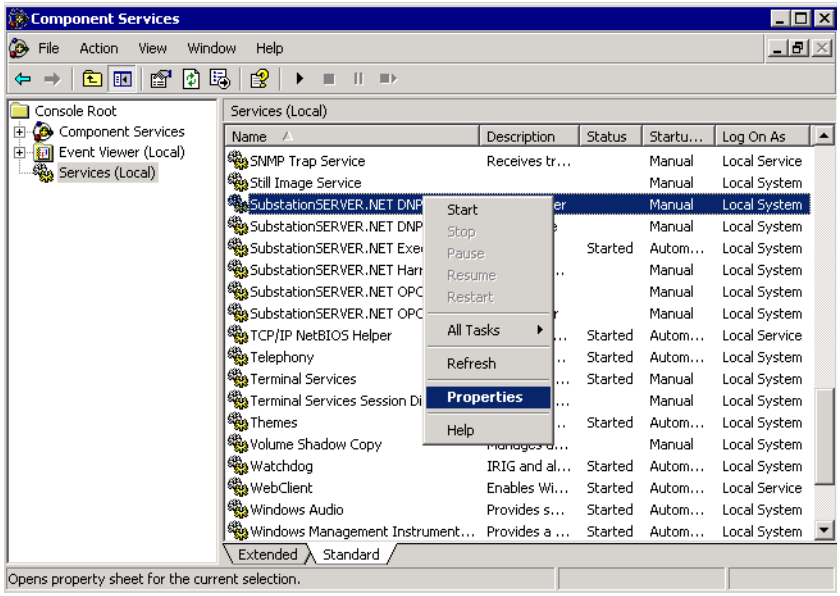


Figure 3.25 Selecting Properties Option

Step 4. Select the options in *Figure 3.26* to set a pulse or set the alarm contact.

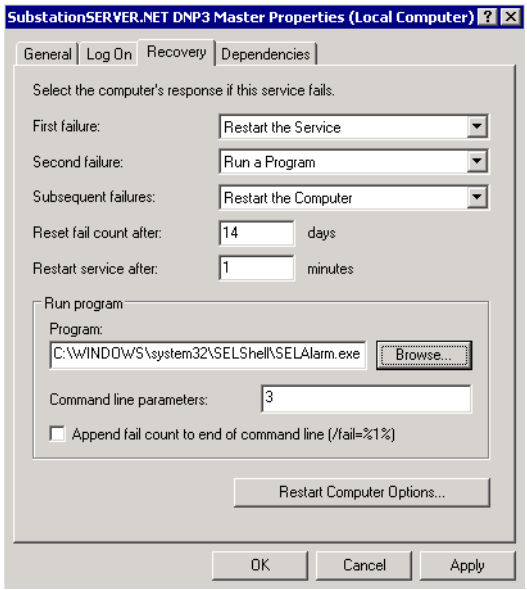


Figure 3.26 Setting a Service to Pulse an Alarm Contact

If you chose the settings shown in *Figure 3.26*, then the SEL-3301 will try to restart the DNP3 Master protocol service on the first failure within a fourteen-day period. On the second failure, the SEL-3301 runs the application C:\Windows\System32\SELShell\SELAlarm.exe with a command line parameter. This program will pulse the alarm contact. The command line parameter of three, in this example, instructs the SELAlarm.exe application to pulse the contact for three seconds. The command line parameter can be set from 1 to 30. This equates to a pulse duration range of 1 to 30 seconds.

Event Viewer

The main tool for troubleshooting Windows and Windows applications is the Event Viewer. To access the Event Viewer, select **System** from the SEL-3301 Control Bar then select **Component Services**.

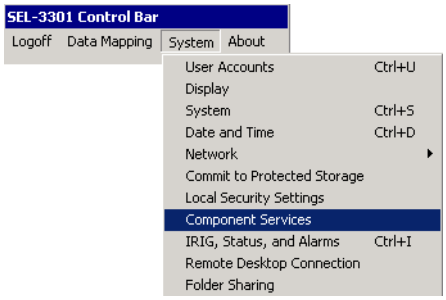


Figure 3.27 Accessing Component Services

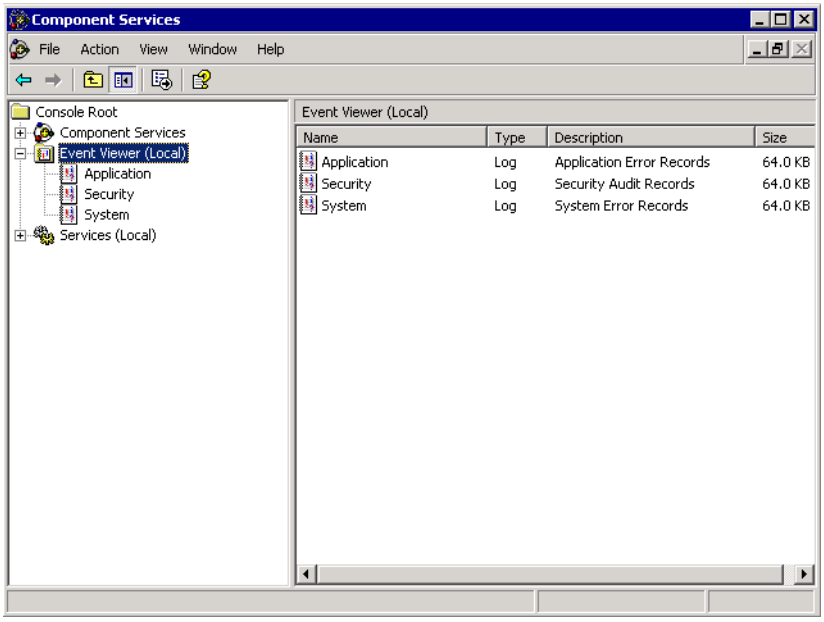


Figure 3.28 Event Viewer

In addition to Windows system errors, look to the Event Viewer to see any assertion or deassertion of overcurrent alarms, CPU burden alarms, and IRIG-B status changes. Do not adjust the default log properties shown in *Figure 3.30*, *Figure 3.31*, and *Figure 3.32*. Access the log properties by selecting the Application, Security or System row, right-click and select **Properties**.

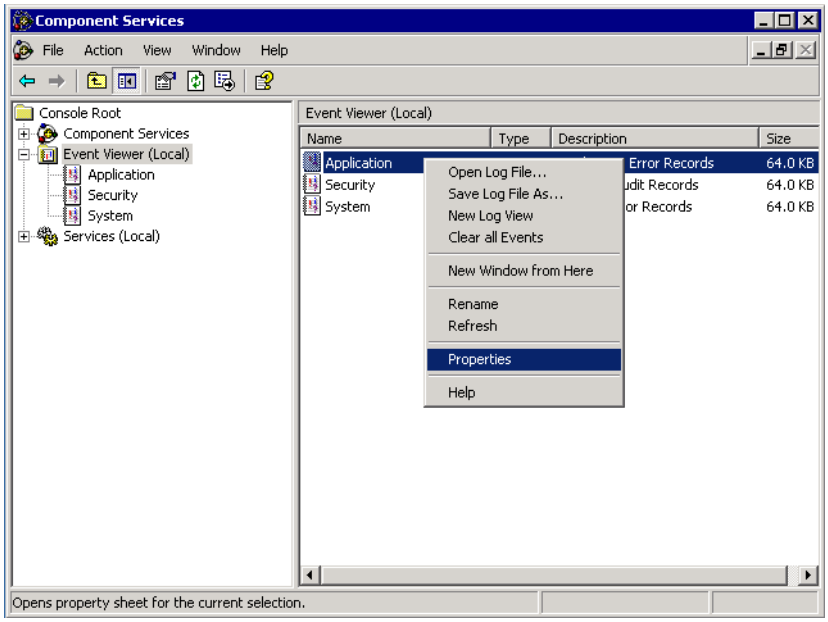


Figure 3.29 Accessing Application, Security, and System Properties

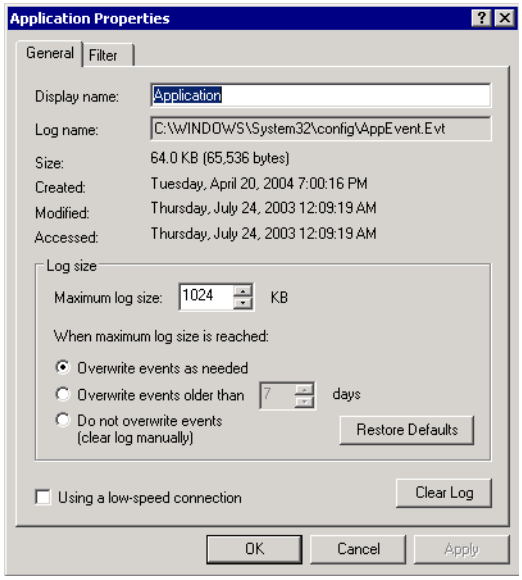


Figure 3.30 Application Properties Window

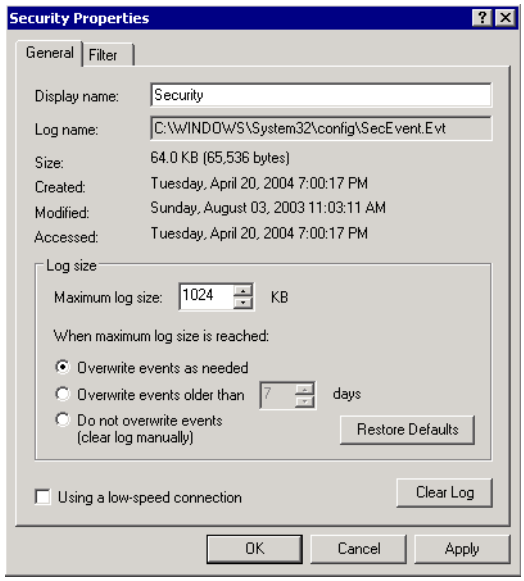


Figure 3.31 Security Properties Window

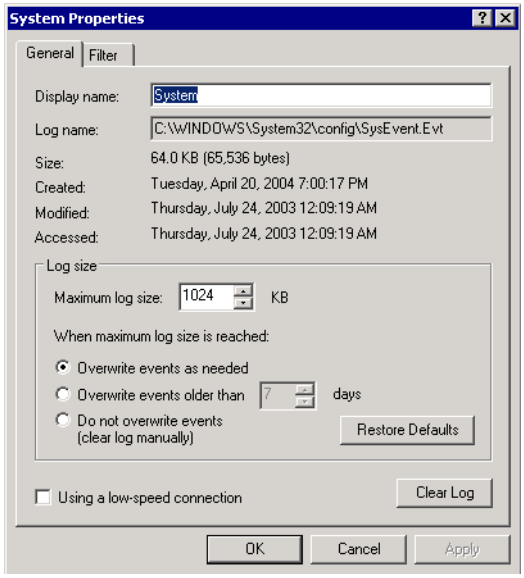


Figure 3.32 System Properties Window

Protected Storage

The SEL-3301 uses a write filter to protect the permanent storage (CompactFlash® card) from burning out or from becoming corrupted due to improper shutdown. The SEL-3301 uses a RAM overlay to store all modifications. Commit all configuration and modifications from RAM to protected CompactFlash storage when you are satisfied with the current setup of the SEL-3301. Once committed, the SEL-3301 will always retain this configuration until Commit is run again.

When you open or create and modify a file by using the protocol conversion software, saving the modifications by using the traditional Windows save methods does ***not*** commit the modifications to permanent, Protected Storage. Rather they are just saved to the RAM overlay. If you wish to make your modifications permanent, you will need to commit to Protected Storage by logging off. You can then log back on. Also, saving settings in Windows or in an application will not be permanent if you select Windows save and then cycle power without committing to Protected Storage by logging off.

Once committed, the protected volume and all of its settings and configuration become extremely resistant to permanent corruption.

Make any modifications or configuration that you desire without worry of causing unrepairable function. Cycle power and the SEL-3301 will return to its previous state if you do not commit the configuration to Protected Storage.

Settings and configuration can only be committed to Protected Storage by logging off. To commit your settings or configuration from RAM to CompactFlash, select the **Logoff** item from the **Control Bar**, then select **Commit** in the dialog box. From the confirmation dialog box, select **Shutdown** or **Restart** to commit your current setup to Protected Storage.

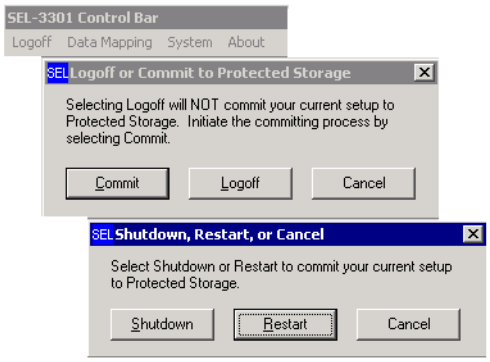


Figure 3.33 Logoff Window

Proper understanding of the Protected Storage is needed for troubleshooting. If the SEL-3301 appears to be malfunctioning, use a USB memory stick to save log files before cycling power. Cycling power will return the SEL-3301 to its previous saved state. This will delete all modifications including log files or other information needed for troubleshooting unless you reassign the file path for event logs.

Use a USB Memory Stick to eliminate the loss of event logs during a power cycle. The following example illustrates how to modify the file path for event logs.

EXAMPLE 3.1 Automatically Save Event Logs to a USB Memory Stick

Step 1. Place a USB memory stick in either the front or rear USB ports.

Step 2. Open the **Environment Variables** dialog box by selecting **System > System** from the **Control Bar**.

Step 3. Click on the **Advanced** tab.

Step 4. Click on the **Environment Variables** button. See *Figure 3.34*.

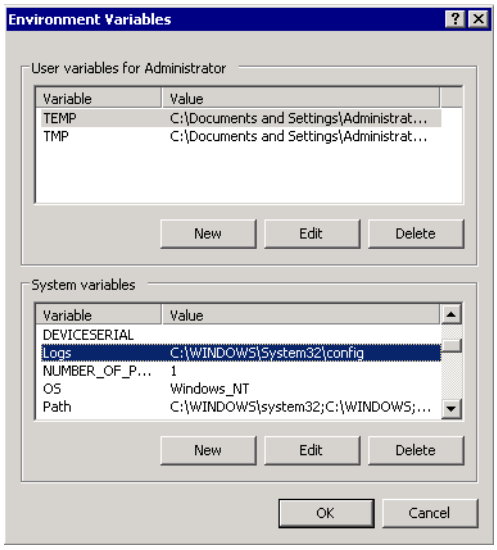


Figure 3.34 Environmental Variables

Step 5. Locate the **System Variables** list box on the bottom.

Step 6. Scroll down until you can see the **Logs** variable.

Step 7. Highlight the **Logs** row.

Step 8. Select **Edit**.

Step 9. Change the Value to **D:** (no slash).

The CompactFlash hard drive that is located inside the SEL-3301 is the C:\ drive. Plugging in USB memory sticks will create additional drives starting with D:\.

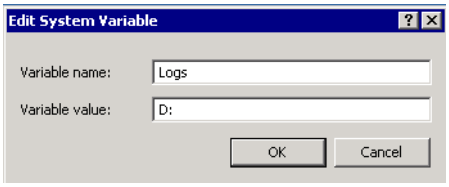


Figure 3.35 Edit System Variable Window

Step 10. Select **OK** to save your settings.

Step 11. Log off and commit your changes to Protected Storage.

Step 12. Log on to the SEL-3301.

Step 13. Open Event Viewer by selecting **System > Component Services**.

Step 14. Expand the **Event Viewer** tree menu.

Step 15. Right click on **Application**.

Step 16. Select **Properties**. See *Figure 3.36*.

The Log Name should now reflect your new file path and AppEvent.Evt file.

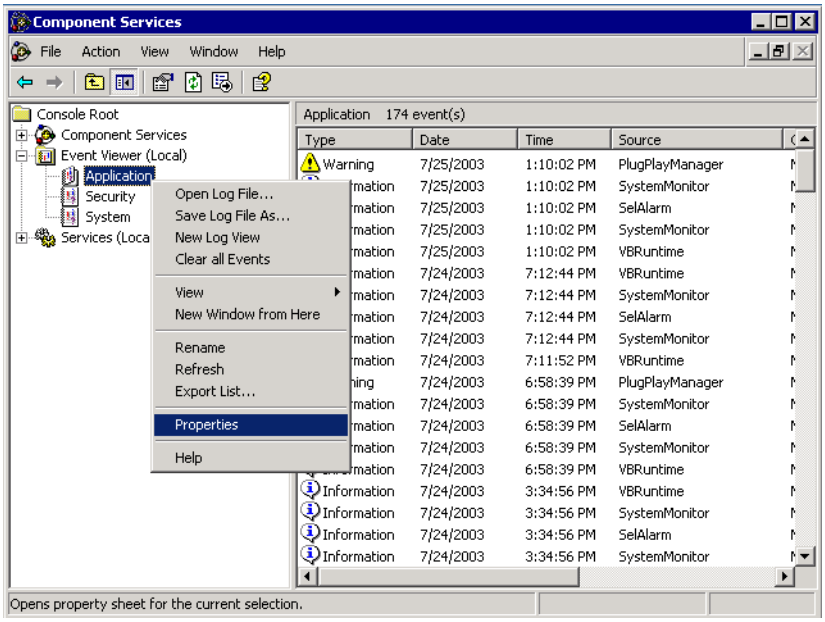


Figure 3.36 Selecting Application Properties

A reboot is required to initialize the event files on the new USB drive.

Local Security Settings

The SEL-3301 Protocol Gateway is based on Windows Embedded XP and commercial-off-the-shelf (COTS) software. A major portion of the security infrastructure that is native to Windows XP Professional has been retained in the XP Embedded operating system used in the SEL-3301.

The following illustration shows how to launch the Local Security Settings.

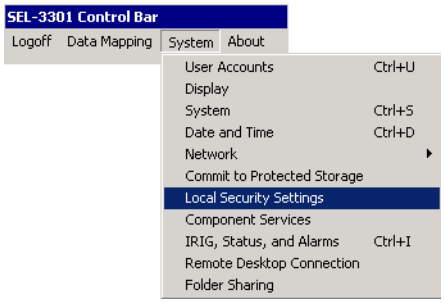


Figure 3.37 Accessing Local Security Settings

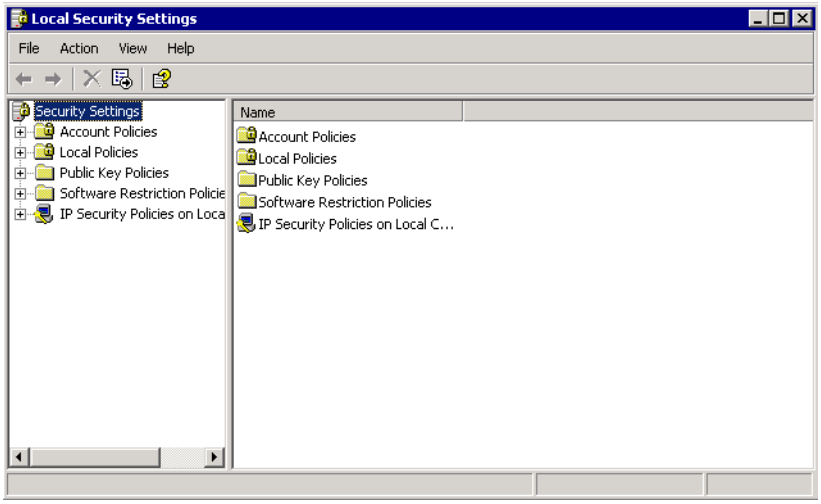


Figure 3.38 Local Security Settings Window

A detailed discussion of Microsoft Windows XP security is beyond the scope of this manual. Refer to your computer security administrator for guidelines to setting your SEL-3301.

Follow your company's computer security policies.

Simple Network Management Protocol

The SEL-3301 includes Simple Network Management Protocol Support (SNMP). SNMP is disabled by default. Choosing whether or not to use SNMP is a major decision. Completely research SNMP and the potential security risks before deciding on using SNMP.

As always, follow your company's policies regarding SNMP.

The SEL-3301 ships with SNMP Security configuration per Microsoft Knowledge Base Article - 324261 *How to: Configure Network Security for the SNMP Service in Windows Server 2003.*

The following figures illustrate how to enable SNMP.

Step 1. From the Control Bar, select **System > Component Services**.

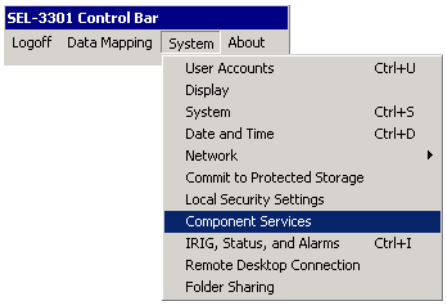


Figure 3.39 Selecting Component Services

Step 2. Select **Services**.

Step 3. Select **SNMP Service**.

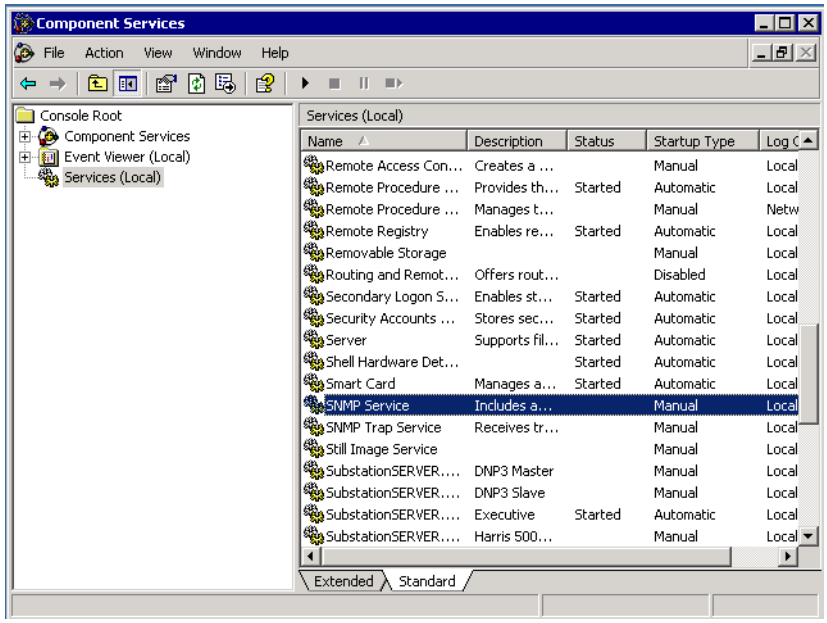


Figure 3.40 Component Services Window

Step 4. Right click the **SNMP Service** row.

Step 5. Select **Properties**.

Step 6. Click the **Start** button.

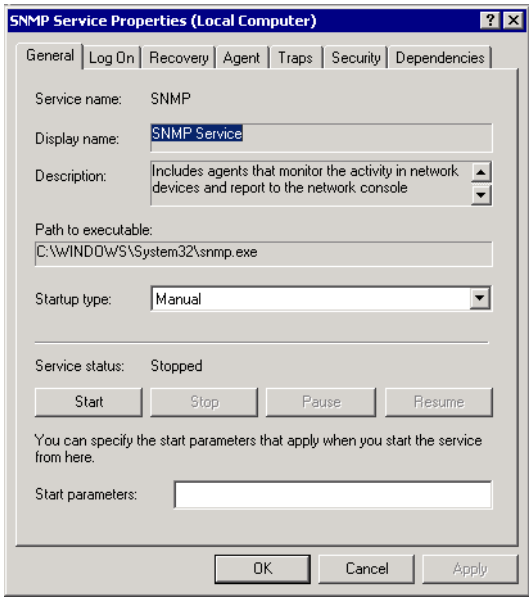


Figure 3.41 SNMP Service Properties Window

Step 7. Click **OK**.

The status should now show as started.

If you want SNMP to start every time power is cycled, change the **Startup type** to **Automatic**. Remember to commit to Protected Storage.

Folder Sharing

Use folder sharing to allow access to application files between two or more computers.

Application specific files such as configuration files or settings files may need to be shared between the SEL-3301 and a personal or work computer. Some application software is broken into a run-time or reduced function application that resides on the SEL-3301 and an enhanced configuration software that may reside on your personal or work computer. Use folder sharing to allow both of these computers to see the same files.

Folder sharing does not allow the creation of new folders. Use the application software's **File > Save As** function to allow access to creating a folder. The following figure illustrates how to create a folder using application software running on the SEL-3301.

Step 1. From the application software, click **File > Save As**.

Step 2. Click the **Create New Folder** button.

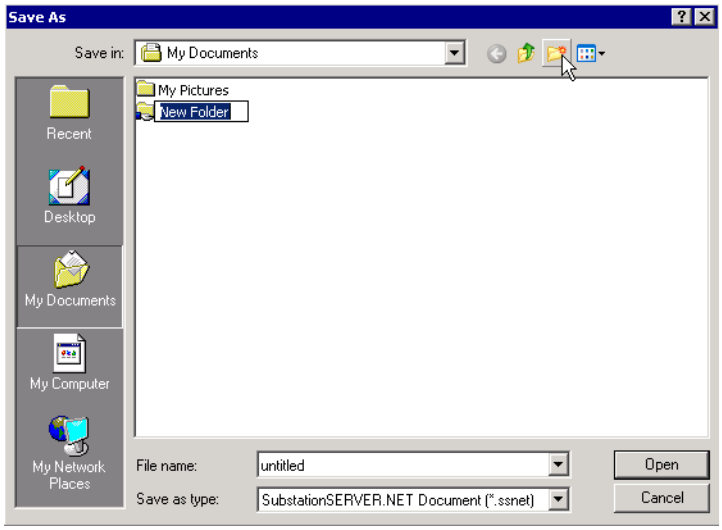


Figure 3.42 Creating a New Folder

Step 3. Name the folder.

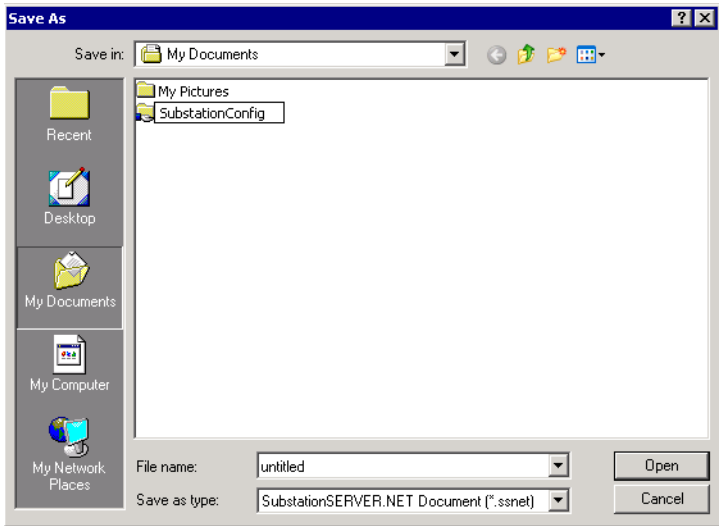


Figure 3.43 Naming the Folder

After the folder is created, use Folder Sharing to set the sharing permissions to the newly created folder. The following figures illustrate how to share folders.

Step 4. From the **Control Bar**, select **System > Folder Sharing**.

Step 5. Select the **Shares** folder.

Step 6. Right click and select **New** > **File Share**.

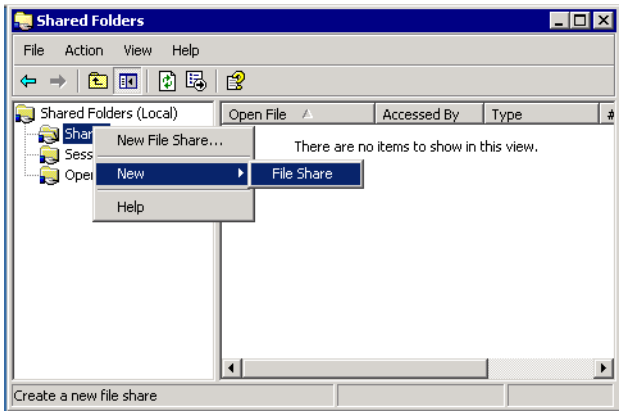


Figure 3.44 Selecting Files Share Option

Step 7. Browse to the folder created in *Step 3*.

Step 8. In the **Share name** text box, type the folder name.

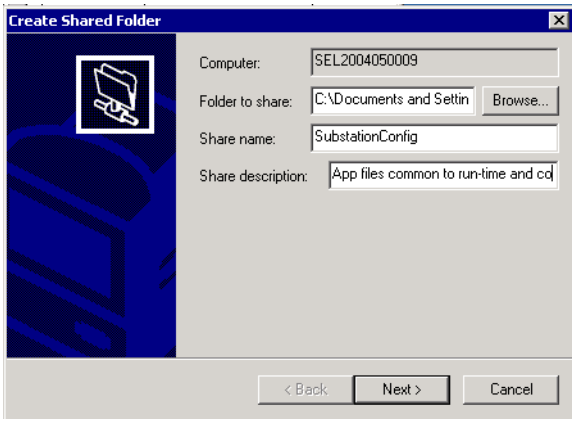


Figure 3.45 Create Shared Folder Window

Step 9. Add a description of the folder in the **Share description** text box.

Step 10. Click **Next**.

All users have full control is selected by default. If this is not selected, please select it.

Step 11. Click **Finish**.

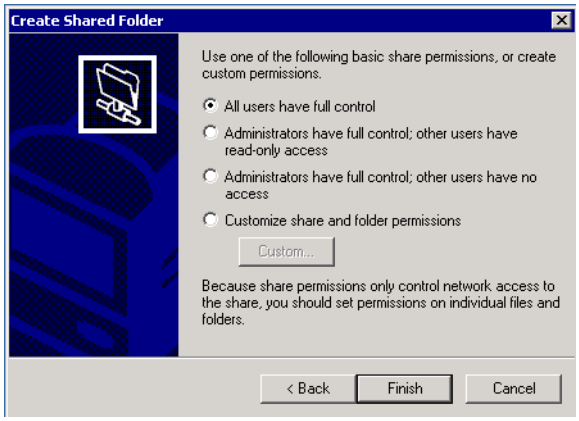


Figure 3.46 Created Shared Folders Permission Window

You will be prompted to create another shared folder. (Choose **Yes** or **No**.)

Notice the Shared Folder you created is now displayed in the list (see *Figure 3.47*).

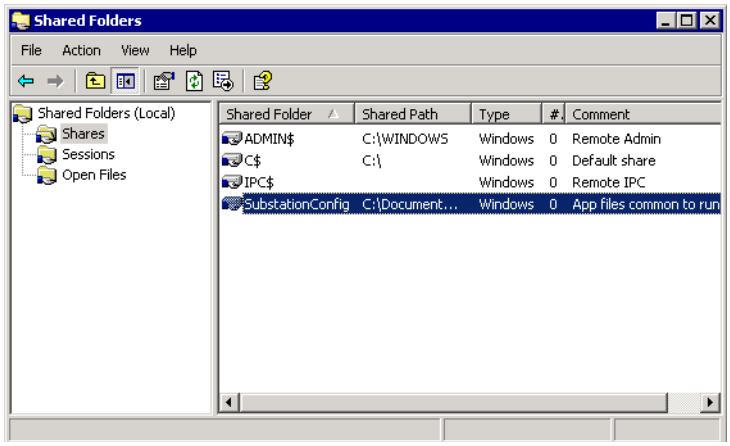


Figure 3.47 Shared Folders Window

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Section 4
IRIG, Status, and Alarms

Overview

This section introduces the IRIG, Status, and Alarm Control Panel. This control panel provides a custom interface that is not part of any standard Microsoft® interface. This control panel provides an interface to the microcontroller.

Control Bar Functions

Located under **System > IRIG, Status, and Alarms** (see *Figure 4.1*), the control panel provides access and control to system computer functions.

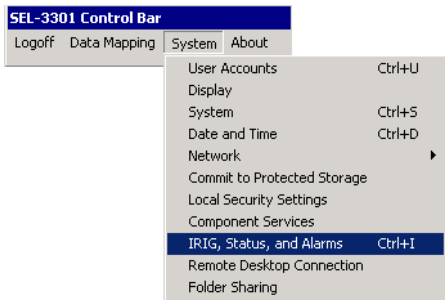

Figure 4.1 Selecting IRIG, Status, and Alarms

Available RAM

The RAM in the SEL-3301 functions as a virtual hard drive and memory space for applications and the operating system. The SEL-3301 alarms if the RAM gets below 40 MB. Avoid continuous operation below 40 MB. To increase available RAM:

Step 1. Delete any files that have been saved since the last time you committed to protected storage.

Step 2. Commit your current configuration to protected storage by logging off and restarting.

Step 3. Restart or cycle power. This will cause a loss of current configuration. The SEL-3301 will restart with the settings and configuration that was saved during the previous time you committed the RAM to protected storage.

Disk Space

The SEL-3301 does not use a rotating hard drive. The hard drive is a 512-MB compact flash. Delete unused application files if the hard drive disk space is low. The SEL-3301 will alarm when disk space is below 40 MB.

CPU Burden

The device temperature rating of –40 to +75° C assumes a continuous average maximum processor burden of 50 percent. The default settings for alarming are greater than 50 percent CPU burden for greater than 30 seconds. The alarm contact will close for operation outside of these parameters. Contact your SEL representative if the CPU burden is routinely alarming in your application. Adjustment of these settings is possible but not recommended.

Refer to the (*Figure 4.2*) **IRIG, Status, and Alarm Control Panel** dialog box to locate the CPU burden settings.

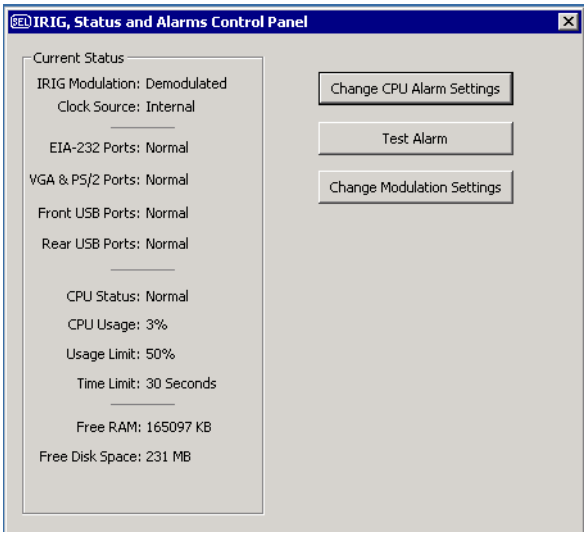

Figure 4.2 IRIG, Status, and Alarm Control Panel

Selecting the **Change CPU Alarm Settings** box shown in *Figure 4.2* allows the user to configure CPU burden set points for alarming.

Overcurrent Status

The SEL-3301 sources power out of the EIA-232, USB, PS/2, and VGA ports. Current limiting on these ports is provided to ensure that there will not be equipment damage in the event of a short circuit on these ports. Shorting the power on these ports will not affect the operation of the SEL-3301.

Table 4.1 shows the current limited sections.

Table 4.1 Current Limited Sections

Ports	Limit
VGA and PS/2	0.6 A, 5 Vdc, 3.0 W total for both
Front USB Ports	0.6 A, 5 Vdc, 3.0 W total for both
Rear USB Ports	0.6 A, 5 Vdc, 3.0 W total for both
EIA-232 Ports	0.6 A, 5 Vdc, 3.0 W total for all

Exceeding the limits shown in *Table 4.1* will cause the alarm contact to close and the status will change in the **IRIG, Status, and Alarm Control Panel** dialog box.

IRIG-B

The IRIG, Status, and Alarm Control Panel (see *Figure 4.2*) shows the current IRIG-B status. A status of External IRIG indicates that a separate IRIG clock is currently supplying time to the SEL-3301. The external IRIG source has the highest precedence. If there is no external source, then the SEL-3301 will provide IRIG from the computer system clock and the indication will be

Internal or External NTP. Internal means the Windows system clock is free running and is not being corrected. External NTP means the Windows system clock is being periodically updated by a network-time server.

Accuracy between the Windows system clock and IRIG-B signal is ± 900 ms.

Select **Change Modulation Settings** to modify **Modulated** or **Demodulated** as the IRIG input to the SEL-3301 from an external source. The **Modulated** and **Demodulated** radio buttons are ignored if the SEL-3301 internal Windows clock is sourcing time. See *Figure 4.3*. Ensure any changes are properly committed to the Protected Storage area (see *Protected Storage on page 3.17*).

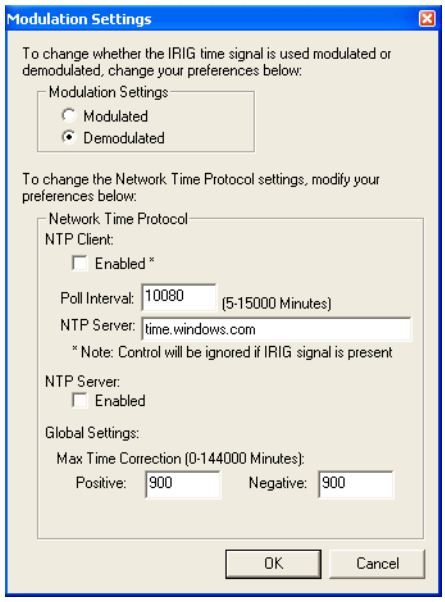

Figure 4.3 Modulation Settings Window

Select the appropriate NTP client options if you wish to time-synchronize the SEL-3301 to a remote NTP time server. The IRIG-B clock input takes precedence over the NTP client. Use the NTP server settings to instruct the SEL-3301 to act as an NTP server for time-synchronizing remote network devices.

Alarm Contact Test

Contained in the **IRIG, Status, and Alarm Control Panel** (see *Figure 4.2*) is a **Test Alarm** button. Enter the pulse duration in seconds and press the **Test Alarm** button to test the alarm contacts. See *Figure 4.4*.

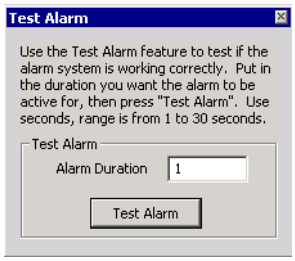

Figure 4.4 Test Alarm Window

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Section 5
Troubleshooting

Overview

Please refer to the SEL website (www.selinc.com) for up-to-date troubleshooting information.

Common Operation Oversights

Blank Monitor

The SEL-3301 is compliant with most computer monitors. The video selections available are 800 by 600, 1024 by 758, 1152 by 864 and 1600 by 1200. Ensure that your monitor meets this specification.

Table 5.1 lists possible causes and solutions for a blank monitor.

Table 5.1 Blank Monitor Troubleshooting

Symptoms/Possible Cause	Diagnosis/Solution
Power saver is activated	➤ Move your mouse to ensure that the screen saver is not activated.
Monitor power is off	➤ Locate and verify that the monitor power indication LED is illuminated. ➤ If the LED is not illuminated, locate the monitor power button and press to turn the power on. ➤ If the power does not come on, verify that the correct power supply is connected to the monitor. ➤ Verify that the monitor's video cable is plugged into the SEL-3301.
SEL-3301 power is off	➤ Verify that the SEL-3301 power LED is illuminated. ➤ If the SEL-3301 LED is not illuminated, re-examine the power outlet and power connection to the SEL-3301 monitor. ➤ Ensure that your SEL-3301 is properly being powered. Note that the SEL-3301 is available with multiple voltage levels.
Equipment Failure	➤ Contact your computer administrator if you cannot determine the cause.
Miscellaneous	➤ Verify that the monitor brightness is not turned all the way down.

Networking

Although proper computer system networking is an extremely broad topic, there are a few steps that can aid in simple network troubleshooting.

Ensure that the Ethernet hub, switch, or router is compatible with the SEL-3301. The SEL-3301 has the ability to connect to 10BASE-T and 100BASE-T copper cable connected equipment. The SEL-3301 has the ability to connect to two 100BASE-FL fiber Ethernet connections.

Verify that the SEL-3301 and the network are communicating by observing the LEDs associated with the Ethernet network switch or hub. If the LEDs display no activity, then verify that the proper cabling exists.

If you are sure the Ethernet cabling is proper, then ping the SEL-3301 from a work or personal computer. As a basic rule, nothing will work if pinging does not work. When pinging, use an IP address or computer name.

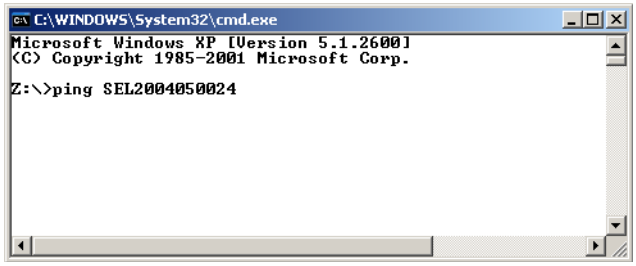

Figure 5.1 Ping Command

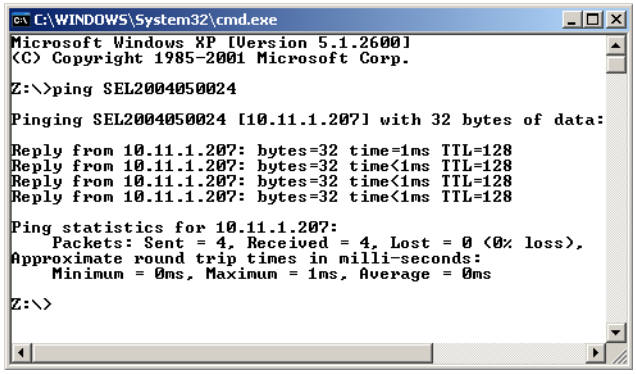

Figure 5.2 Ping Response

Factory Assistance

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

Schweitzer Engineering Laboratories, Inc.
2350 NE Hopkins Court
Pullman, WA USA 99163-5603
Tel: (509) 332-1890
Fax: (509) 332-7990
Internet: www.selinc.com

Appendix A

Software and Manual Versions

Software

Determining the Software Versions in Your SEL-3301

To find the revision number in your SEL-3301, select **ABOUT** in the SEL-3301 Control Bar.

Table A.1 lists the software, firmware, and shell versions, a description of modifications, and the instruction manual date code that corresponds to these versions. The most recent version is listed first.

Table A.1 Software Revision History

Identification Numbers	Description of Changes	Manual Date Code
This release differs from the previous version as follows: Operating System: R2.0.5 Firmware: R103 Shell Version: R1.0.13 System Monitor: R1.1.1.2 System Control Monitor: R1.1.1.0	**Operating System** ➤ Updated per Daylight-Saving Time date change.	20070214
This release differs from the previous version as follows: Operating System: R2.0.4 Firmware: R103 Shell Version: R1.0.13 System Monitor: R1.1.1.2 System Control Monitor: R1.1.1.0	**Firmware** ➤ Improved performance at cold temperatures.	20060111
This release differs from the previous version as follows: Operating System: R2.0.4 Firmware: R102 Shell Version: R1.0.13 System Monitor: R1.1.1.1 System Control Monitor: R1.1.1.0	**Firmware** ➤ Allow saving modulated/demodulated IRIG-B settings. ➤ Improve accuracy of operating system time synchronization.	20051107
This release differs from the previous version as follows: Operating System: R2.0.3 Firmware: R101 Shell Version: R1.0.13	**Operating System** ➤ Updated per Service Pack 2.	20050406
This release differs from the previous version as follows: Operating System: R1.0.2 Firmware: R101 Shell Version: R1.0.13	**Firmware** ➤ Watchdog software modified to support field upgrade. ➤ Corrected IRIG-B year rollover conflict.	20050111
Operating System: R1.0.2 Firmware: R100 Shell Version: R1.0.13	➤ Original release.	20040503

Reference Manual

The date code at the bottom of each page of this manual reflects the creation or revision date.

Table A.2 lists the reference manual release dates and a description of modifications. The most recent reference manual revisions are listed at the top.

Table A.2 Reference Manual Revision History (Sheet 1 of 2)

Revision Date	Summary of Revisions
This manual differs from the previous version as follows:	
20070214	**Appendix A** ➤ Updated for operating system version R2.0.5.
This manual differs from the previous version as follows:	
20060111	**Appendix A** ➤ Updated for firmware/software revisions.
This manual differs from the previous version as follows:	
20051107	**Section 1** ➤ Updated Battery Life information in the *Specifications*. **Section 2** ➤ Updated *Table 2.4*. ➤ Updated *Real-Time Clock and BIOS Battery Replacement*. **Section 4** ➤ Updated *IRIG-B*. **Appendix A** ➤ Updated for firmware revisions. **Appendix C** ➤ Updated *Resetting BIOS*.
This manual differs from the previous version as follows:	
20050406	**Section 1** ➤ Updated *Features*. ➤ Modified *Figure 1.1*. ➤ Specifications modified to include new protocols. **Section 2** ➤ Updated *Table 2.3*. ➤ Changed heading *CompactFlash of Image Replacement* to *CompactFlash Upgrade*. ➤ Updated *CompactFlash Upgrade*. **Section 3** ➤ Added note under *Overview*. ➤ Modified *Control Bar Functions*. ➤ Added *Figure 3.16*. ➤ Updated *Figure 3.3* and *Figure 3.33*. ➤ Removed *Figure 3.39*. **Appendix B** ➤ Added note under *Step 6*.

Table A.2 Reference Manual Revision History (Sheet 2 of 2)

Revision Date	Summary of Revisions
This manual differs from the previous version as follows:	
20050111	**Appendix A** ➤ Updated for firmware revisions.
20040503	➤ Initial Release Master: DNP3 Serial, OPC Client Slave: DNP3 Serial, DNP3 LAN/WAN, Harris 5000, OPC Server

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Appendix B
Device Update Agent

Device Updates

SEL will issue an update to the SEL-3301as needed. Deploy the update locally, over a network via a shared drive. Most updates only require using the Device Update Agent. However, some updates may require a complete copy over the CompactFlash® card hard drive located in the SEL-3301. The following subsections give a general description of the process. Specific instructions may also be furnished with the release of the update.

Local Update

The SEL-3301 uses the Device Update Agent. The Device Update Agent continuously scans a designated drive for a file labeled **SELUpdate.dua**.

Step 1. Start the Component Services by selecting **System > Component Services**.

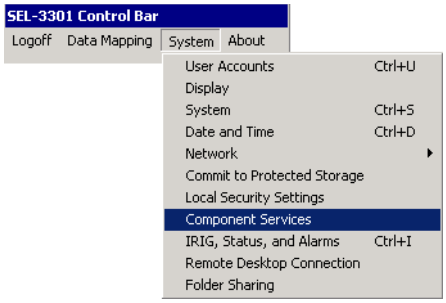

Figure B.1 Accessing Component Services

Step 2. Select the **Services** folder.

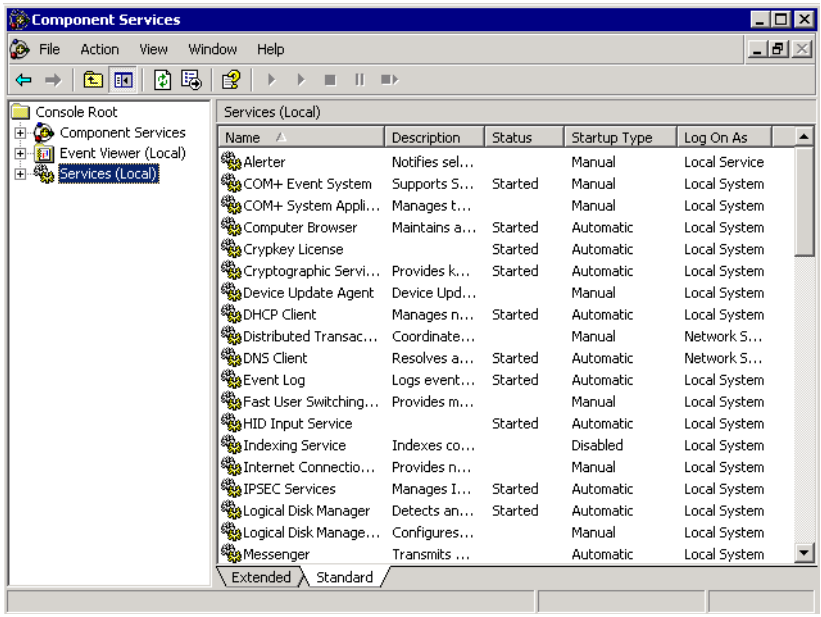

Figure B.2 Selecting the Services Folder

Step 3. Select the **Device Update Agent** row.

Step 4. Right-click and select **Start**.

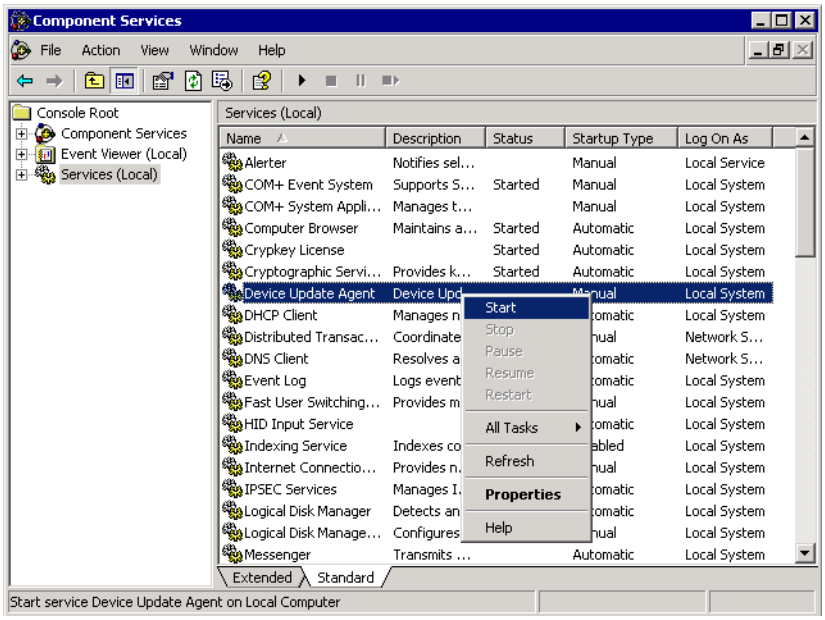

Figure B.3 Selecting the Device Update Agent Row

Step 5. Copy the **SELUpdate.dua** furnished by SEL to a USB memory stick.

Step 6. Place the memory stick in one of the available USB ports on the SEL-3301.

Wait for a minimum of 10 minutes for the SEL-3301 to scan for updates. After the SEL-3301 runs the update, it will delete the file.

NOTE: Computer may restart several times.

Step 7. Verify the update file is no longer on the USB stick.

This indicates that the update was successful.

Step 8. Repeat for all SEL-3301 devices that apply to the update.

Network Update

Use folder sharing to update the SEL-3301 over a network.

Step 1. Create a shared folder on the targeted SEL-3301. See *Folder Sharing* in *Section 3*.

Step 2. Use the **Environment Variables** dialog box, also described in *Section 3*, to set the **Logs** file path to your newly created shared folder. For example, C:\NewUpdateFolder.

Step 3. Copy the **SELUpdate.dua** file to the shared folder from your remotely connected network computer.

Step 4. Start the Device Update Agent service as shown in *Local Update on page B.1*.

The SEL-3301 will follow this newly created path and search for the file **SELUpdate.dua**. Once the file is found, the SEL-3301 will run the script and then delete the file.

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Appendix C
Resetting BIOS

Resetting BIOS

The SEL-3301 ships with the proper BIOS settings. Do not modify the BIOS settings unless either of the following has occurred.

- The ETX single board computer has been replaced or removed.
- The baseboard battery has been replaced.

Reset the BIOS using the following steps.

⚠CAUTION
Read the following steps before attempting to reset the BIOS. Contact your computer administrator if you have any concerns.

Step 1. Connect a keyboard and monitor.

Step 2. Apply power to the SEL-3301.

Step 3. Press the **<Delete>** key during the boot sequence.

The BIOS boot menu should be displayed.

Step 4. Select the **Auto Configure with Optimal Settings** near the bottom of the list.

Step 5. Make the following modifications to the BIOS shown in *Table C.1*.

Follow the same order shown in the *Table C.1* when making the edits (they are order dependent).

NOTE: Create a new supervisor password (recommended).

Table C.1 BIOS Modifications

Standard CMOS	Date: Time:	
	Floppy A	Not installed
	Boot Sector Virus Protection	Enabled
Advanced CMOS	Quick boot	Enabled
	Wait for **F1**	Disabled
	Press **DEL** message	Disabled
Advanced Chipset	USB Legacy Device	All Device
	LCD Type	#7 1024 x 768
	LCD CRT Selection	CRT
Power Management	ACPI	No
	Restore on ac power loss	Power on
	Power Type select	PC-AT
PCI/Plug and Play	IRQ5	ISA/EISA
	IRQ9	ISA/EISA
Peripheral Setup	Add LPT Function Select	LPT (SSP)
	Onboard FDC	Disable
	Onboard Parallel	Disabled
	Onboard AC ‘97 Audio	Disabled

Glossary

10/100BASE-T 10BASE-T is a variant of Ethernet that allows devices to be connected via twisted-pair cable. 100BASE-T incorporates any of several Fast Ethernet standards (under IEEE 802.3) or planned standards for twisted-pair cables. Fast Ethernet is a version of Ethernet capable of 100 Mbps, instead of the 10 Mbps data transfer speed for standard Ethernet.

100BASE-FX Fast Ethernet over optical fiber. Fast Ethernet is a version of Ethernet capable of 100 Mbps, instead of the 10 Mbps data transfer speed for standard Ethernet.

3U The designation of the vertical height of a device in rack units. One rack unit, U, is approximately 1.75 inches or 44.45 mm.

A Abbreviation for amps or amperes; unit of electrical current flow.

ac Abbreviation for alternating current.

ACPI Advanced Configuration and Power Interface. An open industry standard developed by Intel, Microsoft, and Toshiba for configuration and power management.

ASCII Abbreviation for American Standard Code for Information Interchange. Defines a standard set of text characters. The SEL-3301 uses ASCII text characters to communicate through the use of serial ports.

BIOS Basic Input/Output System. System software that provides the most basic interface to peripheral devices and controls the first stage of the boot process, including operating system installation.

Burden Percentage of time during which the CPU is working.

CMOS Complementary Metal Oxide Semiconductor. A semiconductor fabrication technique that makes use of n- and p- doped semiconductor material to achieve low-power dissipation.

CompactFlash® A type of nonvolatile relay memory used for storing large blocks of nonvolatile data.

CPU Central processing unit.

CRT Cathode ray tube. A type of monitor.

CTS Clear to send.

Current Limiting Keeping current within a specified threshold.

dc Abbreviation for direct current.

DCD Digital Control Design Language. A language for simulating computer systems.

Dry Contact An initially available contact that is neither connected to nor energized by voltage (such voltage is usually supplied externally).

DSR Dynamic Service Register.

DTR Data Terminal Ready. A wire in an EIA-232 connection that tells data communications equipment (typically a modem) that the computer or terminal is ready to transmit and receive data.

EIA-232 Electrical definition for point-to-point serial data communications interfaces, based on the standard EIA/TIA-232. Formerly known as RS-232.

EMI Electromagnetic Interference.

Environment Variables Environment variables are part of Windows® System Properties. Adding, deleting, and editing these variables changes your Windows system configuration.

ESD Electrostatic discharge. The sudden transfer of charge between objects at different potentials caused by direct contact or induced by an electrostatic field.

Ethernet A network physical and data link layer defined by IEEE 802.2 and IEEE 802.3.

ETX End of Text. The interrupt character (also obtained through Ctrl+C) used on many operating systems to interrupt a running program.

Firmware The nonvolatile program stored in the relay that defines relay operation.

GND Ground.

GPS Global Positioning System. Source of position and high-accuracy time information.

GUI Graphical user interface.

HMI Human machine interface.

IRIG-B A time code input that the relay can use to set the internal relay clock.

IRQ3/IRQ5 Interrupt requests that cause the processor to suspend normal instruction execution temporarily and to begin an interrupt handler routine. An interrupt condition persists as long as the input is active. Some processors have several interrupt request inputs, allowing different priority interrupts.

LCD Liquid Crystal Display.

LED Light-Emitting Diode. Used as indicators on the Protocol Gateway front panel.

MAC Address The hardware address of a device connected to a shared network medium.

MOV Metal-Oxide Varistor.

Network Time Server	A device that provides system-wide time synchronization for distributed computer network/client server applications.
Null-modem Cable	A serial cable for direct connection of computers without use of a modem.
PC	Personal Computer.
Peak Common Mode	Maximum voltage between a signal line and common (ground).
Peak Differential Mode	Maximum voltage between two signal lines.
Ping	Packet InterNet Groper. A program that tests the ability to communicate with a remote device by sending one, or repeated, echo requests to a remote location and waits for replies. The term is also used as a verb to indicate the action of sending signals to and receiving echoes from remote devices.
Pinout	The definition or assignment of each electrical connection at an interface. Typically refers to a cable, connector, or jumper.
Protocol	A language for communication between devices.
RAM	Random-Access Memory.
RC Filter	Resistive-Capacitive Filter. A filter composed of a resistor and capacitor.
RFI	Radio-Frequency Interference.
RTS	Request to Send.
RXD	Received data.
SCADA	Supervisory Control and Data Acquisition.
Star Topology	Connection scheme in which multiple devices connect to one common node device.
TTL	Transistor-Transistor Logic. A term originating with Texas Instruments describing a common semiconductor technology for building discrete digital logic integrated circuits.
TXD	Transmitted data.
V	Abbreviation for volts; unit of electromotive force.
VESA	Video Electronic Standards Association.
W	Abbreviation for watts; unit of electrical power.
Write Leveling	Technique by which information written to CompactFlash card is spread throughout the storage area to prevent exhausting individual memory locations.

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