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System 922

PFT for T1 Robbed Bit and ISDN PRI

Installation Guide

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WARNING: This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the installation guide, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measure may be required to correct the interference.

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Chapter One

Planning for the System 922

Overview

This chapter provides information to help you make several necessary decisions and do some simple planning before you actually begin installing your System 922. If you read this chapter with care and follow its suggestions, you will undoubtedly make installation a much quicker and more efficient process.

The System 922 enclosure, circuit cards, and reference document diskette may be shipped in separate cartons. Upon receiving your System 922, you should inspect it for damage immediately. Should damage be found, a claim should be filed with the shipper. Save the original cartons and packing materials for later inspection.

Make sure the carton containing the System 922 enclosure includes an installation kit. The kit should contain four #8 pan-head screws ($\frac{3}{4}$ -inch long), two or four 8-position modular jacks, and two or four 8-position modular data cables.

Once you have inspected the System 922 and related components, continue the planning process by reading the remainder of this chapter. Then read Chapter Two, "Installing the System 922," as you actually perform the installation.

Mounting Location

The System 922 can either be wall or rack mounted. If wall mounting, you must find a suitable position on the equipment room wall. Choose a spot where you can easily view the diagnostic LEDs located on the front of the System 922 enclosure. Also make sure you locate the System 922 close enough to the digital telephone circuits that need to be connected. Seven-foot 8-pin modular data cables are included in the installation kit for this purpose.

Rack mounting requires an optional Rack Mount Kit. If rack mounting the System 922, the 19-inch Rack Mount Kit must first be installed onto the System 922 in accordance with the instructions. The System 922 will occupy eight positions in a standard rack. If rear access to the 19-inch rack is limited, do not mount the System 922 to the rack assembly until all interconnecting cables are connected.

–48 Vdc Power Source

The System 922 requires an external source of –48 Vdc, 1.2 A maximum, for operation. This power source must be uninterruptible. In other words, it must be present at all times, even in the event of a commercial power outage. If a –48 Vdc uninterruptible power source (UPS) is available at the site you can use it to power the System 922.

If an AC UPS system that provides an uninterruptible source of 120 Vac is available at the site, you can use it to power a –48 Vdc power supply, such as the Model 728 from Gordon Kapes, Inc. The Model 728 provides a –48 Vdc, 2 A maximum output using input power of 110-240 Vac. A single Model 728 can power one System 922 unit.

If it is desirable for the System 922 to operate independently of other equipment, you can use the Model 732A or Model 734A DC Power Supply with Battery Back-Up from Gordon Kapes, Inc. The Model 732A is a self-contained, wall-mounted unit that provides an uninterruptible source of –48 Vdc using input power of 120 Vac. The Model 734A can be wall or rack mounted, depending on the selected mounting option. Both models provide 2 A maximum output, and can sustain 1.2 A for a minimum of 5 hours.

When connected to a System 922, the Model 732A or Model 734A provide worst-case minimum operating time of about 6 hours. Under more routine circumstances—where all System 922 resources, such as the OPS extensions, are used less than 100% of the time—8 to 10 hours of operation is possible. The Model 732A and Model 734A were expressly designed for use with applications such as the System 922. Contact Gordon Kapes, Inc. for details.

Analog Telephone Sets

If you plan to install and use OPS extensions with the System 922, you must obtain the needed number of single-line, analog telephone sets (as many as 48) supporting touch-tone dialing. (Pulse dialing is not supported.) Gordon Kapes, Inc. highly recommends you supply telephone sets that include a separate “flash” button. For each set of eight telephones you intend to use, ensure you have one 938A OPS Card (available with analog caller ID option).

25-Pair Cables and Interconnecting Assemblies

During installation, you use two 25-pair plugs to make connections to the analog telephone sets previously described. These RJ21X-style plugs are standard to the telephone industry. You must provide two 25-pair cables with female connectors attached to mate with plugs P1 (analog ports 1-24) and P2 (analog ports 25-48). You must also obtain the interconnecting assemblies of your choice, such as 66-type blocks, for terminating the analog ports via the 25-pair cables.

Alarm Inputs

The System 922 provides two independent inputs for activating the seizure of the Network DS1 circuits. Input A or Input B can be connected to alarm control signals provided by CPE equipment such as a PBX or ACD system. Alarm events from these sources will cause a specific interface or both interfaces to seize the System 922's Network DS1 connections. The transfer action is dependent upon the setting selected in System 922 configuration menu.

If the uninterruptible power supply, which ultimately supplies –48 Vdc, provides a contact indicating an AC failure, consider connecting it to one of the alarm contact inputs. The Gordon Kapes, Inc. Model 732A or Model 734A DC Power Supply with Battery Back-Up provide this type of contact.

Alarm signals to the System 922's alarm contact inputs can be either normally open (not shorted) or closed (shorted). The signals must be in the form of isolated contacts or contacts that close or open in reference to earth ground.

Note that an alarm signal must change from the normal state to alarm state for longer than one second for a System 922 alarm condition to be activated. After the alarm contact input returns to the normal state for longer than three seconds, the alarm condition returns to normal. These time periods enable the System 922's operating system to correctly detect changes.

CPE DS1 Monitoring

Circuits on the System 922 DS1 Interface Card monitor the DS1 signals coming from the CPE DS1 equipment. If generation of this signal ceases, or frame loss is detected, a System 922 alarm state occurs. If configured to monitor CPE DS1 frame loss the System 922 will seize the network DS1 connection. The presence of carrier with frame sync will return the system back to the normal mode. CPE DS1 monitoring times are selectable from 1 second through 100 seconds. CPE DS1 yellow alarm monitoring can also be included in the frame loss monitoring function. Independent monitoring control is provided for both CPE DS1 A and CPE DS1 B.

Status Relay Contact Outputs

The System 922 provides two general-purpose relay contact outputs, one for DS1 A and one for DS1 B. These status contacts consist of a normally open (not shorted) contact. Each status contact changes state in response to the System 922 seizing its respective DS1 network circuit.

You might use each status contact to signal an external monitoring device that the network DS1 A or B has been seized. As with the contact inputs, exactly how you choose to use these status relay contact outputs depends upon the needs of the site and your own imagination.

Network DS1 and CPE DS1 Terminating Jacks

Network T1 Robbed Bit or ISDN PRI service is carried over DS1 telecommunications facilities. The System 922 must be connected to the one or two associated DS1 circuits selected for power failure transfer backup. Each network T1 Robbed Bit or ISDN PRI circuit must be terminated on a jack wired as a USOC RJ48C. This connection method is an 8-position, unkeyed, modular jack with four wires terminated: two for customer interface (CI) receive and two for customer interface (CI) transmit. The system 922 connects to the RJ48C jacks using standard 8-position modular data cables.

The one or two CPE DS1 circuits associated with the System 922 must also terminate on 8-position modular jacks. These jacks must be wired so as to mate with the RJ48C jacks using standard 8-position data cables. These cables maintain a one-to-one connection scheme. For convenience, 8-position modular data cables and wall-mount 8-position modular jacks are supplied with the System 922.

Configuration Port Interface Cable

To allow for configuration, the System 922 contains a serial communications port intended for connection to a personal computer. Using VT100 emulation, the System 922's menu system can be accessed.

The configuration port is implemented as data communications equipment (DCE) under the RS-232-C standard. You access the port by way of its 25-pin D-subminiature female connector. You must obtain or prepare the proper cable for this port. The cable is a typical 25-pin D-subminiature male to 9- or 25-pin male (straight through) cable used to connect DCE equipment to DTE equipment. These types of cables are commonly available at any retail computer store. (For detailed information, refer to Appendix D. The technical specifications for the port, along with specific cabling examples are provided in this appendix.)

VT100 Terminal Emulation

To configure the System 922 a personal computer with software capable of emulating VT100 is required. It's important that the VT100 emulation supports the function keys F1 through F4, Backspace or Delete.

The terminal emulator available with various Microsoft Windows® versions works very well. Appendix C contains more detailed information about terminal emulation requirements.

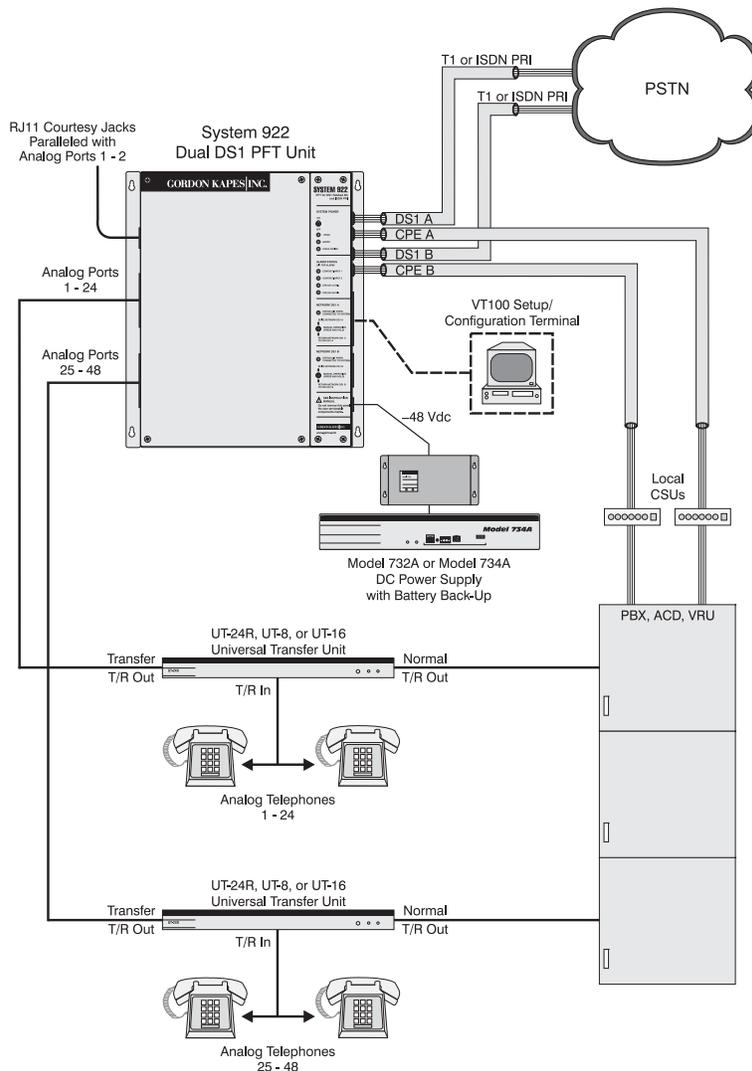
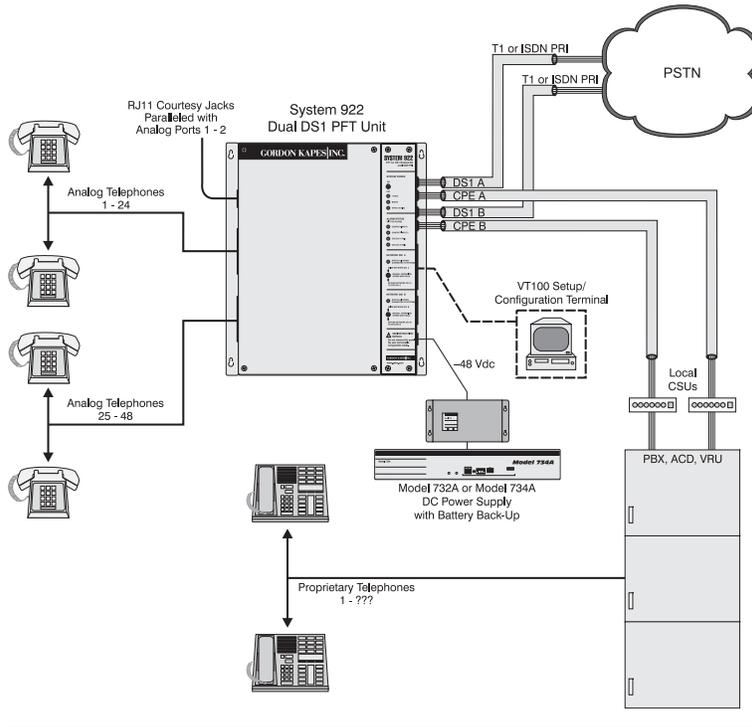


Figure 1-1. Overview of Typical System 922 Installations

Chapter Two

Installing the System 922

Overview

This chapter explains how to install the System 922.

Efficient installation requires some planning. Consequently, it is strongly recommended you read and follow the guidelines presented in Chapter One, “Planning for the System 922,” before beginning installation as described in this chapter.

- ❑ If you have not done so, open the shipping carton and remove the System 922 enclosure from its packing material.
- ❑ Open any additional shipping cartons and verify that you have everything required for the installation. If not, contact the factory for assistance.

Words of Caution

As with any product, installing the System 922 requires a safety first approach. Please read and comply with the following warning before you begin the installation:



Never install telephone wiring during a lightning storm. Never install a telephone jack in a wet location unless the jack is specifically designed for wet locations. Never touch non-insulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

Step One: Mount the System 922

- ❑ Before mounting the System 922, ensure you have selected the desired mounting location. (Refer to “Mounting Location,” in Chapter One.)

Wall Mounting

- ❑ For wall mount applications, mount the System 922 on the equipment room wall using the four screws (#8 pan head, 3/4-inch long) included in the installation kit. These screws are for use with a wooden-backboard surface (minimum thickness 3/4-inch). The System 922’s enclosure is outfitted with four keyhole screw slots. Use one screw per slot and securely fasten the unit to the backboard. Refer to Figure 2-1 for details.

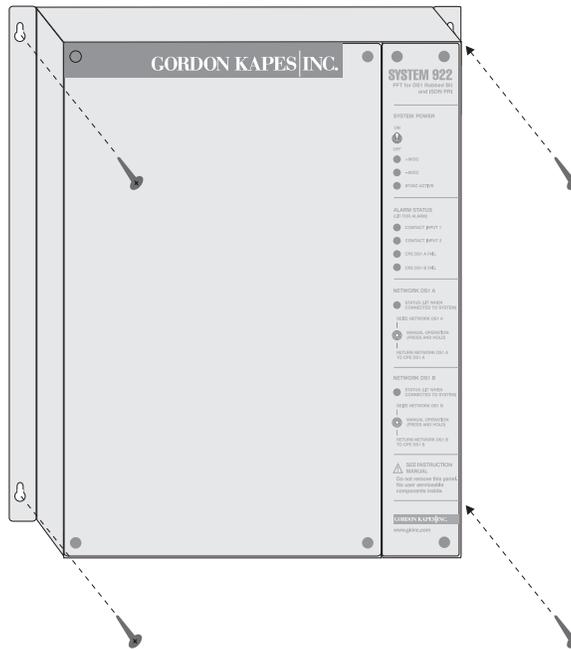


Figure 2-1. Wall Mounting the System 922

Rack Mounting

- For rack mount applications, install the optional rack adapter plates per Figure 2-2. Note that the rack screws must be customer supplied. If rear access to the rack is restricted, do not fasten the System 922 to the rack assembly until all interconnecting cables are attached to the System 922. Figure 2-3 shows a System 922 rack mounted with a Model 734A DC Power Supply with Battery Back-Up.

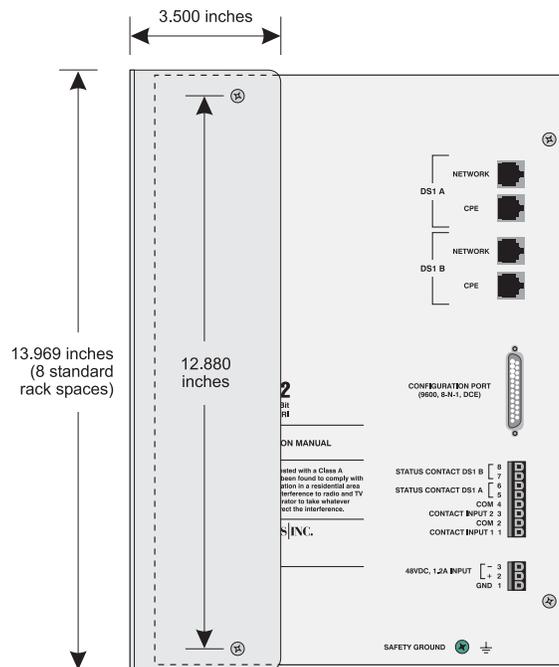


Figure 2-2. System 922 shown with Rack-Mount Bracket (Right Side of Unit)

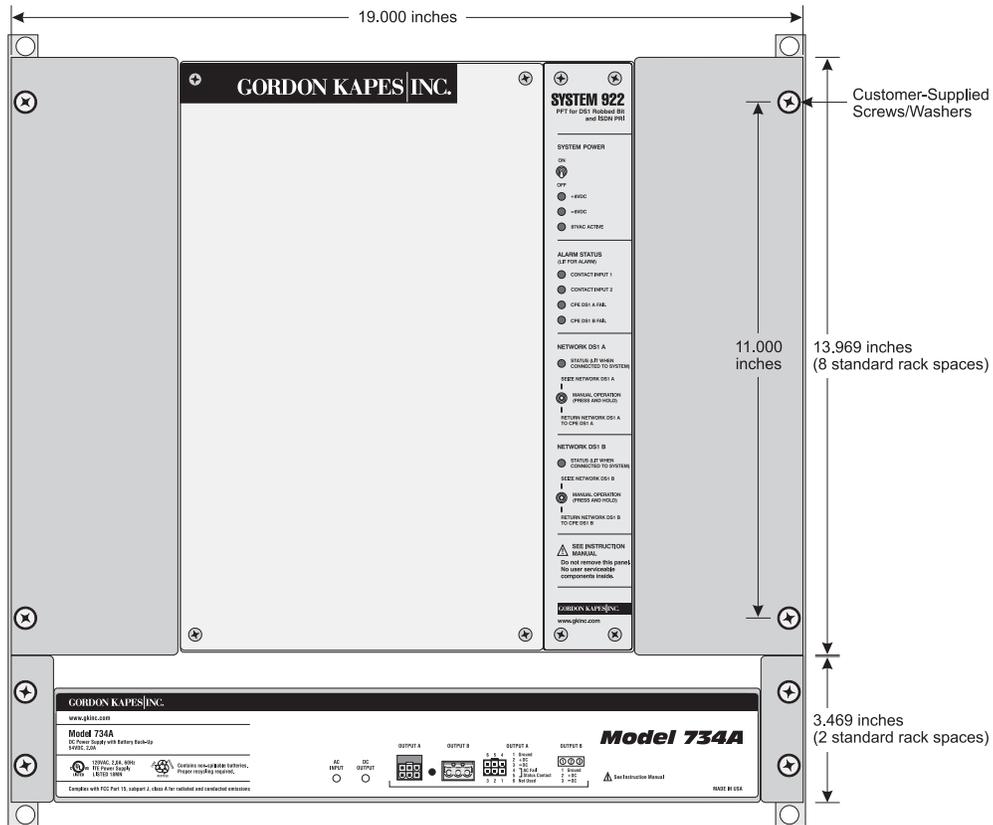


Figure 2-3. Rack Mounting the System 922 and Model 734A Power Supply

Step Two: Circuit Card Installation

- ❑ Ensure the power switch on the System 922 (shown in Figure 2-4) is in the Off (down) position. Leave the power switch in the Off position until you are instructed to turn it on later in this chapter.

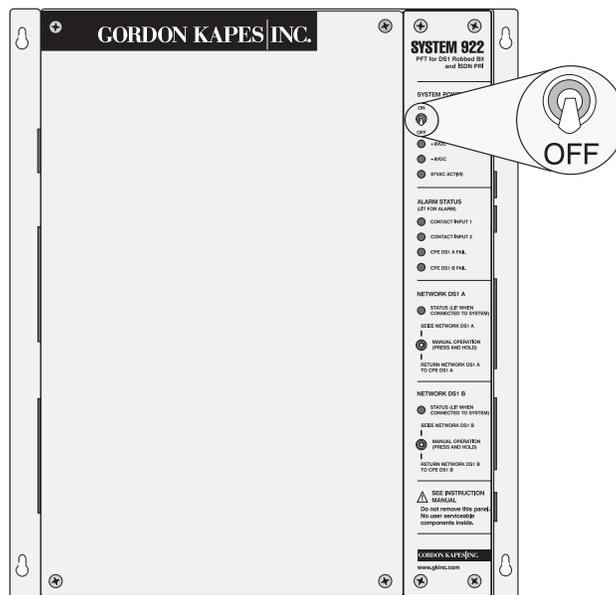


Figure 2-4. Ensure Power Switch is in OFF Position

- ❑ As shown in Figure 2-5, remove the front cover from the System 922. This panel is held in place by four Phillips-head screws.
- ❑ Observing Figure 2-6, install the cards associated with the specific installation into the System 922's enclosure. Firmly press the plastic handles at the top and bottom of each card to ensure the cards are fully inserted. To ensure cards cannot be inappropriately interchanged, the height of the mating connectors for each type of card is staggered. This enables you to interchange the analog cards, but not any of the other cards. Note that the two RJ11 "courtesy jacks" are functional only if an analog card is present in slot 1.
- ❑ Depending upon the requirements of the application, up to six analog cards can be installed in a 922 enclosure, providing a total of 48 analog ports. These cards include the 938A OPS Card (with analog caller ID option) and the 939 Analog Interface Card (used for special applications only).

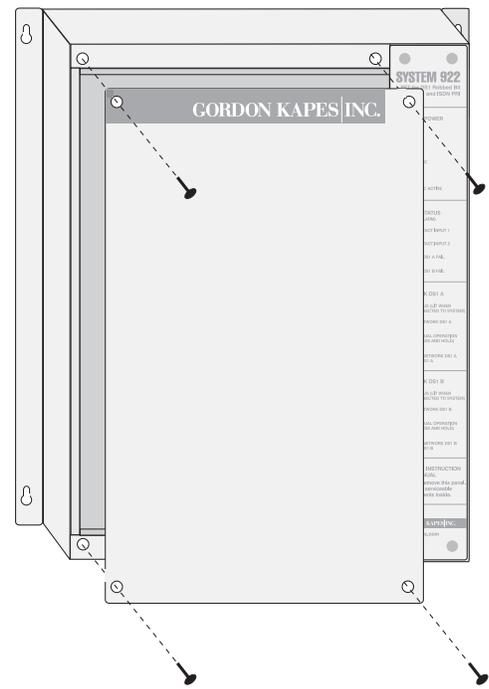


Figure 2-5. Removing the Front Cover

The 938A OPS card emulates eight PBX Class A FXO circuits as defined in FCC Part 68. This card provides nominal -48 Vdc loop voltage, 25 mA loop current, and 87 Vac, 20 Hz sine wave ringing. Switch-hook flash, DTMF dialing, disconnect supervision, and analog Caller ID are also supported.

The 939 analog card emulates eight PBX Class A FXS circuits as defined in FCC Part 68. This card provides subscriber loop start circuits capable of answering incoming analog calls or initiating outbound analog calls. DTMF dialing, adjustable ring trip, and disconnect supervision are also supported. The Model 939 is used for special applications only.

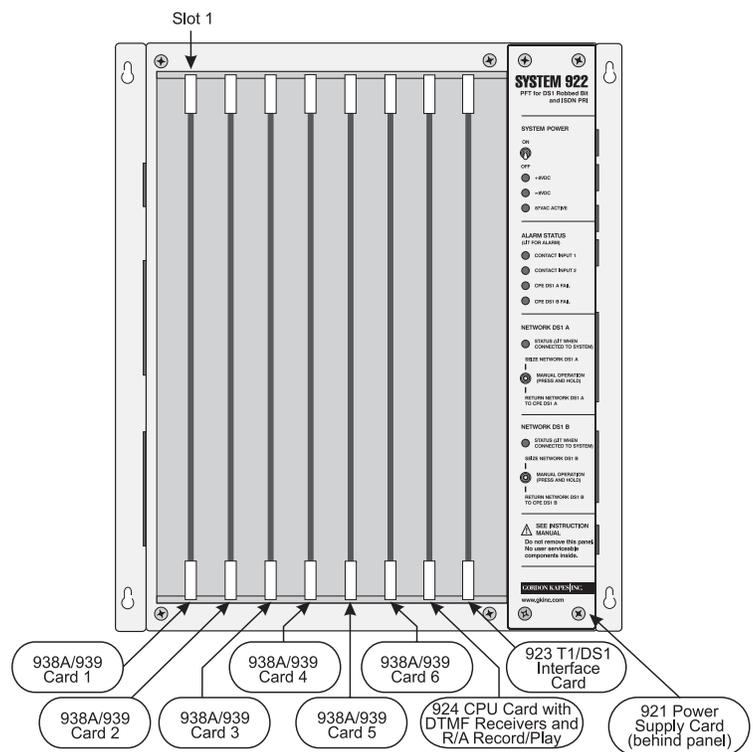


Figure 2-6. System 922 with All Cards Installed

- ❑ Since there are no switches to set on the installed circuit cards, you can now replace the cover on the System 922's enclosure.

Step Three: Ground and –48 Vdc Power Connections

Use the ground screw and the 3-position removable terminal strip to connect ground and –48 Vdc power to the system. On the terminal strip, pin 1 is earth ground, pin 2 is the positive lead of the power supply, and pin 3 is the negative lead of the power supply.

Ground and –48 Vdc Connections



The –48 Vdc power connected to the System 922 must come from a fuse-protected or current-limited source. Do not connect wires directly across a battery or battery stack. A 2-ampere fuse in series with the –48 Vdc source is appropriate to protect equipment and personnel from short circuits and other wiring errors.

Earth Ground Connection

- ❑ A ground connection screw has been specifically provided on the right side panel of the System 922 enclosure. Refer to Figure 2-7 for the location of the ground screw. Using a #12 or #14 AWG wire, connect safety ground to this green-colored screw. The other end of the wire must be connected to a known-good safety ground location. Should there be any questions, a competent electrician is best able to identify an adequate safety ground connection point.
- ❑ Unplug the 3-position terminal block from its mating header connector located on the right side panel of the System 922 as shown in Figure 2-7.
- ❑ On the terminal block:
 - Connect a safety ground to pin 1.
 - Connect the positive side of the power source to pin 2.
 - Connect the negative side of the power source to pin 3.For more details, refer to Chart 2-1.
- ❑ Plug the terminal block back into the mating header connector on the side of the enclosure.
- ❑ If using a 3-conductor cable assembly, supplied with a Gordon Kapes, Inc. Model 728 Power Supply, plug the black mating terminal block into the connector on the side of the System 922 enclosure. Then plug the green terminal block into the Model 728's mating connector.

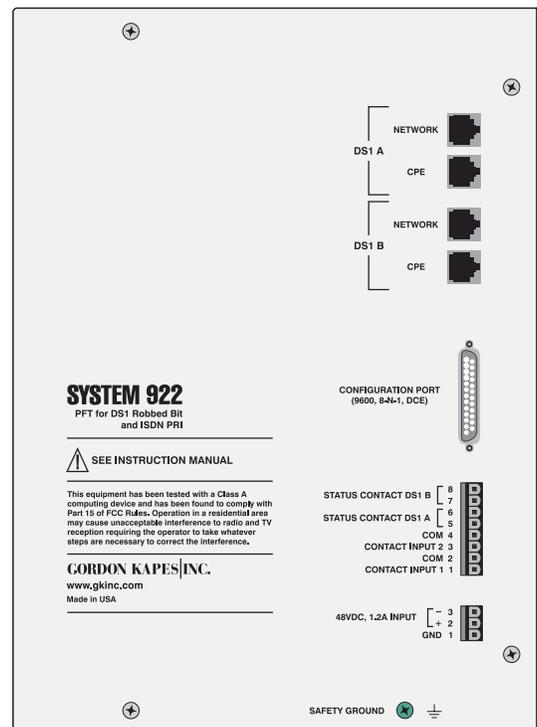
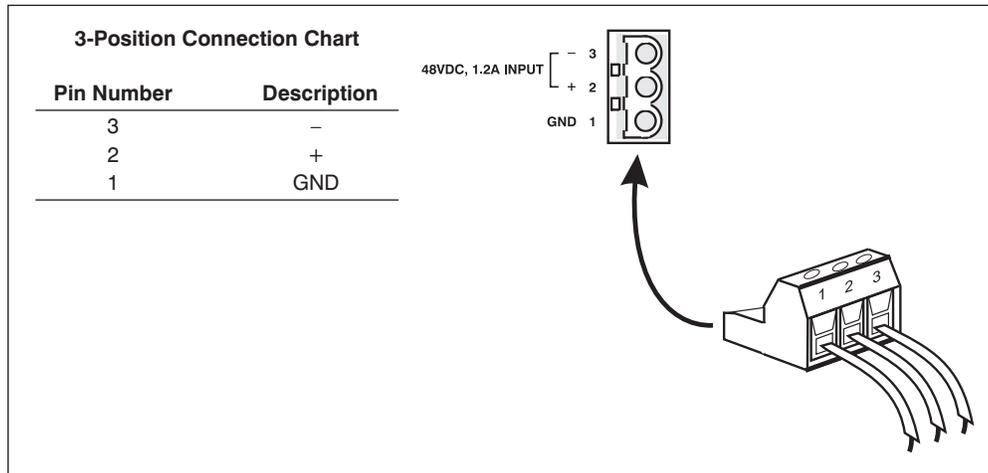


Figure 2-7. System 922 Right Side Panel

Chart 2-1

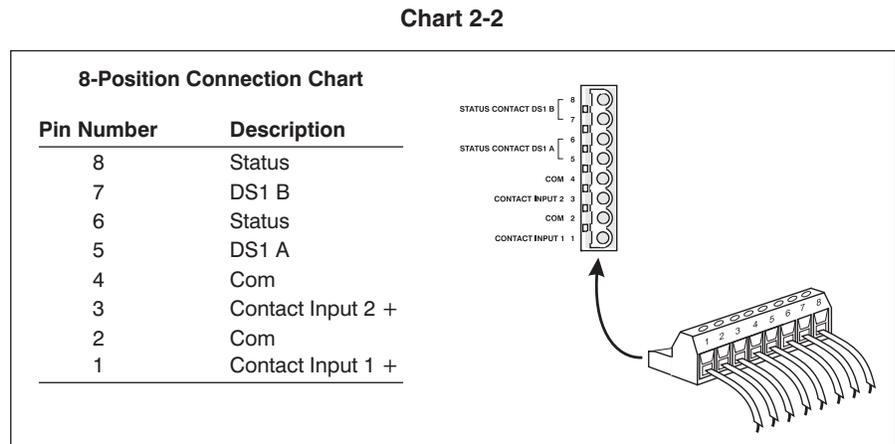


Contact Inputs

- ❑ You can remove the 8-position terminal block from the mating header connector, allowing easy access to the connector.
- ❑ Following the details shown in Chart 2-2, connect up to two contact inputs to the 8-position terminal strip. If your signal provides an isolated contact, connect its leads to the pair associated with the desired contact input. If your signal is referenced to earth ground, connect the contact to the positive (+) connection, and earth ground to the COM connection of the associated contact input.

Status Relay Contacts

- ❑ As discussed in “Status Relay Contact Outputs” in Chapter One, the System 922 provides one general-purpose relay contact per digital interface that is normally open (not shorted). The relay contacts change state when the System 922 seizes the network DS1 circuit(s). If you intend to connect these contacts to other devices, ensure leads to the devices are ready.



- ❑ Following the details shown Chart 2-2, connect either or both of the status relay contacts to the 8-position terminal block. The status relay contacts are designed only to control low-voltage, low-current electrical signals. Do not use the contacts to switch AC-line (120 Vac) voltage.

Step Four: Analog Port Connections

Use the plugs labeled Analog Port 1-24 and Analog Port 25-48 to connect analog telephone extensions. Each analog card in the System 922 provides eight analog telephone circuits. Depending upon the requirements of the application, up to six analog cards can be installed in a 922 enclosure.

- ❑ Locate the 25-pair cables with mounted female connectors and the interconnecting assemblies you obtained for use with the analog ports. (Refer to “25-Pair Cables and Interconnecting Assemblies,” in Chapter One.)
- ❑ Prepare the wiring for the single-line analog telephones you have obtained for use as analog extensions. As described in Chapter One, you can use as many as 48 single-line, analog telephones supporting touch-tone dialing. For each set of eight telephones you use, you must have one 938A OPS Card installed in the System 922. The 939 FXS card emulates eight subscriber loop start circuits and may be used for special applications.

25-Pair Cables

- ❑ Insert the female connector of the 25-pair cable into the plug labeled Analog Port 1-24. Secure the connector using the fastener strap attached to the plug. The plug is located on the left side panel of the System 922 as shown in Figure 2-8.
- ❑ Terminate the 25-pair cable into the interconnection assembly you prepared for this purpose.
- ❑ Using the wiring pattern shown in Figure 2-9, connect as many as 24 analog telephones, trunks, or analog circuits to the interconnection assembly. A single tip-and-ring connection is required for each telephone, trunk, or analog circuit. Figure 2-9 indicates the analog card port associated with each connection.
- ❑ Insert the female connector of the 25-pair cable into the plug labeled Analog Port 25-48. Secure the connector using the fastener strap attached to the plug. This plug is also located on the left side panel of the System 922 as shown in Figure 2-8.
- ❑ Terminate the 25-pair cable in the interconnection assembly you prepared for this purpose.
- ❑ Using the wiring pattern shown in Figure 2-10, connect as many as 24 analog telephones, trunks, or analog circuits to the interconnection assembly. A single tip-and-ring connection is required for each telephone, trunk, or analog circuit. Figure 2-10 indicates the analog card port associated with each connection.

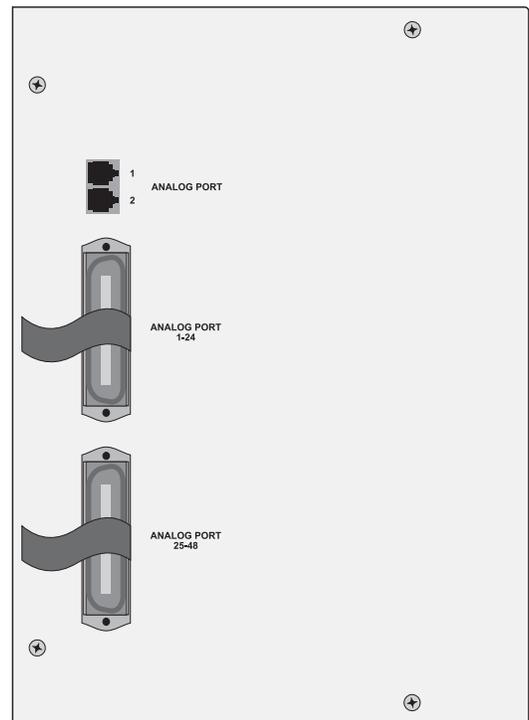


Figure 2-8. System 922 Left Side Panel

Analog Port Plug 1-24 and Modular Jacks Pin Connection Chart

Pin Number	Wire Color	Description		Pin Number	Description
26	WHT-BLU	T Analog Port 1	}	4	T RJ11 Port 1 Courtesy Jack
1	BLU-WHT	R		3	R
27	WHT-ORN	T Analog Port 2	}	10	T RJ11 Port 2 Courtesy Jack
2	ORN-WHT	R		9	R
28	WHT-GRN	T Analog Port 3	}		
3	GRN-WHT	R			
29	WHT-BRN	T Analog Port 4	}		
4	BRN-WHT	R			
30	WHT-SLT	T Analog Port 5	}		
5	SLT-WHT	R			
31	RED-BLU	T Analog Port 6	}		
6	BLU-RED	R			
32	RED-ORN	T Analog Port 7	}		
7	ORN-RED	R			
33	RED-GRN	T Analog Port 8	}		
8	GRN-RED	R			
34	RED-BRN	T Analog Port 9	}		
9	BRN-RED	R			
35	RED-SLT	T Analog Port 10	}		
10	SLT-RED	R			
36	BLK-BLU	T Analog Port 11	}		
11	BLU-BLK	R			
37	BLK-ORN	T Analog Port 12	}		
12	ORN-BLK	R			
38	BLK-GRN	T Analog Port 13	}		
13	GRN-BLK	R			
39	BLK-BRN	T Analog Port 14	}		
14	BRN-BLK	R			
40	BLK-SLT	T Analog Port 15	}		
15	SLT-BLK	R			
41	YEL-BLU	T Analog Port 16	}		
16	BLU-YEL	R			
42	YEL-ORN	T Analog Port 17	}		
17	ORN-YEL	R			
43	YEL-GRN	T Analog Port 18	}		
18	GRN-YEL	R			
44	YEL-BRN	T Analog Port 19	}		
19	BRN-YEL	R			
45	YEL-SLT	T Analog Port 20	}		
20	SLT-YEL	R			
46	VIO-BLU	T Analog Port 21	}		
21	BLU-VIO	R			
47	VIO-ORN	T Analog Port 22	}		
22	ORN-VIO	R			
48	VIO-GRN	T Analog Port 23	}		
23	GRN-VIO	R			
49	VIO-BRN	T Analog Port 24	}		
24	BRN-VIO	R			
50	VIO-SLT	No Connect			
25	SLT-VIO	No Connect			

Analog Card 1
(Installed in slot 1)

Analog Card 2
(Installed in slot 2)

Analog Card 3
(Installed in slot 3)

Figure 2-9. Analog Port Plug 1-24 and Modular Jacks Pin Connections

Analog Port Plug 25-48 Pin Connection Chart

Pin Number	Wire Color	Description	
26	WHT-BLU	T	Analog Port 25
1	BLU-WHT	R	
27	WHT-ORN	T	Analog Port 26
2	ORN-WHT	R	
28	WHT-GRN	T	Analog Port 27
3	GRN-WHT	R	
29	WHT-BRN	T	Analog Port 28
4	BRN-WHT	R	
30	WHT-SLT	T	Analog Port 29
5	SLT-WHT	R	
31	RED-BLU	T	Analog Port 30
6	BLU-RED	R	
32	RED-ORN	T	Analog Port 31
7	ORN-RED	R	
33	RED-GRN	T	Analog Port 32
8	GRN-RED	R	
34	RED-BRN	T	Analog Port 33
9	BRN-RED	R	
35	RED-SLT	T	Analog Port 34
10	SLT-RED	R	
36	BLK-BLU	T	Analog Port 35
11	BLU-BLK	R	
37	BLK-ORN	T	Analog Port 36
12	ORN-BLK	R	
38	BLK-GRN	T	Analog Port 37
13	GRN-BLK	R	
39	BLK-BRN	T	Analog Port 38
14	BRN-BLK	R	
40	BLK-SLT	T	Analog Port 39
15	SLT-BLK	R	
41	YEL-BLU	T	Analog Port 40
16	BLU-YEL	R	
42	YEL-ORN	T	Analog Port 41
17	ORN-YEL	R	
43	YEL-GRN	T	Analog Port 42
18	GRN-YEL	R	
44	YEL-BRN	T	Analog Port 43
19	BRN-YEL	R	
45	YEL-SLT	T	Analog Port 44
20	SLT-YEL	R	
46	VIO-BLU	T	Analog Port 45
21	BLU-VIO	R	
47	VIO-ORN	T	Analog Port 46
22	ORN-VIO	R	
48	VIO-GRN	T	Analog Port 47
23	GRN-VIO	R	
49	VIO-BRN	T	Analog Port 48
24	BRN-VIO	R	
50	VIO-SLT	No Connect	
25	SLT-VIO	No Connect	

Analog Card 4
(Installed in slot 4)

Analog Card 5
(Installed in slot 5)

Analog Card 6
(Installed in slot 6)

Figure 2-10. Analog Port Plug 25-48 Pin Connections

Step Five: Network DS1 and CPE DS1 Circuits

- As mentioned in Chapter One, T1 Robbed Bit and ISDN PRI circuits use DS1 facilities to send and receive the actual data. Ensure that each T1 Robbed Bit or ISDN PRI network circuit is terminated on an 8-position modular jack wired as USOC RJ48C. Ensure the CPE DS1 circuits are terminated on 8-position modular jacks wired to mate with an RJ48C using modular data cables. Figures 2-11 and 2-12 show the wiring for the network DS1 and CPE DS1 jacks. For further details, refer to “Network DS1 and CPE DS1 Terminating Jacks,” in Chapter One. For convenience, 8-position modular jacks are included in the installation kit.

It is important to ensure that the network DS1 jack is connected directly to the DS1 circuit. No intervening CPE DS1 equipment must be present. This ensures that failure of any CPE DS1 equipment does not affect operation of the System 922. The System 922 contains its own CSU (channel service unit) circuitry. Consequently you do not need to use an external CSU when the System 922 seizes the network DS1 circuits. However, you still must supply independent local CSUs for use with CPE DS1 equipment.

- Locate the 8-position modular data cables included in the installation kit. To test the wiring of the network DS1 and CPE DS1 terminating jacks, you can connect network DS1 to CPE DS1 circuits together by connecting the associated jacks together using one of the 8-position data cables.

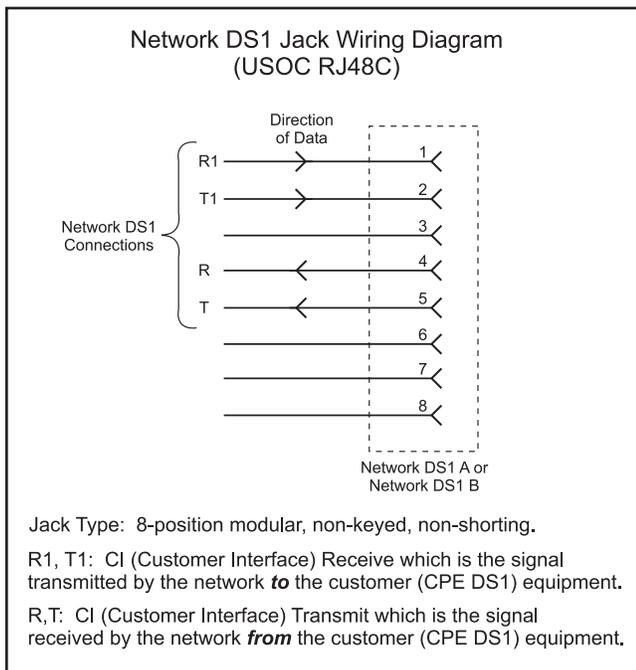


Figure 2-11. Network DS1 Jack Wiring (USOC RJ48C)

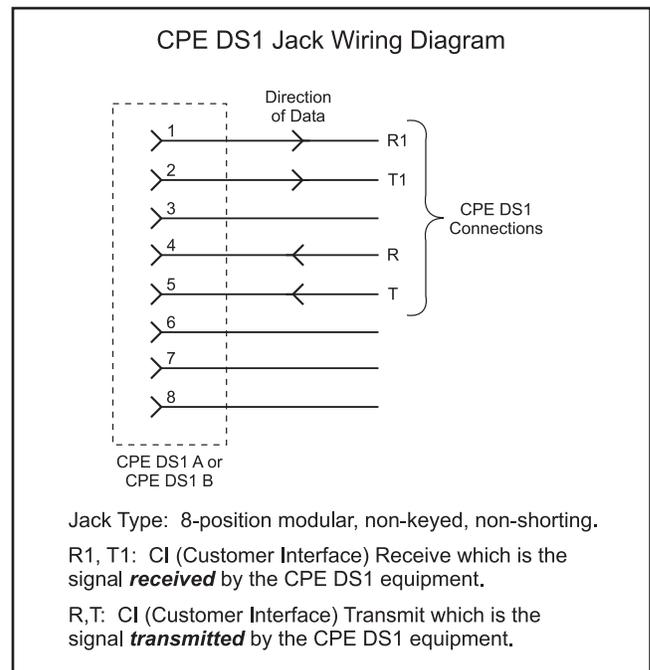


Figure 2-12. CPE DS1 Jack Wiring

Installing

- ❑ Using one of the modular data cables from the installation kit, connect the specified network DS1 circuit to the Network DS1 A Jack located on the right side panel of the System 922 enclosure. Refer to Figure 2-13.
- ❑ Using a second modular data cable, connect the specified CPE DS1 circuit to the CPE DS1 A Jack located on the right side panel of the System 922 enclosure. Refer to Figure 2-13.
- ❑ Repeat above steps for DS1 B.

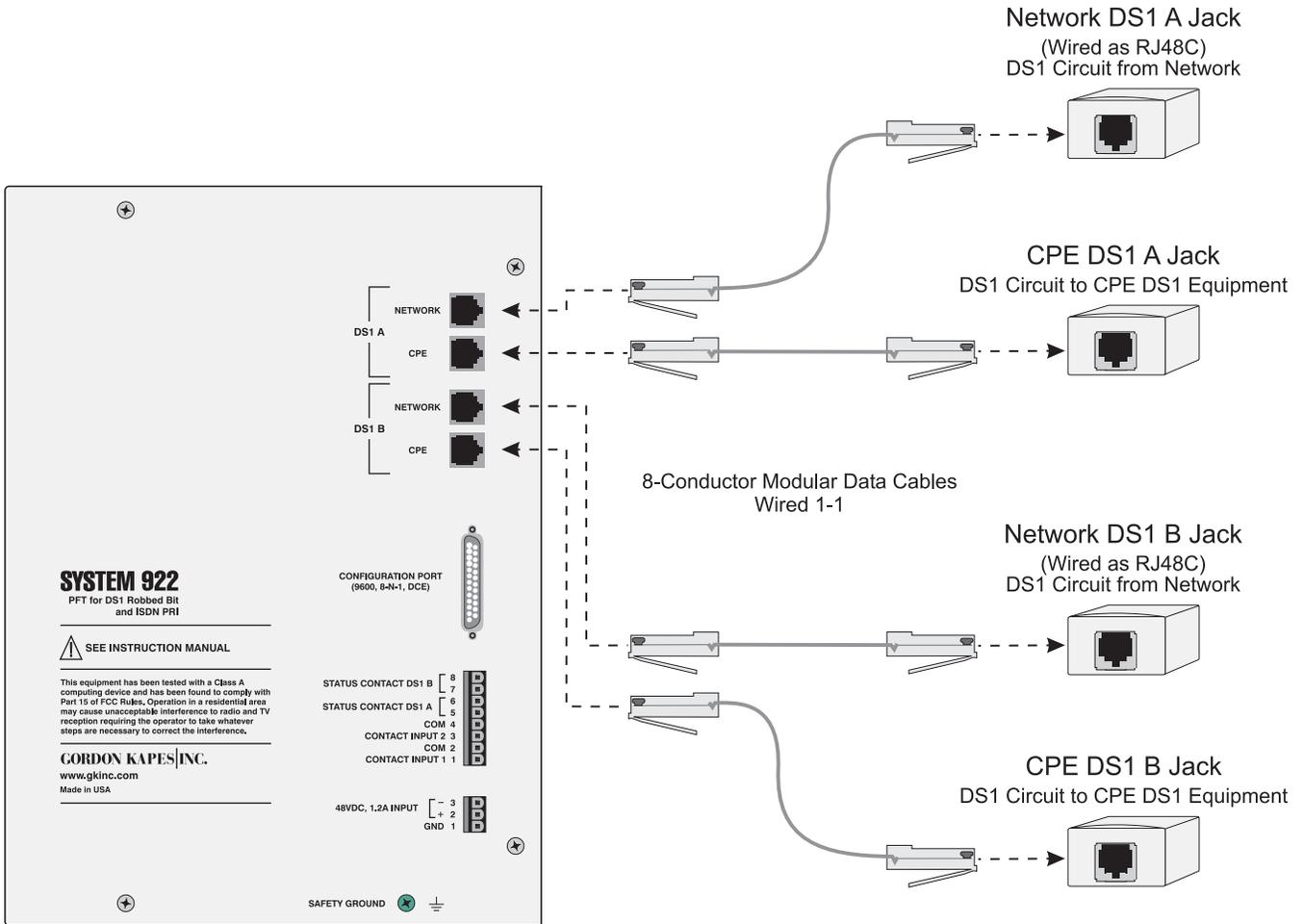


Figure 2-13. Connecting the System 922 to the Network DS1 and CPE DS1 Jacks

Step Six: Configuration Port

To access the System 922's menu system, connect a personal computer capable of VT100 emulation to the configuration port. The configuration port is accessed using a 25-pin D-subminiature connector located on the right side panel of the System 922 enclosure. The menu system enables you to configure the system and review system status.

In general, you only need to connect to the configuration port when configuring the system after initial installation, when changing the configuration, or when testing and troubleshooting the system. You will probably not need to connect permanent wiring to the configuration port. A technician can simply plug a standard serial communications cable into the port.

Preparing

- ❑ Locate the serial communications cable you obtained or prepared for connecting to the configuration port. The port is implemented as data communications equipment (DCE) under the RS-232-C standard. It uses an individual 25-pin D-subminiature female connector. The cable is a typical 25-pin D-subminiature male-to-male cable (straight through) used to connect DCE equipment to DTE equipment. This type of cable is commonly available at any retail computer store. (For detailed information, refer to Appendix D. The technical specifications for the port, along with specific cabling examples are provided in this appendix.)

Note: If you are connecting a modem to the port, use a null modem cable since the modem's port is also implemented as DCE. For correct operation, you may need to disable DTR monitoring on the modem.

Installing

- ❑ Connect the serial communications cable to the configuration port on the System 922. The configuration port is shown in Figure 2-14.
- ❑ Use the screws on the mating plug to ensure the cable is secured to the System 922's connector.
- ❑ Connect the other end of the cable to the serial port on the designated personal computer.
- ❑ Set the personal computer's communications settings to the following:
 - Baud rate: 9600
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: XON/XOFF

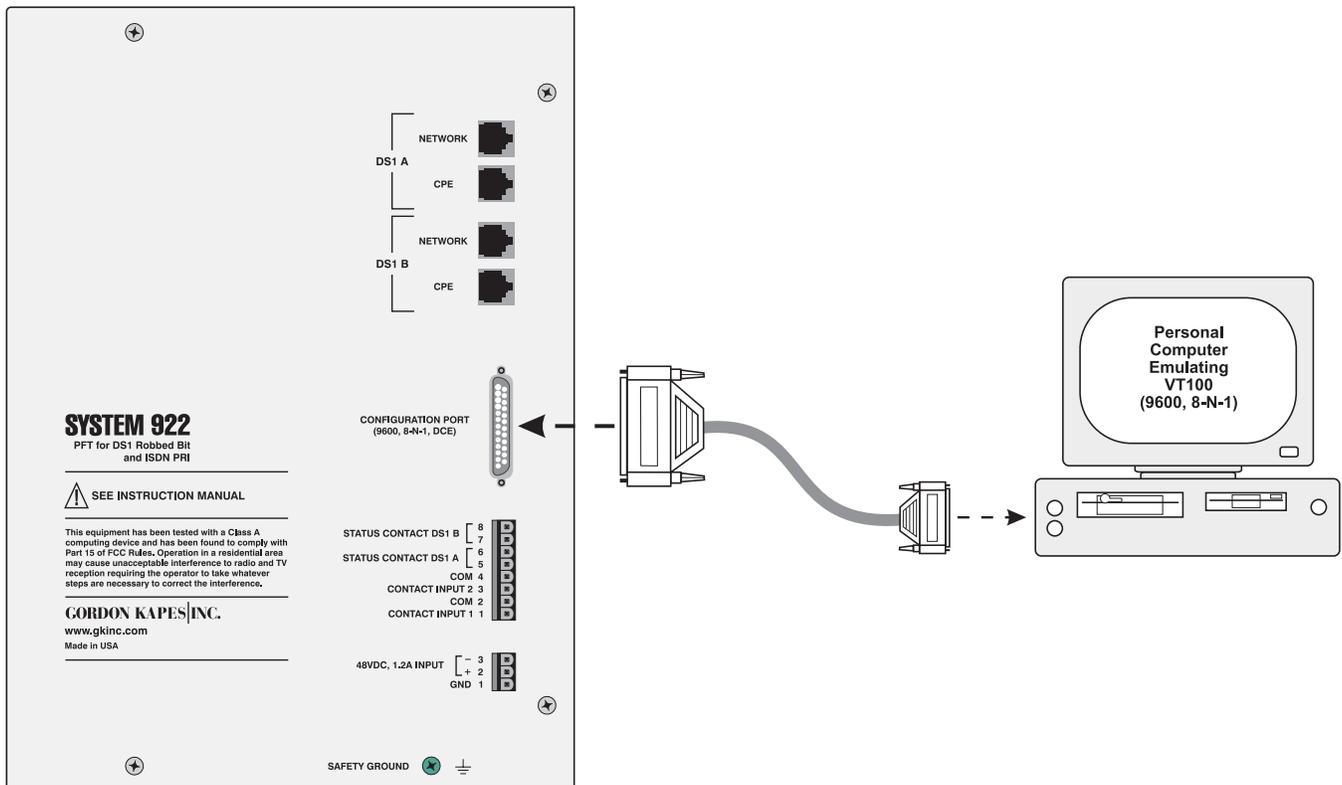


Figure 2-14. Connecting the Configuration Port to a Personal Computer

Step Seven: Review the Installation and Initial Operation

- ❑ Review and ensure you have taken all previous installation steps. For example, verify you have installed and correctly seated the required cards in the System 922 enclosure, and make sure all required connections have been made. Replace the cover if you have not already done so.
- ❑ Apply power to the unit at this time by placing the system power switch in the On (up) position.
The +8 and –8 Volt status LEDs should light. Other LEDs may also light. These may or may not indicate an installation problem.
- ❑ For ports associated with the 938A OPS cards, test the analog telephone extensions by taking each off-hook. Make a call to and receive a call from each telephone extension. The default numbering plan, beginning with the telephone connected to analog port 1, is extension 1001 through 1048.

You are now ready to begin configuring the system. Proceed to Chapter Three, “Getting Started with the Menu System.”

Chapter Three

Getting Started with the Menu System

Overview

The System 922 contains menu-driven software called the menu system. The *menu system* enables you to configure, test, and examine the operating status of the System 922.

The menu system and other software components of the System 922 are loaded into permanent memory at the factory.

This chapter provides basic information you need before using the menu system. It explains the following:

- How to access the menu system
- How to exit the menu system and disconnect from the System 922
- How to select menu options and enter or select information
- How to use online help

The menu system is extremely easy to use and quite similar to other menu-driven software widely used with personal computers.

Conventions

This guide provides a detailed procedure for each task you can accomplish with the menu system. To help you read and understand these procedures easily and quickly, this guide uses several special terms, symbols, and type faces. The following explains these conventions:

Term	Meaning
menu	A numbered list of options displayed on a screen. To accomplish a task, you display the needed menu and then select the option corresponding with the task.
cursor	A highlighted box or small line which may or may not blink depending upon the personal computer you are using and how it is set up. The cursor marks the location on the screen where the information you type or select is displayed. As you move from field to field by pressing keys, the cursor moves along with you to show you where you are.
field	An area on the screen where you enter or select information or where information is displayed. In general, each field has a title displayed next to it for easy identification.

Type style	Purpose
bold	Used to indicate words you must type exactly as they appear, and to indicate the names of keys you must press.
<i>italic</i>	Used to highlight a key term defined in this guide. Also used for emphasis and to indicate variable information. For example, ACD <i>n</i> stands for ACD 1, ACD 2, or any of the other 30 ACD functions.
Condensed	Used to indicate information exactly as it is displayed on a screen.
Condensed Bold	Used to indicate field titles.

Symbol	Purpose
↵	Used to indicate the Enter key on the keyboard. Press ↵ after entering information.
↓	Used to indicate the down-arrow key. Press ↓ to move down from field to field on a screen.
↑	Used to indicate the up-arrow key. Press ↑ to move up from field to field on a screen.
←	Used to indicate the left-arrow key. Press ← to move to the left among fields in columns.
→	Used to indicate the right-arrow key. Press → to move to the right among fields in columns.

The menu system consistently uses specific keys to perform the following operations:

Key	Purpose
F1	Press to display Online Help available on a separate screen.
F2	Press to exit a screen and return to the previous menu.
F3	Press to display the previous page of a multi-page screen.
F4	Press to display the next page of a multi-page screen.
Backspace or Delete	Press to edit a field.
X	Press to exit the menu system.

Accessing the Menu System

To access the menu system, take the following steps:

1. Connect a personal computer to the configuration port located on the right panel of the System 922 enclosure. (For more information about configuration port connection and cabling refer to Appendix D, “Configuration Port Connections.”)
2. Ensure power is turned on to the System 922.
3. Ensure the personal computer has terminal emulation enabled and is correctly configured for VT100.
4. Press **↵** to display the Login screen.

If You Have Problems with Garbage on the Screen

Should you access the menu system using an inappropriate terminal emulation or baud rate, the screen may appear filled with “garbage.” Ensure the baud rate is set to 9600 and that your terminal emulator is set to VT100. Then press **↵** or **F2** to refresh the screen.

Exiting the Menu System and Disconnecting

To exit the menu system and disconnect from the System 922, press **X** at the Main Menu.

To exit and disconnect, take the following steps:

1. At any screen in the menu system, press **F2** until the system displays the Main Menu.
2. At the Main Menu, press **X**.

The System 922 clears the screen.

Selecting Menu Options

To select an option from a menu, either press the key with the number of the option or press **↓** or **↑** to highlight the option, then press **↵**.

Entering and Selecting Information

When configuring the System 922, you must make an entry or select a value in specific fields displayed on a configuration screen.

To make an entry, move to the field by pressing **↑**, **↓**, **←**, or **→**. Type the entry, then press **↵**. To delete an entry, press **Backspace** or **Delete**.

To select a value in a field, move to the field by pressing ↑, ↓, ←, or →. Press the spacebar to scroll forward through a list of possible values. Press **Backspace** or **Delete** to scroll backward through the list. Display the value you want to select. This value is saved and activated. (Some fields require that you press ↵ after making a selection. This is indicated at the bottom of each screen displaying these fields.)

Using Online Help

The menu system displays brief operating instructions at the bottom of each screen. These instructions, which can change as you move from field to field, tell you how to make an entry or select a value in the highlighted field.

Many screens in the menu system provide additional online help using separate screens, which supplement the information available in this guide. Press **<F1> help** displayed at the bottom of a screen indicates additional help is available. Press **F1** to display the online help screen.

Appendix A

Powering the System 922 with a Gordon Kapes, Inc. DC Power Supply

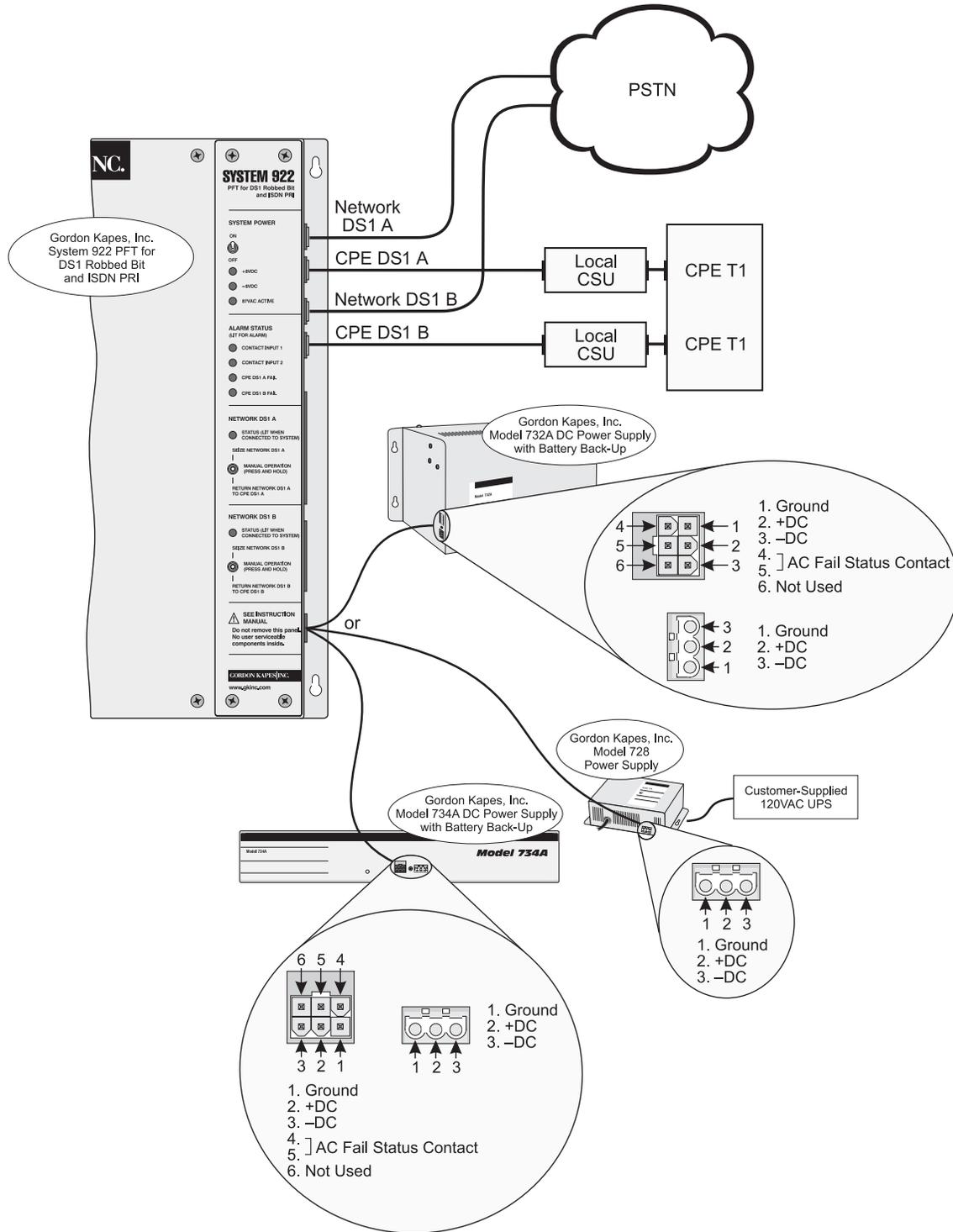


Figure A-1. System 922 shown Powered by either a Model 732A or Model 734A DC Power Supply with Battery Back-Up, or a Model 728 Power Supply

Appendix B

System 922 Specifications

This appendix contains technical specifications for the System 922. The specifications are subject to change without notice.

General

Dimensions (Overall):

13.9 inches high (35.3 cm)
13.5 inches wide (34.3 cm)
10.2 inches deep (25.9 cm)

Weight:

Basic Configuration Unit: 21.5 pounds (9.8 kg)
All Cards Installed: 25.0 pounds (11.4 kg)
Shipping Weight: 33.0 pounds (15.0 kg)

Mounting:

Wall Mounting: mounts to minimum 3/4-inch thick plywood backboard
Rack Mounting: mounts in a 19-inch rack assembly, uses eight rack spaces

Environment: 0 to 50 degrees C, humidity to 95% (no condensation)

Connectors:

2, 25-pair plugs, male (analog ports)
1, 25-pin D-subminiature connector, female (serial port)
4, 8-position non-keyed modular jacks for Network DS1 and CPE DS1
1, 3-position header (ground and DC power)
1, 8-position header (contact input/status output)

Power Requirements:

Voltage: -42.5 to -56 Vdc, filtered and regulated
Current: 1.2 amp maximum
Type: uninterruptible, even in the event of a commercial power failure
Connection: 3-position removable terminal block

Configuration Port:

Type: RS-232-C Data Communications Equipment (DCE)
Data Format: 8 data bits, no parity, 1 stop bit (8-N-1)
Data Rate: 9600 baud
Flow Control: XON/XOFF
Connector: 25-pin D-Subminiature, female

LED Indicators: 9

Indication: +8 VDC, -8 VDC, 87 VAC Active, Contact Input 1, Contact Input 2, CPE DS1 A Fail, CPE DS1 B Fail, Network DS1 A Status, Network DS1 B Status

Configuration Data Storage:

Type: 128 k bytes, super low power static RAM
Configuration Back-up Battery: 3 V, 150 mAh lithium battery, field replaceable
Memory Retention with No DC Power Present: 6 years cumulative, minimum

Contact Inputs: 2

Signal Compatibility: normally open (not shorted) or normally closed (shorted), contact closure referenced to ground
Signal Requirements: signals connected to the contact inputs must be capable of handling 5 mA at 10 Vdc
Connections: 2 pairs on 8-position removable terminal block

DS1 Status Relay Contacts: 2, normally open (not shorted)

Rating: 0.5 A maximum at 60 Vdc or 60 Vac (resistive)
Connections: two pairs on 8-position removable terminal block

Network DS1 Connections: 2, directly connects to RJ48C using an 8-position modular data cable (cable and 8-position modular jack included with System 922)

CPE DS1 Connections: 2, connects to CPE DS1 equipment using 8-position modular data cable to mate with 8-position modular jack (cable and jack included with System 922)

Network DS1 to CPE DS1 Transfer Method: metallic switching using sealed, bifurcated relay contacts

Regulatory Compliance:

Complies with Part 68, FCC Rules
FCC Registration Number: GIDUSA-18534-DE-N
Ringer Equivalence: not applicable
Required Connector: USOC RJ48C
Service Code: 6.0N
Facility Interface Code: 04DU9-B (D4 Framing), 04DU9-C (ESF Framing)

923 DS1 Interface Card

Installation: for use in System 922 enclosure only, one card maximum

DS1 Circuit Compatibility:

Designed for direct connection to DS1 circuits without requiring the use of an external channel service units (CSU). CSU circuitry is contained on the 923 Card and is intended only for System 922 use. CSU functionality is not provided to connected CPE DS1 equipment.

T1 Framing: ESF or D4 (superframe)

Zero Suppression: AMI, B8ZS, ZCS

Signaling Method: Robbed Bit, ISDN PRI

Robbed Bit Signaling Support: Ground Start FXS/FXO, SAS/SAO; Loop Start FXS/FXO, SAS/SAO; E&M Wink, Immediate

PRI Signaling Support: National ISDN-2, including AT&T 4ESS PRI (per TR41449, TR41459), AT&T 5ESS (5E6 and 5E7) PRI, Northern Telecom DMS100 and DMS250; 4ESS (NI-2); 5ESS (NI-2); 5ESS (NI-1); DMS100 (NI-2); DMS100 (NI-1), user side only

Layer 2 Protocol: per CCITT Q.921; LAP-D

Layer 3 Protocol: per CCITT Q.931

Transmitter:

Line Rate: 1.544 Mbps (external source)

Line Impedance: 100 ohms, resistive

Line Build Out: 0, -7.5, -15 dB, and -22 dB

Maximum Cable Drop: 6000 feet

Transmit Pulse Characteristics: meets the requirements of AT&T Communications Document TR 62411 (December 1990), ANSI T1.403-1989

Receiver:

Line Rate: 1.544 Mbps \pm 200 bps

Line Impedance: 100 ohms, resistive

Sensitivity: 0 to -30 dBm

Maximum Cable Length for Correct Performance: 6000 feet

Jitter Tolerance and Jitter Attenuation: meets the requirements of AT&T Communications Document TR 62411 (December 1990), ANSI T1.403-1989

CPE DS1 Carrier Loss Monitoring – DS1 A, DS1 B:

Circuitry watches for the presence of frame loss including yellow alarm

CPE DS1 Keep Alive – DS1 A, DS1 B: send framed ones, send blue alarm, send yellow alarm, send line loopback

924 CPU Card

Progress Tones Generated: industry-standard dial, reorder, busy, audible ring, vacant, and howler tones
Configuration Back-up Battery: 3 V, 150 mA lithium battery, field replaceable

Memory Retention with No DC Power Present: 6 years cumulative, minimum

Recorder/Announcer Channels: 2, each with 20-second (maximum) record/playback duration

Audio Recording Source: System 922 OPS telephone only

DTMF Receivers: 8 (serves as shared resource)

T1 Robbed Bit DNIS Type: DTMF only

Analog Cards

Depending upon the requirements of the application, up to six analog cards can be installed in a 922 enclosure.

938A OPS Card:

OPS Ports: 8, emulate PBX Class A FXO OPS circuits as defined in FCC Part 68

Loop Voltage: -48 Vdc

Loop Current: 25 mA (maximum)

Maximum Loop Resistance: 1520 ohms

Ring Voltage: 87 Vac, 20 Hz, sine wave

Ringer Load: REN 2 (maximum)

Disconnect Supervision: 1.5-second break in loop current

Switch Hook Flash Timing: 350 to 950 milliseconds

Dialing Type: DTMF only

Analog Caller ID Option: FSK Caller ID

939 Analog Card:

Ports: 8, emulate FXS (subscriber) loop start circuits as defined in FCC Part 68

Actions: answer incoming analog calls, initiate outbound analog calls

Ring Trip: 1 to 9 rings, adjustable

Ringer Load: REN 2 (maximum)

Disconnect Supervision: 1.5-second break in loop current

Dialing Type: DTMF only

Specifications subject to change without notice.
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Appendix C

Terminal Emulator Requirements

Overview

The System 922's menu system is designed to communicate with personal computers that emulate the keyboard and screen position commands of a VT100 terminal.

Keyboard Commands

For operation, the configuration port requires the use of several VT100 cursor-position and function keys. The selected terminal or terminal-emulator software must support the following keys and respective key sequences:

Table C-1. Keyboard Commands

Key Name Values	Characters Sent
Backspace	Ctrl-H or DEL
Up Arrow	Esc [A
Down Arrow	Esc [B
Left Arrow	Esc [D
Right Arrow	Esc [C
F1	Esc O P
F2	Esc O Q
F3	Esc O R
F4	Esc O S

Please note that many of the terminal emulator software packages do a very poor job of emulation. We were shocked to find they didn't even support the function keys F1-F4. So before you try to connect with the System 922, do a careful review of your terminal emulator character set.

Appendix D

Configuration Port Connections

This appendix is provided as a reference when you are preparing an interconnecting cable for use between the System 922's configuration port and a serial port on a related device. Table D-1 provides detailed connection information for the port. Subsequent paragraphs describe how the port functions. The examples at the end of this appendix provide details for actual cable implementations.

Table D-1. Serial Port Connections

Pin	Direction	Description
2	To System 922	Transmitted Data (TD)
3	From System 922	Received Data (RD)
5	From System 922	Clear to Send (CTS)
6	From System 922	Data Set Ready (DSR)
7	To/From System 922	Signal Ground (SG)
8	From System 922	Data Carrier Detect (DCD)
Notes: <ol style="list-style-type: none">1. The port uses a 25-pin D-Subminiature female connector.2. The port is configured as RS-232-C Data Communications Equipment (DCE).3. Pin 1, shield, is not connected on DCE equipment. Cable shield wire will pick up shield at DTE equipment.4. Pin 5, CTS, and Pin 6, DSR, are connected together and held high (+8 Vdc through a 3300 ohm resistor) and do not change state.5. Pin 8, DCD, is held high (+8 Vdc through a 3300 ohm resistor) and does not change state.		

Understanding the Serial Ports

Correct configuration port operation depends on the careful preparation of a cable linking the System 922 configuration port to the related equipment. Before you prepare a cable, it is important that you understand how the System 922's port is implemented. The port consists of two parts: data transmission to and from the connected equipment, and general purpose pull-up signals.

Data transmission takes place using two pins: one pin for data sent by the System 922, and one pin for data received by the System 922. In some applications, these pins, along with signal ground, may be the only connections required to fully interface the System 922 with another device.

The System 922 holds the Clear to Send (CTS), Data Set Ready (DSR), and Data Carrier Detect (DCD) pins in the high state. These are provided for general purpose use, enabling one or more pins on the related equipment to be pulled to the high state.

Hardware Handshaking

The System 922's configuration port does not implement hardware data-flow control. The superior XON/XOFF software data-flow control is implemented.

Preparing the Serial Cable

Preparing serial cables requires a clear understanding of three topics: System 922 serial port, the serial port on the related equipment, and the goals of the installation. The previous paragraphs provided an overview of how the System 922's serial port is implemented.

Determine what hardware connections are required so that the serial port on the related equipment functions correctly. Some pins may need to be pulled to the high state to enable data flow.

Nuts and Bolts

You should use shielded cable and connector housings to minimize interference to and from the System 922. Be certain to use a connector that contains locking screws. These screws enable the connector to be secured to the threaded fasteners contained on the System 922's configuration port connector.

Sample Cable Implementations

The following examples provide details for several common cable implementations. These are provided for reference only and may not be correct for your application.

System 922 Configuration Port		PC-Type Serial Port
2 (RD)	←	2 (TD)
3 (TD)	→	3 (RD)
5 (CTS)	→	5 (CTS) See Note 4
7 (SG)	←	7 (SG)
8 (DCD)	→	8 (DCD) See Note 5
1 (No Connection)	→	1 (FG)

Notes:

1. Required connectors:
System 922 end: 25-pin D-subminiature male.
PC-type end: 25-pin D-subminiature female.
2. Use shielded cable and connector housings.
3. System 922 port-configuration parameters: 9600 baud, 8-NONE-1, XON/XOFF.
4. DTR connection may be required for correct modem operation. Alternately, DTR monitoring can be turned off in the modem.
5. To enable modem auto-answer mode send command **ATS0=1** using terminal or personal computer

Example D-1. Interconnection between System 922 Configuration Port and PC-Type Serial Port.

System 922 Configuration Port	AT-Type Serial Port
2 (RD)	3 (TD)
3 (TD)	2 (RD)
5 (CTS)	8 (CTS) See Note 4
7 (SG)	5 (SG)
8 (DCD)	1 (DCD) See Note 5
1 (No Connection)	Connector Shell
Notes:	
<ol style="list-style-type: none"> Required connectors: System 922 end: 25-pin D-subminiature male. PC-type end: 25-pin D-subminiature female. Use shielded cable and connector housings. System 922 port-configuration parameters: 9600 baud, 8-NONE-1, XON/XOFF. DTR connection may be required for correct modem operation. Alternately, DTR monitoring can be turned off in the modem. To enable modem auto-answer mode send command ATS0=1 using terminal or personal computer 	

Example D-2. Interconnection between System 922 Configuration Port and AT-Type Serial Port.

System 922 Configuration Port	Modem Serial Port
2 (RD)	3 (TD)
3 (TD)	2 (RD)
7 (SG)	7 (SG)
8 (DCD)	20 (DTR) See Note 4
1 (No Connection)	1 (FG)
Notes:	
<ol style="list-style-type: none"> Required connectors: System 922 end: 25-pin D-subminiature male. PC-type end: 25-pin D-subminiature female. Use shielded cable and connector housings. System 922 port-configuration parameters: 9600 baud, 8-NONE-1, XON/XOFF. DTR connection may be required for correct modem operation. Alternately, DTR monitoring can be turned off in the modem. To enable modem auto-answer mode send command ATS0=1 using terminal or personal computer 	

Example D-3. Interconnection between System 922 Configuration Port and Modem Serial Port.