GORDON KAPES|INC.

System 920i
PFT for PRI ISDN

Installation Guide

Chapter One
Planning for the System 920i

Overview

This chapter provides information to help you make several necessary decisions and do some simple planning before you actually begin installing your System 920i. 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 920i enclosure, circuit cards, and reference manual may be shipped in separate cartons. Upon receiving your System 920i, you should inspect it for damage immediately. Should damage be found, file a claim with the shipper. Save the original cartons and packing materials for later inspection.

Make sure the carton containing the System 920i enclosure includes an installation kit. The kit should contain four #8 pan-head screws (¾-inch long), two 8-position modular jacks, and two 8-position modular data cables.

Once you have inspected the System 920i and related components, continue the planning process by reading the remainder of this chapter. Then read Chapter Two, "Installing the System 920i," as you actually perform the installation.

Selecting Mounting Location

Since the System 920i is intended for wall mounting only, 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 920i enclosure. Also make sure you locate the System 920i close enough to the telephone circuits that need to be connected. Seven-foot modular data cables are included in the installation kit for this purpose.

Selecting –48Vdc Power Source

The System 920i requires an external source of –48Vdc, 1A 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 –48Vdc uninterruptible power source (UPS) is available at the site, you can use it to power the System 920i.

If an AC UPS system providing an uninterruptible source of 120Vac is available at the site, you can use it to power a –48Vdc power supply, such as the Model 723 from Gordon Kapes, Inc. The Model 723 provides –48Vdc, 2A maximum output using input power of 120Vac. A single Model 723 can power one or two System 920i units.

If an AC UPS is not present at the site, or if it is desirable for the System 920i to operate independently of other equipment, you can use the Model 733 DC UPS from Gordon Kapes, Inc. The Model 733 is a self-contained, wall-mounted unit that provides an uninterruptible source of –48Vdc using input power of 120Vac. The Model 733 provides 2A maximum output, and can sustain 2A for a minimum of 2 hours.

When connected to a System 920i, the Model 733 provides worst-case minimum operating time of 4 hours. Under more routine circumstances— where all System 920i resources, such as the OPS extensions, are used less than 100% of the time—8 to 10 hours of operation is possible. The Model 733 was expressly designed for use with the System 920i; and is suitable for a wide range of other telecommunications applications as well. Contact Gordon Kapes, Inc. for details.

Obtaining Analog Telephone Sets

If you plan to install and use OPS extensions with the System 920i, you must obtain the needed number of single-line, analog telephone sets (as many as 24) supporting touch-tone dialing. (Pulse dialing is not supported.) Gordon Kapes, Inc. highly recommends you supply the type of telephone set with a separate flash button. Ensure you have one 914 OPS card for each set of eight telephones you intend to use.
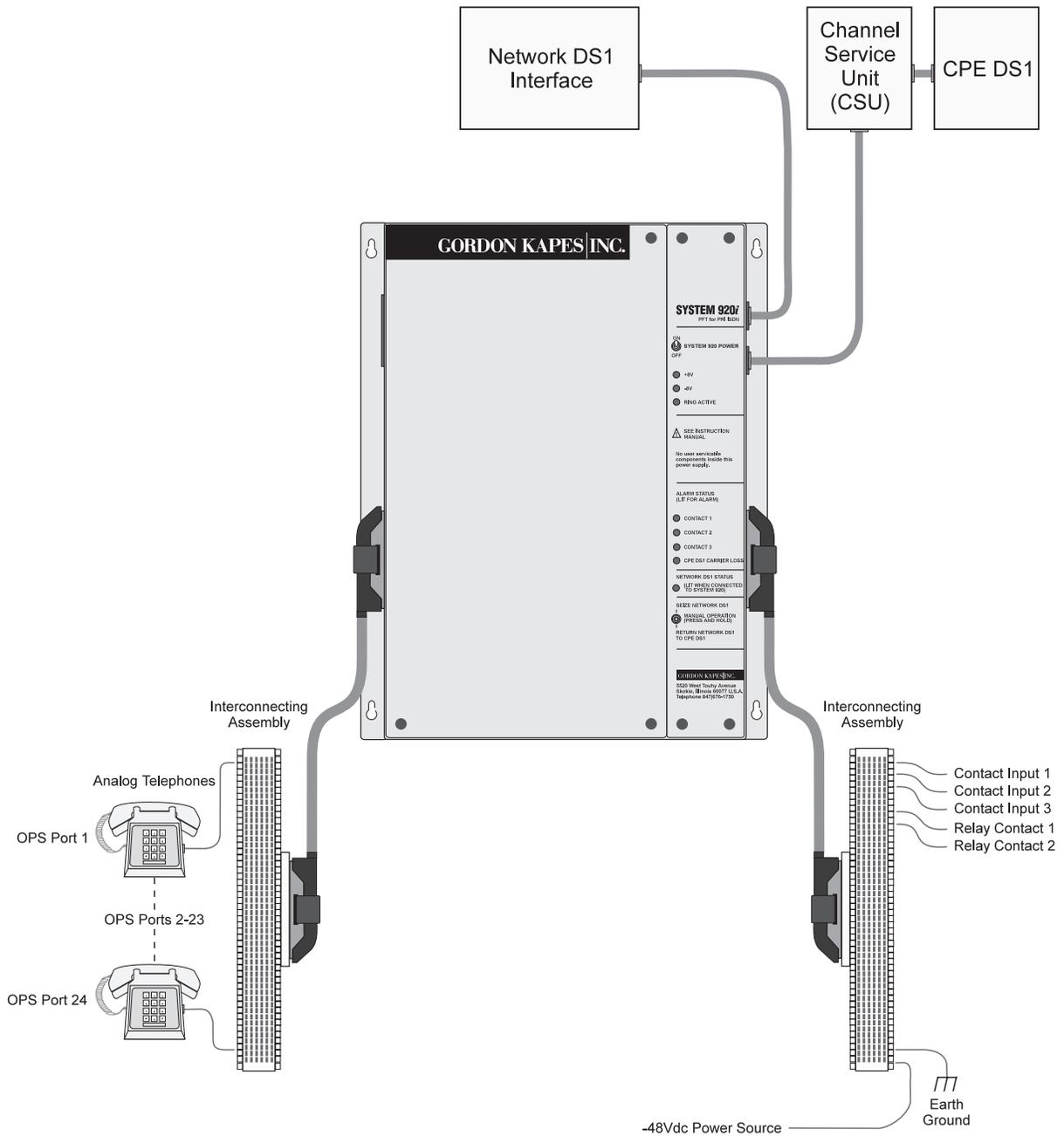
Figure 1-1. Overview of a Typical System 920i Installation

Obtaining 25-Pair Cables & Interconnecting Assemblies

During installation, you use 25-pair plug P1 to make connections to the analog telephone sets previously described. In addition, you make ground, DC-power, contact input, and relay-contact connections using 25-pair plug P2. These plugs are standard to the telephone industry. You must provide two 25-pair cables with female connectors attached, to mate with plugs P1 and P2.

You must also obtain the interconnecting assemblies of your choice, such as 66-type blocks, for terminating the various functions to the 25-pair cables.

Selecting Contacts to Monitor

The System 920i has three contact inputs for monitoring various functions. These can be connected to the alarm contacts provided by CPE-DS1 equipment such as a PBX or ACD system. Exactly how you choose to use the contact inputs depends upon the needs of the site and your own imagination.

If the uninterruptible power supply, which ultimately supplies –48Vdc, provides a contact indicating an AC failure, consider connecting it to one of the contact inputs. The Gordon Kapes, Inc. Model 733 DC UPS provides this type of contact.

When selecting monitoring applications, keep these guidelines in mind: Signals compatible with the System 920i's 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 (short) in reference to earth ground.

When a contact changes from the normal state for longer than one second, an alarm condition is activated. After the contact returns to the normal state for longer than three seconds, the alarm condition returns to normal. These time periods enable the System 920i's operating system to correctly detect changes.

CPE-DS1 Carrier Monitoring

A circuit on the System 920i DS1 Interface card monitors the electrical signal coming from the CPE-DS1 equipment. If generation of this signal ceases for longer than one second, an alarm state occurs and the System 920i seizes the DS1 network The presence of carrier for greater than one second will return the system back to the normal mode.

Planning for Relay Contacts

The System 920i provides two general-purpose relay contacts. These contacts consist of a normally open (not shorted) and a normally closed (shorted) contact. Each contact changes state in response to the System 920i seizing the DS1 network circuit.

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

Preparing DS1 Network and CPE-DS1 Terminating Jacks

ISDN PRI service is carried over DS1 telecommunications facilities. The System 920i is physically connected to an associated DS1 circuit. Some-times people refer to PRI as being carried over a "T1 circuit," but that's not exactly accurate. The network PRI must be terminated on a jack wired as a USOC RJ48C. This 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 920i connects to the RJ48C using an 8-position modular data cable.

The CPE-DS1 circuit must be terminated on an 8-position modular jack wired so as to mate with an RJ48C using a modular data cable.

Two 8-position modular data cables, which use a straight-through connec-tion arrangement, and two 8-position modular jacks are supplied with the System 920i. These are for your use if you need to prepare terminating jacks, and for making the necessary DS1 network and CPE-DS1 connec-tions.

Figures 2-9 and 2-10 in Chapter Two show the wiring for both the DS1 network and CPE-DS1 terminating jacks. To test the wiring, you can connect DS1 network directly to CPE DS1 using the straight-through connection provided by either of the supplied 8-position modular data cables.

Obtaining or Preparing a Cable for the Maintenance Port

The System 920i contains a serial communications port for use with a terminal or personal computer to access the System 920i's menu system. The terminal or personal computer must use VT100 emulation.

The maintenance 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-male (straight through) cable 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: Use a "null modem cable" if you are connecting a standard modem to the maintenance port. You may need to disable DTR monitoring on the modem. This enables the modem and maintenance port, which are both configured as DCE, to be connected.

Obtaining a VT100 Terminal

Locate either a VT100 terminal, or a personal computer with software capable of emulating VT100. Either device must support the function keys F1 through F4, Backspace or Delete.

If you are using a personal computer, you may need to acquire terminal emulator software. The communications program PROCOMM PLUS by DATASTORM TECHNOLOGIES, INC. provides excellent VT100 emulation. The terminal emulator available with Microsoft Windows also works very well. Appendix C contains more detailed information about terminal emulation requirements.

Chapter Two
Installing the System 920i

Overview

This chapter explains how to install the System 920i.

Efficient installation requires some planning. Consequently, it is strongly recommended you read and follow the guidelines presented in Chapter One, "Planning for the System 920i," before beginning installation as described in this chapter.

Words of Caution

As with any product, installing the System 920i 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: Open Carton, Check for Damage, and Locate Installation Kit

❑ If you have not done so, open the shipping carton and remove the System 920i enclosure from its packing material. As you unpack the unit, inspect it for damage. If you find damage, file a claim with the shipper. For later inspection, store the damaged unit in the original carton and packing material. If necessary, order a replacement from Gordon Kapes, Inc.

❑ Remove the front cover (shown in Figure 2-1) from the System 920i. This panel is held in place by four Phillips-head machine screws. Remove the foam packing material and warning card placed between the cover and the System 920i's enclosure. Retain these items along with the other packing material and shipping carton to use if you ever need to return the unit to the factory.
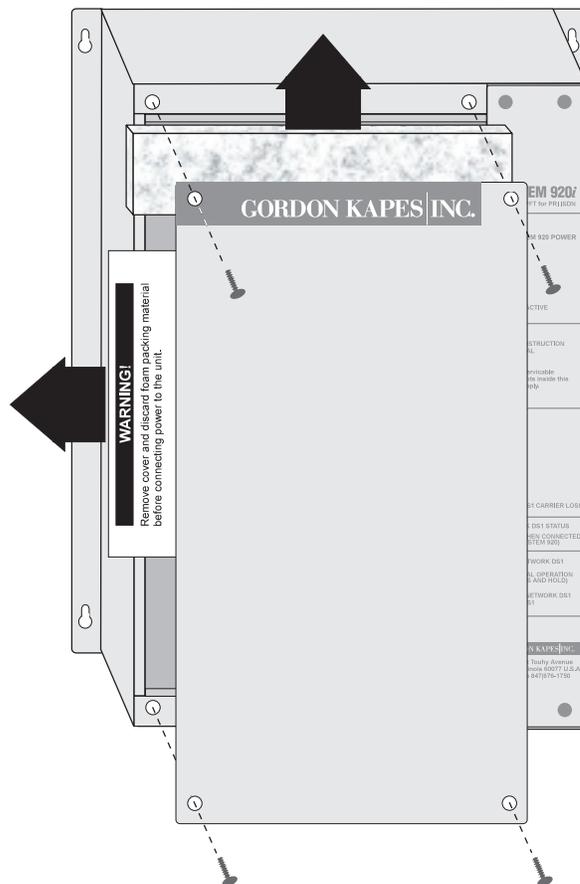
Figure 2-1. Remove Foam Packing Material and Warning Card from Unit

❑ Open any additional shipping cartons and verify that you have everything required for the installation. If not, contact the factory for assistance.
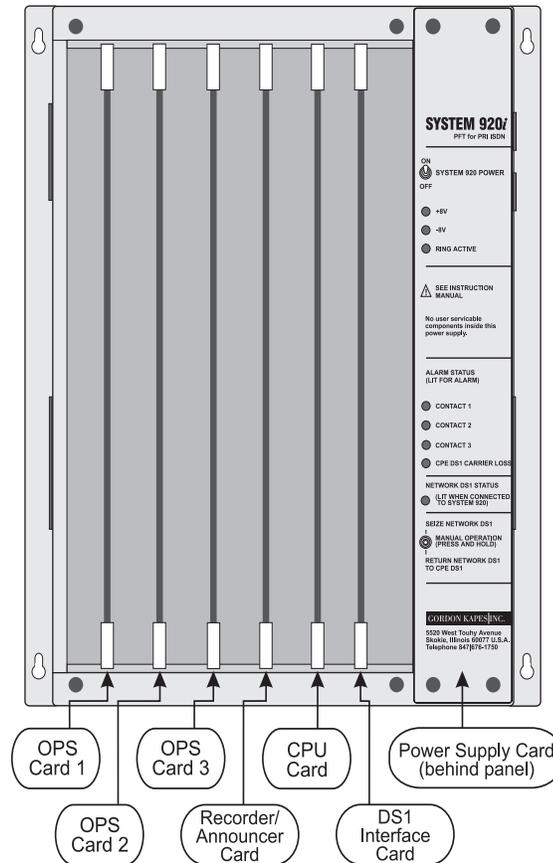
Figure 2-2. System 920i with All Cards Installed

❑ Observing Figure 2.2, install all cards into the System 920i enclosure. Press the plastic handles at the top and bottom of each card to verify the card is 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 OPS cards, but not any of the other cards.

❑ Since there are no switches to set on the circuit cards, you can now replace the cover.

Step Two: Mount the System 920i

Mount the System 920i on the equipment room wall.

Preparing

❑ Before mounting the System 920i, ensure you have selected the desired mounting location. (Refer to "Selecting Mounting Location," in Chapter One.)

Installing

❑ Mount the System 920i using the four screws (#8 pan head, ¾-inch long) included in the installation kit. These screws are for use with a wooden-backboard surface (minimum thickness ¾ inch). The System 920i's enclosure is outfitted with four keyhole screw slots. Use one screw per slot and securely fasten the unit to the backboard.
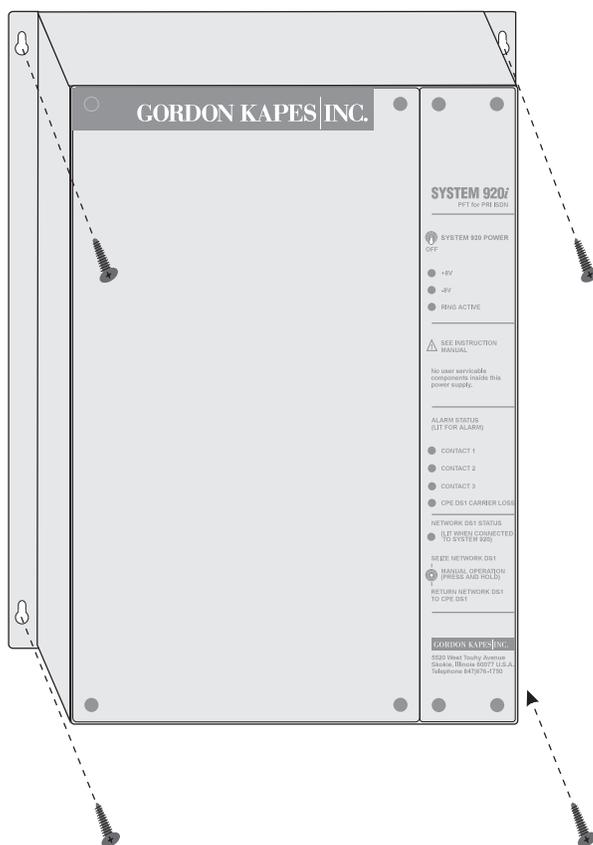
Figure 3-3. Mount the System 920i

Step Three: Make Plug P2 Connections

Use plug P2 to connect ground and power, as many as three contact inputs, and either or both of the relay contacts.

Preparing

❑ Locate the 25-pair cable with mounted female connector, and the interconnecting assembly you obtained for use with Plug P2. (Refer to "Obtaining 25-Pair Cables and Interconnecting Assemblies," in Chapter One.)

❑ Select the –48Vdc power source to be used with the System 920i. As discussed in Chapter 2, the System 920i requires an external source of –48Vdc, 1A 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 –48Vdc uninterruptible power source (UPS) is available at the site, you can use it to power the System 920i.

If an AC UPS system providing an uninterruptible source of 120Vac is available at the site, you can use it to power a –48Vdc power supply, such as the Model 723 from Gordon Kapes, Inc. The Model 723 provides –48Vdc, 2A maximum output using input power of 120Vac. A single Model 723 can power one or two System 920i units.

If an AC UPS is not present at the site, or if it is desirable for the System 920i to operate independently of other equipment, you can use the Model 733 DC UPS from Gordon Kapes, Inc. The Model 733 is a self-contained, wall-mounted unit that provides an uninterruptible source of –48Vdc using input power of 120Vac. The Model 733 provides 2A maximum output, and can sustain 2A for a minimum of 2 hours.

The common, or positive lead of the power source must be connected to earth ground. This creates what is called a positive-ground power source, which is common in the telecommunications industry.

❑ Ensure the contacts for the functions you want to monitor are ready to be connected to the System 920i. (For more information, refer to "Selecting Contacts to Monitor," in Chapter One.) If the power source provides a contact indicating AC failure, consider connecting it. (The Gordon Kapes, Inc. Model 733 DC UPS provides this type of contact.)

❑ As discussed in "Planning for Relay Contacts" in Chapter One, the System 920i provides two general-purpose relay contacts: a normally open (not shorted) and a normally closed (shorted) contact. The relay contacts change state when the System 920i seizes the DS1-network circuit. If you intend to connect these contacts to other devices, ensure leads to the devices are ready.

Installing the 25-Pair Cable

❑ Ensure the power switch on the System 920i (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. (Leave the switch off even after you have connected the power leads.)
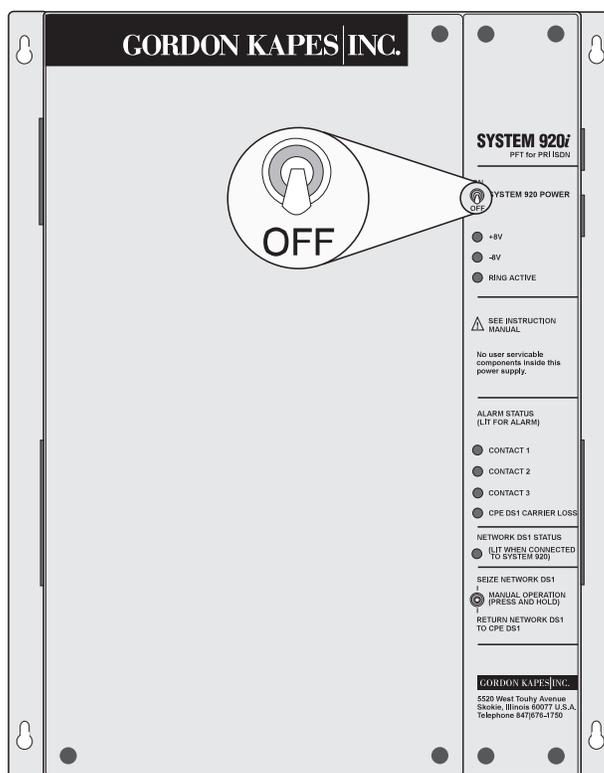
Figure 2-4. Ensure Power Switch is in Off Position

❑ Insert the female connector of the 25-pair cable into plug P2. Secure the connector using the fastener strap attached to the plug.

❑ Plug P2 is located on the right panel of the System 920i as shown in Figure 2-5.

❑ Terminate the 25-pair cable in the interconnection assembly you prepared for this purpose.
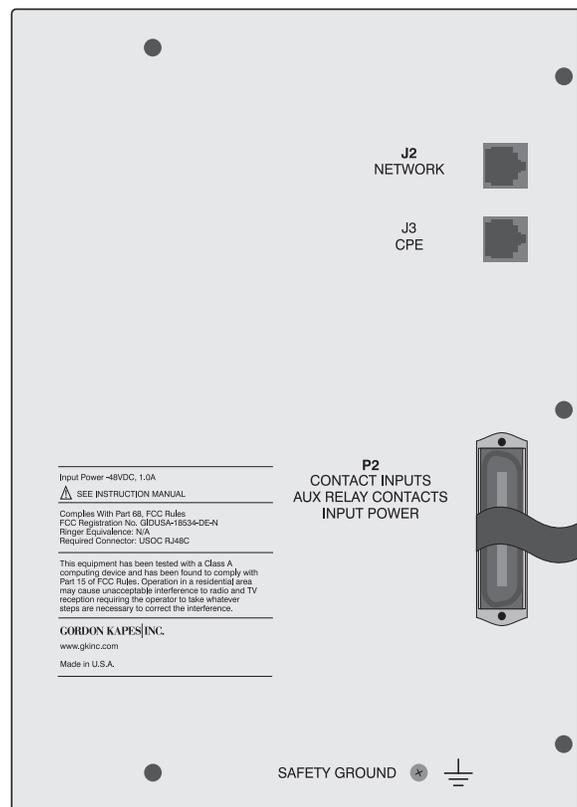
Figure 2-5. System 920i Right Panel

Connecingt Ground and Power Leads

The –48Vdc power connected to the System 920i 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 –48Vdc source is appropriate to protect equipment and personnel from short circuits and other wiring errors.

❑ Confirm that the power source has its positive or common lead connected to earth ground. This creates a –48Vdc source that is negative with respect to earth ground. If the power source is not configured in this manner, it must be changed. Perform this connection only if you are qualified to do so. If you are unfamiliar with the procedure, consider consulting with a technician qualified in DC power systems. Obtain assistance prior to making any changes that could involve a safety hazard. If you are using a Gordon Kapes, Inc. Model 733 DC UPS Power Supply, refer to Appendix A for details.

❑ Connect safety ground to green cabinet screw.

❑ Connect the violet-brown and violet-slate leads (pins 49 and 50) on the interconnection assembly to earth ground. Since this connection acts as both a safety ground and a –48Vdc ground, a minimum wire gauge of 22 AWG should be used.

❑ Connect the brown-violet and slate-violet leads (pins 24 and 25) on the interconnection assembly to the –48Vdc lead of the power source.

Connecting Contact Inputs

❑ Using the pin connections shown in Figure 2-6, connect as many as three contact inputs to the interconnection assembly.

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 ground connection of the desired contact input.

Connecting Relay Contacts

❑ Using the pin connections shown in Figure 2-6, connect either or both of the relay contacts to the interconnection assembly.

The relay contacts are designed only to control low-voltage, low-current electrical signals. Do not use the contacts to switch AC-line (120Vac) voltage.

Plug P2 Pin Connection Chart

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

Note 1: The ground connection associated with the contact inputs is essentially at earth-ground potential.

Note 2: A filtered and regulated source of uninterruptible −48Vdc, 1A maximum, must be connected to the brown/violet and slate/violet leads.

Figure 2-6. Plug P2 Pin Connections

Step Four: Make Plug P1 Connections

Use plug P1 to connect OPS telephone extensions. Each OPS card in the System 920i provides eight OPS telephone circuits.

Preparing

❑ Locate the 25-pair cable with mounted female connector and the inter-connecting assembly you obtained for use with Plug P1. (Refer to "Obtaining 25-Pair Cables and Interconnecting Assemblies," in Chapter One.)

❑ Prepare the leads from the single-line analog telephones you have obtained for use as OPS extensions. As described in Chapter One, you can use as many as 24 single-line, analog telephones supporting touch-tone dialing. You must have one 914 OPS card installed in the System 920i for each set of eight telephones you use.

Installing

❑ Insert the female connector of the 25-pair cable into plug P1. Secure the connector using the fastener strap attached to the plug.

Plug P1 is located on the left panel of the System 920i as shown in Figure 2-7.

❑ Terminate the 25-pair cable in the interconnection assembly you prepared for this purpose.

❑ Using the pin connections shown in Figure 2-8, connect as many as 24 OPS telephones to the interconnection assembly. A single tip-and-ring connection is required for each telephone. Figure 2-8 indicates the OPS-card port associated with each connection.
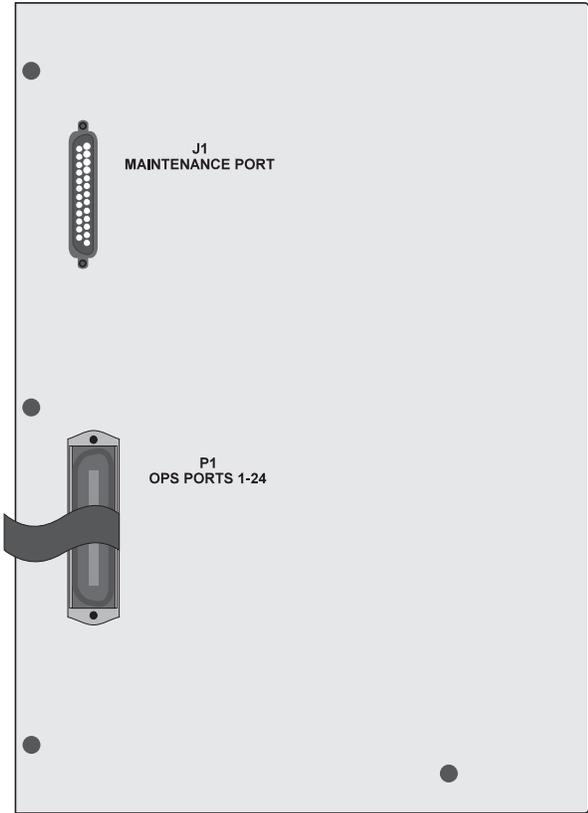
Figure 2-7. System 920i Left Panel

Plug P1 Pin Connection Chart

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

Figure 2-8. Plug P1 Pin Connections

Step Five: Connect to the DS1 Network and CPE-DS1 Circuits

Preparing

❑ As mentioned in Chapter One, ISDN PRI uses DS1 facilities to send and receive the actual data. Ensure the DS1 network is terminated on an 8-position modular jack wired as USOC RJ48C. Ensure CPE DS1 is terminated on an 8-position modular jack wired to mate with an RJ48C using a modular data cable. Figures 3-9 and 3-10 show the wiring for the DS1 network and CPE-DS1 jacks. For further details, refer to "Preparing DS1 Network and CPE-DS1 Terminating Jacks," in Chapter One. Two 8-position modular jacks are included in the installation kit.

It is important to ensure that the DS1 network jack is connected directly to the DS1 circuit with no intervening CPE-DS1 equipment. This ensures that failure of any CPE-DS1 equipment does not affect operation of the System 920i. (The System 920i contains its own channel-service-unit circuitry. Consequently you do not need to use an external CSU when the System 920i seizes the DS1 network. However, you still must supply an independent CSU for use with CPE-DS1 equipment.)

❑ Locate the two 8-position modular data cables included in the installation kit. (To test the wiring of the network and CPE-DS1 terminating jacks, you can connect DS1 network to CPE DS1 by connecting the associated jacks together using one of the 8-position data cables.)
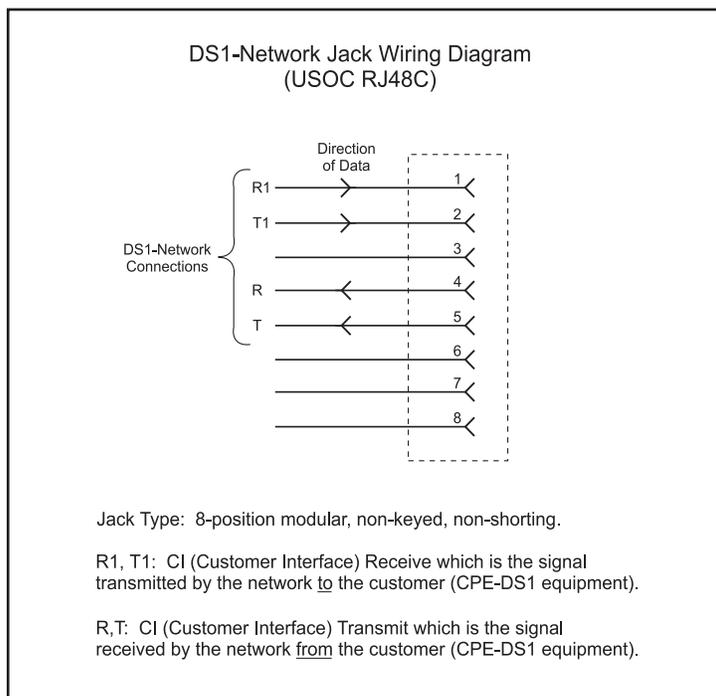
Figure 2-9. DS1 Network Jack Wiring (USOC RJ48C)
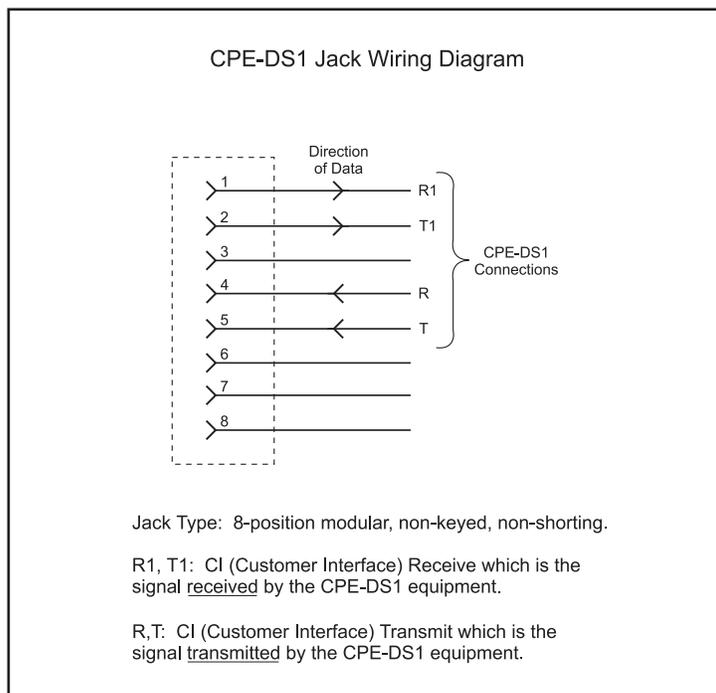
Figure 2-10. CPE-DS1 Jack Wiring

Installing

❑ Using one of the modular data cables from the installation kit, connect the DS1 network to jack J2 on the right panel of the System 920i enclosure. Jack J2 is shown in Figure 2-11.

❑ Using the other modular data cable from the installation kit, connect CPE DS1 to jack J3 on the right panel of the System 920i enclosure. Jack J3 is shown in Figure 2-11.
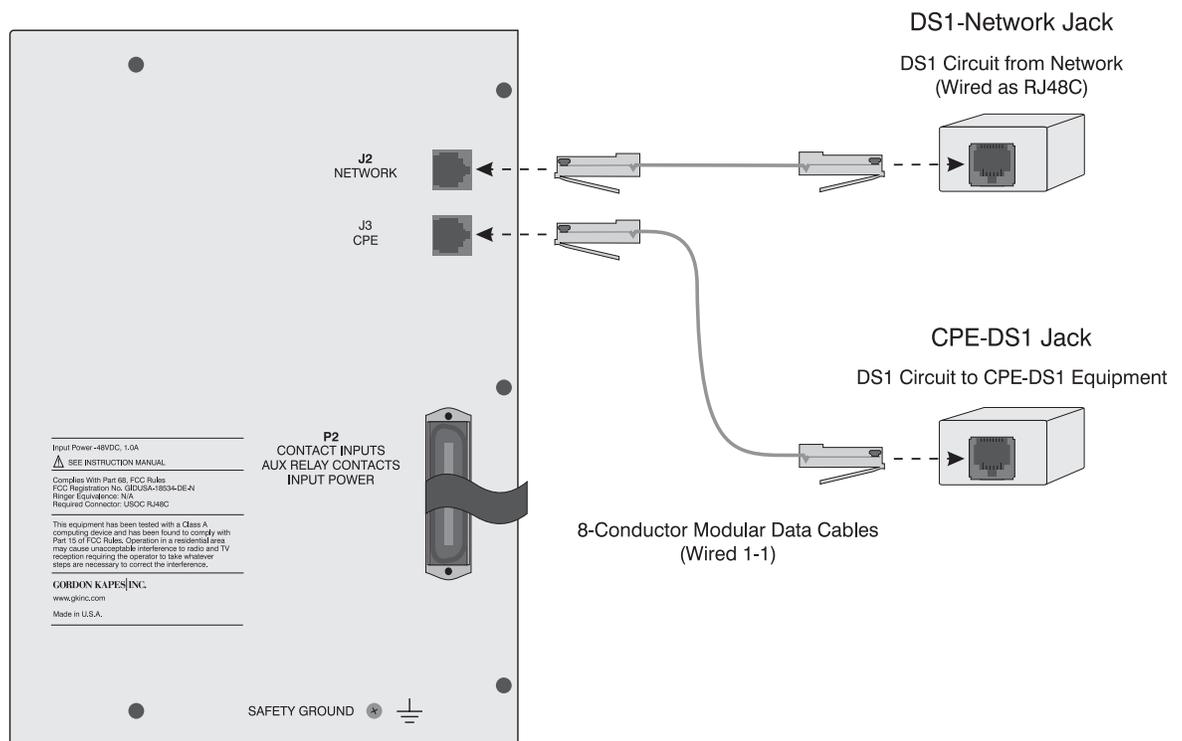
Figure 2-11. DS1 Network and CPE-DS1 Connections

Step Six: Connect to the Maintenance Port

To access the System 920i's menu system, connect a VT100 terminal or personal computer capable of VT100 emulation, to the maintenance port on the left panel of the System 920i. The menu system enables you to configure the system and review system status.

In general, you only need to connect to the maintenance 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 maintenance 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 maintenance 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.

❑ You must also have a terminal or personal computer capable of VT100 emulation.

Installing

❑ Connect the serial communications cable to the maintenance port on the System 920i. The maintenance port is shown in Figure 2-12.

❑ Use the screws on the mating plug to ensure the cable is secured to the System 920i's connector.

❑ Connect the other end of the cable to a serial port on the designated terminal or personal computer.

❑ Set communications settings in the terminal to the following:

Baud rate: 9600
Data bits: 8
Parity: None
Stop bits: 1
Flow control: XON/XOFF
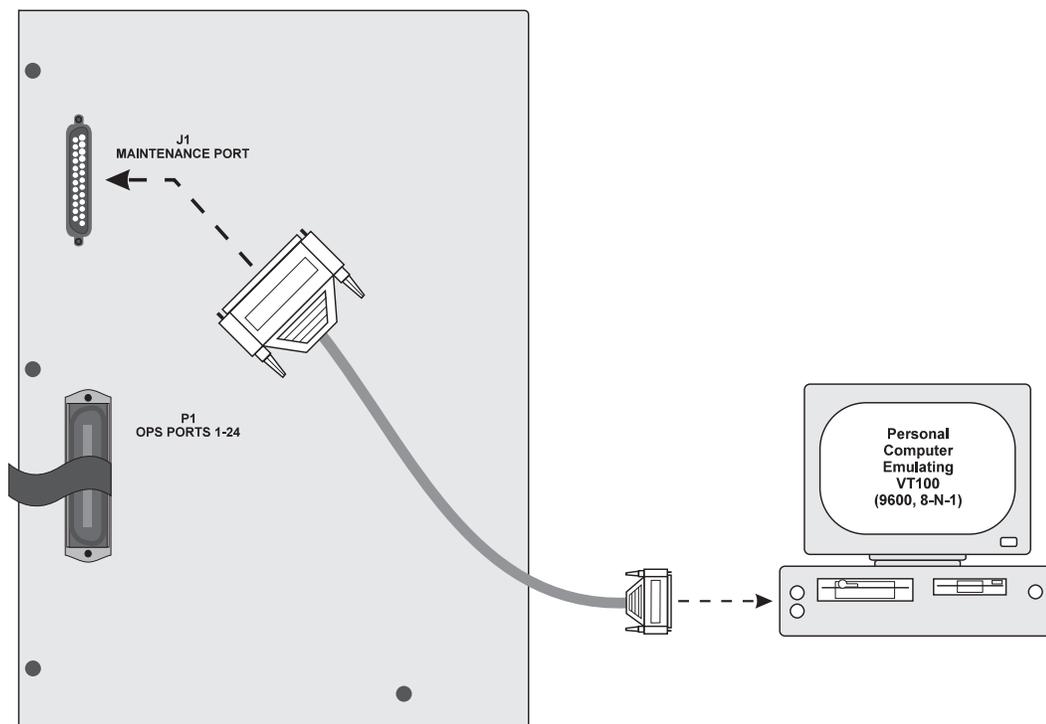
Figure 2-12. Connect Serial Communications Cable to Maintenance Port

Step Seven: Review the Installation

❑ 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 920i 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.

If a contact LED is lit, it indicates that the contact is in the shorted (closed) state. Remove the short and the LED will stop lighting.

❑ Test the OPS telephone extensions by taking each off-hook. Make a call to and receive a call from each telephone. The default numbering plan, beginning with the telephone connected to OPS port 1, is extension 1001 through 1024.

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 920i contains menu-driven software called the menu system. The *menu system* enables you to configure, test, and examine the operating status of the System 920i.

The menu system and other software components of the System 920i 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 920i

- 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 IBM-compatible 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 terminal or 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.
italic	Used to highlight a key term defined in this guide. Also used for emphasis and to indicate variable information. For example, ACD *n* stands for ACD 1, ACD 2, or any of the other 22 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 VT100 terminal to the maintenance port (J1) located on the left panel of the System 920i enclosure. Figure 3-1 illustrates the location of the maintenance port. (For more information about maintenance port connection and cabling refer to Appendix D, "Maintenance Port Connections.")

2. Ensure power is turned on to both the terminal and the System 920i.

3. Press ↵ to display the Login screen.
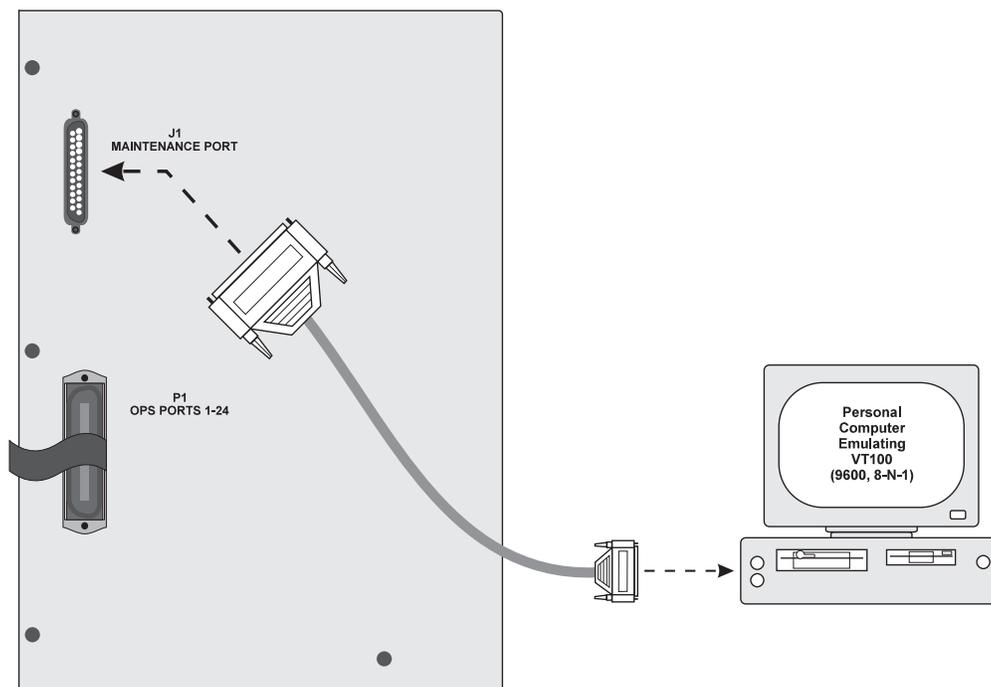
Figure 3-1. VT100 Terminal Connected to Maintenance Port J1

Choose a terminal or software that is capable of VT100 emulation supporting the function keys F1 through F4, Backspace or Delete. If you are using a personal computer, you may need to acquire terminal emulator software capable of emulating VT100. The communications program PROCOMM PLUS by DATASTORM TECHNOLOGIES, INC. provides excellent VT100 emulation. The terminal emulator available with Microsoft Windows also works very well. Appendix C contains more detailed information about terminal emulation requirements.

Set communications settings in the terminal to the following:

Baud rate:	9600
Data bits:	8
Parity:	None
Stop bits:	1
Flow control:	XON/XOFF

If You Have Problems with Garbage on the Screen

Should you access the Password screen or the Main Menu using 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.

The VT100 compatibility test enables you to verify VT100 emulation prior to using the menu system. The test requires you to press F1, F2, F3, F4, and Backspace after entering a valid password. If the terminal emulator does not support these keys, you are prevented from proceeding with the menu system. The test is enabled by default.

Exiting the Menu System and Disconnecting

To exit the menu system and disconnect from the System 920i, 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 920i 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 920i, 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.

Powering the System 920i with a Model 733 DC UPS

Network DS1 Interface

Channel Service Unit (CSU)

CPE DS1

Gordon Kapes, Inc. System 920i PFT for PRI ISDN

SYSTEM 920*i*
PFT for PRI ISDN

ON
SYSTEM 920 POWER
OFF

+8V
-8V
RING ACTIVE

⚠ SEE INSTRUCTION MANUAL

No user serviceable components inside this power supply.

ALARM STATUS
(LIT FOR ALARM)

CONTACT 1
CONTACT 2
CONTACT 3
CPE DS1 CARRIER LOSS

NETWORK DS1 STATUS
(LIT WHEN CONNECTED TO SYSTEM 920)

SEIZE NETWORK DS1
MANUAL OPERAITON
(PRESS AND HOLD)
RETURN NETWORK DS1 TO CPE DS1

5520 West Touhy Avenue
Skokie, Illinois 60077 U.S.A.
Telephone 847|676-1750

P2

Gordon Kapes, Inc. Model 733 DC UPS Power Supply

Pin	Color
24	BRN/VIO
25	SLT/VIO

J1

Pin	Desc.
5	Aux Relay
4	
3	−DC
2	+DC
1	GND

LOW BATTERY
BATTERY OPERATION
DC OUTPUT

Pin	Color
49	VIO/BRN
50	VIO/SLT

AC Power Cord

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System 920i Specifications

This appendix contains technical specifications for the System 920i. The specifications are subject to change without notice.

General

Dimensions (Overall)

13.9 inches high (35.3cm)
11.5 inches wide (29.2cm)
10.2 inches deep (25.9cm)

Weight (all cards installed)

23.5 pounds (10.7kg)
Shipping Weight: 27.0 pounds (12.3kg)

Mounting

Wall mounted to minimum ¾-inch thick plywood backboard

Environment

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

Connectors

Two 25-pair plugs (male), one 25-pin D-subminiature connector (female), two 8-position non-keyed modular jacks

Power Requirements

Voltage: –42.5 to –56Vdc, filtered and regulated

Current: 1.0 amp maximum

Type: uninterruptible, even in the event of a commercial power failure

Connections: two pairs on 25-pair plug P2

Maintenance 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

Qty: 7

Indication: +8V, –8V, ring active, contact inputs 1-3, and DS1 network status

Program Data Storage

Type: 128K bytes (16 bits/byte) ROM

Configuration Data Storage

Type: 128K bytes (16 bits/byte), super low power static RAM

Backup Power: 3V, 150mAh lithium battery, field replaceable

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

Contact Inputs

Qty: 3

Signal Compatibility: normally open (not shorted) or normally closed (shorted)

Signal Requirements: signals connected to the contact inputs must be capable of handling 5mA at 10Vdc

Connections: 3 pairs on 25-pair plug P2

Relay Contacts

Qty: 2, one normally open (not shorted), one normally closed (shorted)

Rating: 0.5A maximum at 60Vdc or 60Vac (resistive)

Connections: two pairs on 25-pair plug P2

DS1-Network Connection

Directly connects to RJ48C using an 8-position modular data cable (cable and 8-position modular jack included with System 920i)

CPE-DS1 Connection

Connects to CPE-DS1 equipment using 8-position modular data cable to mate with 8-position modular jack (cable and jack included with System 920i)

DS1-Network 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)

Radiated Noise Compliance

Complies with the requirements in Part 15 of FCC Rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

913 DS1 Interface Card

Installation

For use in System 920i enclosure only, one card maximum

DS1 Circuit Compatibility

Designed for direct connection to DS1 circuit without requiring the use of an external channel service unit (CSU). CSU circuitry is contained on the 913 Card and is intended only for System 920i use. CSU functionality is not provided to connected CPE-DS1 equipment.

Framing: D4 (Superframe), ESF

Zero Suppression: B8ZS

Loopback

Manual: accessed using maintenance port menu system

Automatic: in-band for D4 (Superframe), FDL message for ESF

Dial Tone Source for Outbound Dialing: local (internally generated) or network

Transmitter

Line Rate: 1.544 Mbps ±50bps (local source)

Synchronization Source: local (internally generated) or network (external)

Zero Suppression: B8ZS

Line Impedance: 100 ohms, resistive

Line Build Out: 0, –7.5, and –15dB

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

Network Layer 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)

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

Layer 3 Protocol: per CCITT Q.931

Receiver

Line Rate: 1.544Mbps ±200bps

Zero Suppression: B8ZS

Line Impedance: 100 ohms, resistive

Sensitivity: 0 to –30dBSX

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

Circuitry watches for the presence of digital information with a center frequency of 772kHz

914 OPS Card

Installation

For use in System 920i enclosure only, three cards maximum

OPS Ports

Qty: 8

Type: meets the requirements for FCC Part 68 Class A PBX OPS Circuit

Port Connections

8 pairs on 25-pair plug P1 (per card)

Port Parameters

Impedance: 600 ohms

Loop Supply Voltage: –48Vdc

Loop Supply Current: 22mA with 300 ohm loop, 18mA with 1300 ohm loop, 16mA with 1800 ohms loop, 24mA with shorted tip and ring

Ring Voltage: 87Vac, 20Hz, sine wave

Ring Cadence: 0.95 seconds on/3.050 seconds off

Ringer Load: maximum REN of two or less

On-Hook to Off-Hook Detection: 0.2 seconds

Switch Hook Flash Timing: 0.3 to 1.0 seconds

Off-Hook to On-Hook Timing: 1.5 seconds for new dial tone

Disconnection Supervision: 1.0 second break in loop current

Dialing: DTMF only, pulse dialing not supported

Progress Tones (Internal)

Dial tone (350Hz+440Hz)

Reorder tone (480Hz+62Hz)

Busy tone (480Hz+620Hz)

Audible ring tone (440Hz+480Hz)

Vacant tone (620Hz/440Hz)

Howler tone (1000Hz)

915 Recorder/Announcer Card

Installation

For use in System 920i enclosure only, one card maximum

Recorder/Announcer Channels

Qty: 2

Duration: 20 seconds, maximum, per channel

Recording Audio Source: System 920i OPS telephone only

Specifications subject to change without notice.

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Appendix C
Terminal Emulator Requirements

Overview

The System 920i's menu system is designed to communicate with termi-
nals and personal computers that emulate the keyboard and screen
position commands of a DEC VT100 terminal.

Keyboard Commands

For operation, the maintenance 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 920i, do a careful review of your terminal emulator character set.

We are very fond of DATASTORM TECHNOLOGIES' PROCOMM PLUS software package. Its VT100 terminal emulator implementation is excellent–we highly recommend it. (They refer to it as VT100/102 emulation.) Whatever software you choose, be certain to confirm that the required keys are implemented.

Appendix D
Maintenance Port Connections

This appendix is provided as a reference when you are preparing an interconnecting cable for use between the System 920i's maintenance 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 920i	Transmitted Data (TD)
3	From System 920i	Received Data (RD)
5	From System 920i	Clear to Send (CTS)
6	From System 920i	Data Set Ready (DSR)
7	To/From System 920i	Signal Ground (SG)
8	From System 920i	Data Carrier Detect (DCD)

Notes:

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 (+8Vdc through a 3300 ohm resistor) and do not change state.

5. Pin 8, DCD, is held high (+8Vdc through a 3300 ohm resistor) and does not change state.

Understanding the Serial Ports

Correct maintenance port operation depends on the careful preparation of a cable linking the System 920i maintenance port to the related equipment. Before you prepare a cable, it is important that you understand how the System 920i'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 920i, and one pin for data received by the System 920i. In some applications, these pins, along with signal ground, may be the only connections required to fully interface the System 920i with another device.

The System 920i 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 920i's maintenance 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 920i 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 920i'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 920i. 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 920i's maintenance 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 920i Maintenance 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 920i end: 25-pin D-subminiature male.
   PC-type end: 25-pin D-subminiature female.

2. Use shielded cable and connector housings.

3. System 920i port-configuration parameters: 9600 baud, 8-NONE-1, XON/XOFF.

4. CTS connection required if hardware flow control is enabled.

5. DCD connection required for PROCOMM PLUS to display online status.

Example D *Notes:*

1. Required connectors:
   System 920i end: 25-pin D-subminiature male.
   AT-type end: 9-pin D-subminiature female.

2. Use shielded cable and connector housings.

3. System 920i port-configuration parameters: 9600 baud, 8-NONE-1, XON/XOFF.

4. CTS connection required if hardware flow control is enabled.

5. DCD connection required for PROCOMM PLUS to display online status.

System 920i Maintenance 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:

1. Required connectors:
   System 920i end: 25-pin D-subminiature male.
   AT-type end: 9-pin D-subminiature female.

2. Use shielded cable and connector housings.

3. System 920i port-configuration parameters: 9600 baud, 8-NONE-1, XON/XOFF.

4. CTS connection required if hardware flow control is enabled.

5. DCD connection required for PROCOMM PLUS to display online status.

Example D-2. Interconnection between System 920i Maintenance Port and AT-Type Serial Port.

System 920i Maintenance 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:

1. Required connectors:
   System 920i end: 25-pin D-subminiature male.
   Modem end: 25-pin D-subminiature male.

2. Use shielded cable and connector housings.

3. System 920i 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-3. Interconnection between System 920i Maintenance Port and Modem Serial Port.