GORDON KAPES | INC.

Model 125 Site Monitor

Installation Guide

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WARNING The Model 125 Site Monitor is not intended to monitor or report conditions that relate to the safety of people or property. It should not be used in place of, or in conjunction with an approved fire or burglar alarm system.

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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 instruction manual, 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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Foreword
Words about this Guide

This document covers only planning and installation of the Model 125 Site Monitor. To ensure that personnel are always prepared to perform an installation, a copy is supplied with each Model 125. Other documentation covers the configuration and operation of the installed unit.

Depending on the terms under which this Model 125 was purchased, an Operator Guide and a Master Reference Guide may also be included with the unit. The Operator Guide covers how to use the Model 125 once it has been installed and configured. The Master Reference Guide is a 400+ page document covering all facets of Model 125 installation, configuration, troubleshooting, and operation.

Please contact your system administrator to obtain any additional documentation that you require. Also, remember that Gordon Kapes, Inc. welcomes your questions, comments, or suggestions. We can be reached by voice at 847 | 676-1750, fax at 847 | 982-0747, or via the Internet @ www.gkinc.com.

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Chapter One
Understanding the Model 125

Introduction

Today rapid and effective communications activities depend more and more upon the use of telecommunications and data systems equipment. As dependency upon this equipment increases, so does the need to provide immediate, cost-effective, and secure troubleshooting and maintenance.

The *Model 125 Site Monitor* is a compact, multi-functional device designed to help support personnel by enabling rapid access to maintenance software resident within such equipment, to ensure access security to that equipment, and to implement the automatic monitoring and reporting of various physical and electrical conditions in the equipment room itself.

Intended to be mounted on the wall of an equipment room, the Model 125 is powered by a 120Vac outlet, with power failure backup provided by a built-in battery.

Flexibility

The Model 125 features a host of resources including a 2400 bits-per-second modem, three serial communications ports, eight contact inputs, an internal temperature sensor (along with provision for connecting an external temperature sensor), two DC-voltage-monitoring inputs, and two relay-contact outputs.

The Model 125's processing power is provided by a microprocessor, a real-time multi-tasking operating system, and RAM-based program software. The program software can be remotely updated, ensuring that upgrades are easily performed. The Model 125's internal *menu system* enables you to configure and operate the Model 125 with ease. This provides the flexibility to meet both site-specific requirements and global maintenance goals.

Figure 1-1 illustrates the major hardware components of the Model 125 as installed in a typical PBX-system site.

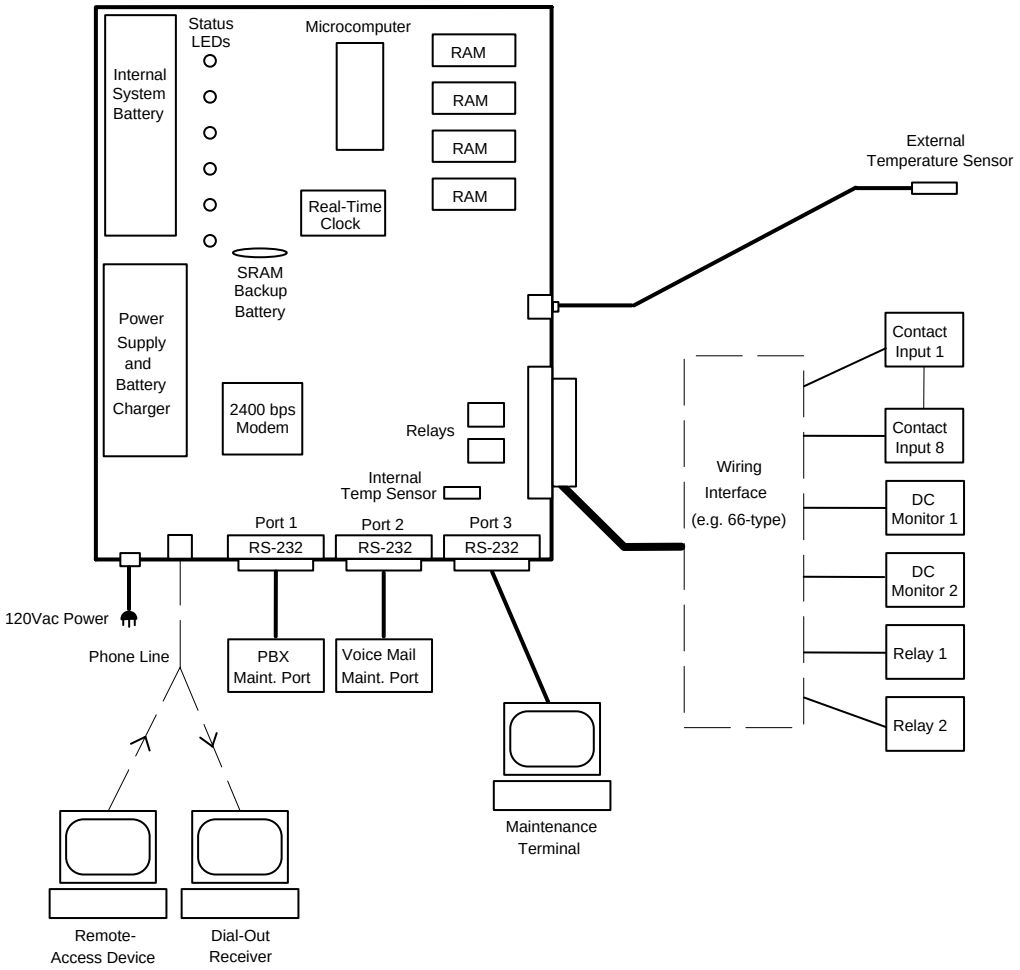

Figure 1-1. Model 125 Installed in a Typical PBX-System Site

Major Purposes

The Model 125 serves two major purposes. First, as an intelligent “front end,” it provides rapid, secure access to devices connected to the three serial communications ports. Extensive password protection and access logging maintains the integrity of the connected equipment.

Second, the Model 125 monitors various site conditions. Both real-time and historical records of the conditions are available for review. In addition, alarm conditions can be defined so that the system will generate automatic dial-out alarm reports. These reports, which are in the form of text-based data, can be transmitted to multiple receiver locations using the Model 125’s internal modem. In addition, alarm conditions can cause the unit to call a pager.

Feature Highlights

- Rapid, Secure Access to Three Serial Ports
- Configurable Access and Security Parameters
  Multiple, Unique Name-Password Combinations
  Logging of User Access
  Intruder Detection, Lock Out, and Reporting
- Monitors On-Site Equipment-Room Conditions
- Serial Port Monitoring and Message Capture
- Automatic Reporting of Alarms
- Real-Time Display of System Conditions
- Maintains Log of Site and System Activity
- Relay Functions
- Menu System for Rapid Model 125 Operation

Provides Rapid, Secure Access to Equipment

The Model 125 contains three RS-232 serial ports. These are designed to allow communications with up to three serial ports located on telecommunications or other types of data equipment.

A typical configuration might consist of a PBX telephone system's maintenance port connected to Port 1 on the Model 125. The maintenance port on an associated voice-mail system would be connected to Port 2. Although a third device can be connected to Port 3, this port is generally reserved for an on-site maintenance terminal.

On-Site Access

Using an on-site terminal or personal computer connected to Port 3, you can access the serial port on either connected device by simply selecting a software menu option. You do not need to connect a cable to one device, then remove it to connect to the other device. The cables are already in place! Nor do you need to change communications settings such as data format or baud rate when switching from one port to another. The Model 125's smart routing capability automatically performs any needed protocol conversion.

Remote Access

In addition to on-site access, you may choose to access the Model 125 from a remote location as well. Integral to the Model 125 is a 2400 bits-per-second modem. Connect the unit to a phone line and you are ready to use all Model 125 resources. A remote-access device can be as simple as a modem and a terminal or a modem and a personal computer running communications software that supports VT100 emulation. (The Model 125 also provides limited functionality with a TTY-compatible terminal.)

The Model 125's internal modem enables you to access the Model 125 from a variety of remote locations, or to access many Model 125s from a single location. The Model 125 eliminates the need for more than one phone line and more than one on-site modem.

When you access the Model 125 from a remote site, you enjoy the same capabilities provided through on-site access. You can connect to Ports 1 and 2 on the Model 125, and, if it is not configured for use with an on-site maintenance terminal, to Port 3 as well. You can also access the Model 125's menu system to view an audit trail of events and "alarms" reported by the Model 125 (described later in this chapter), or to configure and test the system. You can even configure the system to allow you to perform special functions remotely, such as using one of the two relays to perform a reset of malfunctioning equipment.

The advantages of remote-access monitoring are self-evident to all involved with equipment maintenance—whether they provide services to many clients, maintain equipment in several locations on a corporate campus, or simply wish to continue site monitoring when most personnel are "off duty." With the Model 125 there is no need to spend time traveling to a site unless you know a potential problem exists.

Configurable Access and Security Parameters

Although the Model 125 provides you rapid, easy access to the devices connected to the three serial ports, it in no way trades these advantages for system security. On the contrary, the Model 125 contains a multi-functional access security system designed to give you the right amount of security for meeting your specific needs.

The Model 125 enables you to configure access security using two different modes. These are the open-operator-menu mode and the name-password mode. *Open-operator-menu* provides basic security suitable for use with

connected devices that contain good internal security, while the *name-password* mode offers advanced features designed for maximum protection. This mode is especially attractive to those using equipment with minimal security features on their serial ports.

Multiple, Unique Name-Password Combinations

The name-password mode is a user privilege system where preregistered users must enter a valid name-and-password combination to gain access to the Model 125. Alternately, you can configure the Model 125 to call back an authorized user at a predetermined telephone number before entry to the system is granted. The Model 125 can store up to 15 name-password combinations. Each user name and password can consist of up to 15 characters, with letters, numbers, and punctuation marks acceptable. For additional protection, the Model 125 discriminates between upper and lower case letters.

Logging of User Access

All attempts to access the Model 125, whether successful or unsuccessful, result in an entry being made to the System Activity Log. This information provides system administrators with a time-stamped history of Model 125 use.

Intruder Detection, Lock Out, and Reporting

The Model 125 provides numerous options and possibilities for configuring access security. The number of times a user can enter a name-password combination can be set. Should the number of password attempts be exceeded, the system goes into an access restriction mode. Three methods of access restriction can be selected from, each of which prevents access for up to 99 minutes. In addition, should someone attempt and fail to gain access to the Model 125 repeatedly (as defined by you), an alarm is generated. This alarm sends a message to the internal log and, if configured, causes a dial-out report to be sent to the destinations you define. Thus within a few minutes of someone attempting to “hack” a system, the Model 125 can send an alert message to a service or maintenance center, or even call a pager!

Monitors On-Site Equipment-Room Conditions

In addition to its functions as a secure front end and “smart router” for access to serial communications ports on connected equipment, the Model 125 monitors a variety of equipment-room and system-specific conditions. These monitoring functions can enable you to quickly spot operating trends. These may require immediate remediation or further analysis with more expensive equipment, which the Model 125 enables you to use in a more strategic and cost-effective manner.

The Model 125 provides these monitoring capabilities:

- Open-or-closed state monitoring for as many as eight contact inputs
- Temperature monitoring for room-ambient temperature and, using an optional temperature sensor, a second location
- Voltage-level monitoring for as many as two DC-power sources
- AC-line monitoring including voltage, sag, and impulse conditions
- DTR-pin status monitoring for the three serial ports
- Model 125 backup battery condition monitoring

The following paragraphs provide details about the monitoring capabilities.

Contact-Input Monitoring

The Model 125 provides eight general-purpose contact inputs which allow monitoring of the open-or-closed state of various hardware points. You can connect these contact inputs to equipment alarms or a variety of sensors.

Temperature Monitoring

Built into the Model 125 is a sensor that monitors ambient temperature in the equipment room where the Model 125 is installed. An optional external sensor kit is available from Gordon Kapes, Inc. You can use this kit to measure the temperature for a specific piece of equipment or location either within or near the equipment room.

DC-Power Monitoring

With the Model 125 you can monitor DC-voltage levels from as many as two DC-power sources. These could be a PBX battery backup system, the power source for a paging system, or the status of a logic signal.

AC-Line Monitoring

The Model 125 performs extensive monitoring of the AC-line that powers the unit. Line-to-neutral voltage is measured and displayed in real-time. High-speed circuits detect voltage sags (temporary low-voltage conditions) and high voltage impulses (spikes). These features allow power problems to be recognized, reported, and corrected.

DTR Monitoring

The Model 125 monitors the state of the DTR lead (pin 20) on each of its serial ports. This function is used to detect accidental disconnection of the three serial ports.

Internal Battery Monitoring

The Model 125 tests and reports the condition of its internal lead-acid battery once every 168 hours (one week). This helps you ensure that Model 125 battery backup operation is always ready should an AC-power failure occur.

Serial Port Monitoring and Message Capture

Using its ASCII-data-matching function, the Model 125 can monitor both Port 1 or Port 2 for specific ASCII data that may be present. This feature is valuable when the Model 125 is used with communications systems generating critical alarm and status messages from serial ports. You can configure the Model 125 to activate its own alarms when it detects specified messages emitted from the connected equipment. As configured by you, each alarm can include a name and message as well as the actual data string emitted by the connected equipment. Each alarm is sent either to the System Activity Log or to both the log and a dial-out alarm report.

Message ignore characters can be included in the specified messages so that historical records of messages stored in an internal database can be accessed without causing duplicate alarms.

Automatic Reporting of Alarms

The Model 125 reports conditions and alarms to the System Status screen, the System Activity Log, and dial-out alarm reports.

Dial-Out Reports

The Model 125 can automatically send a dial-out alarm report to up to three receiver locations. A dial-out alarm report is a list of the one or more alarms the Model 125 transmits, through the internal modem, to a database, personal computer, or printer set up as a dial-out alarm receiver. (Software is available from Gordon Kapes, Inc. to implement a personal-computer-based receiver system.) In addition to the alarm data, each dial-out report contains an opening and closing message that has been specifically configured for each receiver destination—primary, backup, and secondary. Opening and closing messages can be used for several purposes since they can contain machine-readable codes as well as human-readable text.

As an alternative to calling a modem and leaving text alarm reports, the Model 125 can be configured to call a pager. Using a pager allows the Model 125 to automatically alert field service personnel that a system problem may exist.

Real-Time Display of System Conditions

The Model 125 reports the current condition for each entity monitored on the System Status screen, which is a part of the menu system. The System Status screen displays values that are updated in real time. It also displays whether each entity is currently in a normal or alarm state. Figure 1-2 shows a screen capture of page 1 taken from a configured Model 125.

You determine the values that constitute an alarm. For example, if you determine that 95 degrees Fahrenheit is an alarm condition for room ambient temperature, the System Status screen displays the state of Temperature 1 as “alarm.” The System Status screen enables you to review current conditions at a glance, and to perform needed troubleshooting and diagnosis of the system.

```
Gordon Kapes, Inc.                Model 125           16:01:32 UTC 15-MAR-1994
Skokie, Illinois USA
                           System Status - Page 1
Status        State        Function
ENABLED       NORMAL       Contact 1 - Major Alarm - PBX System
NOT CONFIG                 Contact 2
NOT CONFIG                 Contact 3
NOT CONFIG                 Contact 4
NOT CONFIG                 Contact 5
NOT CONFIG                 Contact 6
NOT CONFIG                 Contact 7
NOT CONFIG                 Contact 8
ENABLED       NORMAL   75F Temperature 1 - Equipment Room Ambient
NOT CONFIG                 Temperature 2
SLEEP 005:40  ALARM   <+1V DC Volts 1 - Emergency Lighting 12V Power Supply
NOT CONFIG                 DC Volts 2
ENABLED       NORMAL  117V AC-Line Volts - Phase 1 of PBX Power Source
ENABLED       NORMAL       AC-Line Sag - Phase 1 of PBX Power Source
ENABLED       NORMAL       AC-Line Impulse - Phase 1 of PBX Power Source
DISABLED      ALARM        Port 1 DTR - PBX 9000
DISABLED      ALARM        Port 2 DTR - Phone Mail
NOT CONFIG                 Port 3 DTR - Maintenance
                  Press Space Bar to select then <Enter>
 Up/Down Arrow, <F1> for help, <F2> to exit, <F3> previous page, <F4> next page
```

Figure 1-2. Page 1 of the System Status Screen

Maintains Log of Site and System Activity

Alarms generated by Model 125 functions are reported to the System Activity Log. The contents of the *System Activity Log* can be displayed or downloaded to another device by accessing the Model 125's menu system. The Model 125 also reports many other events as they occur within the Model 125 itself, making the log a useful audit trail of both alarms and operating events.

Relay Functions

You can configure the Model 125 to energize two built-in relays making it possible for the system to automatically operate devices such as a cooling fan or warning light. The system can energize a relay when configured alarm conditions are encountered, when an alarm is reported for battery failure, when the Model 125 switches to battery power, or when it fails to connect with primary, backup, or secondary dial-out report destinations. You can also trigger either relay manually to perform an operation such as resetting equipment from a remote location.

Menu System

The Model 125's internal menu system enables you to configure and operate the Model 125 with ease. The menu system is organized into three major levels—operator, system, and administrator. Each level has its own main and sub menus. The three levels make it possible for you and other personnel to operate, configure, and test Model 125 functions within the rights granted by the access security system.

From the Operator-level menu you can:

- Directly access the three serial communications ports
- View the System Status screen
- View or download the System Activity Log
- Exit the Model 125

From the System-level menu you can:

- View the System Status screen
- View or download the System Activity Log
- Perform System Tests
- Configure a multitude of system operating parameters

From the Administrator-level menu you can:

- View the System Status screen
- View, download, or clear the System Activity Log
- Configure Access Security, a comprehensive system to control and monitor access to the Model 125 and the serial communication ports

VT100 and TTY Terminal-Emulation Capabilities

Although the Model 125 is intended for use with terminals or personal computers running communications software configured for VT100 emulation, it does provide limited functions when used with terminals configured for TTY.

The capabilities provided by the Model 125 in TTY mode enable you to connect to each of the three serial ports and to exit from the Model 125. Consequently, TTY mode may be adequate for field engineers or others

whose responsibilities are limited to these tasks, and for whom a VT100 terminal is not currently available.

VT100 mode, however, enables you to make full use of the menu system. You must use VT100 mode to access the System Status screen and the System Activity Log from the Operator Menu, and to access *all* of the functions available from the system and administrator levels of the menu system. As a result, you cannot configure the system, test it, or access the System Status screen or System Activity Log unless you are using a terminal set to VT100.

The limited functions provided by TTY mode are included to aid organizations where a VT100 terminal is not available for each person using the Model 125. If you can make VT100 emulation available to everyone, you should probably do so. You can then disregard all references to TTY in this guide, since the Model 125 is shipped from the factory configured for use with VT100.

Model 125 Applications

The Model 125 is appropriate for use in virtually every PBX-system site. In addition, it should find wide application in data and other specialized communication and computer settings.

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Chapter Two
Planning for the Model 125

Overview

This chapter provides information intended to help you make several necessary decisions and do some simple planning before you actually begin installing your Model 125. If you read this chapter with care and follow its suggestions, you will undoubtedly make installation a much quicker and more efficient process.

Upon receiving your Model 125, you should inspect it for damage immediately. Should damage be found, file a claim with the shipper. Save the original carton and packing materials for later inspection. If necessary, order a replacement Model 125 from Gordon Kapes, Inc.

Make sure your Model 125 includes an installation kit containing four #8 pan-head screws (¾-inch long) and a modular-to-modular telephone cable.

If the Model 125 is intact and in good shape, please place it aside until after you have read this chapter. Then read Chapter Three “Installing the Model 125,” as you actually perform the installation.

This chapter discusses the following topics:

- Selecting Mounting Location
- Planning Serial Port Use & Preparing Cables
- Testing Modem Telephone Line
- Procuring a 25-Pair Cable & Interconnecting Assembly
- Selecting Contacts to Monitor
- Planning for DC-Voltage-Monitoring Inputs
- Planning for Relay Contacts
- Planning for External Temperature-Sensor Assembly

Selecting Mounting Location

Since the Model 125 is intended for wall mounting only, you must find a suitable position on the equipment room wall. Two major factors come into play as you select the “perfect” mounting location: air flow and proximity to an AC outlet on the desired power circuit.

Ensure Proper Air Flow

To enable the Model 125 to accurately measure room temperature with its internal temperature sensor, the mounting location needs to provide a free flow of room air around and through the Model 125 cabinet. As long as air can flow into the bottom vents and exit from the slots in the left and right sides of the cabinet, the sensor will provide an accurate reading.

Take care not to mount the cabinet near the ceiling since this might cause too high a reading and prevent the desired air flow. Mounting the Model 125 near the floor, on the other hand, might result in a reading that is too low. Use this simple rule of thumb: if the selected mounting location allows you to easily observe the Model 125’s status lights then a correct temperature reading should result.

Locate Correct AC Outlet

The Model 125 measures the AC power (voltage, sags, and impulses) entering its own power cord. Since you want these measurements to accurately represent the general condition of a communication system’s AC power, select an outlet on the same electrical circuit as that equipment.

Selecting an outlet is not a trivial matter. It may be desirable for you to consult with an electrician or other power expert. Remember, accurate monitoring is possible only when the Model 125 is powered in common with the equipment that you are interested in!

Planning Serial Port Use & Preparing Cables

The Model 125 contains three serial communication ports. They are implemented as data communications equipment (DCE) under the RS-232-C standard. The three serial ports use individual 25-pin D-subminiature female connectors. You must first decide how you are going to use these ports and then obtain or prepare the proper cables.

Guidelines for Using Ports

As you decide how you intend to use the three serial ports, keep the following guidelines in mind:

The first two ports, labeled Port 1 and Port 2, are intended to be connected to serial ports on equipment such as PBX telephone systems and voice mail systems.

The third port, named Port 3, can be configured using the menu system to operate in one of several modes. In the standard mode, Port 3 functions in the same way as Ports 1 and 2. As such, it is intended to connect to the serial port of an associated piece of equipment.

When Port 3 is set to operate in the maintenance mode (which is the default mode), the port is intended for use by an on-site piece of equipment. This can be a terminal or personal computer with VT100 emulation, which you use to access Ports 1 or 2, or the Model 125's menu system. (You can also use a TTY-compatible terminal to access Ports 1 and 2, but not the full menu system.)

Preparing Serial Interconnection Cables

Proper operation of the serial ports depends on careful planning for and preparation of serial interconnecting cables. For detailed information about preparing the serial cables, refer to Appendix B. The technical specifications for the ports, along with specific cabling examples are provided in this appendix.

Once you have the required cables prepared, lay them aside for now. Chapter Three contains instructions for connecting the cables.

Testing Modem Telephone Line

A central office loop-start telephone line should be provided for use by the Model 125's modem. It is recommended that you test the telephone line. Use an industry-standard single-line telephone when conducting this test. To test the line, take the following steps:

1. First, ensure the telephone line is terminated with an RJ11 jack. Then connect the RJ11 jack to the telephone using the modular cable included in the Model 125 installation kit.
2. Take the telephone off hook and verify that you hear a "clean" dial tone. If you do not hear a dial tone, check the RJ11 wiring, and confirm the line is set for loop start. Often in a PBX setting a line will be set for ground start by default.
3. Test the line for its ability to make outgoing calls. If the line is set for touch-tone dialing, make certain you test with touch tones.
4. Test the line for incoming calls. This confirms the telephone number, and ensures that ringing voltage is coming in.

When the telephone line has passed these tests, it should be ready for use with the Model 125.

Procuring 25-Pair Cable & Interconnecting Assembly

During installation, you will make contact input, DC-voltage input, and relay-contact connections using the 25-pair plug P1 on the Model 125. This plug is standard to the telephone industry.

You must provide a 25-pair cable with female connector attached, to mate with plug P1. Refer to Appendix A for details about the connections made using P1.

You should also obtain the interconnecting assembly of your choice, such as a 66-type block, for terminating the various functions to the 25-pair cable.

Selecting Contacts to Monitor

The Model 125 has eight contact inputs that can be used for monitoring various functions. These inputs are designed to be connected to a variety of different relay contacts, switches, sensors, and other similar devices.

Exactly how you choose to use the contact inputs depends upon the needs of your organization and your own imagination.

When selecting monitoring applications, keep these guidelines in mind: Signals compatible with the Model 125's contact inputs can be either normally open (not shorted) or normally closed (shorted). A signal must be in the form of an isolated contact or a contact that closes (shorts) or opens (removes short) in reference to earth ground. An isolated contact provides two leads, neither of which is connected to ground.

The Model 125 can detect a change in contact state when the signal changes and holds the new state for a minimum of 1 second. This time period allows the Model 125's real-time operating system to correctly detect the change.

Planning for DC-Voltage-Monitoring Inputs

The Model 125 enables you to monitor two low-voltage DC signals, accurately measuring DC voltages in the range of 1 to 59Vdc. The unit measures DC voltage differentially, without regard to earth ground. In this manner DC signals that are floating (isolated from ground), positive in reference to earth ground, or negative in reference to earth ground can be correctly monitored.

As you select the DC voltages to be monitored, you must adhere to the following requirements:

- The voltage sources must be limited to 1/10 amp maximum current. This provides sufficient current for accurate monitoring while ensuring that a shorted connecting cable does not cause harm to personnel or equipment. A fuse, located at the source of the DC voltage, is the recommended means of limiting the current.
- DC voltage must not exceed 59Vdc.
- The DC voltage must not rapidly vary in value. The Model 125 measures the voltage approximately every 10 seconds. Consequently, it will not correctly monitor a voltage that quickly drifts or "jumps."

Once you have connected the monitoring inputs to the specified DC voltage sources, use the Model 125's menu system to configure the specifics of how the system will respond. Configuring DC-voltage monitoring is described in Chapter Nine. A software configuration parameter allows the value displayed on the Model 125's menu system to be displayed as either positive or negative. This aids technicians with quickly understanding the type of DC voltage that is being monitored.

Planning for Relay Contacts

The Model 125 provides two sets of general purpose relay contacts. Each set consists of a normally open (not shorted) and a normally closed (shorted) contact. The relay contacts change state in response to software configured parameters.

Exactly how you choose to use the relay contacts depends upon the needs of your organization and your own imagination.

Planning for External Temperature-Sensor Assembly

The Model 125 allows you to monitor the temperature at two locations. The first location is fixed inside the Model 125's cabinet. Here a sensor monitors the ambient temperature of the equipment room in which the Model 125 is mounted.

You determine the second location, which is external to the Model 125. Use the optional temperature sensor assembly kit available from Gordon Kapes, Inc. to monitor temperature at this location. The sensor assembly consists of a precision sensor secured inside a housing, with an attached 50-foot interconnecting cable and plug. Also included is a set of mounting hardware.

Chapter Three
Installing the Model 125

Overview

This chapter explains how to install the Model 125.

Efficient installation requires some planning. Consequently, it is strongly recommended you read and follow the guidelines presented in Chapter Two, “Planning for the Model 125,” before beginning installation as described in this chapter.

Words of Caution

As with any product, installing the Model 125 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 telephone jacks in wet locations 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.

Recommended Installation Procedure

The following steps outline the recommended installation procedure. This chapter explains each step in detail.

1. Check for damage.
2. Locate the installation kit.
3. Mount the Model 125.
4. Connect to the serial ports.
5. Install and terminate the 25-pair connecting cable.
6. Connect to the contact inputs.
7. Connect to the DC-voltage-monitoring inputs.
8. Connect to the relay contacts.
9. Install the external temperature-sensor assembly.
10. Connect the telephone line.
11. Connect to AC power.
12. Review the installation.

Check for Damage

If you have not done so, inspect the Model 125 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.

Locate the Installation Kit

Locate the installation kit included in the Model 125 shipping carton. The kit contains four #8 pan-head screws (type A, ¾-inch long) and a modular-to-modular telephone cable.

Mount the Model 125

Before mounting the Model 125, ensure you have selected the correct mounting location. (Refer to “Selecting Mounting Location,” in Chapter Two.)

Mount the Model 125 using the four screws supplied (#8 pan head, ¾-inch long). These screws are intended for use with a wooden-backboard surface (minimum thickness ¾ inch). The Model 125’s cabinet is outfitted with four keyhole screw slots. Use one screw per slot and securely fasten the unit to the backboard.

Do not connect the AC-line cord at this time. You will be instructed to do so later in this chapter.

Connect to the Serial Ports

Connect the serial port cables you have prepared to the appropriate Model 125 ports. (If you have not prepared serial port interconnecting cables, refer to “Planning Serial Port Use & Preparing Cables,” in Chapter Two.)

Use the screws on the mating plugs to ensure the cables are secured to the Model 125’s connectors.

Install & Terminate the 25-Pair Connector Cable

Install the female connector mounted on the 25-pair cable into plug P1. Secure it using the fastener strap that is attached to the plug. Terminate the 25-pair cable in the interconnection assembly you prepared for this purpose.

Connect to the Contact Inputs

Once you have selected the functions you want to monitor (relay contacts, switches, sensors, and so forth), connect them to the Model 125. (For selection guidelines, refer to “Selecting Contacts to Monitor,” in Chapter Two.)

The eight contact inputs are accessible through the 25-pair plug P1. Refer to Appendix A for a detailed description of P1. 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.

Connect to the DC-Voltage-Monitoring Inputs

The DC voltages connected to the Model 125's inputs must come from a fuse-protected source. Do not connect wires directly across a battery or battery stack. A 1/10 amp fuse must be used to protect equipment and personnel from short circuits and other wiring errors.

Once you have selected the DC-voltage sources you want to monitor, proceed with connecting them to the Model 125. (Refer to "Planning for DC-Voltage-Monitoring Inputs," in Chapter Two for more information.)

The two inputs are accessible through the 25-pair plug P1. Refer to Appendix A for a detailed description of P1. The monitor input measures voltages differentially, without regard to which lead is common, earth ground, or system ground. For correct operation, follow this simple rule: Connect the more positive lead to the "+" input connection and the more negative lead to the "–" input connection.

In certain telecommunications applications you may encounter a voltage source with its positive lead connected to earth ground and the "hot" or negative battery lead being nominally –48Vdc. In this case simply connect earth ground to the "+" terminal and –48Vdc to the "–" terminal.

If your DC voltage is floating (isolated) from ground, connect the positive lead to the "+" input and the negative lead (which may be referred to as common, ground, or minus) to the "–" terminal. If your system has a negative ground, connect ground to "–" and the positive lead to the "+" input.

Warning: Reversing the polarity of the DC inputs will cause the Model 125 to make erratic readings of all analog measurements, including the DC voltage, AC mains voltage, battery voltage, and temperature. Make sure you connect the most positive lead to the "+" terminal.

Connect to the Relay Contacts

As discussed in “Planning for Relay Contacts,” in Chapter Two, the Model 125 provides two sets of general purpose relay contacts. Each set consists of a normally open (not shorted) and a normally closed (shorted) contact. The relay contacts change state in response to software configured parameters.

The relay contacts are accessible via 25-pair plug P1. Refer to Appendix A for a detailed description of P1. Since the exact use of the contacts is site dependent, connection details cannot be reviewed in this document.

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.

Install the External Temperature-Sensor Assembly

Installation of the temperature-sensor assembly is very simple. Insert the sensor assembly’s plug into the jack on the right side of the Model 125’s cabinet. Then place the actual sensor, located at the end of the 50-foot connecting cable, at the point to be monitored. Use the fasteners included with the sensor assembly to secure the sensor in place and “dress” the interconnecting cable.

Connect the Telephone Line

A standard central office loop-start telephone line should be provided for use by the Model 125’s modem. Test the telephone line as described in Chapter Two (“Testing the Modem Telephone Line”). Then, using the cable included with the Model 125, connect the RJ11 jack to the modular jack on the Model 125.

Connect to AC Power

Now plug the Model 125’s power cord into the designated AC outlet. Leave the AC power cord free hanging. Do not secure it to the wall.

The Model 125 begins operating as soon as you plug in the power cord. (The unit does not contain a power switch.) The top LED, labeled POWER, lights. As the unit begins operation, several other LEDs may momentarily light.

Review the Installation

At this stage, you should have made all connections to the Model 125. Carefully review that all cables have been secured to the Model 125 as required.

Configuring and Using the Model 125

This document is intended to be used during the Model 125 planning and installation process. Documentation relating to configuring and using the Model 125 is covered in the Model 125 Master Reference Guide and the Model 125 Operator Guide. Please contact your system administrator for this material, or to arrange for other personnel to continue the implementation process.

Chapter Four
Troubleshooting & Solving Problems

Troubleshooting

The number-one recommendation when troubleshooting a Model 125 related problem is to use the software resources that are included in the menu system. The System Status screen gives literally dozens of “clues” to make locating problems easier. The System Activity Log, when carefully reviewed, will often explain why a specific action took place. The manual test functions make performing remote diagnostics simple.

While quite lengthy, the Master Reference Guide should serve as your repair assistant. Information is provided on all phases of the Model 125. Correcting any problem should start by reviewing the appropriate sections covering installation and configuration. Check with your system administrator to find out if a Master Reference Guide is available.

Gordon Kapes, Inc. Technical Support

You are encouraged to contact Gordon Kapes, Inc. technical support personnel for assistance. We enjoy speaking with people who are out in the field. Let our experience be of service to you. If you are having problems, a call to us after an initial review of the situation can save you a considerable amount of time.

Contact Inputs

Should problems occur with the contact-monitoring functions, the first item to check is the physical wiring. Ensure that connections to plug P1 have been made according to the site requirements. Confirm that the configuration parameters for each contact input have been set correctly. Use the System Status screen to view the state of each contact in real-time. Changing the physical state of each contact-input source should be reflected in the status field for each contact on the System Status screen.

DC-Voltage Monitoring

Most problems related to DC-voltage monitoring are caused by incorrect connection of the DC source to plug P1. The DC-voltage monitoring circuitry measures voltage differentially, without regard to earth ground, power source ground, and so forth. The most positive lead of the power source must be connected to the + input, the most negative to the – input. Should a voltage source be connected in reverse, the System Status screen always displays <1 (or <–1).

Warning: Reversing the polarity of the DC inputs will cause the Model 125 to make erratic readings of all analog measurements, including the DC voltage, AC mains voltage, battery voltage, and temperature. Make sure you connect the most positive lead to the “+” terminal.

Repair and Replacement

Most equipment returned to Gordon Kapes, Inc. for repair actually has nothing wrong with it. A telephone call to Gordon Kapes, Inc. technical support can often help to get the equipment operating correctly. We don’t mind spending time with our customers getting a site up and running.

If you determine that the Model 125 is defective, return for repair or replacement according to the Gordon Kapes, Inc. Warranty/Repair and Return policy.

In the event repairs are ever needed on your Model 125, they should only be performed by Gordon Kapes, Inc. or an authorized representative. For further information, contact Gordon Kapes, Inc.

Appendix A
Plug P1 Connection Chart

Pin Number	Wire Color	Description	
26	WHT-BLU	+	Contact Input 1
1	BLU-WHT	GND	
27	WHT-ORN	+	Contact Input 2
2	ORN-WHT	GND	
28	WHT-GRN	+	Contact Input 3
3	GRN-WHT	GND	
29	WHT-BRN	+	Contact Input 4
4	BRN-WHT	GND	
30	WHT-SLT	+	Contact Input 5
5	SLT-WHT	GND	
31	RED-BLU	+	Contact Input 6
6	BLU-RED	GND	
32	RED-ORN	+	Contact Input 7
7	ORN-RED	GND	
33	RED-GRN	+	Contact Input 8
8	GRN-RED	GND	
34	RED-BRN		
9	BRN-RED		
35	RED-SLT		
10	SLT-RED		
36	BLK-BLU	+	DC-Voltage
11	BLU-BLK	–	Monitor Input 1
37	BLK-ORN	+	DC-Voltage
12	ORN-BLK	–	Monitor Input 2
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	NO1	Relay 1
22	ORN-VIO	NO1	
48	VIO-GRN	NC1	
23	GRN-VIO	NC1	
49	VIO-BRN	NO2	Relay 2
24	BRN-VIO	NO2	
50	VIO-SLT	NC2	
25	SLT-VIO	NC2	

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

Note 2: DC voltage is measured differentially. Connect most positive lead to + input, most negative lead to – input. Example: –48Vdc power supply with positive ground would connect its –48Vdc lead to Model 125 – input, earth ground to Model 125 + input.

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Appendix B
Serial Port Connections

This appendix is provided as a reference when you are preparing interconnecting cables for use between Model 125 serial ports and serial ports on connected devices. The Model 125 contains three serial communications ports, aptly named Port 1, Port 2, and Port 3. Table B-1 provides detailed connection information for the three ports. Subsequent paragraphs describe how the ports function. At the end of this section examples are provided detailing actual cable implementations.

Table B-1. Serial Port Connection Chart

Pin	Direction	Description
2	To Model 125	Transmitted Data (TD)
3	From Model 125	Received Data (RD)
5	From Model 125	Clear to Send (CTS)
6	From Model 125	Data Set Ready (DSR)
7	To/From Model 125	Signal Ground (SG)
8	From Model 125	Received Line Signal Detect (RLSD)
20	To Model 125	Data Terminal Ready (DTR)

Notes:

1. All ports use individual 25-pin D-Subminiature female connectors.
2. All ports 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, is held high (+8Vdc) and does not change state.
5. Pin 6, DSR, is used to send connection-status information to the connected equipment. It is software configured to provide one of three conditions: continually held high, high when port is active, or momentarily low after port disconnection takes place.
6. Pin 8, RLSD, is held high (+8Vdc) and does not change state.
7. Pin 20, DTR, is used by Model 125 to detect presence of connected equipment.

Understanding the Serial Ports

Correct Model 125 serial port operation depends on the careful preparation of cables linking the Model 125 serial ports to the related equipment. Before preparing cables, it is important to understand how the Model 125's ports are implemented. Each serial port consists of four parts: data transmission to and from the connected equipment, signaling from the Model 125 to the related equipment, signaling from the related equipment to the Model 125, and general purpose pull-up signals.

Data transmission takes place using two pins: one pin for data sent by the Model 125, and one pin for data received by the Model 125. In some applications, these pins, along with signal ground, may be the only connections required to fully interface the Model 125 with another device.

The Data-Set-Ready (DSR) pin can be used to signal the Model 125's serial port connection status to related equipment. DSR can be software configured to go to the high state when the port is active, to momentarily go low when port disconnection takes place, or to remain high at all times. The DSR pin should be used if the related equipment needs a positive indication that a communications path is desired. It may also be important to implement this pin to force a positive disconnect from the related port. On some communications systems, a low state indicates that disconnect has taken place, forcing a log-off command. This can be desirable as it ensures that the next user will be required to enter a password to gain access to the related equipment.

The Data Terminal Equipment (DTR) pin is used by the Model 125 to detect whether a device is connected to the port or not. A high state sent by the related device to the Model 125 indicates that a valid connection is present. Using DTR, along with configuring the DTR-monitoring function (using the menu system), allows an entry in the System Activity Log and an alarm dial-out to take place if the connection is disrupted.

The Model 125 holds the Clear to Send (CTS) and Received Line Signal Detect (RSLD) pins in the high state. These are provided for general purpose use, allowing one or more pins on the related equipment to be pulled to the high state.

Hardware Handshaking

The Model 125's serial ports do not implement hardware data-flow control. The superior XON/XOFF software data-flow control is implemented on all three serial ports and the modem. The DSR and DTR pins do provide some specialized signaling to and from the Model 125, but not true flow control.

Preparing the Serial Cables

Preparing serial cables requires a clear understanding of three topics: Model 125 serial ports, the serial ports on the related equipment, and the goals of the installation. The previous paragraphs provided an overview of how the Model 125's serial ports are implemented.

Determine what hardware connections the serial ports on the related equipment need to function correctly. Some pins may need to be pulled to the high state to allow data flow. One or more pins may need to be controlled by the Model 125's DSR pin. Connecting DSR to the related equipment could be required to ensure a clean log off, assisting with access security.

Finally, you must decide if DTR monitoring is required. In most cases it would be desirable, as DTR-Monitoring can alert personnel when a serial port is accidentally disconnected.

Nuts and Bolts

Shielded cable and connector housings should be used to minimize interference to and from the Model 125. Be certain to use connectors that contain locking screws. These allow the connectors to be secured to the threaded fasteners contained on the Model 125's serial port connectors.

Sample Cable Implementations

The following pages detail cable implementations for a number of common devices. These are provided for reference only and may not have been thoroughly tested. Please contact us with details of your successful cable designs. We'll include them in future issues of this guide and send you a Gordon Kapes, Inc. coffee mug to boot!

ROLM CBX 8000 Teleprinter Port

Interconnection between Model 125 Serial Port and ROLM CBX 8000 Teleprinter Port.

Model 125 Serial Port		ROLM CBX 8000 Teleprinter Port
3 (TD)	→	2
2 (RD)	←	3
6 (DSR)	→	20
7 (SG)	↔	7
20 (DTR)	←	5

Notes:

1. Required connectors:
   Model 125 end: 25-pin D-Subminiature male.
   ROLM CBX end: 25-pin D-Subminiature male.
2. Use shielded cable and connector housings.
3. Model 125 port-configuration parameters: 7-EVEN-1, XON/XOFF.

ROLM PhoneMail Maintenance Port

Interconnection between Model 125 Serial Port and ROLM PhoneMail Maintenance Port.

Model 125 Serial Port		ROLM PhoneMail Maintenance Port
3 (TD)	→	2
2 (RD)	←	3
6 (DSR)	→	20
7 (SG)	↔	7
20 (DTR)	←	5

Notes:

1. Required connectors:
   Model 125 end: 25-pin D-Subminiature male
   ROLM PhoneMail end: 25-pin D-Subminiature male.
2. Use shielded cable and connector housings.
3. Model 125 port-configuration parameters: 8-NONE-1, XON/XOFF.

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Appendix C
FCC Requirements

FCC Requirements

Your Model 125 is designed to be used on standard-device telephone lines. The Model 125 connects to the telephone line by means of a standard jack called the USOC RJ-11C. Connection to telephone company-provided coin service (central office implemented systems) is prohibited. Connection to party line service is subject to state tariffs. We are certain you'll want to connect the Model 125 to a party line, but check it out with your state first. Party, party, party!

The goal of the telephone company is to provide you with the best service it can, within the constraints of receiving a good return on shareholder equity. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations, or procedures. If these changes might affect your service or the operation of your equipment, the telephone company will give you notice, in writing, possibly in advance, to allow you to make any changes necessary to maintain uninterrupted service.

If you have any questions about your telephone line, such as how many pieces of equipment you can connect to it, the telephone company will provide this information upon request.

In certain circumstances, it may be necessary for the telephone company to request information from you concerning the equipment which you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the ringer equivalence number (REN) of the equipment which is connected to your line; both of these items are listed on the equipment label. The sum of all of the RENs on your telephone line should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be usable on a given line.

If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given an opportunity to correct the problem and be informed of your right to file a complaint with the FCC. You have the right to remain silent, if you waive your right to remain silent...