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INSTALLATION INSTRUCTIONS FOR THE HORIZON SYSTEM

CHAMBERLAIN
Sentexsystems™

IMPORTANT NOTICE

The Horizon system provides extremely powerful and user-friendly access control. However, damage could occur if it is installed incorrectly. In particular, ***it is critical that the Horizon system is grounded properly***. Each system contains static sensitive components that can be destroyed if the system is subjected to static discharge and is not grounded thoroughly. Incorrect installation also invalidates the system's warranty. Therefore, we ask that you take the time to read these instructions carefully before attempting to install this system.

This document covers the specific actions needed to install a Horizon system. For an overview of what the Horizon system can do and how it operates, see section 1 in the programming and use manual.

TABLE OF CONTENTS

This document is divided into six (6) sections as follows:

SECTION NAME	PAGE
1. Basic installation hints and rules	2
2. Arranging for phone line installation	4
3. Mounting the cabinet	4
4. Making basic connections	5
5. Installing additional features	7
6. Testing and adjusting units	9

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1 - BASIC INSTALLATION HINTS AND RULES

PLEASE READ THIS SECTION VERY CAREFULLY BEFORE BEGINNING YOUR INSTALLATION

In the sections that follow, detailed procedures are discussed for each step required to install a Horizon system. In addition to these specific procedures, there are a number of general hints and rules which will help ensure that your installation is done correctly and efficiently. These are discussed below:

1. ***GROUND THE SYSTEM AND YOURSELF THOROUGHLY.*** The Horizon system contains a number of static sensitive components which can be damaged or destroyed by static discharge during installation or during regular use. This type of damage is not covered under Sentex's warranty. A proper earth ground will significantly reduce the chances of damage or improper operation. The shields in the cables specified for all remote keypads or card readers should also be connected to the earth ground at this same point.

   To be effective, the ground connections should be made by running 12 awg copper wire to a good ground point within 12 feet of the system. This ground point must be at an electrical panel, at a metallic cold-water pipe that runs into the earth, or at a grounding rod at least 10 feet in length that is driven into the earth. Even if you have a good earth ground, you should try to discharge any static before handling the circuit boards.

   WARNING: Do not connect the two large heat sinks on the main circuit board together as doing so can damage the power supply.

2. ***PROVIDE POWER FROM A DEDICATED SOURCE:*** If you are powering the system from an AC source, be sure that it is solely dedicated to the Horizon. Specifically, the outlet into which you will plug the transformer provided should be wired back to its own circuit breaker. This will prevent two problems: **A)** other equipment cannot introduce spikes, noise, surges, or dips into the power circuit that will affect the Horizon, and **B)** the Horizon's operation will not be affected if any other equipment develops a short circuit across the power line.

3. ***DO NOT OVERLOAD THE TERMINAL BLOCKS.*** The terminal blocks used in the Horizon system makes field wiring simple, but they do have their limits. The terminal blocks may be unplugged, but the mounting pins are soldered into the boards. To connect your wires, remove the "head" from the correct terminal and open the screws. Insert the wire into the correct opening in the front and tighten the screw until the wire is held snugly. A slight tug on the wire will tell you whether you have a secure connection. When you have made all of the connections for a given "head", plug it back onto the pins designated for that terminal block. The only constraint you must observe is that the wire must be within a certain range as shown below:

   A. <u>Stranded wire</u> must be between 16 and 24 awg. This is a total thickness measurement, so if you are putting two wires in, the combined thickness must fall within this range. Thus, you can use 2-26 awg wires at the small end of the range and 2-18 awg wires at the large end of the range. **If you tin the ends of your wire, remember that this will increase the effective size of the wire.**

   B. <u>Solid wire</u> must be between 18 and 24 awg. This is a total thickness measurement, so if you are connecting two wires, the combined thickness must fall within this range.

4. ***READ THE MARKINGS CAREFULLY.*** The connection points are marked on the boards clearly. Before making any connection, make sure you read the marking and understand what the connection point is meant for.

5. ***MOUNT THE UNIT AT THE CORRECT HEIGHT.*** Before mounting the Horizon system, you should determine whether the mounting height is specified by local, state, or other national regulations (such as the Americans with Disabilities Act). If no such regulation governs your installation, the following guidelines should be used in determining the mounting height. The system should be mounted so that the center of the display is about 5 feet 4 inches off the ground in a walk-up application and about 4 feet off the ground in a drive-up application.

6. ***TRAIN YOUR CUSTOMERS THOROUGHLY.*** The Horizon system is very simple to program and use once a short learning period has been completed. However, untrained programmers can cause serious problems for you and themselves. Thus, you should read the accompanying programming and use instructions manual carefully and **SPEND THE TIME NOW** to train them on proper use of the system. It will save you and them lots of inconvenience and aggravation later.

7. ***CLEAN THE DISPLAY AND WINDOW:*** The front of the LCD display, as well as the lexan window which protects the display, may have been coated with a formula that virtually eliminates glare (this is an option). However, if this coating gets too much dirt on it, the dirt will seriously reduce its effectiveness, making the display hard to read in some situations. Make sure your customer understands this possibility and will be attentive to this routine maintenance. It is important that the display and lexan window be cleaned only with a soft rag and a solution of water and mild soap. DO NOT USE HARSH OR ABRASIVE CLEANERS.

2 - ARRANGING FOR PHONE LINE INSTALLATION

You should have your customer arrange with the telephone company for a telephone line to be installed as close as possible to the location at which the Horizon system will be mounted. This line can be ordered with either tone or rotary dialing capability. Rotary lines are generally cheaper, but tone lines allow faster dialing. The Horizon system is set at the factory to dial using DTMF tones, but this can be changed during installation (as described in section 6).

When the telephone line is ordered, the telephone company will require the following information:

FCC REGISTRATION NUMBER:	DS8USA-75053-OT-E
RINGER EQUIVALENCE NUMBER (REN):	0.1B
TYPE OF CONNECTOR REQUIRED:	USOC RJ11C

3 - MOUNTING THE CABINET

You should mount the cabinet using the procedures described below. This will not only make the mounting as efficient as possible, but will also ensure that the Horizon system is protected as fully as possible:

1. In mounting the cabinet, minimize your disassembling of the system and especially the amount that you handle the circuit boards. Ground yourself whenever you are handling the circuit boards. If no ground can be found, attempt to discharge any static build-up before handling the boards.

2. Carefully remove the plugs from the knockouts on the rear of the cabinet. **You must remove the circuit board from the cabinet before knocking out the plug.** Before you remove the circuit boards, you will need to disconnect the keypad from the circuit boards. To disconnect the keypad, simply press the blue levers on each side of the keypad connector and carefully lift the keypad connector from the sockets.

3. Put the top two screw/bolts into the wall, but leave them slightly loose. Hang the cabinet on them by inserting them into the larger part of the top two openings and then slowly lowering the cabinet. Then put the bottom two screws/bolts into the wall through the bottom two openings. Tighten down all four screws/bolts.

4. Pull all of your wires into the cabinet and remount the circuit board.

5. Ground the enclosure in accordance with local codes. As shown in Exhibit 1, the lower left stanchion holding the main circuit board is also the grounding point. ***IMPORTANT NOTE:*** Static discharge can damage electronic components. Proper grounding of the system reduces this risk substantially.

   To be effective, the ground connection must be made by running 12 awg copper wire to a good ground point (e.g., an electrical panel, a metallic cold water pipe that runs into the earth, or a grounding rod at least 10 feet in length that is driven into the earth) within 12 feet of the system. Even if you have a good earth ground, you should still try to discharge any static electricity before handling the circuit boards.

4 - MAKING BASIC CONNECTIONS

Before hooking up a Horizon system, please review Exhibit 1 at the end of this document. This diagram shows all of the connections and indicators that are contained on the main processor board. There are four steps in connecting the basic Horizon system as shown below:

1. Connect a two conductor, 18 to 24 awg cable to the terminal block "head" in area TB6 on the main processor board (see Exhibit 1). Connect the other end of this cable to the "tip" and "ring" terminals on the telephone company jack (it does not matter which conductor hooks to which terminal).

2. Connect the wires from your door strike(s) and door strike power supply (or whatever other device you are controlling) to TB3 for relay/door 1 and TB4 for relay/door 2 on the main processor board (see Exhibit 1). Which terminals you use will depend on what type of device you are controlling, as described below:

   A. **For normally locked strikes:** Connect one conductor from your strike power supply to the "N.O." terminal and one conductor from the door strike to the "COMMON" terminal of the same terminal block. Then, connect the remaining conductors from each source by tying them together off the board (for example, by using a wire nut).

   B. **For magnetic locks or normally unlocked strikes:** Connect one conductor from your strike power supply to the "N.C." terminal and one conductor from the door strike to the "COMMON" terminal of the same block. Then, connect the remaining conductors from each source off the board (e.g., by using a wire nut).

   WARNING: In order to prevent voltage spikes generated by magnetic locks or DC powered strikes from being induced into the system, it is strongly recommended that a IN4001 diode is installed across the magnetic lock coil, so that the cathode of the diode (the end with the band) is connected to the positive connections of the coil, and the anode is connected to the negative end of the coil.

   C. **For dry contact closure (most gate operators):** Connect one conductor to the "N.O." terminal and the other to the "COMMON" terminal.

3. You can power the system using AC or DC power. If you are using **AC power**, connect a two conductor stranded wire cable to TB5 on the main processor board (see Exhibit 1) and the other end to the transformer provided with the system. Then, plug the transformer into a 120 VAC outlet. CAUTION: An excessive run of wire between the system and the transformer or power supply can result in inadequate voltage being delivered to the system due to line loss. Please refer to the table below for wire sizes and distances. PLEASE REFER TO POINT 2 ON PAGE 2 OF THIS DOCUMENT FOR REQUIREMENTS ON THE USE OF A DEDICATED POWER CIRCUIT.

   IMPORTANT NOTE: Do not install MOVs or any other high capacitance transient suppressors to the power lines of the Horizon system. For transient suppression on the power lines, you may install low capacitance transient suppressors.

If you are using 13.5V **DC power**, connect a two conductor stranded wire cable to TB5 on the main processor board (see Exhibit 1) and the other end to your power supply. It does not matter which wire is attached to which terminal on the power supply. Please refer to the table below for wire sizes and distances. Then, plug the power supply into a 120 VAC outlet.

DC POWER WIRE SIZE	DISTANCE	AC POWER WIRE SIZE
18 AWG	30' and under	14 AWG
14 AWG	30'-75'	12 AWG
14 AWG	75'-150'	10 AWG
12 AWG	150'-250'	-----
10 AWG	250'-500'	-----

Table 1 - Power Wire Distance

4. Once you have connected the power, there is a "power monitor" on the right-hand side of the main processor board. The power monitor consists of a monitor clear button and three LEDs. The monitor clear button is located in the upper right-hand corner of the board and there are two red LEDs in areas DS1 and DS3 (marked "hi" and "lo") and one green LED in area DS2 (marked "in"). When you apply power to the board, the "in", “hi”, and "lo" LEDs may all be lit. To ensure that you are providing proper voltage to the system, press the monitor clear button. If only the "in" LED is lit after pressing this button, the voltage being provided to the board is acceptable. If either the "hi" or "lo" LEDs are lit, the amount of voltage being provided to the board is either excessive or inadequate and the power connections, wiring, and transformer need to be checked. If the input power rises or falls below the acceptable range, the "hi" or "lo" LEDs will light and stay lit until the monitor clear button is pressed. This feature allows continuous monitoring of the power condition and captures any power transients. To clear this indication, press the monitor clear button.

5 - INSTALLING ADDITIONAL FEATURES

The Horizon system has several capabilities which may be hooked up at the time of installation. The first two features discussed in this section are standard on every system. You and your customer just need to decide whether to use them. The third feature is an option which needs to be purchased separately. The installation procedures for all of these additional features are described below:

PLEASE NOTE: *It is critical to proper operation of the system that you use the types of cables and the grounding procedures specified. If these specifications are not followed, outside sources of electrical interference (such as nearby power and control cables or even nearby radio station broadcast towers) may cause erratic processor resetting/lock-up.*

IMPORTANT NOTE: The status lines of this system (area TB1), which includes the "DOOR", "COMMON", and "AUX" terminals, can not be grounded or have power connected to them or improper operation and/or severe damage may occur.

WARNING: Before hooking up any of these features, disconnect power from the unit.

1. **POSTAL LOCK:** The post office will require that their own lock be installed when the mail boxes are inside of the controlled area. A kit for hooking up the postal lock is provided with each system. Specific directions for connecting these parts to the 2-pin connector (located in area J4) to activate relay 1 are included in this kit. Your customer will have to arrange with the postal carrier to have a postal lock installed before you can hook up the postal lock kit. Once this kit is installed, when the postal carrier turns his/her key in the lock, the system will activate the appropriate relay for the period of time that the customer programs into the system.

2. **AUXILIARY OPENING/REQUEST ACCESS DEVICES:** Any device (e.g., Knox box or exit button) that provides a contact closure can be hooked up to "Door" and "Common" on TB1 to activate relay 1 or to "AUX" and "Common" on TB1 to activate relay 2. Use shielded cable and connect the shield to the chassis ground at the ground screw shown in Exhibit 1. When a contact closure occurs, the system will activate the respective relay for the period of time that the customer programs into the system. ***PLEASE NOTE:*** If you have an exit request button connected to "AUX", relay 2 will need to be configured as a *Control* relay (please refer to the manual titled "Instruction Manual for the Programming and Use of the Horizon System" for these instructions). If relay 2 is configured as anything other than a "*Control"* relay, the "AUX" connection will act as a door position sense connection for relay 1.

   IMPORTANT NOTE: Do not install MOVs or any other high capacitance transient suppressors to the status lines (area TB1) of the Horizon system. For transient suppression on the status lines, you may install low capacitance transient suppressors.

3. **DOOR POSITION SENSE DEVICES:** The Horizon system has the ability to monitor the position of the door/gate (which is attached to relay 1) and take the appropriate action if the door/gate is pried open or is held open for more than a minute after the relay has been deactivated. The system can be told to close a relay and activate any device you have hooked to it. If the door shuts before the relay times out, the system will deactivate the relay to stop "tailgating". To activate this feature, install a switch in the door frame so that the switch is depressed when the door is closed. Connect a shielded cable to "AUX" and "Common" on TB1. Connect the shield to the chassis at the ground screw shown in Exhibit 1.

   IMPORTANT NOTE: Do not install MOVs or any other high capacitance transient suppressors to the status lines (area TB1) of the Horizon system. For transient suppression on the status lines, you may install low capacitance transient suppressors.

PLEASE NOTE: If you have a door position sense device connected to "AUX", you will need to configure relay 2 as either *Shunt, Alarm,* or *CCTV*, depending upon how you wish to use relay 2 (please refer to the manual titled "Instruction Manual for the Programming and Use of the Horizon System" for this information). If relay 2 is configured as a "*Control*" relay, the "AUX" connection will act as an auxiliary opening connection for relay 2.

4. **BUILT-IN MODEM/MULTIPLE ENTRY:** This feature is standard and does not require special installation. However, if your customer wishes to program the systems via terminal/modem, you cannot have multiple systems tied to the same telephone line since they will create a communication problem for the sending modem.

6 - TESTING AND ADJUSTING THE UNIT

After completing all of the appropriate connections discussed above, the next step is to put the system through a full function test. The exact sequence of this test will depend on which options your system contains.

To accomplish these tasks, you will need to read the accompanying document titled "INSTRUCTIONS FOR PROGRAMMING AND USE OF THE HORIZON SYSTEM."

After this step has been completed, you should program the unit with some test codes and telephone numbers as appropriate. Then use these entries to ensure that all relays are working correctly and that all of the features are working correctly. The tests of whether the various functions are working correctly are described below:

1. **ELECTRONIC DIRECTORY/LCD DISPLAY**: The main thing to look at is the contrast and the viewing angle. You should adjust these, if necessary, using the "CONTRAST ADJUSTMENT" pot on the main processor board (see Exhibit 1). The best contrast should be set for someone about 5 feet 6 inches tall standing about 2 feet away from the Horizon (in drive-up applications, assume the same person is sitting in a midsized car). Then, make sure that the viewing angle is set so that good visibility is available to persons 8 to 10 inches shorter or taller than this.

2. **TELEPHONE ENTRY:** When the Horizon dials, the "OFF HOOK" indicator LED (marked "OH") on the main processor board should come on (see Exhibit 1). And, of course, the person dialed should receive the call. Once the call is answered, the voice communications should be distinct and easily heard. If the called party dials a "9" or a "6" on either a rotary or a tone dial telephone, the main relay should activate for the programmed amount of time. If the called party dials a "5" or a "1" on a tone dial telephone, the second relay should activate for the programmed amount of time, if the second relay is set as a control relay. The second relay cannot be activated from a rotary dial telephone.

   CONDITIONS THAT NECESSITATE ADJUSTMENTS ON SITE:

   All adjustments made to the Horizon system needs to be completed in the following order:

   A. <u>SETTING SIDETONE BALANCE</u>: An accurate setting of the sidetone balance is needed to ensure proper operation of the Horizon system. To set the sidetone balance, enter the programming mode. At the main programming prompt ("IN PROGRAMMING - AREA NUMBER _ _"), enter programming step 69. The Horizon system will then emit a tone from the speaker. While the tone is being emitted, adjust the "FEEDBACK" pot on the main processor board (see Exhibit 1) until the tone is at its minimum level. Once the tone is at its minimum level, press any key on your programming source to discontinue the tone and to return to the main programming prompt.

   B. <u>INSUFFICIENT VOLUME</u>: You may modify the volume at the system by adjusting the "SPEAKER VOLUME" pot for hands-free and handset models. This pot is located on the main processor board (see Exhibit 1). If the tenant's voice is too quiet, turn the "SPEAKER VOLUME" pot clockwise. Normally this pot should not be turned past a "1 O'clock" setting or feedback may occur.

C. MODEM AND FEEDBACK PROBLEMS: If you are experiencing problems with your modem or problems with feedback coming out of the speaker or the handset, you will need to adjust the "SPEAKER VOLUME" pot (see Exhibit 1). Turn the "SPEAKER VOLUME" pot counter-clockwise until the feedback is no longer audible. Close and lock the cabinet door to make sure there is no feedback coming from the speaker or the handset. If you are still able to hear feedback after you close and lock the cabinet door, turn the "SPEAKER VOLUME" pot counter-clockwise in small increments and the close the cabinet door after each adjustment. Repeat this step until feedback is no longer audible when the cabinet door is closed and locked.

D. CLICK LEVEL: To adjust the click level, the following steps need to be taken:

1) Set the "CLICK LEVEL" pot on the main processor board (see Exhibit 1) in the center of its range.

2) Place a call to a tenant with a rotary-dial telephone and ask them to dial a "9". The "CLICK" LED (see Exhibit 1) should flash in sequence with the clicks heard over the speaker or handset and it should activate the door opening mechanism.

If the relay does not click and the "CLICK" LED doesn't flash regularly, turn the "CLICK LEVEL" pot clockwise until both responses are received.

If the relay clicks and the "CLICK" LED stays on or doesn't flash regularly, turn the "CLICK LEVEL" pot counter-clockwise until the desired response occurs.

3. **CODE ENTRY:** Test the code entry feature with a valid code. The main relay should be activated when the code is entered. If the code was denied access, verify that the code was programmed properly into the system by using programming step 13.

4. **POSTAL LOCK AND REQUEST FOR ACCESS:** Test these features by shorting across the appropriate terminal block pins to make sure the relay activates and deactivates properly. Once your wiring is in place, test the functions again.

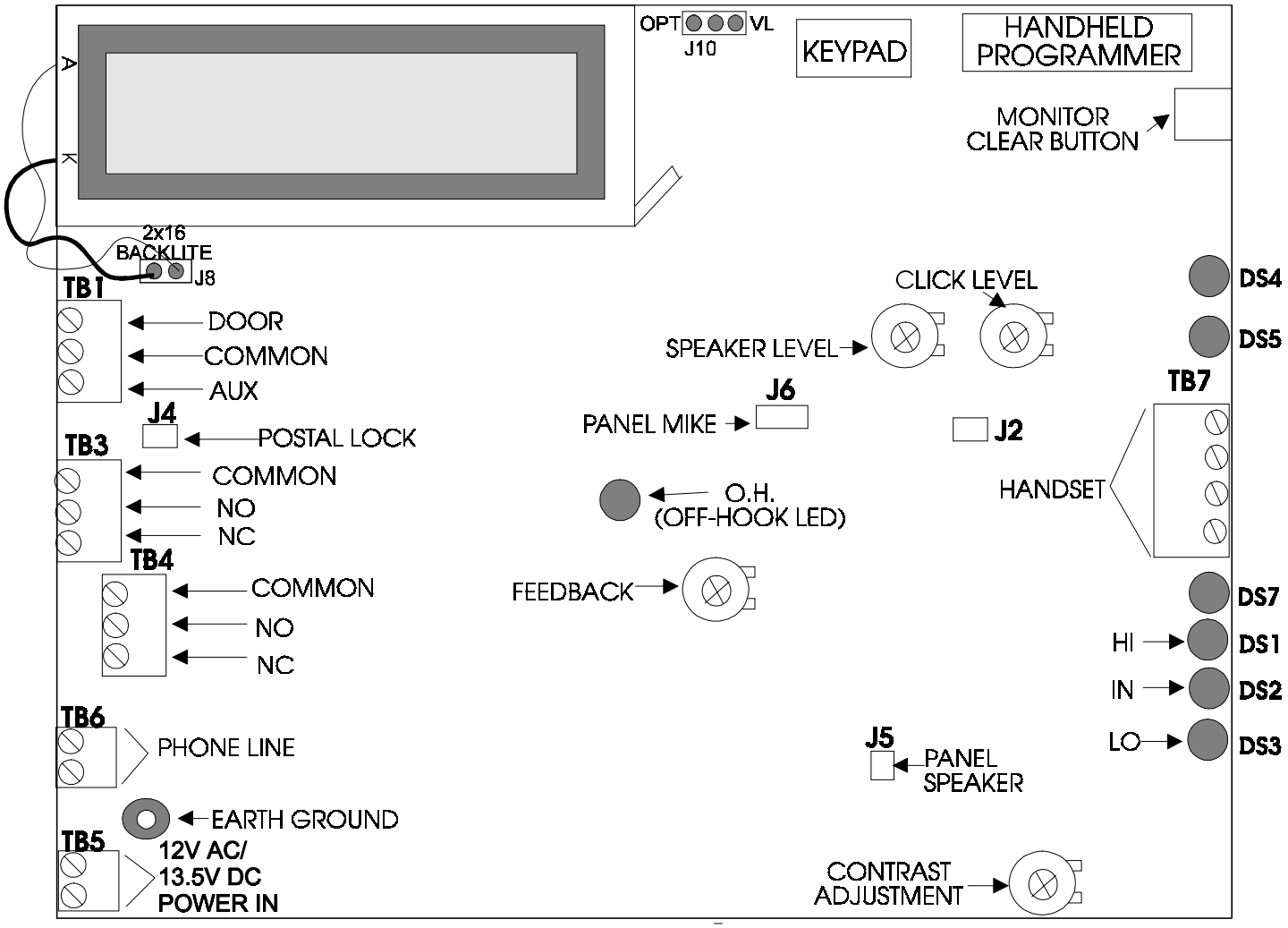
5. **BUILT-IN MODEM:** You can test this modem by calling the system using a Hayes-compatible modem hooked to a terminal (or a personal computer using terminal emulation software). If transmission is taking place correctly, you will be able to access the programming mode as described in the programming instructions. If communication is not established, check the baud rate of the other modem. It must be set to 300 baud to communicate with the Horizon system's built-in 300 baud modem.

6. **MULTIPLE ENTRY:** Test this function by disconnecting the telephone line from the system you are testing and attempting to dial a number. If the system gives you a "LINE IN USE-PLEASE WAIT" message, this feature is working correctly. Reconnecting the telephone line will cause the system to beep and show the message "LINE IS AVAILABLE NOW-PRESS # TO TRY TO CALL AGAIN". You may do so, or press the "S" button until you return to the welcoming message.

7. **METHOD OF DIALING:** As mentioned earlier, the system is set at the factory to dial using DTMF tones. If you wish to change to rotary (also called pulse) dialing, on the front panel keypad, enter the programming mode and press "55" followed by the "#" button. When the new programming prompt appears on the screen, the change has been made. To change the method back to DTMF tones, use the same procedure except use programming step "60" instead of step "55". If you are programming the system with the use of a terminal/modem or a handheld programmer, please refer to the manual titled "PROGRAMMING AND USE INSTRUCTIONS FOR THE HORIZON SYSTEM" for instructions on programming with these devices.

MAIN PROCESSOR BOARD

GUIDE TO CONNECTIONS, ADJUSTMENTS, AND INDICATORS



FCC REQUIREMENTS

INSTALLATION

When you are ready to install the system, call your telephone company and give them the following information:

1. The telephone number of the line to which you will connect the system.
2. The FCC registration number for the system, which is **DS8USA-75053-OT-E**.
3. The ringer equivalence number (REN) which is **0.1B**.

This system connects to the telephone line by means of a standard jack call the USOC RJ11C. If this type of jack is not available where you want to install the system, you will need to order it from the telephone company.

TYPE OF SERVICE

Your Sentex Horizon system is designed to be used on standard-device telephone lines. They should not be used on coin service or party lines. 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.

TELEPHONE COMPANY PROCEDURES

The goal of the telephone company is to provide you with the best service it can. 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 operation of your equipment, the telephone company will give you notice, in writing, to allow you to make any changes necessary to maintain uninterrupted service.

IF PROBLEMS ARISE

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 discontinuation. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

DISCONNECTION

If you should ever decide to permanently disconnect your Horizon system from its present line, please call the telephone company and let them know of this change.

RADIO FREQUENCY

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the FCC helpful: "How to Identify and Resolve Radio-Television Interface Problems". This booklet is available from the United States Government Printing Office. Washington, D.C., 20402. Stock No. 004-000-00345-4.

DOC REQUIREMENTS

NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, user's should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. The load number for the Horizon system is 2.