ELCOTEL

TELECOMMUNICATIONS

Series-5
Operation Manual
Installation, Operation, Maintenance

Series-5 Operation Manual
Installation, Operation, Maintenance

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Elcotel, Incorporated

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— NOTICE —

Elcotel, Inc. reserves the right to make any changes
and improvements in the product described in this
document at any time and without prior notice.

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All other product names are trademarks of their respective owners.

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STATEMENT OF FCC COMPLIANCE

This equipment has been tested and found to comply with the limits for Class A 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 commercial 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment complies with PART 68 of the FCC RULES AND REGULATIONS. The label affixed to this equipment contains, among other information, the FCC REGISTRATION NUMBER and RINGER EQUIVALENCE NUMBER (REN) for this equipment. The REN is useful to determine the quantity of devices you may connect to your telephone line and still have all those devices ring when the telephone number is called. In most areas, the sum of the REN's of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should contact your local telephone company to determine the maximum REN for your calling area.

The following jacks must be ordered from the telco in order to connect this equipment with the public communication network: RJ11

An FCC compliant modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network premises wiring using a compatible modular jack which is Part 68 compliant. "See installation instructions for details."

This product is hearing aid compatible to SECTION 68.316, FCC RULES AND REGULATIONS.

ABOUT THIS PRODUCT

In order to ensure compliance with state tariff requirements, the telephone company must be notified prior to connecting this equipment to the telephone line. In some states, prior approval of the State Public Utility or Public Service Commission may be required.

Your telephone company may make changes in facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. If it does, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, it will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

ABOUT SERVICE

Because of the complexity of this payphone product, normal field maintenance and troubleshooting procedures may not provide solutions to field problems. Units in need of service must be returned to ELCOTEL, INC. The chassis battery should be disconnected, and a RETURN AUTHORIZATION NUMBER must be obtained before sending. Contact TECHNICAL SUPPORT for more information: 941-758-0389 or 800-352-6835.

An effective electrical ground is essential!

You must always ground the phone case or there will be the potential for an electric shock hazard!

NOTICE

Changes or modifications to the Line-Powered Payphone not expressly approved by Elcotel Inc. can void the owner-operator's authority to operate the equipment. Always install and maintain this equipment to manufacturers specifications. Failure to do so will automatically void the warranties.

This manual is designed to assist the customer with the installation, operation, and programming of the Line-Powered Payphone. Every effort has been made to make the materials easy to follow and appropriate to the task. Elcotel Technical Support can assist you with your questions, and provide guidance in those instances where unusual or non-normal operating conditions are occurring.

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Introduction

Audience Description

This manual is for persons who are responsible for installing, servicing, and maintaining Elcotel Series-5 Line-Powered "smart" payphones at the payphone site.

This manual assumes some knowledge of the payphone industry and basic electrical and mechanical skills.

Applicability

This manual applies to the Elcotel, Inc. Series-5 Line-Powered Payphone.

Purpose

This manual is intended to provide:

- Basic knowledge of the functions and features of the payphone hardware.
- Step-by-step procedures for installing, operating, and maintaining the payphone on site.

This manual also refers you to related publications, when appropriate, for additional information. You should:

- Read this manual in normal reading sequence before starting the installation task.
- Refer to this manual as necessary while performing installation, operation, and servicing tasks.
- Refer to the related publications as directed.

Related Publications

- *Series-5 Compact Field Guide*, P/N 3350141

This manual may refer to other related product manuals using a generic reference, such as "network management system manual," "firmware operation manuals," or "payphone operation manual." The exact title and part number of these related manuals will vary, depending on the actual network management system, firmware, or payphone product purchased.

Contacting Elcotel

For further information, or to report a discrepancy in this manual, contact:

<p style="text-align:center">Elcotel, Inc., Technical Support Department</p>

<p style="text-align:center">Toll Free: 800-ELCOTEL (800-352-6835)</p>

<p style="text-align:center">Office: 941-758-0389</p>

<p style="text-align:center">Fax: 941-753-6981</p>

Elcotel, Inc

1. PAYPHONE DESCRIPTION

The Elcotel Series-5 Line-Powered payphone is a state-of -the-art "smart" payphone capable of sent paid operation, both local and long distance, without the need for operator assistance. The Series-5 payphone is shown in the following figure.
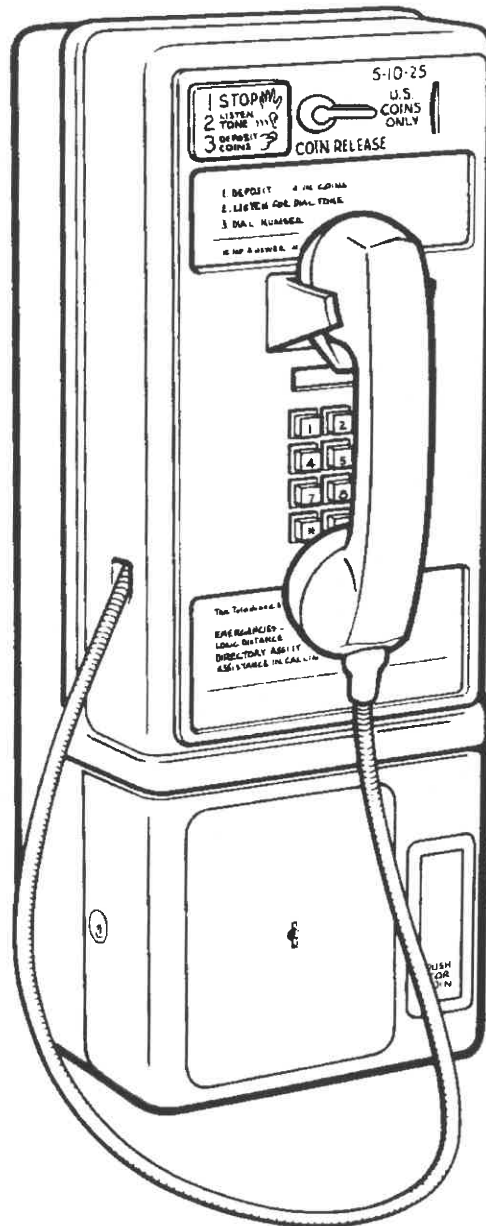

Figure 1-1   Series-5 Line-Powered Payphone

The rugged and reliable Series-5 payphone housing is a Quadrum/GTE style which provides the appearance and feel of a Bell system payphone and is suitable for installation in all locations.

The intelligence and flexibility of the Series-5 payphone is provided by the Elcotel PCM-5 Payphone Control Module which is mounted in the housing. The customizable operating features of the payphone are provided through the firmware that runs in the PCM-5.

Series-5 payphone remote operation and management is supported by the Elcotel payphone network management software. Payphone network management software is a personal-computer-based program that assists in all aspects of payphone route operation and management via a telecommunications link between the payphone(s) and the network management system personal computer.

Important installation and maintenance features of the Elcotel Series-5 are:

- **Line-Powered** - An AC power source is not required. Even the power for the coin relay is derived from the telephone line. This makes installation easier and operation more reliable.

- **Downloadable firmware** - The firmware, feature configuration, and ratecenter information can be downloaded via the telecommunications link with the network management system. This reduces on-site time for initialization, configuration or rate changes, and firmware upgrades.

- **Alarms** - The payphone constantly monitors the operational status of several functions. These are reported via telecommunications with the network management system and can even initiate that communication. This alerts you to the need for remedial action before there is a serious impact on revenue or customer satisfaction.

- **Diagnostic Event Recorder** - The payphone records up to 4000 network, payphone, and caller events intended to aid in problem diagnosis. These are uploaded to the network management system and can be viewed or printed for analysis.

- **Voice Telemetry** - You can communicate with the payphone to issue maintenance commands or change configuration settings via dual tone multifrequency (DTMF) signalling from the keypad on site or from any touch call telephone. You receive voice confirmation of your entries. This allows placing the payphone in the proper operating condition when telecommunications with the network management system is not immediately available or is inappropriate for the situation.

- **Default operation** - The payphone is operational as supplied from Elcotel through a high percentage of CO interfaces. The default feature configuration settings provide a starting point for installation testing and minimize the customization required for many locations.

- **Elcotel Technical Support** - Elcotel supports you with a staff of experienced Technical Support personnel ready to assist you with your payphone questions or problems.

1.1 Quadrum/GTE Style Housing

The housing is made of reinforced, deep-drawn steel. Hardened steel liners and tongue-in-groove construction of the housing and cashbox vault door provide additional physical security. The vault door is extra heavy gauge steel to further protect against unauthorized entry.

The housing has two major assemblies, the upper and lower housings, shown in the following figure. The upper and lower housings are joined securely by two steel slide bars with latches on the upper housing which engage six slots in the lower housing.
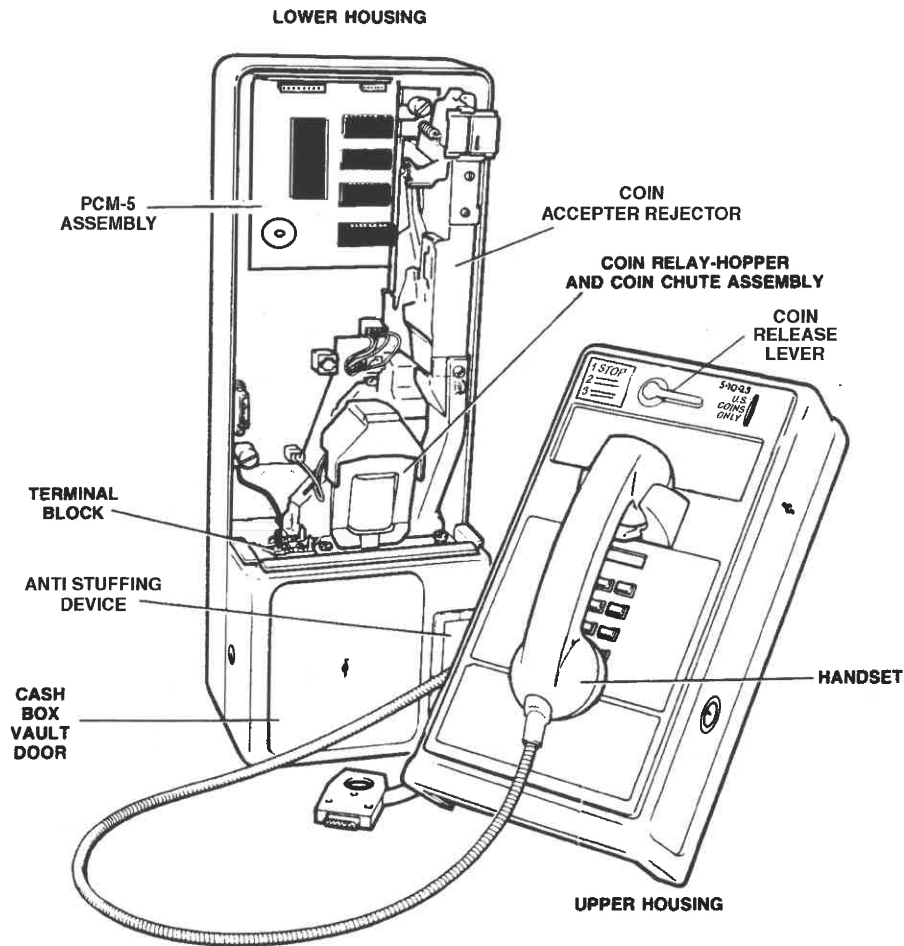
Figure 1-2   Series-5 Housing Assemblies

1.1.1 UPPER HOUSING

The upper housing contains the coin slot, coin release lever, hookswitch lever, handset, and the dial housing.

The coin release lever engages the coin mechanism in the lower housing.

The hookswitch lever is operated when the handset is placed on or taken off the hook. The hookswitch lever engages the hookswitch mounted on the dial housing.

1.1.1.1 Handset

The handset is connected through armored cable to the touch call unit (TCU) terminal board on the dial housing. The handset contains a hearing-aid coupler coil, making it hearing-aid compatible (HAC) per Part 68 of the FCC Rules and Regulations. This compatibility is indicated by the blue grommet where the armored cable enters the handset.

1.1.1.2 Dial Housing

The dial housing contains the touch call unit (TCU), hookswitch , and TCU terminal board.

The TCU generates the Dual Tone Multifrequency (DTMF) dialing digits via the keypad and its associated circuitry.

The hookswitch signals on-hook or off-hook conditions to the PCM-5.

The TCU terminal board connects the dial housing subassembly wiring to a cable with a 17-pin connector. This cable is the electrical connection between the upper housing and the PCM-5 in the lower housing.

1.1.2 LOWER HOUSING

The lower housing contains the coin acceptor-rejector mechanism, the coin relay-hopper-trigger switch assembly, the cashbox vault, and the PCM-5.

The coin acceptor-rejector mechanism tests coins to determine whether they are genuine. Coins entering the mechanism are first sorted by size and separated into nickels, dimes, and quarters. All coin denomination are checked for diameter, weight, deformity, and thickness. Additionally, dimes and quarters are checked for the presence of edge serrations. Nickels are checked for correct "bounce." Rejected coins are directed to thecoin return receptacle. Accepted coins are passed to the coin hopper through the trigger switch.

As each denomination coin passes through the corresponding path in the trigger switch assembly, it signals the PCM-5, which calculates the total amount of the deposited coins. The coins fall into the hopper where they are held in escrow.

The voltage applied to the coin relay determines which of two paths the coins take when they exit the hopper. A positive (collect) voltage allows the coins to drop into the cashbox. A negative (refund) voltage allows the coins to fall into the coin return receptacle.

The collect or refund determination, as well as many other operations, is controlled by the PCM-5 Payphone Control Module.

1.2 Payphone Control Module (PCM-5)

The PCM-5 consists of two printed circuit boards; a larger bottom board and a smaller auxiliary board, sometimes referred to as the "piggyback" board. The PCM-5 is shown in the following figure.

The PCM-5 circuit boards contain a microprocessor, erasable programmable read-only memory (EPROM), electrically-erasable programmable read-only memory (EEPROM), and battery-backed random access memory (RAM). These, together with other electronic circuitry, the operating system software that runs in the microprocessor, and the operational files downloaded from the network management system, control the operation of the payphone. Refer to the firmware operation manual(s) for a description of the firmware and site operational files.
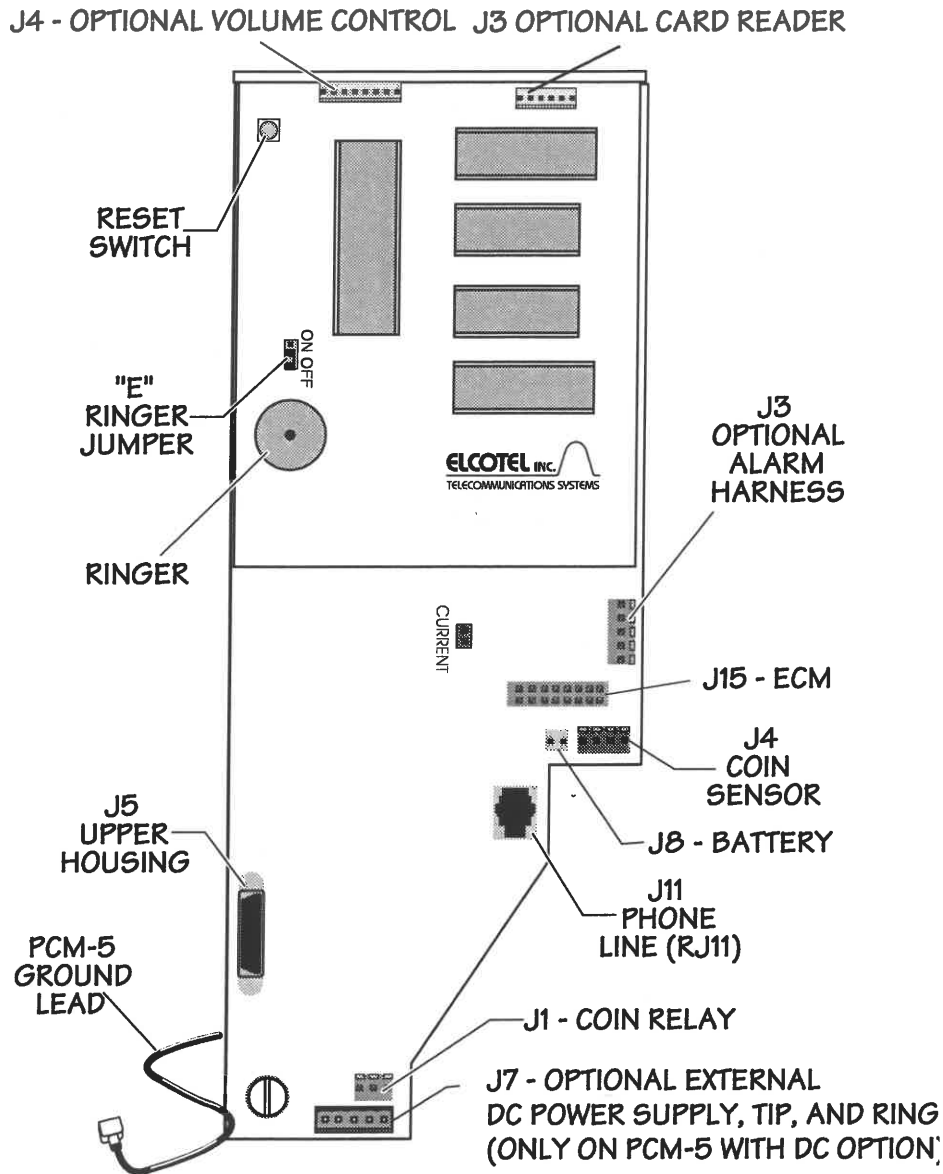
Figure 1-3 Payphone Control Module (PCM-5)

2. INSTALLING THE PAYPHONE

2.1 Inspecting the Site

The site requirements should be addressed early in the planning process, during which sites are selected, legal access secured, and telephone company services obtained. A final on-site check should be made before proceeding with the payphone installation.

1	Ensure barrier-free access, if required.	A payphone installed in an area designed to be used by the wheel-chair physically handicapped must not be installed in a corner and must have no obstacles within three feet of its front and sides.
		This would usually be done during an earlier installation planning process.
2	Ensure that a station interface box for an RJ11C hookup was ordered from and installed by the telephone company.	This would also usually be done during an earlier installation planning process.
		Note: The interface box should not be easily accessible to unauthorized persons, primarily to deter clip-on fraud.

> ⚠   **WARNING**   ⚠
>
> The telephone line uses dangerous voltage levels which can present an
>
> **electrical shock hazard**.

3	Remove the interface box cover and ensure that a gas tube or carbon surge protector was installed by the telco.	If a protector was **not** installed, contact the telco.
4	Connect a butt set between the tip and ring terminals of the interface box, switch the butt set to the talk position and ensure that you can DTMF (tone) dial a known working local number.	If you are unable to break dial tone, you may have a rotary-dial or ground-start line.
		In any case, if you are unable to dial successfully, notify the telco that you require an operational loop-start COCOT (B-1) line. Availability of the correct line characteristics are usually determined in an earlier installation and physical planning process.

5   Ensure that the telco line provides a minimum of 42 VDC **on-hook** voltage.

Use a multi-meter connected across the tip and ring terminals of the interface box as shown.
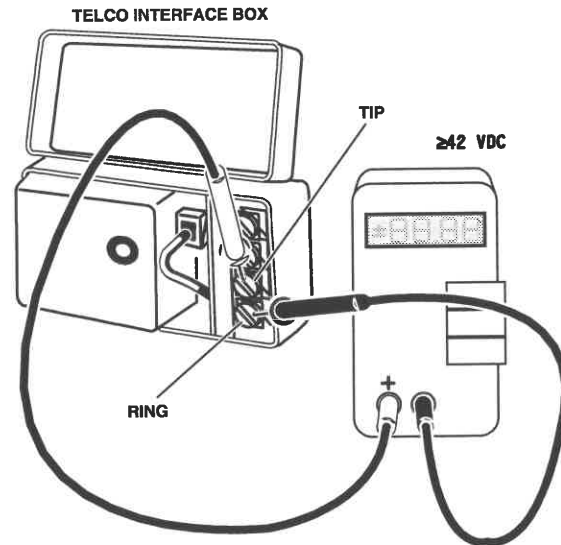
The voltage is required for proper operation of the coin relay. **If the requirement is not met**, the coin relay may not operate or may open too slowly. Contact the telco.

6	Ensure that the telco line provides a minimum of 23 mA **off-hook** current.	Use a digital multimeter, set to a scale that can measure 80 mA, connected between the interface box and a butt-set as shown.
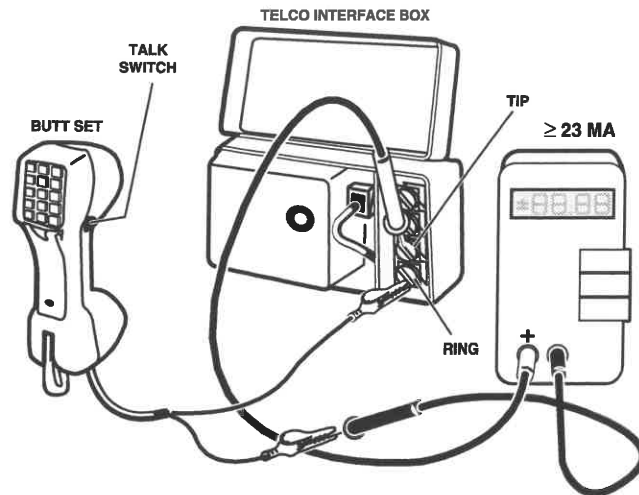
The current is required to properly operate the PCM-5 and charge the battery for the RAM. **If sufficient current is not available**, contact the telco.

If the line voltage is adequate, but the telco cannot consistently provide 23 mA of current, additional current can be obtained by using an optional power supply. See Section 5.5, *External DC Power Supply*.

7	Ensure that there is no Maintenance Termination Unit (MTU) in the line from the Central Office. You may have to contact the telco for MTU removal.	An MTU can cause incorrect coin relay operation. *Note: An MTU may be difficult to locate because they are often installed in a remote or poorly accessible location.*
8	Check for **secondary dial tone** and **wink**, as required.	Whether or not the telco presents secondary dial tone or wink is a consideration for the anti-fraud configuration of the payphone. These characteristics should be determined from the telco when the line is ordered. However, to verify the characteristics or determine them if not known, refer to procedures in Section 2.1.1, *Checking for Secondary Dial Tone* and Section 2.1.2, *Checking for Wink*.

2.1.1 CHECKING FOR SECONDARY DIAL TONE

Secondary dial tone is dial tone restored by some central offices after the called party hangs up, but the calling party does not. At a payphone, this presents the opportunity for fraudulent "chain" dialing of additional calls without additional charges.

⚠	**WARNING**	⚠
	The telephone line uses dangerous voltage levels which can present an	
	electrical shock hazard.	

1	Dial and complete a free or local call.	Use a butt-set, in talk mode, connected to the telco interface (or use the payphone, if installed). "Complete" means that the called party answers.
2	Have the called party hang up, but do **not** go on hook at the payphone site. Listen for the CO response.	Return of dial tone (secondary dial tone) is one possible response from the central office. Others are **no** secondary dial tone or a "fast" busy signal (also with no secondary dial tone).
3	Report the result to the network management system operator.	

2.1.2 CHECKING FOR WINK

Wink is a momentary (60 ms to one second) interruption of loop current preceeding secondary dial tone. Wink is a switching byproduct of some central offices.

> ⚠️ **WARNING** ⚠️
>
> The telephone line uses dangerous voltage levels which can present an
>
> **electrical shock hazard**.

1	Connect an analog multimeter, set to the 100 VDC scale, to the tip and ring wires at the telco interface box (or at the terminal block in the payphone, if installed).	The multimeter red (+) lead connects to tip (green) and the black (-) lead connects to ring (red). **Note:** In some telco installations, color code is non-standard. Connect the meter to obtain a positive deflection.
2	Dial and complete a free or local call.	Use a butt-set, in the talk mode, connected to the telco interface (or use the payphone, if installed). "Complete" means that the called party answers.
3	• Have the called party hang up, but do **not** go on hook at the payphone site. • Watch the multimeter and listen for the CO response.	Wink is indicated by the multimeter needle momentarily defelecting toward a 0 VDC reading just before secondary dial tone is presented. **Caution:** On-hook line voltage can exceed 50 VDC. Protect your meter by ensuring that the scale is set to at least 100 VDC while on hook. If movement is not detected, repeat steps 2 and 3, but switch to a lower voltage scale **only while off hook**.
4	Report the result to the network management system operator.	

2.2 Preparing the Site

2.2.1 MOUNTING HEIGHT

Mounting height is measured from the floor to the top of the top of the mount, for example, a backboard.

Table 1-1 Required Mounting Heights

Installation Type	Height from Floor
Standard, without seat	63 inches
Standard, with seat	52 inches
Barrier free for wheel-chair handicapped	54 inches
Shelf, if used	30 inches

Note: Check all currently applicable regulations before final installation.

2.2.2 MOUNTING SURFACE

The host structure providing the mounting surface must be strong enough to support the payphone and whatever mounting arrangement is used; that is, enclosure or backboard.

The payphone also requires a mounting surface that is within 1-1/2 degrees of vertical. A tilt greater than 1-1/2 degrees in any direction can cause excessive coin jams. Use the following procedure to check the mounting surface.

1	Place a spirit level vertically against the mounting surface. The top end of the spirit level should be the required mounting height.	Refer to *Table 1-1, Required Mounting Heights* for required mounting heights.
2	Move the top **or** bottom of the spirit level away from the mounting surface until the level indicates vertical.	

3	The end of the spirit level should be no further away from the mounting surface than shown in the table to the right.	Spirit Level Length Maximum Distance
		    18 inches 15/32 inch
		    24 inches 5/8 inch
		    30 inches 25/32 inch
		    36 inches 15/16 inch

4	Ensure that the same requirement is met in the right-left direction.	If there is an existing pedestal or enclosure, perform the measurement against a side panel. If you are going to mount an enclosure or backboard, simply ensure that the vertical plumb requirement is met during installation.

Note: If you adjust for a front-to-back out-of-plumb condition by shimming or other means when mounting an enclosure or backboard, keep in mind an increased exposure to vandalism when the payphone appears not to be mounted flush with the host structure.

2.2.3 PHONE LINE

No. 22 gauge telephone wire must be routed from the telco interface box to the payphone mounting site. **If the wire is not enclosed in a grounded metal conduit or a grounded braided shield**, you must:

1. In order to avoid electrical noise, which can affect answer supervision and outdialing, ensure that the telephone line does not run too close to power wires carrying heavy current.

<table>
<tr><td>⚠</td><td>WARNING

Failure to provide a proper ground can result in an

electrical shock hazard to the payphone customer.</td><td>⚠</td></tr>
</table>

2. **If the line is longer than 25 feet,** install a gas tube surge protector, grounded to an earth ground, at the payphone. This is in addition to the surge protector at the telco interface box. See Grounding.

2.2.4 GROUNDING

<table>
<tr><td>⚠</td><td>WARNING

Failure to provide a proper ground can result in an

electrical shock hazard to the payphone customer.</td><td>⚠</td></tr>
</table>

Whenever lightning strikes within a mile of a payphone, high voltage transients can develop between any conductive material and ground. These transients can reach the payphone through power lines or the telephone line and, **if the payphone is not properly grounded,** can cause serious injury to a payphone user and damage payphone electronics.

You must ensure the availability of a good earth ground at the payphone site. A **metal** water pipe and a ground rod are examples of potentially good earth grounds. Local electrical codes for the use of water pipes, ground rod length and installation, and ground wire gauge vary. **It is responsibility of the payphone owner-operator to consult an electrician, licensed for the area of the payphone site, for proper ground installation.**

2.3 Mounting the Backboard

A backboard should be used when there is no predrilled mounting surface such as provided by an enclosure.

The backboard has ten mounting holes. To ensure a secure mount to the surface, the fasteners used should be the proper type, size, and quantity for the mounting surface material. The following table shows the Elcotel mounting recommendations. Figure 2-1 on page 15 shows the backboard and mounting holes.

Table 1-2 Recommended Backboard Mounting Hardware

Surface Material	Recommended Fasteners
Dry wall or panelling	**Ten** 1/4-inch toggle bolts, **or** **Six** no. 12 x 2 inch zinc-plated wood screws, if each can be screwed into a stud.
Poured concrete	At least **six** 1/2-inch masonry sleeve anchors.
Concrete block	**Ten** 1/4-inch toggle bolts, **or** **six** 1/2-inch masonry sleeve anchors.
Brick	At least **six** 1/2-inch lag bolts with 5/16-inch lead anchors.
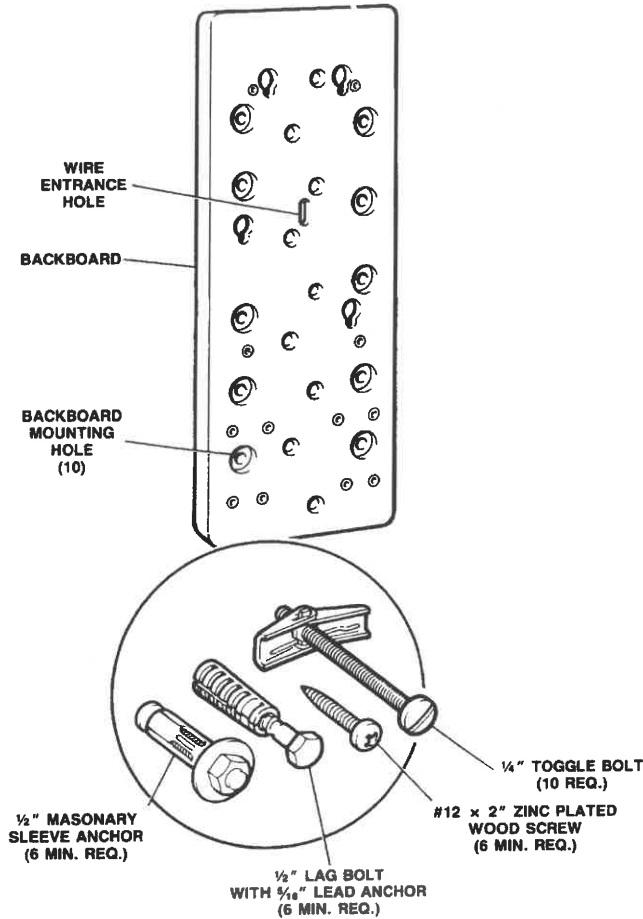
Figure 2-1 Backboard Mounting

Route the telco wire and an earth ground wire of sufficient gauge (per local electrical code or 14 gauge minimum) in the backboard channel as necessary and through the backboard wire entrance hole. If you are installing an optional External DC Power Supply with an additional cable, also route that cable from the transformer through the channel and the wire entrance hole. Refer to Section 5.5, *External DC Power Supply*. The entrance hole should be sealed with a rubber grommet.

The mounted backboard must provide vertical mounting for the payphone as described in Section 2.2.2, *Mounting Surface*.

For outside installation, you should caulk all holes that will not be used for mounting the payphone. This helps keep moisture and dust out of the housing.

2.4 Unpacking and Inspecting the Payphone

The shipping box should contain the completely assembled payphone, documentation, and keys. Examine the payphone to be sure that no damage occurred in shipping and that the payphone is as ordered. See Section 5, *Optional Hardware Features* for additional information if you ordered the payphone with installed options.

Table 1-3 Shipping Box Contents

Description	Qty
Model 1500LP Line-Powered Pay Telephone	1
Lock Assembly, Upper Housing, Random-keyed with 2 keys	1
Accessory Kit, Labels and T-wrench	1
Card, Key Control	1

2.5 Preparing the Payphone for Installation

In order to mount the payphone, the mounting holes in the back of the lower housing must be accessible. Therefore you must separate the upper and lower housing and remove at least the coin acceptor-rejector mechanism and PCM-5. A service hanger, or parking tool, is useful when working with the separated upper and lower housings. The service hanger mounts in the lower housing slots and supports the upper housing while it is still electrically connected to the lower housing. This allows service access to the components while the payphone is still functional.

▽ CAUTION ▽

Be careful when separating the upper and lower housings initially
because the separation is limited by interconnecting cabling.

1
- Place the payphone upright on a flat surface.

- Using the T-wrench, unlatch the upper housing.

- Support the upper housing while separating it from the lower housing.

- Disconnect the cable from J5 on the PCM-5 main board.

- If the payphone has a card reader, disconnect the cable from J3 on the PCM-5 auxiliary board.

- If the payphone has an ECM, disconnect the cable from J15 on the PCM-5 main board.

- If the payphone has an optional alarm switch, disconnect the connector from J3 on the PCM-5 main board.

- If the payphone has an optional volume control, disconnect the cable from J4 on the PCM-5 auxiliary board.
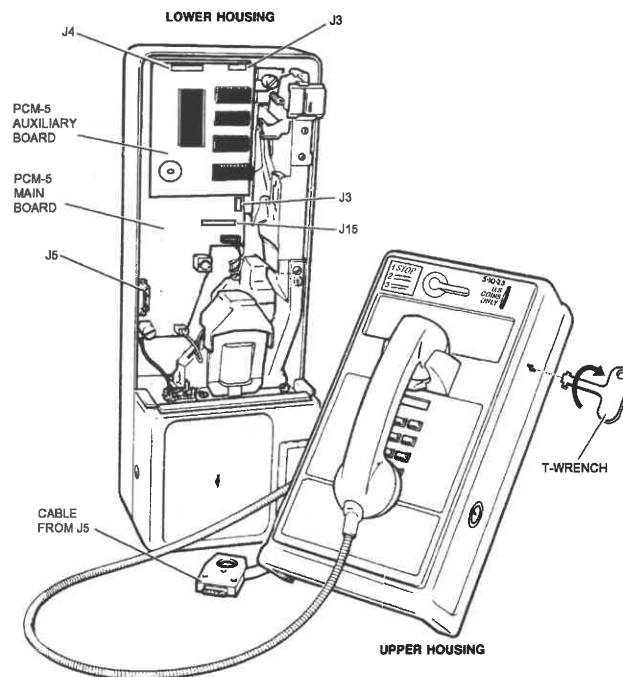
2
- Latch the upper housing latch bars.

- With the lock unlocked (key counterclockwise), insert the upper housing lock assembly into the cutout.

- Install the mounting nut, with the notches away from the side of the housing, and tighten by striking a pin driver engaging a notch.

- Ensure that the lock can be locked and that the cam prevents the latch bars from unlatching.

- Record the payphone serial number from the label on the top of the lower housing and the key numbers.

UPPER
HOUSING

LOCKING BAR
AND CAM

UPPER
HOUSING
LOCK
ASSEMBLY
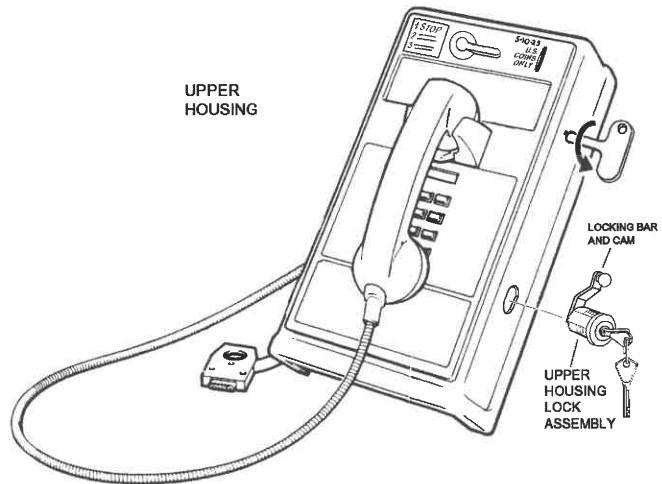
3
- Fill out the upper and lower instruction cards.

- Peel the protective material from the protective plastic windows.

- Install the instruction cards and plastic windows by bowing them and snapping them into the openings in the front plate of the upper housing.
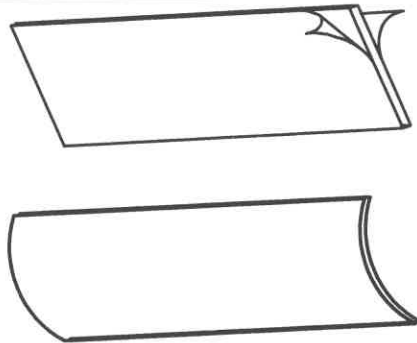
4
- Remove captive screw **A**.
- Tilt and remove the rejector chute.
- Loosen cap nut **B** one turn.
- Lift and remove the coin acceptor rejector.

LOWER HOUSING

B

PCM-5 ASSEMBLY

COIN ACCEPTER REJECTOR

A

REJECTOR CHUTE
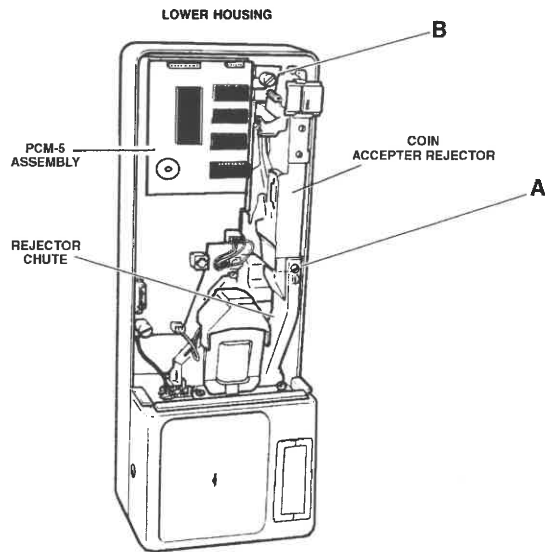
5
- Disconnect the cables from J4 and J1 on the PCM-5.
- Disconnect the PCM-5 ground wire from the terminal block.
- Loosen cap nut **C**.
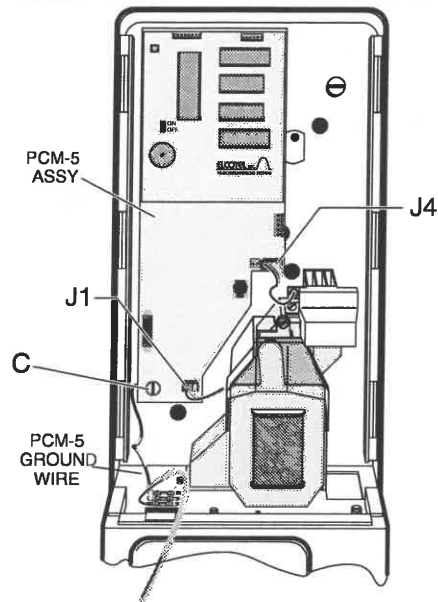
PCM-5 ASSY

J4

J1

C

PCM-5 GROUND WIRE

> ## CAUTION
>
> Protect against electrostatic discharge by wearing a grounded ESD
> wrist strap to avoid **equipment damage**.

6   Lift and remove the PCM-5 assembly and place it metal-chassis-side down on a clean flat surface.

7   Steps 1-5 exposed three holes (H) for 1/4-20 x 5/8 inch security bolts. Up to nine additional bolts can be used for increased physical security. To expose additional holes, J, K, and L, follow step **7** and/or step **8** and/or step **9**, respectively.
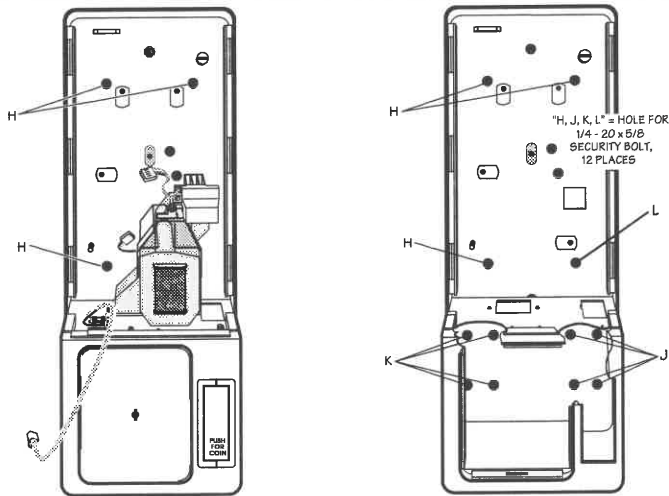
8   Remove screw **D** and the anti-stuffing device. This exposes holes **J**.
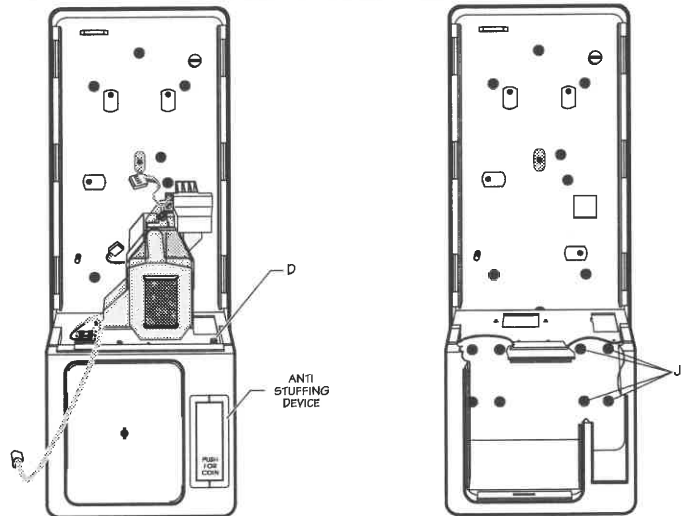
9
- Unlock and unlatch the cashbox vault door.
- Remove the vault door and cashbox. This exposes holes **K**.

CASHBOX VAULT DOOR

K
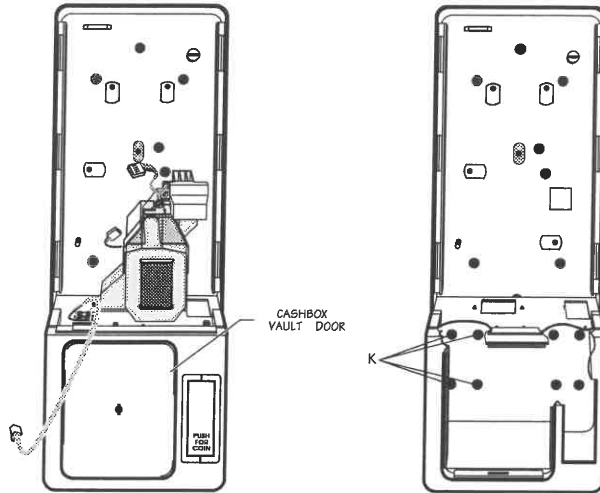
10
- Remove the plastic relay shield.
- Remove and set aside screw **E**.

Caution: Do not grasp the trigger switch assembly by the plastic shield.

- Carefully lift the trigger switch assembly out of the slot in the housing.
- Loosen, but do not remove screw **F**.
- Remove two hex head screws **G** (requires cashbox removal).
- Slide the vault rail forward and carefully remove the escrow hopper assembly. This exposes hole **L**.

E

TRIGGER SWITCH ASSY

COIN RELAY/ ESCROW HOPPER ASSEMBLY

PLASTIC RELAY SHIELD

F

L

HEX HEAD SCREWS G

VAULT RAIL

ESCROW HOPPER NOTCHES
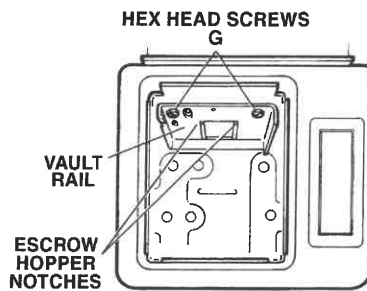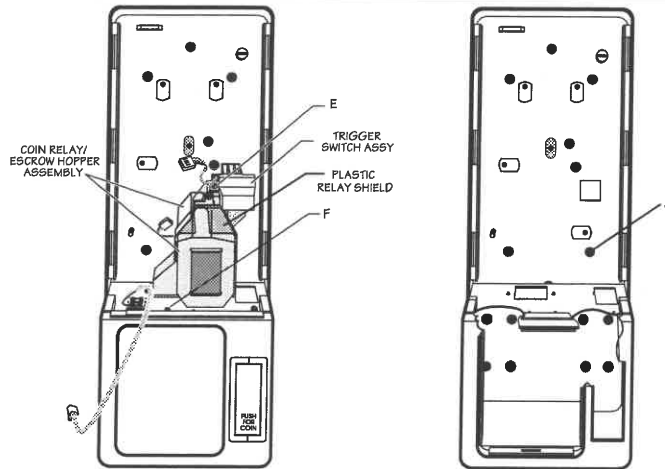
2.6 Mounting the Payphone

1	• Screw four mounting studs into the back of the payphone. • Route the telco wire and the ground wire through the payphone case wire entrance hole. If you are installing an optional External DC Power Supply with a separate cable, route that cable from the transformer through the wire entrance hole. Refer to Section 5.5, *External DC Power Supply*. • Push the payphone against the backboard so the mounting studs enter the keyholes. • Slide the payphone down to lock it in place. • Install 1/4-20 by 5/8 inch bolts through the housing mounting holes exposed in Section 2.5, *Preparing the Payphone for Installation*. A total of 12 bolts can be used. The recommended minimum is one bolt located below the PCM captive screw.	
2	Reinstall the coin relay - hopper - trigger switch assembly, if removed.	Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation*.
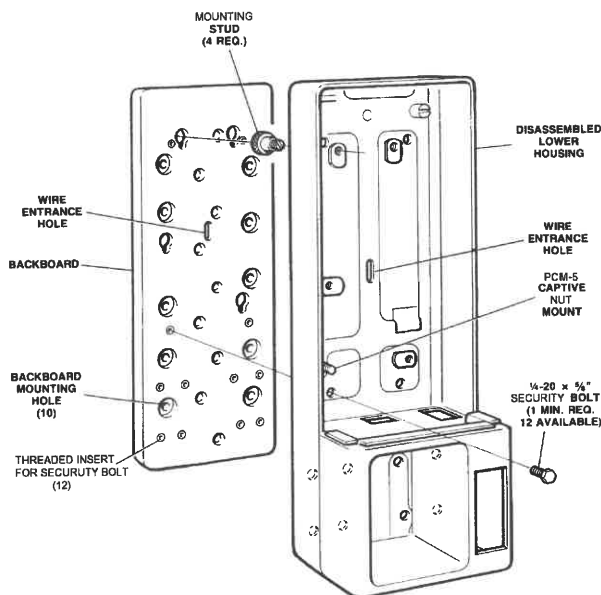
3	Reset the spring lock with a blade screwdriver and reinstall the cashbox, if removed.	
		Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation.*
4	Reinstall the anti-stuffing device, if removed.	Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation.*
5	• Connect the **earth ground wire**, installed in Section 2.2.4, *Grounding*, to the center terminal (G) of the terminal block. Tighten the screw firmly. **Caution:** A poor ground connection can result in loss of payphone programming from electrostatic or power line disturbances. • Using an ohmmeter, ensure that the resistance from the ground wire to the payphone case is **no more than 0.2 ohms**.	
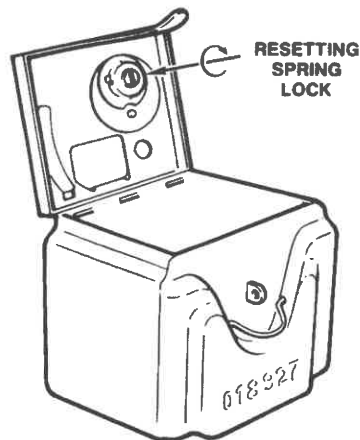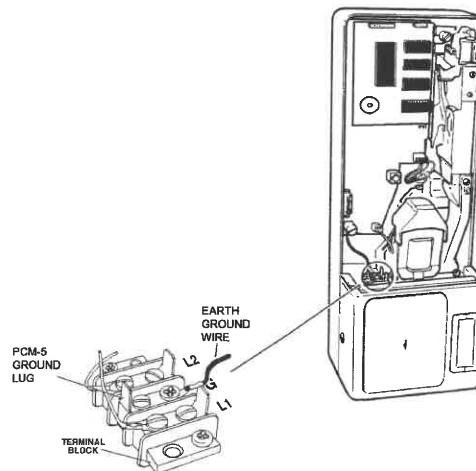
CAUTION

Protect against electrostatic discharge by wearing a grounded ESD wrist strap to avoid **equipment damage**.

6	• Reinstall the PCM-5. • If the payphone has an optional alarm switch, reconnect the cable to J4 on the PCM-5.	Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation*, ensuring that the **PCM-5 ground wire** is reconnected to the ground lug on the terminal block.

7	• Reinstall the coin acceptor-rejector mechanism and rejector chute.	Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation.*
	• If the coin mechanism is an ECM, reconnect the ECM cable to J15 on the PCM-5.	

▽   **CAUTION**   ▽

When connecting the battery, do not force the connector. It is designed to fit only one way. Improper connector orientation may result in **equipment damage**.

8	Connect the battery to J8 on the PCM-5.

⚠   **WARNING**   ⚠

The telephone line uses dangerous voltage levels whichcan present an **electrical shock hazard**.

9	Connect the telco line tip and ring wires, installed in , to the terminal block and plug the RJ11 connector on the cable assembly into J11 on the PCM-5.	
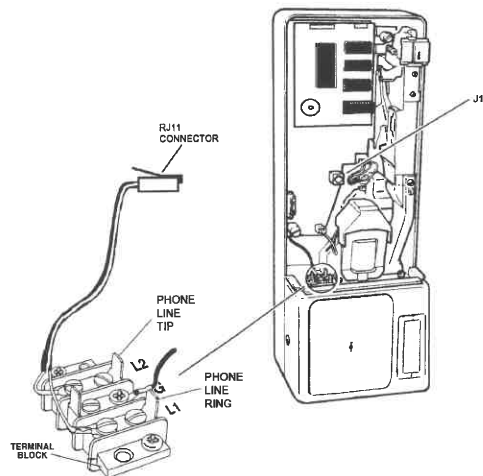
10 Ensure that the ringer jumper on the PCM-5 is in the correct position for the desired operation.

ON OFF
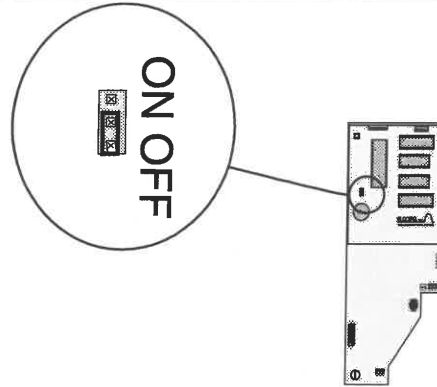
11
- Reconnect the cable(s) from the upper housing to J5 on the PCM-5 (and optionally, J3 and J4 on the auxiliary board).

- Reinstall the upper housing.

Use a service hanger, if available.

Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation*.

2.7 Initializing the Payphone

The payphone must be initialized at installation and any time the battery is disconnected (or fully discharged) for longer than two minutes.

The initialization process includes defaulting the PCM-5 and downloading site operational files.

2.7.1 DEFAULTING THE PCM-5

In the default (reset) state, the RAM and EEPROM on the PCM-5 are cleared and the payphone uses the default operating system and registers and options setting from the EPROM.

1	Ensure that the payphone is on-hook for at least five seconds.	
2	Press and **hold** the reset push button on the PCM. **Note:** An alternate technique is to short pins 7 and 8 of J4 on the PCM auxiliary board.	
3	Go off-hook.	You should hear the payphone coin relay operate.
4	• Release the reset push button (or remove the short). • Go on-hook.	The payphone should be in the default state. The following steps are for verification.
5	• Go off-hook. • Enter "#99999999" on the keypad and wait four seconds.	This enters voice telemetry mode. See Section 3.2, *Using Voice Telemetry* for more information about voice telemetry.
6	Enter "122" and listen for the voice response "122 OFF."	This verifies entry into voice telemetry by querying the setting of option 122. If the payphone responds "Invalid number. Please dial again", perform steps 1 through 5 again.
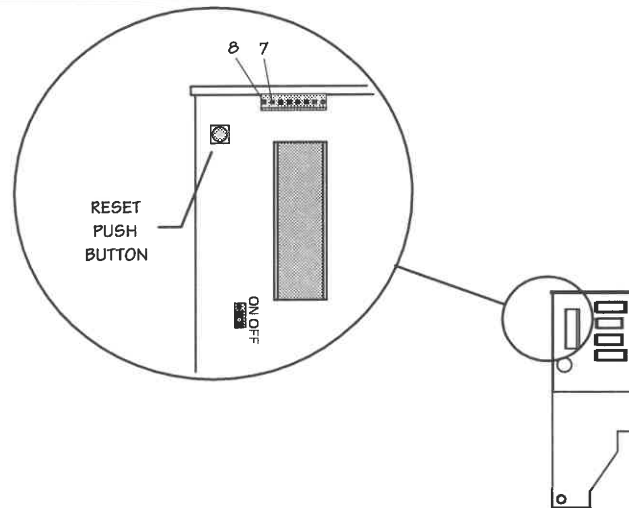
7	Enter "964" and wait for the voice response "Five".	If the payphone responds "Five", the defaulting procedure was successful.
		If the payphone responds "Thank you", repeat the defaulting procedure.
8	Go on-hook.	After a payphone is defaulted, site operational files must be downloaded to it.

2.7.2 DOWNLOADING SITE OPERATIONAL FILES

Site operational files must be downloaded to a payphone after it is defaulted. Site operational files should be created prior to payphone installation. Site operational files are documented in the firmware operation manual(s).

There are two methods which can be used to download the files from the network management system:

- A "manual" method in which the network management system operator initiates the download from the network management system.

- An "automatic" method in which the installer at the site causes the payphone to call the network management system to initiate the download.

2.7.2.1 Manual Downloading

1	Connect a butt set to the line.	A butt set is used so you can monitor the download process for completion.
2	Call and inform the network management system operator that the payphone is installed and ready for downloading.	"Ready for downloading" means that the payphone is defaulted. Refer to Section 2.7, *Initializing the Payphone*.
3	Switch the butt set to "Monitor" and listen to the telecommunications session.	The payphone should answer and present modem tone. The network management system modem should respond and the telecommunication session should begin. When the noise stops and the payphone goes on-hook, the download is completed. This can take two to eight minutes depending on the amount of data downloaded.
4	Disconnect the butt set and verify the download.	Refer to Section 2.8, *Verifying the Download*.

2.7.2.2 Automatic Downloading

Automatic downloading requires that the network management system is properly configured to respond to the call from the payphone. Setting up the network management system for automatic downloading is documented in the network management system operation manual.

To initiate an automatic download from the site, you must know:

- The telephone number of the network management system modem; that is, the "call home" number.

- The four-digit id of the payphone that was entered in the payphone network management system record for the payphone. The subscriber line number portion; that is, the last four digits, of the payphone NPA-NXX-XXXX is often used.

1	Attach a butt set to the line and switch the butt set to "Monitor."	This is so you can monitor the download process for completion.
2	• Go off-hook. • Enter "#99999999" on the keypad and wait four seconds.	This accesses voice telemetry mode.
3	Enter "333" and listen for the voice response.	The payphone responds "333 zero zero." The contents of register 333 is 00 because the payphone is defaulted. If the payphone does **not** respond "333 zero zero," go on-hook, then repeat step 1.
4	Enter "*", the network management system modem phone number, and "*". For example, "*7580389*".	This sets the network management system modem number in register 333.
5	• Enter "402" and wait for the voice response. • Enter "*", the four-digit payphone id, and "*".	This sets the payphone id into register 402.
6	• Enter "961" at the payphone keypad. • Go on-hook.	This commands the payphone to "call home" to the network management system
7	Monitor the session on the butt set.	The payphone should dial out. The network management system modem should answer and present modem tone. The payphone should respond and the modem telemetry session should begin. When the noise stops and the payphone goes on-hook, the download is completed. This can take two to eight minutes depending on the amount of data downloaded.
8	Disconnect the butt set and verify the download.	Refer to Section 2.8, *Verifying the Download.*

2.8 Verifying the Download

The purpose of verifying the download is to determine that the payphone is being controlled by the downloaded data and is no longer using the default settings. The Elcotel download process is very reliable, however, and problems should not be expected.

When the downloading is being done by an attended network management system session (a manual download), the network management system operator is notified if there is a problem with the process from, for example, unexpected service interruption or line disturbances.

The main use for this verification procedure is for assurance following an unattended (automatic) download when problem notification is not visible as network management system error messages.

You should know the eight-digit owner bypass code that was downloaded from the network management system record for the payphone.

Any one of the following steps actually indicates a successful download. Additional steps provide increased assurance that download of all the components was successful.

1	• Go off-hook. • Enter "#" and the owner bypass code. For example, "#12345678". • Wait four seconds and enter "122".	The payphone should respond "122 OFF," indicating successful voice telemetry mode access using the newly downloaded bypass code. **If you do not know the downloaded bypass code**, you can enter "#99999999" (the default bypass code), wait four seconds, and enter "122". The payphone should respond "Invalid number," **implying that the download was successful** because the default bypass code no longer allows access to voice telemetry. **If the payphone responds "122 OFF,"** repeat the download procedure because the default value is still in effect. *Note: The remaining verification steps cannot be accomplished without the new bypass code.*
2	Enter "404".	The payphone should respond with the payphone phone number. **This is a basic indication of successful downloading** because information downloaded from the payphone record in the network management system (owner bypass code and payphone phone number) is in effect. **If the payphone response is not correct**, repeat the downloading procedure.

3	Enter the number of an option or register that you know was customized in the C94 file for the payphone.	The payphone should respond with the customized value. **This indicates that the C94 file was downloaded successfully.** **If the payphone response is not correct**, repeat the download procedure. The C94 file is a required operational file.
4	Enter "967".	This issues the maintenance command "Report any alarms that are set." Alarm 10, Bad Rates, should **not** be reported. **This indicates that the R94 ratecenter file was downloaded successfully.** **If Alarm 10 is reported**, repeat the download procedure. The R94 ratecenter file is a required operational file.

2.9 Testing Payphone Operation

It is the responsibility of the payphone owner-operator to ensure correct operation of the installed payphone, including adherence to applicable regulations and application of sufficient anti-fraud measures to provide optimum protection against fraudulent calling.

Testing should be done at initial installation and after any repair action that involves disassembly, component repair or replacement, or defaulting the PCM and downloading new operational files. Testing can also be done routinely as a preventive measure. The testing techniques are essentially the same and the same problem diagnosis procedures can be used. However, keep in mind that the faults that are more likely in each scenario are different.

For example, at installation the more likely faults are improper assembly or connection, incorrect site operational files, or previously unverified telco line characteristics or carrier access. After a repair action, the more likely faults are in reassembly and connection or new operational files. When testing routinely or to verify a reported problem, the more likely faults are component failures or telco line problems.

The primary technique to test payphone operation and anti-fraud measures is to place representative calls from the payphone and note the payphone response versus the intended feature configuration, expected line characteristics, subscribed services, and so on.

The general categories of testing are:

- coin handling
- call routing and rating
- anti-fraud measures.

2.9.1 TESTING COIN HANDLING

The coin handling tests primarily check for correct operation of the coin path and answer supervision.

1	• While **on hook**, deposit a coin. • Lift the handset off hook, then place back on hook. • Verify that the coin is **returned**.	If the coin is **not** returned, go to Section 4.1.5, *Coins Not Collected or Returned.*
2	• Go **off hook**, deposit a **nickel**, then go back on hook. • Verify that the coin is **returned**.	If the coin is **not** returned, go to Section 4.1.5, *Coins Not Collected or Returned.*
3	Repeat **step 2** using a **dime**, then a **quarter**.	If the coin is **not** returned, go to Section 4.1.5, *Coins Not Collected or Returned.*
4	• Dial a local call and wait for the payphone prompt. • Deposit the correct amount. • Seven seconds after the called party answers, go on hook. • Verify that the coins are **collected**.	If the coins are **not** collected: The time between answer detection and call completion (when the coins are collectible), is controlled by register 417. The default value is 5 (seconds). Use voice telemetry to check the value in register 417 and, if it is other than 5, try this step again, but wait that amount of time before going on hook. This time value can also be overridden by a P94 file which may be downloaded. Consult with the network management system operator about the existence of a P94 file. **Otherwise**, go to Section 4.1.5, *Coins Not Collected or Returned.*
5	Make additional coin sent paid calls as required to verify correct coin handling.	It is up to the payphone owner-operator to determine what additional calls are necessary, for example,1+ intraLATA, 1+interLATA, and 1+interstate. If the coin handling was correct for steps 1 - 4, the additional calling is primarily to verify correct answer supervision for those call types. This can be combined with verifying the correct routing and rating, covered in Section 2.9.2, *Testing Call Routing and Rating.*

2.9.2 TESTING CALL ROUTING AND RATING

Routing and rating tests primarily verify that the site operational files downloaded to the payphone are correct in the areas of rating information, dialing macros, access numbers, authorization codes, and answer supervision. Additionally, correct service provider interfacing is assured. Of course, the electronic and electro-mechanical components of the payphone must also function correctly to obtain the intended result.

1	Dial sent paid (coin) calls and verify correct operation:	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	Local	Correct rate given?
	IntraLATA	Call routed correctly (preferred carrier, alternate carrier, and so on)?
	InterLATA	
	Interstate	Calls restricted?
	Canadian	For calls terminated **before** answer, verify that coins are returned.
	Extended	For calls terminated **after** answer, verify that coins are collected. Refer to Section 2.9.1, *Testing Coin Handling*.
	Corridor, if present	
	011+ (International)	
2	Dial operator assisted calls and verify correct operation.	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	0-	Call routed correctly (LEC operator, OSP operator, and so on)?
	00-	
	0+ Local	Calls restricted?
	0+ IntraLATA	
	0+ InterLATA	
	0+ Interstate	
	01+ (International)	
3	Dial information calls and verify correct operation.	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	411	Call free or sent paid?
	1411	Correct rate given?
	555-1212	
	1-555-1212	
	1-NPA-555-1212	
4	Dial "dial around" calls and verify correct operation.	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	101XXXX / 10XXX	Call routed or restricted?
	1-800-NXX-XXXX	Call free?
	950-XXXX	

5	Dial special calls and verify correct operation.	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	976-XXXX 1-900-XXX-XXXX	Call restricted?
6	Dial emergency call and verify correct operation.	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	911	Call routed correctly? Call free?
7	Dial Service Desk and verify correct operation.	It is up to the payphone owner-operator to identify the required calls and describe the expected results:
	211 (configurable)	Call routed correctly? Call free?

2.9.3 TESTING ANTI-FRAUD MEASURES

It is the responsibility of the payphone owner-operator to determine the anti-fraud requirements, decide on measures to apply, and make test calls to ensure, or at least to be aware of, the effectiveness of those measures at each payphone site. Although Elcotel provides anti-fraud features, Elcotel bears no responsibility for fraudulent acts which may manage to circumvent or defeat those features.

The sources of fraud protection are call screening by the LEC or OSP to prevent operator fraud and features within the payphone to deter operator fraud, chain dialing through the keypad, and DTMF dialing through the microphone.

The optimum payphone anti-fraud feature configuration for **chain dialing** and **DTMF fraud** depends on whether or not the CO presents secondary dial tone, and if so, with or without wink. This should be determined by information from the CO and/or checking for presence or absence when inspecting the site. These line characteristics should then be taken into consideration when configuring the anti-fraud features in the payphone site operational files.

The optimum payphone anti-fraud feature configuration for **operator fraud** depends on whether or not the LEC or OSP offers call screening. Call screening should be used if available.

Anti-fraud measures testing can be combined with routing and rating testing for the same call categories.

1	Check line for secondary dial tone.	It is up to the payphone owner-operator to identify the required tests and describe the expected results.
		If the payphone chain dialing and DTMF anti-fraud feature configuration is based an expectation of **no** secondary dial tone, then verifying the **absence** of secondary dial tone is sufficient testing for those fraud categories.
		Refer to Section 2.1.1, *Checking for Secondary Dial Tone.*
2	Check line for wink.	It is up to the payphone owner-operator to identify the required tests and describe the expected results.
		If the payphone chain dialing and DTMF anti-fraud feature configuration is based on using wink, then the presence of wink should be verified before making any additional test calls to verify fraud protection for various call types.
		Refer to Section 2.1.2, *Checking for Wink.*

3	• Dial operator-assisted calls that access any operator service providers from whom you expect call screening.
	
	  0-
	
	  00-
	
	  0+ Local
	
	  0+ IntraLATA
	
	  0+ InterLATA
	
	  0+ Interstate
	
	• Identify yourself and inquire about the call screening or attempt to make a fraudulent call.
		It is up to the payphone owner-operator to identify the required tests and describe the expected results.
		
		A code, indicating non-billable number, should appear on the operator's screen along with the payphone number.
		
		You should not be allowed to place a call and bill to the payphone.
		
		You should not be allowed to place a collect call to the payphone from another phone.
		
		  Expected call screening in effect?

4	Dial representative calls for the call categories to verify the intended fraud protection based on an expectation of secondary dial tone:
	
	  Local sent paid
	
	  1+
	
	  0-
	
	  0+
	
	  01+
	
	  011+
	
	  800/950
	
	  911
	
	  Any or all other
		It is up to the payphone owner-operator to identify the required tests and describe the expected results.
		
		Verify that the keypad is disabled and DTMF fraud is prevented according to the anti-fraud level set for the call category as described in the firmware operation manual(s).
		
		  Test the keypad disabling by trying to chain dial.
		  Test the DTMF anti-fraud by attempting to dial through the microphone with a DTMF tone generator.
		
		Note: Take into account the setting of register 432 , Time to Leave Keypad Enabled for OSP Bong, and register 434, Time to Leave Keypad Enabled for Manual (customer dialed) IXC. Assure that credit or calling card numbers can be entered for those calls.
		
		*Note: If fraud protection is enabled for **911** calls, you **must** verify that it does not prematurely terminate the call.*
		
		Verify that the anti-fraud measures do not interfere with use of services that you want to allow, such as entering account numbers for bank teller machines or answering system or voice mail menu entries. It may not be possible to ensure the desired level of fraud protection at all payphone sites without impacting the use of these services.

3. OPERATING THE PAYPHONE

Operating the payphone includes performing on-site route management tasks and using payphone utility functions to query status or temporarily change feature configuration settings in order to provide the best payphone service to the customer.

3.1 Collecting Cashbox Contents

1	• Go off-hook • Enter "#" and the cash vault collection number. *Note: If the Vault Door Alarm switch optional feature is installed, this step is not necessary because the function is performed automatically when the vault door is opened.*	The payphone captures the amount in Register 800 (Cash Box Counter) and triggers Alarm 3. If Alarm 3 is enabled, the payphone calls home to the network management system and reports the collection. If Alarm 3 is not enabled, the collection is reported during the next communications session between the payphone and the network management system. Refer to the firmware operation manuals for more information about alarms.
2	• Unlock and unlatch the cashbox vault. • Remove the cashbox vault door.	
3	Remove the cashbox and replace it with an empty one, resetting the spring lock with a blade screwdriver.	
4	• Replace the cashbox vault door. • Lock the cashbox vault.	
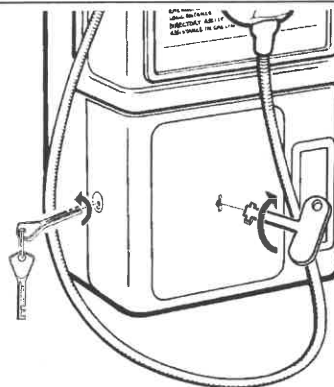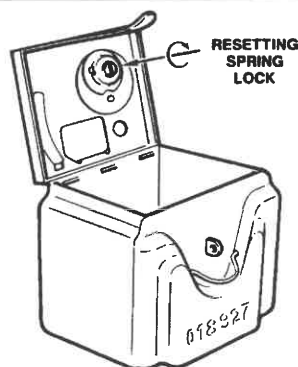
3.2 Using Voice Telemetry

Voice telemetry is the process of communicating with the payphone using Dual Tone Multifrequency (DTMF) signalling. Voice telemetry can be **local** or **remote**. Local voice telemetry is done through the keypad on the payphone. Remote voice telemetry is done through the keypad of any tone-dial telephone.

With voice telemetry you can query or set any register or option in the payphone. You can also issue maintenance commands.

3.2.1 LOCAL VOICE TELEMETRY

1	• Go off hook • Enter "#" and the owner bypass code. For example, "#12345678". • Wait 4 seconds.	*Note: If the payphone is in the default state (defaulted), the owner bypass code is reset to 99999999.* This step accesses the voice telemetry mode.
2	Enter "122" (a reserved option number which is set to OFF by default).	The payphone responds "122 OFF." This verifies entry into voice telemetry mode. If the payphone responds "Invalid number," you may have entered an incorrect bypass code. Go back on hook and begin this procedure again. If no entries are made for 10 seconds, the payphone prompts for entries with "Please dial again. Thank you."
3	To **query** the setting of an option or the value in a register, enter the option or register number.	The payphone responds with the option number and setting (ON or OFF) or the register number and value. If you enter an undefined register or option number, the payphone responds "Please dial again. Thank you." The payphone repeats the response until another option or register number is entered, the option setting or register value is changed, or voice telemetry is terminated.

4	To **change** the setting of an **option** between ON and OFF:	For example:
		Enter "101" (Enable PBX Prefix).
	• Enter the option number and wait for the voice response.	The payphone responds "101 OFF" (default).
		Enter "**".
	• Enter "**" and listen for the opposite response. The setting is changed.	The payphone responds "101 ON."
		*Note: This only changes the option setting in battery-backed RAM. It does **not** change the default nor the backup copy of registers and options.*

5	To **change** the value in a **register**:	For example:
		Enter "341" (PBX Access Code).
	• Enter the register number and wait for the voice response.	The payphone responds "341 9" (the default).
		Enter "*0*" (the new value).
	• Enter "*" *value* "*"and **listen for the voice response. The value is changed.**	The payphone responds "341 0."
		*Note: To **clear** a digit string, such as an access number in a register, enter "**", **not** "*0*".*
		*Note: This only changes the register value in battery-backed RAM. It does **not** change the default nor the backup copy of registers and options.*

6	To **issue a maintenence command**, enter the maintenence command register number.	Commonly used maintenance commands are: **961** PNM Alarm Call Home The payphone calls the network management system (Register 333) to upload alarms and counters and to perform any commands previously set up. **963** Terminate Telemetry Mode The payphone immediately terminates telemetry mode. **964** Reload Battery Backed RAM The payphone transfers information from backup to the battery-backed RAM. **965** Flip Coin Relay to Return Coin The payphone actuates the coin relay in the return direction. **966** Flip Coin Relay to Collect Coin The payphone actuates the coin relay in the collect direction. **967** Report Alarms that are Set The payphone immediately reports by voice any alarms that were triggered or thresholds crossed. See for a summary of alarms. **972** Clear Alarms The payphone clears **all** alarms. **977** Read/Set Hours/Minutes The payphone reports the time in 24 hour format. If the hours or minutes are not correct, you can set them with "*hhmm*". **978** Read/Set Month/Day The payphone reports the date. If the month or day is not correct, you can set them with "*mmdd*". **979** Read/Set Year The payphone reports the last two digits of the year. If they are not correct, you can set them with "*yy*". **980** Read/Set Day of Week The payphone reports the day of the week (Sunday=1, Monday=2, Tueday=3, Wednesday=4, Thursday=5, Friday=6. Saturday=7). If it is not correct, you can set it with "*n*". Refer to the firmware manuals for more information on maintenence commands.
7	To **terminate** voice telemetry mode, issue maintenence command "963".	

3.2.2 REMOTE VOICE TELEMETRY

Remote voice telemetry provides essentially the same utility as local voice telemetry but does not require presence at the payphone site.

Note: Option 104 must be ON in the payphone in order to enable remote voice telemetry.

1	At the remote tone dial telephone: • Go off hook and dial the payphone phone number. • Wait for the payphone response, which varies with configuration.	**If** incoming calls are **not** allowed (option 100 OFF), or the time is within the fast telemetry window (registers 410 and 411), the payphone answers immediately and presents modem carrier tone for 30 seconds. Otherwise, the payphone rings the number of times set in register 408 before answering and presenting modem carrier tone.
2	When the carrier tone stops: • Enter "#" and the owner bypass code. For example, "#12345678". • Wait 4 seconds.	This accesses remote voice telemetry mode. If no further entries are made , the payphone terminates the call in 10 seconds. If the owner bypass code is incorrect, the payphone terminates the call in 10 seconds regardless of further entries.
3	**Query** or **change** settings and values, **issue** maintenence commands, and **terminate** voice telemetry according to steps 3 through 7 of the local voice telemetry procedure.	If an option or register number entered is not valid, the payphone responds "Please dial again. Thank you."

3.3 Checking Alarms

You can obtain a voice report of triggered alarms by accessing voice telemetry mode and entering maintenence command "967". Refer to Section 3.2, *Using Voice Telemetry* for instructions.

The following is a summary of payphone alarms that may be reported. Refer to the firmware manuals for more information on alarms.

Alarm #	Description
1	SMDR Buffer Damaged
2	Handset
3	Cash Vault / Bypass Code
4	Program Running from ROM
5	Rate RAM Reload
6	Cash Box Trigger
7	Cash Box Full
8	Inactivity
9	Coin Jam / Walk Away
10	Bad Rates
11	Call Counts Cleared
12	Change in Master Block
13	Entry into Telemetry Mode
14	Bad Downloaded Program
15	SMDR Buffer 80% Full
16	SMDR Buffer 100% Full
17	Bad Registers and Options
18	Force Call Home
19	Validation System
20	Billing Records Buffer 100% Full
21	Clock
28	Low Battery

4. MAINTAINING THE PAYPHONE

4.1 Diagnosing Problems

The following problem diagnosis procedures are directed primarily at resolving problems in the field. Field repair actions are generally limited to cleaning or replacing subassemblies or **temporarily** changing a feature setting to restore the payphone to correct operation.

The procedures are based on the following assumptions:

- The payphone was installed successfully and initially operated correctly; that is, the failure occurred after a period of use. However, some consideration is given to problems that might result from subsequent mechanical or feature configuration changes to the payphone.

- There is a **single fault**; that is, there is only one reason why the payphone is not operating correctly.

- The reported or observed symptom is valid. Each procedure is identified by a symptom description.

4.1.1 PAYPHONE DOES NOT DIAL OUT

```
      ┌─────────────────┐
      │ Payphone Does   │
      │ Not Dial Out    │
      └────────┬────────┘
               │
          ╱────┴────╲
         ╱ Dial tone  ╲
        ╱  present through╲──No──►──┐
        ╲  handset       ╱          │
         ╲──────────────╱           ▼
               │             ┌──────────────────┐
              Yes            │ Go to 4.1.2 No Dial│
               │            │ Tone Through Handset│
               ▼            └──────────────────┘
   ┌────────────────────┐
   │ Enter voice telemetry. │
   │ Check that option 130  │
   │ is set correctly for the│
   │ line dialing method    │
   │ (ON = pulse, OFF =     │
   │ DTMF).                 │
   └──────────┬─────────┘
              │
         ╱────┴────╲
        ╱ Option 130 ╲──No──►
        ╲  correct   ╱
         ╲──────────╱
              │
             Yes
              │
              ▼
   ┌────────────────────┐
   │ Dial a known coinless│
   │ call such as a 0-.  │
   └──────────┬─────────┘
              │
         ╱────┴────╲
        ╱ Payphone  ╲──No──►
        ╲ dials out ╱
         ╲─────────╱
              │
             Yes
              │
              ▼
   ┌────────────────────┐
   │ Dial a local coin call.│
   └──────────┬─────────┘
              │
         ╱────┴────╲
        ╱ Payphone  ╲──Yes──► (1)
        ╲ prompts for╱
        ╲ 25 cents  ╱
         ╲─────────╱
              │
             No
              │
              ▼
            (A) To next page
```

Use voice telemetry to correct option 130.
Notify the PNM operator to check the operational files..

Trouble cleared

Connect a butt set to the line and dial a call.

╱ Butt set dials call ╲ ──No──► Notify the telco

Yes

Connect a known good upper housing assembly to the PCM. Dial a coinless call..

╱ Payphone dials out ╲ ──Yes──►

Check and correct the wiring and/or replace the upper housing components, one at a time, until the payphone dials out on a test call.
Start with the keypad.

Trouble cleared

No

(A) To next page

(1)

Perform 4.6 Testing Coin Detection

╱ Coins detected ╲ ──Yes──► (A) To next page

No

Go to 4.1.3 Coins Not Detected

A

Default the PCM.
Refer to topic
Defaulting the PCM
Ensure that option 130
is correct.
Dial a local coin call.

↓

Payphone
dials out ——Yes——▶

No

Download operational
files. Refer to *2.7.2
Downloading Site
Operational Files*.
Dial a local coin call.

↓

Payphone
dials out ——Yes——▶

No

Trouble cleared

If you are using
customized macros,
there may be a
problem with the
dialing commands in
them. The person
responsible for the
operational files should
consult with Elcotel
Customer Service.
Otherwise: continue.

↓

Replace the PCM.
Initialize the PCM.
Refer to *2.7 Initializing
the PCM*.

↓

Trouble cleared

4.1.2 NO DIAL TONE THROUGH THE HANDSET

```
┌─────────────────────┐
│   No Dial Tone      │
│ Through the Handset │
└─────────────────────┘
          │
┌─────────────────────┐        ┌─────────────────────┐
│ Disconnect the telco│        │ Using the butt set, │
│ line from the PCM and│       │ test for dial tone  │
│ connect it to a butt │       │ at the telco        │
│ set.                │        │ interface box.      │
└─────────────────────┘        └─────────────────────┘
          │                              │
      ╱Dial tone╲ ──No──>            ╱Dial tone╲ ──Yes──>
      ╲present  ╱                    ╲present  ╱
          │Yes                          │No
          ▼                             ▼
```

Disconnect the telco line from the PCM and connect it to a butt set.

Dial tone present — No → Using the butt set, test for dial tone at the telco interface box.

Dial tone present — Yes →

Repair or replace the:
1. RJ11 connector on the telco line.
2. Line between the payphone and interface box.

→ Trouble cleared

Dial tone present — No → Notify the telco

Dial tone present — Yes ↓

Unplug the battery from the PCM and measure the battery voltage at the cable connector.

Battery voltage > 6.2 VDC — No → Replace the battery. Refer to *4.2 Replacing the Battery*.

Go to *4.1.8 Battery Discharged.*

Battery voltage > 6.2 VDC — Yes ↓

Reconnect the battery. Connect a known good upper housing assembly to the PCM.

Dial tone present — No → Default the PCM. Refer to *2.7.1 Defaulting the PCM.*

Dial tone present — Yes ↓

Isolate the defective subassembly in the original upper housing by replacing, one at a time, the handet, keypad, complete dial assembly, and so on, until dial tone is restored.

Trouble cleared

Dial tone present — No → Replace the PCM. Initialize the PCM. Refer to *2.7 Initializing the PCM.*

→ Trouble cleared

Dial tone present — Yes ↓

Download operational files. Refer to *2.7.2 Downloading Site Operational Files.*

Trouble cleared

4.1.3 COINS NOT DETECTED

```
                    ┌──────────────────────┐
                    │ Coins Not Detected   │
                    └──────────┬───────────┘
                               │
                          ╱────┴────╲
                         ╱   Coin    ╲
                        ╱  mechanism  ╲──Yes──►  ┌─────────────────────┐
                        ╲     is      ╱           │ Reseat the connector│
                         ╲   ECM     ╱            │ in J15 on the PCM.  │
                          ╲────┬────╱             │ Retest using 4.6    │
                               │                  │ Testing for Coin    │
                               No                 │ Detection.          │
                               │                  └──────────┬──────────┘
                               │                             │
```

(Coin mechanism is ECM) — Yes → Reseat the connector in J15 on the PCM. Retest using *4.6 Testing for Coin Detection.*

→ **Coins detected?**
  - No → Replace the ECM and cable. Retest.
    - **Coins detected?**
      - Yes → (loops back to Coins detected / Trouble cleared)
      - No → Replace the PCM. Initialize the PCM. *Refer to 2.7 Initializing the PCM.* → Trouble cleared
  - Yes → Trouble cleared

(Coin mechanism is ECM) — No →

Coin dropped into return chute?
  - Yes → Check the payphone for vertical plumb. *Refer to 2.2.2 Mounting Surface.*
    - **Payphone plumb?**
      - No → Correct payphone mounting. Retest.
        - **Coins still drop into return chute?**
          - Yes → (loops back)
          - No → Trouble cleared
      - Yes → Replace coin acceptor-rejector mechanism. → Trouble cleared
  - No → Replace coin trigger assembly. Retest using *4.6 Testing for Coin Detection.*
    - **Coins detected?**
      - Yes → Trouble cleared
      - No → Replace the PCM. Initialize the PCM. *Refer to 2.7 Initializing the PCM.* → Trouble cleared

4.1.4 HANDSET MICROPHONE DOES NOT OPEN

```
┌─────────────────────┐
│  Handset microphone │
│    does not open    │
└──────────┬──────────┘
           │
┌──────────▼──────────┐
│ Enter voice telemetry.│
│ Check that option 125 │
│ is set for the correct│
│ answer supervision    │
│ (OFF=voice detect,    │
│ ON=reverse-battery).  │
└──────────┬──────────┘
           │
      ╱─────────╲
     ╱ Option 125 ╲────No──►  ┌──────────────────────┐
     ╲  correct   ╱           │ Use voice telemetry to│
      ╲─────────╱             │ correct option 125.   │
           │                  │ Notify the PNM        │
          Yes                 │ operator to check the │
           │                  │ operational files..   │
┌──────────▼──────────┐       └──────────┬───────────┘
│ Dial a known coinless│                 │
│ call such as a 0-.   │         ┌───────▼────────┐
└──────────┬──────────┘         │ Trouble cleared │
           │                    └────────────────┘
      ╱─────────╲
     ╱ Microphone ╲────No──►  ┌──────────────────────┐
     ╲   opens    ╱           │ Connect a known good │
      ╲─────────╱             │ upper housing        │
           │                  │ assembly to the PCM  │
          Yes                 │ Dial a coinless call..│
           │                  └──────────┬───────────┘
┌──────────▼──────────┐                  │
│ Dial a local coin call│            ╱─────────╲
│ and deposit coin.     │           ╱ Microphone ╲──Yes──►
└──────────┬──────────┘            ╲   opens    ╱
           │                        ╲─────────╱
      ╱─────────╲                        │
     ╱ Microphone ╲                      No
     ╲ opens when  ╲──No──►              │
     ╱ answered    ╱           ┌─────────▼──────────┐
      ╲─────────╱              │ Default the PCM.   │
           │                   │ Refer to 2.7.1     │
          Yes                  │ Defaulting the PCM.│
           │                   │ Ensure that option │
┌──────────▼──────────┐        │ 125 is correct.    │
│ Trouble cleared or  │        │ Dial a local coin  │
│  no trouble found   │        │ call.              │
└─────────────────────┘        └─────────┬──────────┘
                                         │
                                    ╱─────────╲
                                   ╱ Microphone ╲──Yes──►
                                   ╲   opens    ╱
                                    ╲─────────╱
                                         │
                                        No
```

```
┌──────────────────────┐
│ Check and correct the│
│ wiring and/or replace│
│ the upper housing    │
│ components, one at a  │
│ time, until the      │
│ microphone opens on  │
│ a test call.         │
│ Start with the handset.│
└──────────┬───────────┘
           │
    ┌──────▼───────┐
    │Trouble cleared│
    └──────────────┘

┌──────────────────────┐
│ Download operational │
│ files. Refer to 2.7.2│
│ Downloading Site     │
│ Operational Files.   │
│ Dial a local coin call.│
└──────────┬───────────┘
           │
      ╱─────────╲
     ╱ Microphone ╲──Yes──►
     ╲ opens when  ╲
     ╱ answered    ╱
      ╲─────────╱
           │
          No
           │
┌──────────▼──────────┐
│ If you are using     │
│ customized macros,   │
│ there may be a       │
│ problem with answer  │
│ supervision commands │
│ in them.  The person │
│ responsible for the  │
│ operational files should│
│ consult with Elcotel │
│ Customer Service.    │
│ **Otherwise:** continue.│
└──────────┬──────────┘
           │
┌──────────▼──────────┐
│ Replace the PCM.     │
│ Initialize the PCM.  │
│ Refer to 2.7 Initializing│
│ the PCM.             │
└──────────┬──────────┘
           │
    ┌──────▼───────┐
    │Trouble cleared│
    └──────────────┘
```

4.1.5 COINS NOT COLLECTED OR RETURNED

```
┌───────────────────────┐
│ Coins not collected or │
│        returned        │
└───────────────────────┘
            │
            ▼
      ╱Dial tone╲
     ╱ present through╲──No──►┌──────────────────┐
     ╲   handset     ╱        │   Go to 4.1.2    │
       ╲         ╱            │   No Dial Tone   │
            │                 │ Through Handset  │
           Yes                └──────────────────┘
            │
            ▼
┌───────────────────────┐
│ Access local voice    │
│ telemetry.            │
│ Enter maintenance     │
│ command 965 (return)  │
│ and 966 (collect).    │
└───────────────────────┘
            │
            ▼
      ╱Coin relay╲
     ╱ operates for both╲──No──►┌──────────────────┐
     ╲   commands     ╱         │ Open the upper   │
       ╲         ╱              │ housing.         │
            │                   │ Gently push on   │
           Yes                  │ the coin relay   │
            │                   │ armature.        │
            ▼                   └──────────────────┘
┌───────────────────────┐              │
│ Check for a coin jam  │              ▼
│ or an obstruction in  │         ╱ Coins ╲
│ the coin mechanism or │        ╱ released from╲──No──►
│ coin trigger switch.  │        ╲ the hopper  ╱
└───────────────────────┘          ╲       ╱
            │                        Yes
            ▼                         │
      ╱ Jam or ╲                      ▼
     ╱obstruction╲──No──►   ┌──────────────────┐
     ╲  found   ╱           │ Enter Voice      │
       ╲     ╱              │ Telemetry.       │
            │               │ Enter maintenance│
           Yes              │ command 965      │
            │               │ (return).        │
            ▼               │ Enter maintenance│
┌───────────────────────┐   │ command 966      │
│ Clear and inspect the │   │ (collect).       │
│ coin mechanism, if    │   └──────────────────┘
│ jammed. If it is      │            │
│ dirty, clean or       │            ▼
│ replace it.           │      ╱Coin relay╲
│ Refer to 4.7 Cleaning │     ╱operates for both╲──No──►
│ the Coinco Style Coin │     ╲  commands     ╱
│ Mechanism.            │       ╲         ╱
│ Clear the coin trigger│            │
│ switch, if jammed.    │           Yes
│ If this is a frequent │            │
│ problem, go to 4.1.7  │            ▼
│ Frequent Coin Jams.   │   ┌──────────────────┐
└───────────────────────┘   │ If this is a     │
            │               │ frequent problem,│
            │               │ go to 4.1.7      │
            │               │ Frequent Coin    │
            │               │ Jams.            │
            │               └──────────────────┘
```

```
      ╱Armature╲
     ╱ moves freely╲──No──►┌──────────────────┐
     ╲ through full╱       │ Dislodge coins in│
     ╲   travel  ╱         │ the hopper       │
       ╲     ╱             │ carefully with a │
            │              │ probe.           │
           Yes             │ Retest the       │
            │              │ mechanism with   │
            ▼              │ maintenance      │
   ┌──────────────────┐    │ commands 965 and │
   │ Unplug the RJ11C │    │ 966.             │
   │ connector from   │    └──────────────────┘
   │ J11 on the PCM.  │            │
   │ Measure the telco│            ▼
   │ line voltage     │      ╱Coin relay╲
   │ between the red  │◄─No─╱operates for both╲
   │ and green wires  │     ╲  commands     ╱
   │ at the terminal  │       ╲         ╱
   │ block on the     │            │
   │ lower housing.   │           Yes
   └──────────────────┘            │
            │                      ▼
            ▼            ┌──────────────────┐
       ╱ 42VDC ╲        │ If this is a     │
      ╱ minimum ╲──No──► │ frequent problem,│
      ╲        ╱         │ go to 4.1.7      │
        ╲    ╱           │ Frequent Coin    │
            │            │ Jams.            │
           Yes          └──────────────────┘
            │                    │
            ▼                    ▼
   ┌──────────────────┐  ┌──────────────────┐
   │ Unplug the coin  │  │ Trouble cleared  │
   │ relay connector  │  └──────────────────┘
   │ from J1 on the   │
   │ PCM.             │
   │ Measure the      │
   │ resistance       │
   │ between the red  │
   │ and white wires  │
   │ at the connector.│
   └──────────────────┘
            │
            ▼
      ╱Measures╲
     ╱ about 1000 ╲──No──►┌──────────────────┐
     ╲ ohms (not  ╱       │ Replace the coin │
     ╲  open)    ╱        │ relay.           │
       ╲     ╱            └──────────────────┘
            │                    │
           Yes                   ▼
            │            ┌──────────────────┐
            ▼            │ Trouble cleared  │
   ┌──────────────────┐  └──────────────────┘
   │ Replace the PCM. │
   │ Initialize the   │
   │ PCM              │
   │ Refer to 2.7     │
   │ Initializing the │
   │ PCM.             │
   └──────────────────┘
            │
            ▼
   ┌──────────────────┐
   │ Trouble cleared  │
   └──────────────────┘
```

```
      ╱ 42VDC ╲──No──►┌──────────────────┐
                      │ Notify the telco │
                      └──────────────────┘
```

```
   ┌───────────────────────┐
   │ Trouble cleared or    │
   │ no trouble found      │
   └───────────────────────┘
```

4.1.6 PAYPHONE DOES NOT RING

```
        ┌──────────────┐
        │  Payphone    │
        │ Does Not Ring│
        └──────┬───────┘
               │
     ┌─────────▼─────────┐
     │ Check for dial tone│
     │ through the handset.│
     └─────────┬─────────┘
               │
          ╱────▼────╲                          ┌──────────────────┐
         ╱  Dial tone ╲───No──────────────────▶│   Go to 4.1.2    │
         ╲  present   ╱                         │ No Dial Tone Through│
          ╲────┬────╱                           │   the Handset    │
              Yes                               └──────────────────┘
     ┌─────────▼─────────┐
     │ Use voice telemetry to│
     │ check setting of option│
     │ 100 and register 408. │
     └─────────┬─────────┘                 ┌─────────────────────┐
               │                            │ Use voice telemetry to│
          ╱────▼────╲                       │ set option 100=ON and │
         ╱ Option 100=ON╲──No──────────────▶│ register 408>0.      │
         ╲ Register 408>0╱                   │ Notify the PNM        │
          ╲────┬────╱                        │ operator to check the │
              Yes                            │ operational files.    │
     ┌─────────▼─────────┐                   └──────────┬──────────┘
     │ Check tho position of│                           │
     │ the ringer jumper on │              ┌────────────▼────────────┐
     │ the PCM.            │               │    Trouble cleared      │
     └─────────┬─────────┘                 └─────────────────────────┘
               │
          ╱────▼────╲
         ╱ Ringer jumper╲──No──────────────┐
         ╲    On       ╱                    │
          ╲────┬────╱                  ┌────▼─────────────┐
              Yes                      │ Move the ringer jumper│
     ┌─────────▼─────────┐             │ to On.           │
     │ Disconnect the telco│           └────┬─────────────┘
     │ line from the PCM and│               │
     │ connect it to a butt set.│     ┌──────▼───────────┐
     │ Dial the payphone   │         │  Trouble cleared │
     │ number from a nearby│          └──────────────────┘
     │ phone (or from the butt│
     │ set and hang up).   │
     └─────────┬─────────┘
               │
          ╱────▼────╲                    ┌──────────────────────┐
         ╱ Butt set  ╲──Yes─────────────▶│ Replace the PCM-5.   │
         ╲  rings    ╱                    │ Initialize the PCM   │
          ╲────┬────╱                     │ Refer to 2.7 Initializing│
              No                          │ the PCM.             │
     ┌─────────▼─────────┐                └──────────┬───────────┘
     │  Notify the telco  │                          │
     └──────────────────┘              ┌─────────────▼───────────┐
                                        │    Trouble cleared      │
                                        └─────────────────────────┘
```

4.1.7 FREQUENT COIN JAMS

Frequent Coin Jams

Jams in coin mechanism —No→

Yes↓

Mechanism is ECM —Yes→ Replace the ECM. → Trouble cleared

No↓

Check the payphone for vertical plumb. Refer to *2.2.2 Mounting Surface*.

Payphone plumb —No→ Correct payphone mounting.

Yes↓

Clean or replace the coin mechanism. Refer to *4.7 Cleaning the Coinco Style Coin Mechanism*.

Trouble cleared

Coins stick in trigger switch —Yes→ Replace trigger switch assembly. → Trouble cleared

No↓

Coins jam in hopper. Unplug the RJ11C connector from J11 on the PCM.
Measure the telco line voltage between the red and green wires at the terminal block or the telco interface box.

42VDC minimum —No→ Notify the telco

Yes↓

Remove the hopper assembly. Refer to *2.5 Preparing the Payphone for Installation*.
Check that hopper doors operate freely and that the cashbox opening is aligned.

Hopper doors operate freely —No→ Replace the hopper assembly. → Trouble cleared

Yes↓

Cashbox opening aligned —No→ Correct cashbox positioning.

Yes↓

Trouble cleared or no trouble found

4.1.8 BATTERY DISCHARGED

The lead acid storage battery in the Series-5 Line-Powered Payphone is charged whenever the payphone is off-hook. If the battery becomes discharged, it should be replaced with a fully charged battery Refer to Replacing the Battery.

The following possible **causes of premature battery discharge** should be investigated:

Insufficient Telco Line Current The telco line must supply sufficient current to power the PCM-5 and charge the battery. If the removed battery **can** be charged, or if the replacement battery also discharges (although this may take several months), test the telco line current. Refer to Section 4.5, *Testing the Telco Line Current*.

Defective Battery Lead acid batteries can develop plate sulfation which reduces the ability to supply current. Battery damage is relatively **rare** and usually only happens when a battery is allowed to remain discharged for an extended period of time. A discharged battery is more often the **symptom** of a problem and **not the cause**. Charge and test the removed battery. Refer to Section 4.3, *Charging the Battery*.

Excessive PCM-5 Current Consumption The PCM-5 electronics can become damaged and draw excessive current from the telco line, thus reducing the current available for charging the battery. This damage can be caused by voltage spikes when a payphone is not adequately grounded or if ESD precautions are not observed when handling the PCM-5. This condition usually results in rapid discharge of the battery. Test the ECM current consumption. Refer to Section 4.4, *Testing PCM-5 Current Consumption*.

Excessive Electronic Coin Mechanism (ECM) Current Consumption An ECM can become defective and draw excessive current from the telco line through the PCM-5. Test the PCM-5 current consumption. Refer to Section 4.4, *Testing PCM-5 Current Consumption*.

*Note: the following generally **do not** cause battery problems:*

- *Inadequate grounding (Except for the exposure to PCM damage).*
- *Line polarity (This has **no** effect on the battery).*

4.2 Replacing the Battery

The payphone may be equipped with a 500 mAH battery mounted on the back of the PCM-5 or a newer 1200 mAH battery resting in front of the coin relay on the floor of the housing. Either type battery may be replaced with either type battery.

4.2.1 REPLACING THE BATTERY WITH A 500 MAH BATTERY

▽ **CAUTION** ▽

Protect against electrostatic discharge by wearing a grounded ESD
wrist strap to avoid **equipment damage**.

1
- Unplug the battery cable connector from J8.

- If you are replacing a 1200 mAH battery, remove the old battery from the housing.

2
- Remove the PCM-5.

- If you are replacing a 500 mAH battery, remove the battery and bracket assembly from the back of the PCM-5.

Refer to Section 2.5, *Preparing the Payphone for Installation*.

▽ **CAUTION** ▽

When connecting the battery, do not force the connector. It is
designed to fit only one way. Improper connector orientation may
result in **equipment damage**.

3
- Install the new battery assembly on the back of the PCM-5

- Plug the battery cable connector into J8 on the PCM-5.

4	• Reinstall the PCM-5. • Reinstall the coin acceptor-rejector mechanism and chute. • Plug the upper housing cables into the PCM-5 connectors, but do not reinstall the upper housing.	Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation.*
5	Default the PCM-5.	Refer to Section 2.7.1, *Defaulting the PCM-5.*
6	Reinstall the upper housing.	
7	Download the site operational files.	Refer to Section 2.7.2, *Downloading Site Operational Files.*
8	Verify the download.	Refer to Section 2.8, *Verifying the Download.*

4.2.2 REPLACING THE BATTERY WITH A 1200MAH BATTERY

1	• Unplug the battery cable connector from J8. • If you are replacing a 1200 mAH battery, remove the old battery from the housing.	
2	If you are replacing a 500 mAH battery: • Remove the PCM-5. • Remove the battery and bracket assembly from the back of the PCM-5.	Refer to Section 2.5, *Preparing the Payphone for Installation.*
3	• Reinstall the PCM-5. • Reinstall the coin acceptor-rejector mechanism and chute. • Plug the upper housing cables into the PCM-5 connectors, but do not reinstall the upper housing.	Reverse the removal procedure in Section 2.5, *Preparing the Payphone for Installation.*

> **CAUTION**
>
> When connecting the battery, do not force the connector. It is designed to fit only one way. Improper connector orientation may result in **equipment damage**.

4	• Place the new battery assembly in front of the coin relay on the floor of the housing • Plug the battery cable connector into J8 on the PCM-5.	
5	Default the PCM-5.	Refer to Section 2.7.1, *Defaulting the PCM-5.*
6	Reinstall the upper housing.	
7	Download the site operational files.	Refer to Section 2.7.2, *Downloading Site Operational Files.*
8	Verify the download.	Refer to Section 2.8, *Verifying the Download.*

4.3 Charging the Battery

If the battery voltage measures less than 6.30 VDC on a digital multimeter, the battery needs to be charged.

An Elcotel BCT-1 Battery Charger/Tester is required.

1	Ensure that the BCT-1 transformer is plugged into a 115VAC outlet and attached to the INPUT 16VDC connector on the BCT-1.	*Note: Always disconnect any batteries from the BCT-1 when the input power is diconnected.*
2	Plug the battery connector into one of the four (1-4) BATTERY CHARGER connectors on the BCT-1 and charge for at least 24 hours.	The charge indicator LED above the corresponding battery connector on the BCT-1 should light. The charge indicator should go **off** within 24 hours and remain off for at least three hours..
3	Disconnect the battery from the charger and let it "settle" for 48 hours.	You might find it helpful to attach adhesive labels to batteries for recording charge date, settling time, and test date.
4	• Connect the battery to the BATTERY TESTER connector on the BCT-1. • Move the toggle switch to the **open** test position **momentarily**.	*Note: The wall transformer does not need to be connected to the BCT-1 for the testing steps.* The Open test indicator should light.
5	Move the toggle switch to the **Load** test position for **5 seconds**.	The Load test indicator should light for the full 5 seconds.
6	If the battery fails either test, repeat this procedure to ensure against insufficient initial charge.	A battery that fails the open circuit test but passes the load test may still be usable, but is deteriorating. A battery that fails the load test should be discarded.

4.4 Testing PCM-5 Current Consumption

The PCM-5 can become damaged and draw excessive current from the telco line. This can be caused by voltage spikes in a payphone that is not adequately grounded or if ESD precautions are not observed when handling the PCM-5. A typical symptom is rapid discharging of the PCM-5 battery.

Note: An accurate digital multimeter capable of 0.1 millivolt resolution is required.

1	Remove, but do not disconnect the upper housing.	A service hanger, or parking tool, is helpful when working with the separated upper and lower housings.
2	With the payphone **on-hook**, connect a digital multimeter, set to measure DC millivolts, between the pins labeled CURRENT on the PCM-5.	The meter should read no more than **40 microvolts DC**. Because many meters can not measure this small voltage accurately, a reading of no more than **0.1 millivolts DC** would indicate that there is no major problem.
3	• If a Mars MS-16 electronic Coin Mechanism (ECM) is installed, disconnect the cable from J15 on the PCM main board. • Go **off-hook** and wait 15 seconds.	The meter should read no more than **19 millivolts DC**. If either this **PCM** current test or the test in step 2 is not met, replace the PCM-5 and return the defective PCM to Elcotel for repair. *Note: Before returning a PCM, you should obtain return authorization from Elcotel.*
4	If the **PCM** current tests are met, reconnect the **ECM**, if installed, to J15 on the PCM-5 main board.	With a Mars MS-16 Electronic Coin Mechanism (ECM) connected to a known good PCM-5, the meter should read no more than **20 millivolts DC** off hook. (The ECM adds up to 1 mv.) If this test is not met, replace the ECM.
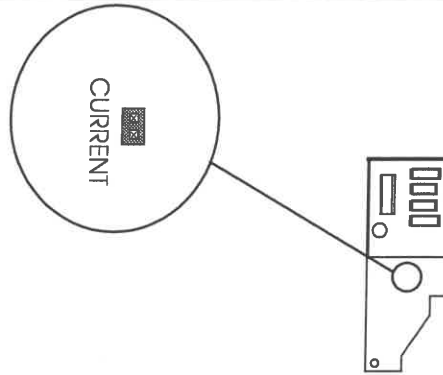
4.5 Testing the Telco Line Current

The telco line must supply sufficient current to operate the PCM-5 and charge the battery.

A digital multimeter is required.

⚠ WARNING ⚠

The telephone line uses dangerous voltage levels which can present an **electrical shock hazard**.

| 1 | Connect a digital multimeter, set to read up to 100 mA, between the payphone terminal block tipterminal (L2) and the tip wire of the telco line removed from L2.

Optionally, you can connect a butt set and the multimeter in series accross the telco line at the interface box and **leave the payphone on hook**. | |

| 2 | Go off hook with the payphone (**or** butt set). | Using the **payphone**, the meter should indicate at least **20 mA**.
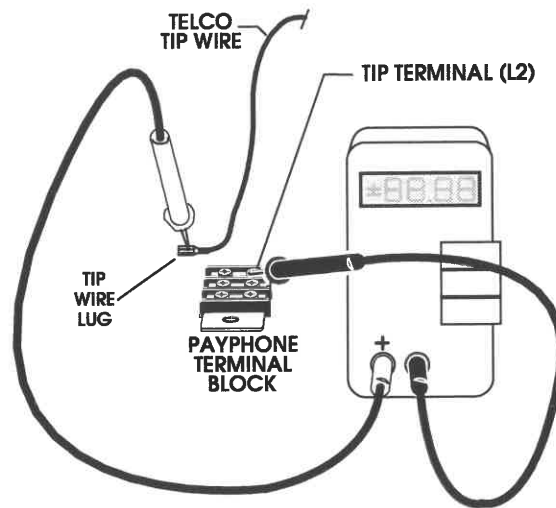
With the **butt set**, the meter should indicate at least **23 mA**. |
| 3 | If the current reading is less than required, contact the telco. | If the telco is unable to supply adequate line current, additional current can be supplied by an optional external DC power supply. Refer to Section 5.5, *External DC Power Supply*. |

4.6 Testing for Coin Detection

This procedure uses the payphone normal deposit calculation ability and human voice responses to check for proper coin detection.

1	• Go off hook. • Dial a local coin call. • When the payphone prompts for 25 cents, deposit a **nickel**.	*Note: The initial rate for a local call may be set to other than 25 cents in your payphone. The default is 20 cents. The concept remains the same. The payphone should recognize the deposit and calculate and prompt for the unpaid balance.*
2	If the payphone responds "Please deposit twenty cents," deposit a **dime**.	**If it does not**, go to Section 4.1.3, *Coins Not Detected* or return to the flowchart that directed you to this procedure.
3	If the payphone responds "Please deposit ten cents," deposit a **quarter**.	**If it does not**, go to Section 4.1.3, *Coins Not Detected* or return to the flowchart that directed you to this procedure.
4	If the payphone responds "Thank you," all coins were detected correctly.	**If it does not**, go to Section 4.1.3, *Coins Not Detected* or return to the flowchart that directed you to this procedure.

4.7 Cleaning the Coinco Style (Mechanical) Coin Mechanism

The most important action you can take to ensure proper operation of the coin acceptor-rejector is cleaning the unit.

Note: Do not lubricate the coin mechanism. Lubrication retains dirt and can increase the chance of malfunction.

⚠	**WARNING** Handle hot water carefully to avoid **personal burn injury**.	⚠

▽	**CAUTION** This procedure is only for mechanical coin mechanisms. Do not use this procedurefor Electronic Coin Mechanisms (ECMs) because it could result in **equipment damage**.	▽

1	Remove the coin mechanism from the payphone.	Refer to Section 2.5, *Preparing the Payphone for Installation*.
2	• Place the mechanism in hot (boiling point) water and soak it for at least 10 minutes. • Use a tootbrush and detergent to remove remaining dirt from the mechanism.	Remove **all** dirt, especially any metal particles.
3	Rinse the mechanism in **clean** hot (boiling point) water and allow it to dry.	You can also dry the unit with **clean** compressed air, if available.

4.8 Connecting the Handset, Keypad, and Hookswitch

The Elcotel-specified handset for use in the Series-5 payphone is the Quadrum LO-009200-CAZR (GTE style). The handset has a four-wire four-color cable. The following table shows the terminal board connections for:

- Quadrum Housing - 2200

- Quadrum Terminal board HB-1317

- Quadrum handset assembly LO-009200-CAZR (GTE style)

- Quadrum hookswitch assembly HD-500040T, HD-500071A, or HD-500071B

Table 4-1 Upper Housing Wiring

Assembly	Color	HB-1317 Terminal
Keypad	Violet	1
	Green	2
	Red/White	7
	White	9
	Black	12
	Pink	15
	Blue	A
Handset receiver	Yellow	4
	Black	B
Handset Transmitter (Mic)	Red	6
	Green	15
Hookswitch	Red/White	1
	Yellow (if present)	4
	Pink	11
	Gray (if present)	B
Jumper J1	PCM-5	Short 1 and 2

Note: There are other handset assemblies in general use that look like the specified Quadrum handset.
Do not use handsets other than those specified by Elcotel. *Refer to Section C, Retrofitting the PCM-5.*

4.9 Upgrading the PCM-5 Default Firmware (EPROM)

The EPROM on the PCM-5 contains the firmware and registers and options settings that are used by the payphone when in the default state. The firmware in the EPROM is also used in normal operation if no V94 file is downloaded. If the firmware is enhanced and/or features are added, the later version can be downloaded to the payphone RAM from the network management system in a new V94 file. The downloaded firmware is then used in normal operation. If, for some reason, you decide that you want the default firmware to also be at the later version, you can change the EPROM on the PCM to the later version, using the following procedure.

An electrostatic discharge (ESD) wrist strap and a chip extraction tool are required.

1
- Disconnect the battery from J8 on the PCM-5.

- Disconnect the line from J11 on the PCM-5.

CAUTION

Protect against electrostatic discharge by wearing a grounded ESD wrist strap to avoid **equipment damage**.

2
- Note the orientation of the notch on the EPROM.

- Gently lift the EPROM (U3 - PGM) from the socket with a chip extraction tool.

- Insert the new EPROM, ensuring correct orientation and that no pins are bent under or outside the socket.
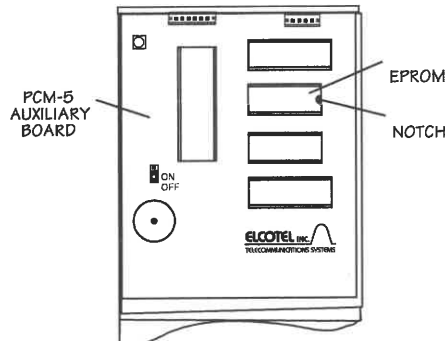
CAUTION

When connecting the battery, do not force the connector. It is designed to fit only one way. Improper connector orientation may result in **equipment damage**.

3
- Reconnect the battery to J8 on the PCM-5.

- Reconnect the line to J11 on the PCM-5.

4	Initialize the payphone.	Refer to Section 2.7, *Initializing the Payphone.*
5	Verify the download.	Refer to Section 2.8, *Verifying the Download.*

5. OPTIONAL HARDWARE FEATURES

Installation instructions are included in the package with each option when shipped from Elcotel. They are included in this manual also for the purposes of planning for option installation and to ensure availability for reference during any future repair actions on payphones with options.

5.1 Magnetic Card Reader

The Magnetic Card Reader is available **only** as a **factory installed** option. Payphones with a card reader are supplied with a white information card and a self-adhesive instruction label.

5.1.1 PREPARING THE CARD READER FOR USE

1	On the white information card, type or write with ball-point pen any required information in the appropriate spaces.

2
- Unlock and unlatch the upper housing.

- Support the upper housing while you separate it from the lower housing.

- Disconnect the cable from J5 on the PCM-5 main board.

- Disconnect the card reader cable from J3 on the PCM-5 auxiliary board.

- If the payphone has an optional volume control, disconnect the connector from J3 on the PCM-5 main board.

- Remove the upper housing.

*Note: When you are **installing** a payphone with the Credit Card Reader option, this is done in step 1 of xxx.*
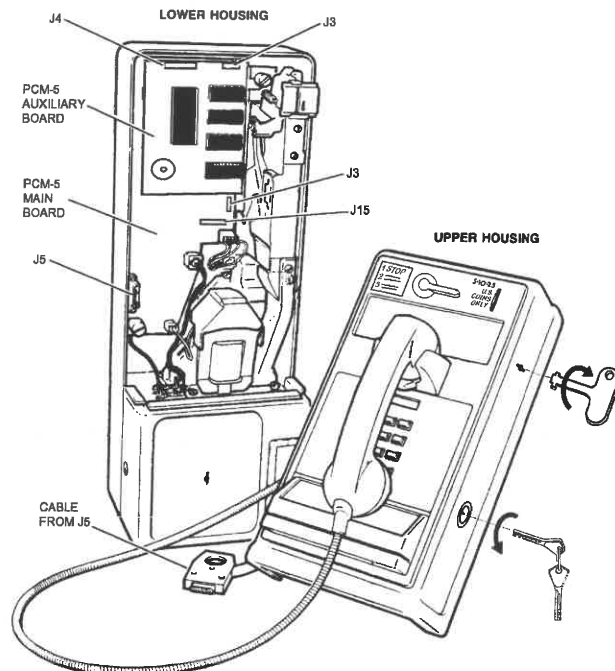
3 From inside the upper housing, remove the two screws and lock washers holding the card reader to the upper housing.

4 Pull the card reader outer shell straight away from the upper housing.

The outer shell separates from the card reader chassis, leaving the chassis still attached to the upper housing.

UPPER HOUSING

CREDIT CARD
READER
(OUTER SHELL)
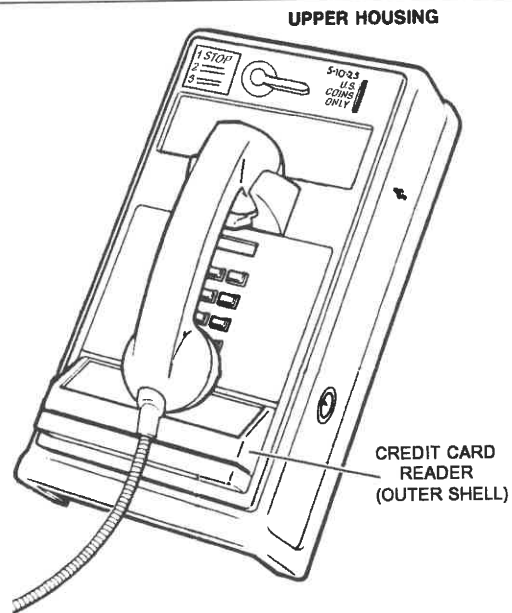
5 • Remove the plastic window from the spring clips in the card reader outer shell.

• Peel the protective material from both sides of the window.

• Reinstall the window.

• Slide the white plastic information card between the spring clips and the window.
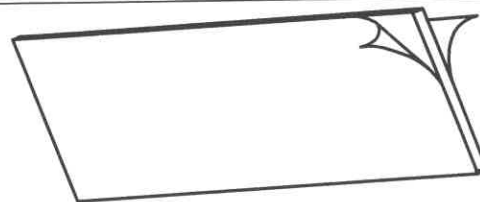
Note: Make sure that the information card is right-side-up and centered in the window opening.

6 Reinstall the card reader outer shell.

7 Ensure that the payphone face plate is free of dirt or oil and apply the self-adhesive card reader instruction label.

Note: The label may be placed at any visible location on the payphone. Use care when applying the label because its design to prevents it from being removed intact.

8 Reinstall the payphone upper housing.

*Note: When you are **installing** a payphone with the Credit Card Reader option, this is done in xxx.*

5.1.2 ENABLING THE CARD READER

When a payphone is installed, the operational files should be downloaded as soon as possible. Be sure that the PNM operator knows that the payphone has the Credit Card Reader option so that the site operational files are correct when downloaded.

However, if you are not going to download operational files immediately or if you need to enable the credit card reader in a payphone already downloaded with site operational files that are correct except for the credit card feature, use the following procedure to enable the credit card reader.

Note: On a new installation, the payphone should first be defaulted according to Section 2.7.1, Defaulting the PCM-5.

1	• Go off hook. • Enter "#" and the owner bypass code. For example, "#12345678". • Wait four seconds.	This step accesses the voice telemetry mode.
2	Enter "103", enable card reader option number and listen for the response "103 OFF."	This verifies entry into voice telemetry mode and indicates that the credit card option is **not** enabled. If the payphone responds "Invalid number," you may have entered an incorrect bypass code. Go back on hook and begin this procedure again.
3	Enter "**" and listen for the response "103 ON."	This enables the credit card reader.
4	Go on hook.	

5.1.3 TESTING THE CARD READER

A valid credit card is required for this procedure.

1	• Go off hook. • Dial a valid 0+ telephone number. • Listen for a "bong" tone or voice prompt "Please swipe card."
2	With the magnetic strip facing **down**, slide a valid card through the reader from right to left.
3	Listen for "Thank you."
4	Go back on hook.

5.2 Volume Control Button

The volume control button provides four levels of volume through the handset earpiece, starting with the lowest level and increasing in 3 dB increments with each push of the button. The fourth push returns the volume to the lowest level.

In order for the volume control button to function correctly, the volume control value in the payphone master record in PNM must be set to "0", the lowest value. This value is stored in register 501 in the payphone.

The volume control button mounts in place of the orange information plate on the upper housing. The volume control button is available as a factory option or can be installed in the field.

5.2.1 INSTALLING THE VOLUME CONTROL BUTTON

> ⚠️ ⚠️
> # WARNING
> Always wear approved eye protection when performing tasks that involve hand tools and activities such as cutting, prying, drilling, and filing in order to prevent **personal injury**.

1
- Unlock and unlatch the upper housing.
- Support the upper housing while you separate it from the lower housing.
- Disconnect the cable from J5 on the PCM-5 main board.
- If the payphone has a card reader, disconnect the cable from J3 on the PCM-5 auxiliary board.
- Remove the upper housing.
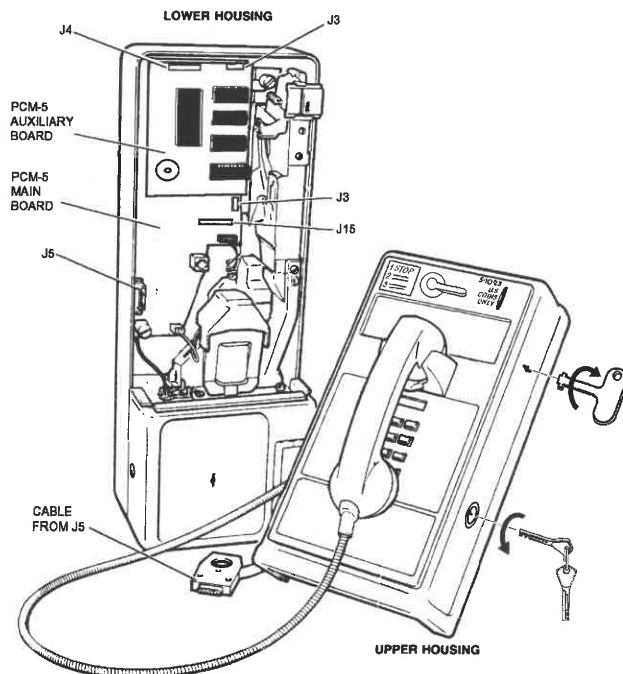
2
- Place the upper housing on a flat work surface.
- Use pliers or cutters to remove spring retainer **A** from the mounting stud so the spring can be unhooked
- Remove nuts **B** with a 5/16" nut driver.
- Remove the orange information plate.
- Enlarge the two information plate mounting holes to 7/32".
- Deburr the holes and remove any loose metal particles from the housing.
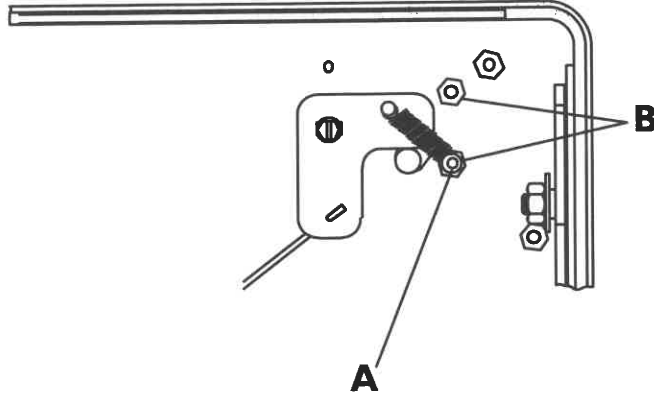
3
- Ensure that there is a piece of insulating tubing **C** on each stud of the volume control button.
- Insert the volume control button studs through the enlarged holes.
- Slide a plastic spacer **D** onto each stud.
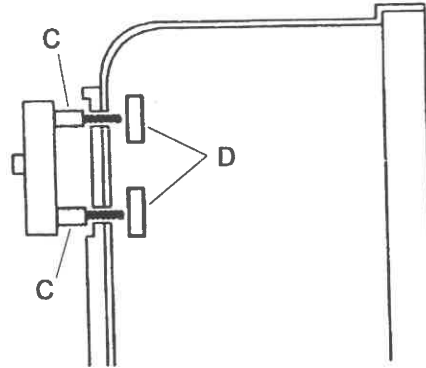
4
- Hook the free end of the return spring through the small hole in the fiberglass spring anchor.
- Slip the anchor onto the volume button studs.
- Install a large brass nut on each stud.
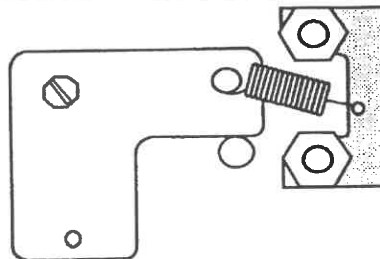
5	Operate the coin return lever several times to check for freedom of movement. Ensure that the return spring does not touch the mounting studs or nuts when the lever is operated.	If the linkage rubs on the upper plastic spacer, trim some material from the spacer to provide clearance.
6	Ensure that the studs are insulated from the housing by testing with an ohmmeter and correcting the mounting if necessary.	
7	Secure the spade lug end of each volume control cable assembly wire to a stud with a lock washer and small nut.	
8	**Caution:** Ensure that the connector is oriented as shown. Plug the volume control cable connector into J4 on the auxiliary board.	
9	Reinstall the upper housing	Reverse the process in step 1.
10	Ensure that register 501 is set to "0".	Use voice telemetry to query register 501, the starting volume level. If not "0," use voice telemetry to set register 501 to 0 and inform the PNM operator to change the payphone master record for the next download.
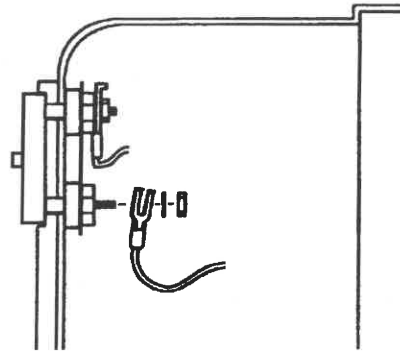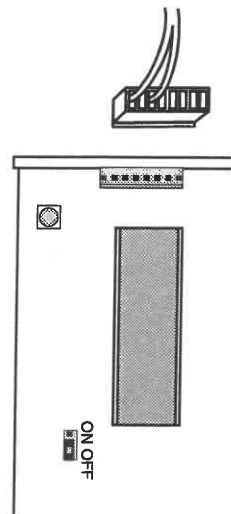
5.2.2 TESTING THE VOLUME CONTROL

The volume control changes the sound level in 3 dB increments which should be clearly distinguishable by ear.

1	Go off hook and note the dial tone sound level.	This should be the lowest level encountered. *Note: Register 501 must be set to "0".*
2	Press the volume button once.	There should be an easily detectable increase in the dial tone volume.
3	Press the volume button two more times, listening after each press.	The volume level should increase with each press. If it does not, press the button until the lowest level is heard and repeat steps 2 and 3.
4	Press the volume button again.	The level should return to the lowest (initial) level.
5	• Press the button once or twice to increase the level. • Go on hook.	Going on hook should reset the volume to the lowest level.
6	Go off hook and verify that the volume level is at the lowest level.	If the volume does not start at the lowest level and/or increments, but not correctly, the most likely cause is that register 501 is not set to "0". If the volume does not increment at all, recheck the installation.

5.3 Electronic Coin Mechanism (ECM)

5.3.1 INSTALLING THE ECM

1
- Unlock and unlatch the upper housing.
- Support the upper housing while you separate it from the lower housing.
- Disconnect the cable from J5 on the PCM-5 main board.
- If the payphone has a card reader, disconnect the cable from J3 on the PCM-5 auxiliary board.
- If the payphone has an optional volume control, disconnect the cable from J4 on the PCM-5 auxiliary board.
- Remove the upper housing.
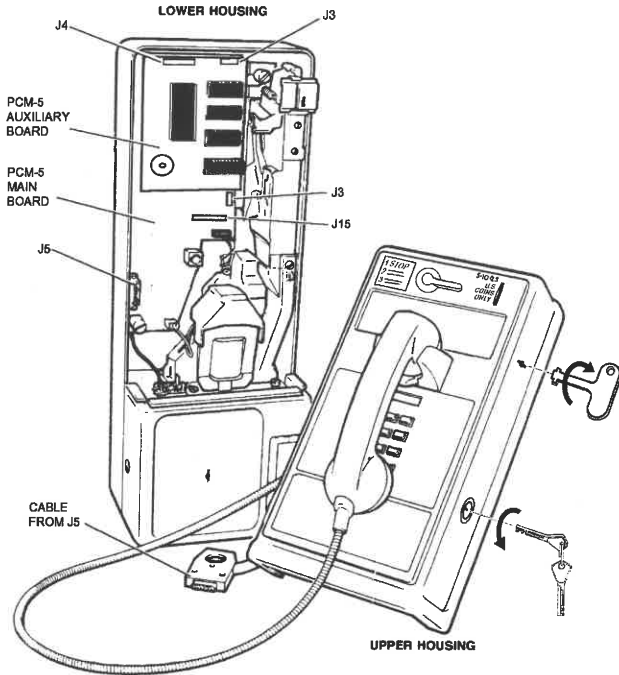
2
- Remove captive screw **A**.
- Tilt and remove the rejector chute. **Note:** The rejector chute can be left in the payphone but it must be angled forward.
- Loosen cap nut **B** one turn.
- Lift and remove the coin acceptor rejector.

Note: The coin accepter rejector cap nut and rejector chute are used in the new installation.
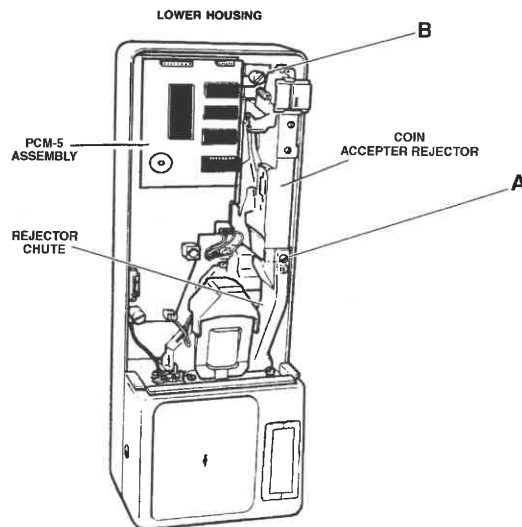
3
- Disconnect the trigger switch connector from J4 on the PCM-5.
- Remove screw **C**.
- Remove the trigger switch assembly.

PCM-5

J4

C

TRIGGER
SWITCH
ASSEMBLY
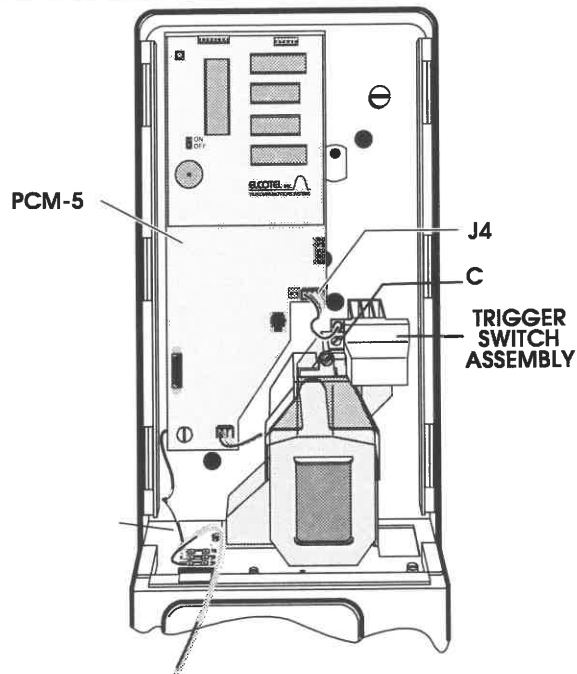
4
- Install the hopper top retainer in place of the trigger switch, ensuring that the tab on the back of the retainer goes into the slot on the back of the lower housing.

  This is best done by pushing the hopper toward the back of the housing with one hand and installing the retainer with the other hand.

- Fasten the retainer to the hopper with the supplied 8-32 screw, being careful not to overtighten the screw.

HOPPER
TOP
RETAINER

TAB
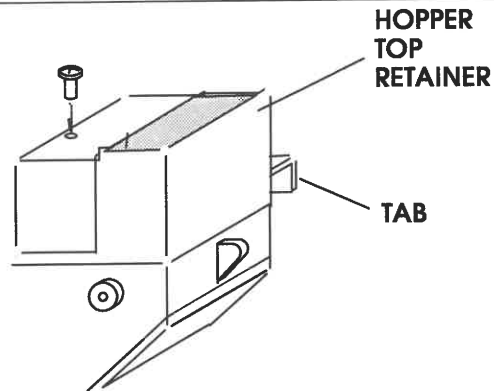
Note: Double check to assure that the retainer tab is in the slot.

5
- For first time installation, tighten the retaining nut, without the ECM in place, until it bottoms on the housing. Then **loosen** the nut **one turn.**

- Install the ECM by inserting the collection chute into the hopper top retainer opening and placing the keyhole slot over the retaining nut.

- Tighten the retaining nut, ensuring that the ECM chassis rests on the retaining nut shoulder, **not** on the threaded stud. There **must not** be any gap between the nut and ECM chassis.
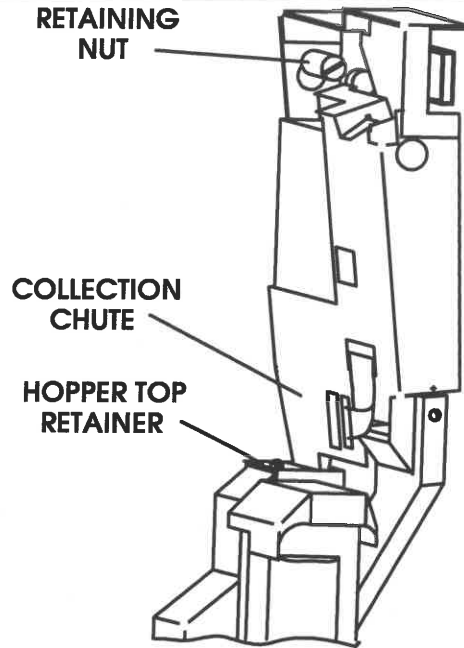
Note: To remove the ECM, it is only necessary to loosen the retaining nut 1/4 turn.

RETAINING NUT

COLLECTION CHUTE

HOPPER TOP RETAINER

RIGHT!
ECM CHASSIS
NO GAP
NUT
SHOULDER
NOTE: ECM CHASSIS RESTS ON SHOULDER OF NUT

WRONG!
ECM CHASSIS
NOTE GAP
NUT
NOTE: ECM CHASSIS RESTS ON STUD.

---
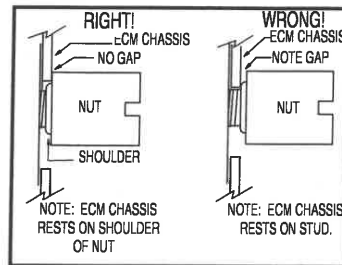
6 Reinstall the coin rejector chute, ensuring that it is properly aligned with the anti-stuffing device opening.

Reverse step 2.

---

7 Plug the ECM cable connector into J15 on the PCM-5.

J15 - ECM
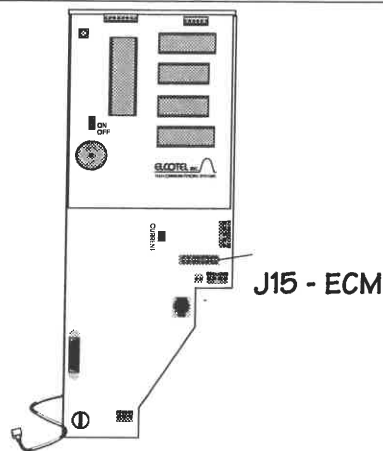
| 8 | • Remove screws **D** and the original guide fork from inside the upper housing.

• Install the replacement guide fork. | |

GUIDE FORK

D
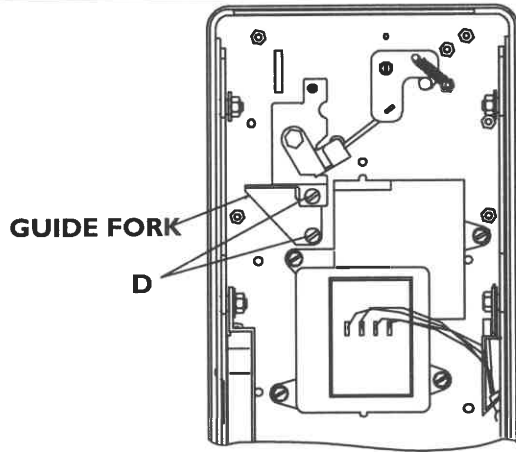
| 9 | Reinstall the upper housing. | Reverse step 1.

Note: The ECM should not interfere with installation of the upper housing. If difficulty is encountered, recheck for proper installation and alignment of the ECM and related components. |
| 10 | • Look into the coin slot to assure that the ECM chute opening aligns with the coin slot.

• Open the upper housing, loosen and and adjust the guide fork left or right as necessary to align. | |

5.3.2 TESTING THE ECM

1	Operate the coin release lever several times and verify that the action is smooth and consistent.	If it is **not**, recheck for proper installation. The cause of chute binding **must** be found and corrected. A binding chute causes coin jams.
2	Using a flashlight, look into the coin slot and verify that the right hand upper chute moves when the coin lever is operated.	If it does **not**, recheck for proper installation and adjustment of the guide fork mechanism.
3	While on hook, deposit a coin.	The coin should fall into the anti-stuffing device. If it does **not**, check for proper installation of the rejector chute. Ensure that the payphone mounting is plumb.
4	Test for proper coin detection.	Refer to Section 4.6, *Testing for Coin Detection*.

5.4 Cashbox Vault Door Alarm Switch

The cashbox vault door alarm switch option further automates the monitoring of cashbox collection activity. Without this option, Alarm 3, the Cash Vault / Bypass Code alarm must be triggered by the collector manually entering the cashbox collection code. With this option, when the cashbox vault door is unlatched, this switch triggers Alarm 3 automatically. If Alarm 3 is enabled (option 703 ON) and the network management system modem number is stored in register 333 or 334, the payphone then calls home to the network management system and reports the alarm.

1
- Unlock and unlatch the upper housing.
- Support the upper housing while you separate it from the lower housing.
- Disconnect the cable from J5 on the PCM-5 main board.
- If the payphone has a card reader, disconnect the cable from J3 on the PCM-5 auxiliary board.
- If the payphone has an optional volume control, disconnect the cable from J4 on the PCM-5 auxiliary board.
- Remove the upper housing.
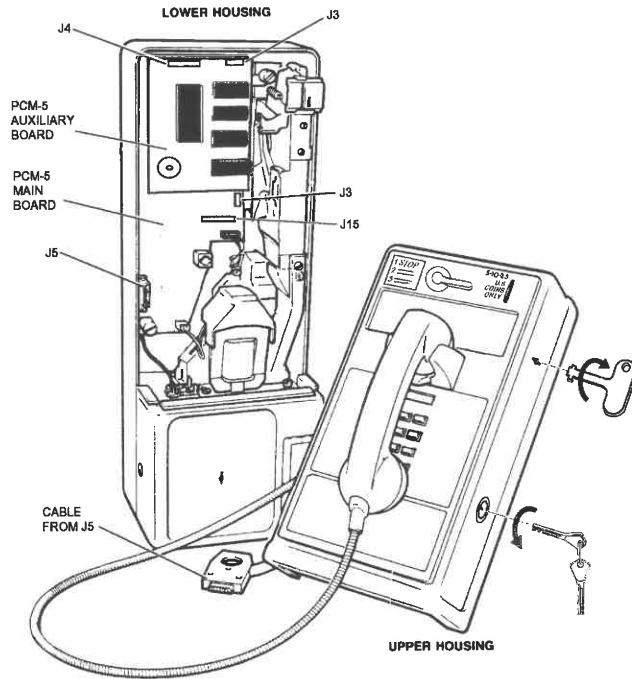
2
- Attach the switch and bracket assembly to the lower housing using the supplied screws and washers **A**. Leave the screws slightly loose.

- Position the bracket so the switch lever is centered, front to back, in the square hole **B**. Ensure that the lever is not touching the housing.

- Tighten the screws **A**.

- Loosen the two screws **C** that attach the switch to the bracket.

- With the vault door installed and latched, slide the switch down the bracket, keeping the switch horizontal, until the body of the switch just touches the lever **D**.

- Tighten screws **C**.
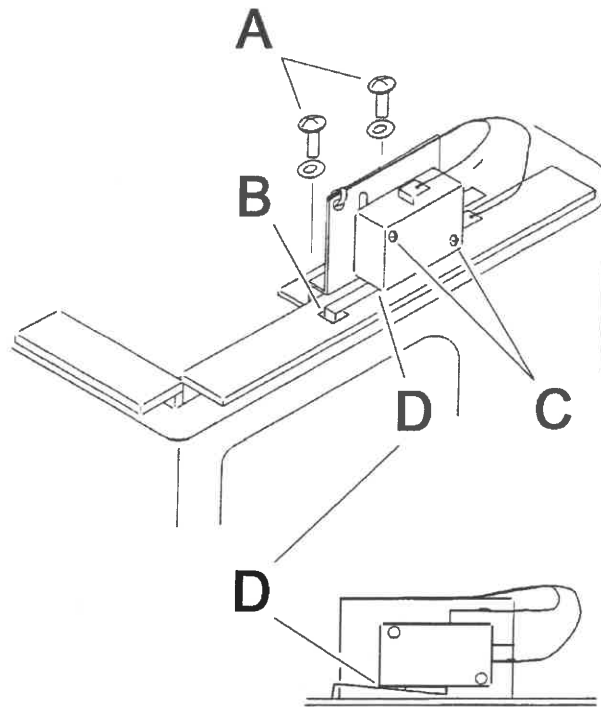
CAUTION

Do not insert meter probes into the connector on the switch cable.
Doing so may **damage the contacts**.

3	Attach ohmmeter probes to the terminals of the switch where the wires are attached.	With the vault door still **latched**, the ohmmeter should indicate **high resistance** (open circuit).
4	Unlatch the vault door and verify that the ohmmeter reading changes to **low resistance** (closed circuit).	**If it does not**, the switch lever may be binding on the lower housing. Readjust the switch until it operates smoothly and consistently when latching and unlatching the vault door.
5	With the vault door latched, lightly push and pull on the switch bracket. This should **not** activate the switch.	**If it does**, the switch must be adjusted slightly further **down** on the bracket (as in step 3) so that it is not so sensitive. Readjust and retest as necessary so the switch operates correctly with the vault door latch but is not likely to be activated by vibrations in the payphone.

---

6   Plug the switch cable
     connector into J3 on the
     PCM-5 **main board**.
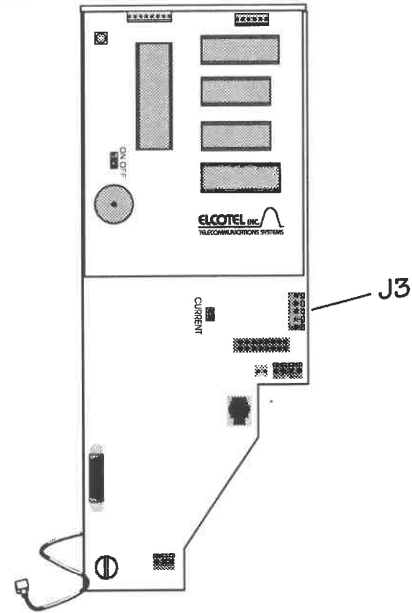
7   Reinstall the upper housing.   Reverse the process in step 1.

5.5 External DC Power Supply

If the telco line cannot consistently supply the required 23 ma DC, this power supply can be used to provide sufficient current to operate the PCM and charge the battery. The 16 VDC power supply plugs into a standard 110 VAC wall outlet and can located up to 500 feet from the payphone, using two-conductor 22-18 AWG solid or stranded wire. Access to the wall transformer and protection of the connecting wire should be given the same consideration as the telco interface box and phone line.

The external power supply option includes a **wall transformer** and a **PCM-5 assembly** with DC option and a connector.

Note: This procedure assumes that the power supply option is being installed as part of the initial installation of the payphone according to Section 2, Installing the Payphone.

⚠	CAUTION
	Ensure that the power is unplugged when starting this procedure in order to avoid **equipment damage**.

1

- Strip approximately 3/8 inch of insulation from both conductors at one end of a two-conductor 22-18 AWG solid or stranded wire cable of sufficient length to run from the power supply at the AC receptacle to the payphone. You can use available wires in the phone line if the site configuration accomodates it.

- Connect one conductor to the "+" terminal and the other to the "-" terminal on the power supply. Note the color of the wire attached to the "+" terminal.
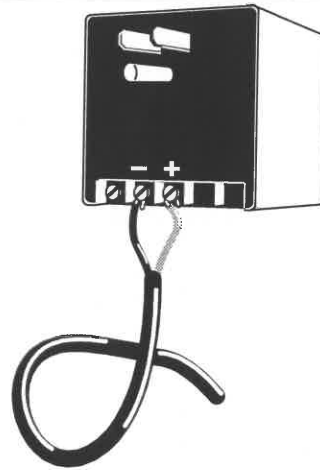
*Note: The "AC GND" terminal is **not** used for this application.*

*Note: If the wires cannot be distinguished by color coding, use a multimeter to identify the positive wire at the telephone end of the cable. Mark the positive (+) conductor at the payphone end of the cable with a wire marker or other means for future reference. **Be sure to unplug the wall transformer before continuing**.*

2	Route the cable from the power supply location to the payphone such that the cable is dry and secure.	
3	• Route the cable through the backboard channel and wire entrance hole. • Mount the backboard.	Refer to *xxx.*
4	• Route the wire through the payphone wire entrance hole along with the telco line. • Mount the payphone. **Note:** Be sure to install the PCM-5 assembly with DC option in place of the original PCM-5. • Remove the connector from J7 on the replacement PCM-5.	Refer to *xxx.* J7 - EXTERNAL DC POWER SUPPLY, TIP, AND RING (ONLY ON PCM-5 WITH DC OPTION)
5	• Strip 1/4 to 3/8" of insulation from the payphone end of the power supply conductors. • Insert them into the connector as shown and tighten the set screws. *Note: If you are using conductors in the telco cable for the power supply, for convenience you can optionally also connect the tip and ring wires through the connector as shown.*	 RING TIP (OPTIONAL CONNECTIONS) DC + DC -
6	• Plug the connector into J7 on the PCM-5. • Plug the wall transformer into a 110 VAC outlet.	
7	Complete the payphone installation.	Refer to xxx.
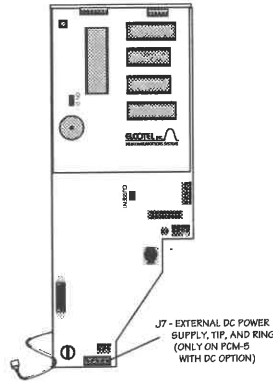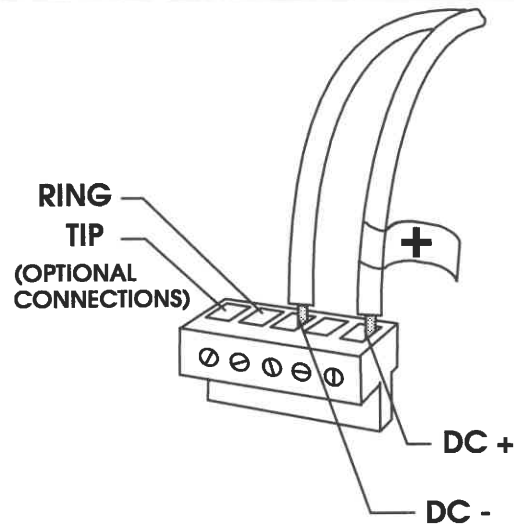
5.6 Bilingual Voice Chip

You can install an optional bilingual voice chip which provides a set of high quality digitally-recorded voice prompts in English and Spanish.

An electrostatic discharge (ESD) wrist strap and a chip extraction tool are required.

| 1 | • Disconnect the battery from J8 on the PCM-5.

• Disconnect the line from J11 on the PCM-5. |

CAUTION

Protect against electrostatic discharge by wearing a grounded ESD wrist strap to avoid **equipment damage**.

| 2 | • Note the orientation of the notch on the voice chip.

• Gently lift the voice chip (U2) from the socket with a chip extraction tool.

• Insert the new voice chip, ensuring correct orientation and that no pins are bent under or outside the socket. | PCM-5 AUXILIARY BOARD / Voice Chip U2
ELCOTEL INC. TELECOMMUNICATIONS SYSTEMS |
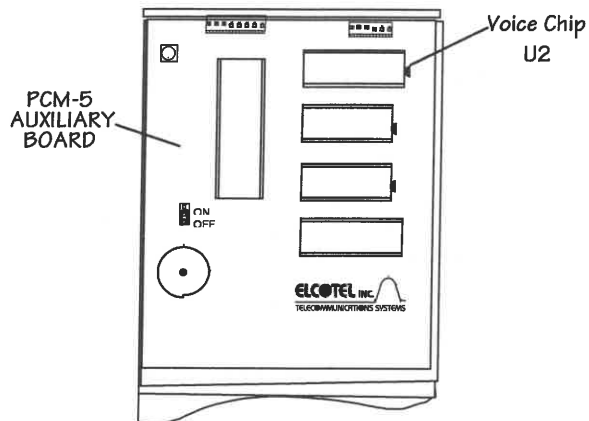
CAUTION

When connecting the battery, do not force the connector. It is designed to fit only one way. Improper connector orientation may result in **equipment damage**.

3	• Reconnect the battery to J8 on the PCM-5. • Reconnect the line to J11 on the PCM-5.	
4	Initialize the payphone.	Refer to Section 2.7, *Initializing the Payphone.*
5	Verify the download.	Refer to Section 2.8, *Verifying the Download.*

APPENDIX A. SPECIFICATIONS

Housing Dimensions:	21 x 7-5/8 x 6 inches
Payphone Weight	48 lbs.
Handset:	Hearing aid compatible (HAC)
Coin Acceptance:	Nickel, dime, quarter
Power:	Telephone line powered, 48VDC (on hook), 23 mA loop current (off hook)
	Internal rechargeable lead-acid gel cell, 6V, 500 mAH.
Operating Temperature Range	-4 to +140 Degrees Fahrenheit
Telco line type:	COCOT (PAL), B-1, Loop Start
Loop Current Range:	23 mA to 80 or 100 mA
Ringer Equivalaency Number (REN):	0.7B
FCC Registration Number	E2DUSA-61027-CX-E
Telco Line Interface:	Internal to payphone, terminal strip with standard US RJ11C connector terminated cable and RJ11C jack on printed cicuit board.
Coin Relay Driver:	Internally provided +/- 80 VDC
Voice Prompts:	High quality digitally-recorded female voice in English.

APPENDIX B. TOOLS AND SUPPLIES FOR INSTALLATION

Standard Tools

#1 Phillips screwdriver
#2 Phillips screwdriver
1/4" blade screwdriver
stubby screwdriver
1/4" nut driver
3/8" nut driver
5/16" nut driver
7/32" metal drill bit or round file
analog multimeter
crimping tool
digital multimeter
drill bits, wrenches, sockets, extensions, handles for payphone mounting
electric drill
flashlight
lineman's pliers
needle nose pliers
ruler/tape measure
spirit level
wire cutters
wire stripper

Special Tools

BCT-1 Battery Charger/Tester
butt-set
chip extraction tool
Elcotel Power Analyzer Test Set (optional)
ESD wrist strap
pocket dialer
service hanger
T-wrench

Supplies

1/4 -20 by 5/8 security bolt(s)
backboard mounting hardware (fasteners)
caulking compound
ground wire
telephone cable

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APPENDIX C.   RETROFITTING THE PCM-5

The Series-5 Payphone Control Module (PCM-5) can be purchased and retrofitted to existing Quadrum/GTE style payphones. The correct version of the payphone network management system is also required for managing the resulting Series-5-equivalent payphone.

Physically, retrofitting requires only removing the existing payphone chassis or PCM assembly and replacing it with the PCM-5. Instructions in xxx and yyy can be used.

Requirements and procedures in zzz also apply to a PCM-5 retrofitted payphone.

If you are retrofitting an Elcotel Series-3 or -4 payphone, new site operational files can be based on existing equivalent Series-3 or -4 files. Refer to the network system manager manual(s) for more information and instructions.

The following are Elcotel-specified handsets for use in the Series-5 payphone. There are other handset assemblies in general use that look like the specified handsets. **Do not use other than those handsets specified by Elcotel**.

- Quadrum handset LO-009200-CAZR
- Audio-Sears 2102L00AGSB-AII34
- IdTel IDT10
- Robbins CPR 321NII-R1-SSELC
- Bektel 32LXE

Glossary

ANI Acronym for Automatic Number Identifier. ANI is commonly used incorrectly as a term to identify the payphone site telephone number (NPA-NXX-XXXX).

answer detect The ability to determine when a call is answered. The payphone can be programmed to use answer detect to determine when to collect or refund coins. Answer detect is also referred to as " answer supervision" and "voice detect."

answer supervision The ability to determine when a call is answered. The payphone can be programmed to use answer supervision to determine when to collect or refund coins. Answer supervision is also referred to as " answer detect" and "voice detect."

auxiliary board The printed circuit board which is mounted above (in front of) the main board on the Payphone Control Module (PCM) assembly. Sometimes referred to as the "piggyback" board.

AWG Abbreviation for American Wire Gauge, the pricipal American standard for designating the size of wire. The larger thenumber, the smaller the cross-sectional area of the wire.

B-1 Line A loop-start telephone line commonly used for Smart payphone operation. Payphones operating on a B-1 line must perform rating, routing, and answer supervision.

backboard A flat, strong device used as a mount behind a payphone, for example, when mounting a payphone in a surface-wired location, or when a pre-drilled mounting surface is not available.

barrier-free area an area where there are no obstructions to wheel-chaired physically-handicapped access.

BONG In 0+ dialing protocol, the signal which alerts the user to enter a telco credit card number (or swipe the card). The BONG sound may be created by either the CO (external) or by the payphone (internal).

"Burn to EEPROM" command An instruction which copies selected files or data currently in RAM to an Electrically-Erasable Programmable Read Only Memory chip.

butt set A test set for testing a telephone line.

call completion The moment when the payphone determines that coins should be collected. Call completion occurs a specified amount of time (call completion timer) after answer detect.

call home Call from a payphone to PNM.

call screening A telco subscription feature that protects the payphone owner from fraudulent calls by alerting the telco operator that the phone is a payphone and, therefore, not a billable number.

call termination The moment when either the called party or the caller hangs up or the purchased time expires and the call is terminated.

cashbox The metal container for coins which are accepted as payment for the call.

cashbox vault The portion of the lower housing of a payphone which protects the cashbox.

central office The central office (CO) is the place where telephone calls originate. When dialing out of the LATA, the CO switches the call to the proper carrier.

clearing The process of erasing "counts" accumulated by counters, or the "flags" (warning notes) about alarms posted in PNM screens.

CO Abbreviation for Central Office.

COCOT Acronym for Customer-Owned, Coin-Operated Telephone.

coin chute assembly The unit that channels the coins past the coin detect switches before they enter the coin-relay hopper.

coin-relay hopper The assembly that temporarily stores the coins until call completion, when it channels the coins to the cashbox, or, if the call attempt is terminated prior to call completion, it refunds the coins to the coin return receptacle.

coin return receptacle The die-cast tip-out container labelled "PUSH FOR COIN" that receives refunded and rejected coins.

current The flow of electricity, measured in amperes.

decibel A unit which measures the relative difference in sound power. One decibel (1 dB) is the smallest amount of change in sound power level that the human ear can detect. A three decibel (3 dB) change represents a doubling or halving of power.

default A value which is in effect initially and/or in the absence of a user-specified value.

dial housing The mount for the touch control unit, terminal board and the hookswitch, which mounts onto the upper housing.

disable To turn OFF a smart payphone option.

discount period Period of time during which less than the full price of a call may be charged.

DMM Abbreviation for Digital MultiMeter, an instrument used to check grounding and to measure resistance and voltage.

downloading The process of sending data or complete files from PNM to the payphone or from the Elcotel On-Line (EOL) bulletin board system to PNM.

DTMF Abbreviation for Dual Tone Multi-Frequency signals, which are analog signals created by telco equipment, a keypad or "TCU" (touch call unit), or a pocket dialer.

ECM Abbreviation for Electronic Coin Mechanism.

Enable To turn ON a smart payphone option.

EEPROM Acronym for Electrically-Erasable Programmable Read-Only Memory. This memory chip is similar to an EPROM except that this memory chip can be erased and reloaded after receiving an electronic signal, either through voice telemetry or by using PNM in modem telemetry.

EPROM Acronym for Erasable Programmable Read-Only Memory. This memory chip can be erased and reprogrammed, but only by a special process in a factory setting. Once programmed, it is non-volatile; that is, loss of power does not cause loss of data.

exchange A telco switching center identified by a three-digit prefix (NXX). All telephones within the exchange usually share the same schedule of charges.**FCC** Federal Communications Commission

FCC (Interstate) Refers to telephone rates regulated by the Federal Communications Commission for calls which cross state borders.**frequency** The number of repetitions per unit of time of a complete waveform, as of an electric current. Frequency is measured in Hertz.

HAC Abbreviation for Hearing Aid Compatible.

handset The hand-held unit that contains the payphone receiver and microphone.

hertz (Hz) A unit of frequency equal to one cycle per second.

hookflash A momentary "on hook" signal.

hookswitch A switch that is actuated by the removal of the handset from its hanger. An "off-hook" status signals the TCU terminal board to open the line, returning dial tone to the receiver. "On-hook" status signals the TCU to close the line.

housing The metal body, or cabinet, of a payphone.

interLATA Refers to a call from one LATA (Local Access and Transport Area) to another. These calls are carried by an Inter-exchange Carrier (IXC).

intraLATA Refers to calls within the same LATA (Local Access and Transport Area). These calls are carried by the Local Exchange Carrier (LEC).

interstate (FCC) Refers to telephone rates regulated by the Federal Communications Commission for calls which cross state borders.

IXC Abbreviation for Inter-exchange Carrier, a company that carries telephone communications from one LATA to another.

loop The local path between the Central Office and the payphone. An electrical current path comprised of one conductor from the CO to the telephone and another conductor from the telephone back to the CO forms the loop. The loop conductors are called "tip" and "ring."

loop start A method used to signal the CO that a calling party has gone off-hook. The CO switching system supplies battery (voltage) on one side of the line and ground on the other side. When a connection is made between tip and ring at the payphone, current flows through the completed loop. Note that the telco line may be either a loop start line or a ground start line.

low level command A single instruction that the PCM and operating system can execute. A low level command causes the payphone to perform an action related to the protocol involved in placing a call, such as "enable keypad", "initiate dialing sequence", "start answer detect", and so on.

lower housing The part of the housing which contains most of the payphone components, including the microprocessor.

macro A set of low level commands to be executed in sequence. In a smart payphone, a dialing macro establishes how and when to send digits to the CO for each call type.

main board The larger of two printed circuit boards in a payphone control module (PCM) assembly.

master record Payphone unique data including ID, address and name, password, authorization codes, as well as the names of the configuration files required by that phone. The master record can be edited in Payphone Network Manager (PNM).

microprocessor The central processing unit (CPU) of a personal computer computer or smart payphone.

modem A device that converts digital signals, as from a computer, to analog wave signals for the purpose of transmission over telephone communication channels. The modem MOdulates the signal at one end, then DEModulates at the other end of the transmission. Modem telemetry enables the PNM-to payphone communication linkage.

modem telemetry The transmission of modulated digital data (in analog form) over a communication channel. The process requires a modem at each end of the communication channel. Modem telemetry is the method the PNM operator uses to create a communications link with the payphone and vice versa.

noise Interference or unwanted sound on a line which can be the result of proximity to other lines or electrical devices, transmission of other electrical devices sharing the same line, or the result of CO switching equipment.

off-hook The condition when the handset is removed from the cradle.

operational file See *site operational file*

option A program switch (identified by a three-digit number) that enables or disables a payphone feature depending whether the option is set ON or OFF, respectively.

owner bypass code A code used by the owner-operator to access the voice telemetry mode, allowing a person to program and/or test the payphone.

OSP Abbreviation for Operator Service Provider.

PAL Acronym for Public Access Line.

PBX Abbreviation for Private Branch Exchange, a telephone switching system usually located on the owner's premises. PBX encompasses a wide variety of equipment that can provide intra-premises telephone service as well as access to public telephone networks.

PCM Abbreviation for Payphone Control Module. In the Elcotel smart payphone, it is the circuit board assembly that contains the microprocessor, EPROM, EEPROM, RAM and other electronic elements.

PGM (V94) file A file containing the payphone operating system software. The PGM file can be downloaded to the phone when new features are added.

PIC Acronym for Preferred Inter-Exchange Carrier, a term used to identify the owner-operator's preference of an IXC.

polarity Related to the direction of the current in the telco circuit. Some payphone equipment is polarity sensitive; that is, the Tip and Ring must be correctly identified and wired for the equipment to function.

prompt The way DOS or other program indicates to the user that it is waiting for a command or response. The typical DOS prompt looks like **C:\>.** Also refers to the digitized voice phrases a smart payphone uses to communicate with a user.

pulse dialing Also known as rotary dialing, the dialing mechanism breaks the current loop, and the number of pulses per second that this occurs is equivalent to the digit dialed. This is one method of sending the number to the CO.

RAM Acronym for Random Access Memory, the working memory or temporary storage area in Pcs and smart payphones. Data stored in RAM, without battery backup, is lost if power is removed.

RAM Reload command Causes the backup data stored in the EEPROM chip to be loaded into Random Access Memory for use by the payphone operating system.

register A place in computer memory for storing a value that is used by a payphone feature. A unique three-digit number identifies each register.

rejector mechanism A device that accepts genuine coins and rekects others which do not meet the requirements for size, weight, and conformity.

remote Usually refers to a location away from the main computer in a network. Remote systems are connected to the main computer by communication channels. Remote terminals are located at a distance from the main computer. Remote data from a phone in the network can be imported to the PC by using PNM. However, with smart payphones, activity performed through the keypad at the payphone site is referred to as local, for example, local voice telemetry.

Reverse Battery Answer Supervision (RBAS) A form of answer supervision by which the polarity of the tip and ring changes when an answer is detected (the call is completed).

Ring The second wire in the telco pair. Normally, the red wire in the pair of wires which makes the talking circuit in the telco line. named for being connected through the outer or "ring" portion of a manual telephone patchboard plug. Also, the signalling of an incoming call by a telephone through a "ringer" device. (Sometimes referred to as "one ringy dingy".)

S94 File Speed dial file. This file, containing "quick access" telephone numbers can be downloaded to the payphone. The user can access them by entering * (two digits).**secondary dial tone** Dial tone sometimes restored by the Central Office after called-party hang up but without a hookswitch transition (on-hook/off-hook) by the calling phone.

Service Desk™ A feature of Elcotel payphones which allows credit to be issued to customers while they are on the line.

SIT Acronym for Special Information Tone, a three-tone sequence preceeding a telco interrupt message, such as "This call cannot be completed as dialed."

site operational files The files that are downloaded to a payphone to allow it to operate properly at its site. The minimum files that must be downloaded to a phone are the C94 (ROF) and R94. The P94, S94 and V94 (PGM) files can be downloaded to provide value added features.

SMDR Abbreviation for Station Message Detail Records, which are call data detailing the number dialed, date, time, duration of the call, price, credit card information, and so on. SMDR are stored and uploaded for viewing and evaluation. SMDR are sometimes called "Call Detail Records" (CDR).

software A program or set of instructions that tells the microprocessor in a computer or smart payphone what to do.

TCU Abbreviation for Touch Call Unit, the assembly which includes the keys, keypad, and terminal board used to generate DTMF tones for such purposes as dialing and smart payphone programming.

TELCO The operating TELephone COmpany.

Tip The first wire in the telco pair. Normally, the green wire in the pair of wires that is the talking circuit of a telephone line. Named for being connected through the center or "tip" of a manual telephone patchboard plug.

trigger level In some instances, values in a register can be changed to reflect the owner-operator requirements for setting or "flagging" an alarm condition. For example, the Cash Vault Alarm Trigger is an adjustable dollar amount. When the sum in the cash box exceeds the amount, the alarm is set. **uploading** The process of transferring data or complete files from a payphone to PNM.

V94 (PGM) file A file containing the payphone operating system software. The PGM file can be downloaded to the phone when new features are added.

voice detection The ability of the payphone to identify the end of ringback and the beginning of voice answer.

voice telemetry A technique by which the payphone can be programmed by using DTMF tones, that is, by entering a series of digits at a touch keypad. Note that this method is an alternative to communications via modem telemetry.

wink A momentary (typically 60 ms to one second) loss of loop current preceding the return of dial tone after a call is terminated. Wink is a switching byproduct of **some** Central Offices.

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