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Millennium multi-pay terminal (M1211, M1221, M1231)

# Installation, operation, and maintenance guide, MTR 1.9

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Standard

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# Publication history

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## January 1997

This is the standard release for terminals based on firmware release MTR 1.9. This guide reflects an upgrade of the Millennium Manager platform to MSR 2.0. Changes from the previous release include several new firmware and system features:

- local summary CDRs for individual cash cards (up to 12)
- capability to zero out smart cards containing less than the value of a local call
- flashing date and time preceding the advertising line
- ability to rate 1-800, 1-888, and 1-600 calls
- updated prompts for degraded service levels
- external rating for domestically-dialed international calls
- clip-on fraud deterrents
- defective card reader alarm
- craft interface changes
- uploadable coin box status

## October 1996

MSR 1.7 standard up-issue of this document to reflect the smart card alert, datajack, and IAS module features. This document is still applicable for terminals running on pre-MSR 2.0 systems.

## February 1996

MSR 1.7 standard up-issue of this document.

**April 1995**

MSR 1.7 standard release of this document.

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# About this guide

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This guide is intended for the craftspeople who install, operate, and maintain the Millennium multi-pay terminals.

This document has been specifically released to support the added features provided on the MTR 1.9 version terminal, including new craft interface features. The hardware procedures are still applicable to pre-MTR 1.9 versions of terminals.

This terminal release is being combined with the system release MSR 2.0.

## Scope of this document

This document contains information about the installation, operation, and maintenance of the Millennium multi-pay terminal.

It explains how to:

- install the terminal, both hardware and software procedures
- install and remove its replaceable parts
- use the craft interface to test terminal functions and diagnose hardware and line problems
- additional features include a troubleshooting chapter and a chapter listing terminal parts and replaceable-parts ordering information

## How this guide is organized

The *Millennium multi-pay terminal installation, operation, and maintenance guide* is organized into the following sections:

**About this guide** describes the guide and gives an overview of its contents.

**Chapter 1: Describing the terminal** describes the terminal and discusses its operation, characteristics, features, power requirements, hardware, and software.

**Chapter 2: Mounting the terminal** provides instructions for installing the terminal on-site. It discusses the site selection, tools, and equipment required to install the terminal, as well as giving the actual installation procedure.

**Chapter 3: Installing terminal software** provides instructions for installing, testing, and downloading software tables to the terminal.

**Chapter 4: Operation-code interface** provides instructions on how to use the operation-code level, in the craft interface, and to send messages to the Millennium Manager on the status of the terminal. It also discusses the reserved and non-reserved codes used in this level.

**Chapter 5: Maintenance-level interface** explains how to perform maintenance, administrative, and diagnostic functions. This chapter provides instructions on how to perform the terminal maintenance routine, how to troubleshoot the terminal components, and how to perform restricted activities.

**Chapter 6: Troubleshooting strategies** explains how to diagnose and troubleshoot problems.

**Chapter 7: installing replaceable parts** explains how to remove and replace modules in the terminal.

**Chapter 8: Cleaning the terminal** provides instructions on how to clean the exterior of the terminal.

**Chapter 9: Customer-orderable parts** explains how to order parts, tools, and instruction cards.

**Appendix A: List of alarms** provides details about the alarms issued by the terminal to the Millennium Manager.

**Appendix B: Error codes** provides details about the error codes found in the craft interface.

**Appendix C: Regulatory notices** describes the Canadian and U.S. regulatory and safety information in regard to terminal connection and usage.

**Glossary:** provides the definitions of the terms and acronyms used in this document

**Index:** provides an easy cross-reference for the *Millennium multi-pay terminal installation, operation, and maintenance guide*.



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# 1 Describing the terminal

---

This chapter describes Millennium multi-pay terminal features and physical characteristics, power requirements, internal components, interconnection diagrams, and a description of the craft interface, an internal software diagnostic tool.

The Millennium multi-pay terminal is shown in Figure 1-1.

This terminal allows calls to be made with coins, credit and calling cards, and may also be equipped to use pre-paid integrated circuit cards (PICCs), referred to as smart cards in this document. These cards have a microchip embedded at one end of the card. Currently smart cards must be Gemplus GPM 103 cards, EEPROM-based cards compliant with ISO 7816-1 and 7816-2.

## Types of multi-pay terminals

Millennium terminals are distinguished by the type of card reader they have, or lack of card reader, in the case of the Basic Coin terminal. The style names for each type of Millennium multi-pay terminal are listed below:

- Millennium multi-pay mag stripe terminal (M1211)
- Millennium multi-pay smart card terminal (M1221)
- Millennium multi-pay multi-card terminal (M1231)

The terminals all have the same **software** and **firmware** features and options available, although optional features are not necessarily part of all terminals. Terminals without optional features, such as the quick access keys bezel, do not need to download any tables related to the feature.

The multi-pay terminal with multi-card reader is the most versatile in terms of **payment methods**. The multi-card reader can be configured to read both mag stripe and smart cards, or only one type. This customization is triggered through a software download from the Millennium Manager. Terminals can be upgraded at a later date to read both types of cards.

## Terminal features

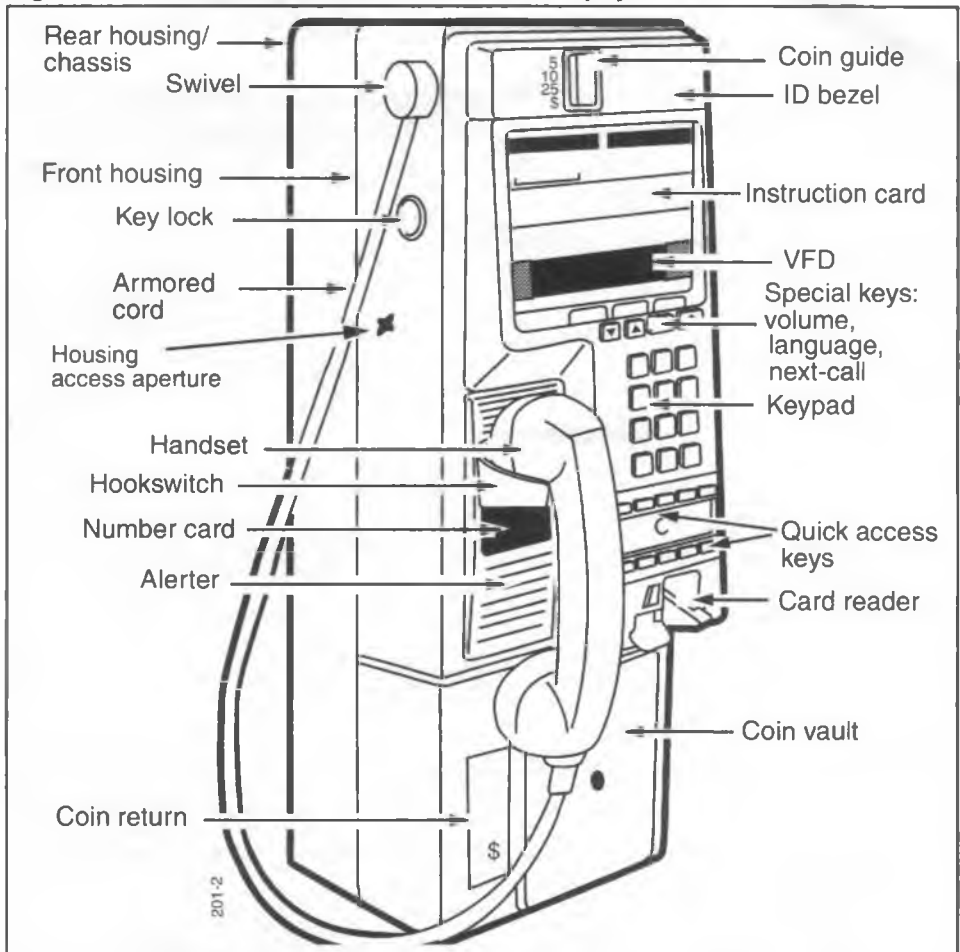
The external terminal features are shown in Figure 1-1. These features include:

- customized-ID bezel
- vacuum fluorescent display (VFD)
- special function buttons for volume control, language selection, and next call capability
- push-button keypad with wide-spaced, easy-access buttons
- optional quick access keypad for one-button dialing of pre-selected numbers
- card reader reads mag stripe cards, smart cards, or both, with optional smart card alert alarm
- coin box, accessed with customer-specific unique lock (not shown in diagram), contained in secured coin vault
- hearing-aid compatible handset with armored cord attached to the housing with a swivel

The components of the terminal are attached to the front and rear housing assemblies. The front housing assembly swings down from the rear housing. A hinged tie-rod supports the front housing when it is open. This rod can be

unhooked to permit removal of the entire front housing assembly.

**Figure 1-1: Front view of the Millennium multi-pay terminal**



The terminal connects to a standard analog central-office (CO) line with answer supervision and a supplementary low-voltage DC power source.

- The terminal uses the supplementary power to provide enhanced services for coin, credit and calling card billing of telephone calls. Terminals with smart card or multi-card readers also use the supplementary power for smart card services.



- If the supplementary power supply fails, the terminal uses power from the telephone line to provide minimum services, which are determined by the operating company. Typically these include: free, local, emergency, and operator-assisted calls.

Millennium terminals use a packet-switched network (PSN) to interconnect to the Millennium Manager. The terminals use the Millennium Manager to receive the following types of data:

- card authorization
- coin and smart card call rating
- call billing
- terminal-alarm routing
- functional tables

The terminals send the following information up to the Millennium Manager:

- cashbox statistics
- alarms and terminal status messages
- call statistics

## Physical characteristics

Each Millennium multi-pay terminal has the following characteristics:

Height	533 mm (21 in), approximately
Width	194 mm (7.8 in), approximately
Depth	155 mm (6.10 in), approximately (without the optional furniture spacers)
Weight	19.05 kg (42 lb)

# Multi-pay terminal specifications

This chapter provides specification information about the Millennium multi-pay terminal. These specifications must be met for the terminal to work to the optimum level.

## Environmental requirements

Temperature, operating:	-40 °C to +60 °C
Temperature, nonoperating (storage):	-50 °C to +70 °C
Humidity, operating:	up to 95% (at +40 °C)
Humidity, nonoperating:	up to 95% (at +40 °C)
Maximum temperature shock:	-40 °C to +60 °C in 5 minutes

## Shipping vibrations

5 to 60 Hz:	maximum 0.035 mm displacement
60 to 500 Hz:	maximum 5 G

## Line requirements

Line:	Standard analog loop; not a coin line
Answer detection:	Required

## Power consumption

8.6 W maximum

## Supplementary power requirements

Power source: Local power using a wall plug-in class 2 transformer (110 V AC), or direct current with class 2 output from a central location.

Recommended source: 0.5 A, 24 V DC  $\pm$ 15%

Acceptable start-up voltage: 19 V DC to 30 V DC

Recommended power supply: James Electronics Inc.  
model 13933 class 2 power supply, or equivalent


**Note:** Output resistance should be less than 10  $\Omega$ .

## Maximum cable length specifications

Table 1-1 gives the specifications for the cable length from the terminal to the power supply based on wire size for a single unit (assuming 24 V DC  $\pm 15\%$  power source).

**Note:** Not following these specifications could result in irregular performance by the terminal.  
For instance, a too-long cable may have enough power to run the basic terminal functions. However, when the terminal tries to initiate a modem call, the increased power requirement causes the terminal to terminate the transaction and power off and on. Chapter 6 explains this problem in more detail and how to diagnose it.

**Table 1-1: Cable length specifications based on wire size**

Wire gauge	Maximum cable length	Comment
#26	41.8 m (137 ft)	See warning below
#24	66.5 m (218 ft)	See warning below
#22	105.6 m (346 ft)	
#20	168 m (551 ft)	
#18	226.7 m (875 ft)	
#16	424.3 m (1392 ft)	
#14	674.8 m (2214 ft)	
#12	1072.9 m (3520 ft)	
	<p><b>Cable length warning</b> The output impedance of the power supply should be less than 10 <math>\Omega</math>. Excessive cable lengths may cause terminal power problems. Refer to <b>Borderline power anomalies</b> in Chapter 6.</p>	

**Answer  
supervision  
warning**

It is possible answer supervision will be affected if a terminal is connected to the central office (switch) with 100 m of cable or less.

**Problem:** A power spike causes the terminal to connect to the called party, then disconnect inappropriately.

**Solution:** To correct the situation, you may need to pad each side of the line (Tip and Ring) with additional resistance. Suggested padding is 500 ohm

## Operating the multi-pay terminal

Multi-pay terminals have several modes of operation. These modes define levels of operation, and include:

**Full service:** All payment types are available to the caller, and all call types allowed by the terminal can be made.

**Downgraded service:** One of the payment types has been taken out, either by a hardware failure or deliberately by the craftsperson. The VFD will flash a prompt identifying the payment type which is still operable.

**Restricted service:** Only certain call types and payment types are allowed. This is configurable by the operating company, for instance to introduce only emergency calls during an overnight period. The VFD indicates that only restricted service is available during these periods.

**Power Fail:** The supplementary power has been disrupted or the control PCP is not getting power. Only emergency and free calls are allowed.

- The VFD is blank, and no payment functions work.
- There is a dial tone but no voice prompts.
- The called numbers to be allowed during this time must be entered in the first ten lines of the Call Screening list, and must be designated as being free.

**Out of Service:** No service is available. Either there has been a total power failure, the control printed circuit pack (PCP) has lost its memory, or there is a problem with the

terminal functions or components that affects terminal service.

- There is no power if the VFD is blank and there is no dial tone through the handset.
- If the VFD displays **Out of service**, then there is power to the terminal, but a problem exists with some other terminal function or component.

## Making calls

The multi-pay terminal offers several payment options, as well as free and emergency call facilities. In the following section, the call process is explained for each payment type.

In the idle or on-hook state, the terminal is disconnected from the CO line. When the caller lifts the handset off-hook, the handset emits a dial tone, which is produced by the telephony PCP.

## Using a credit or calling card

1. With the handset off-hook, the caller inserts and removes a credit or calling card, then dials a telephone number. Or the number can be dialed before any payment selection is made, in which case the terminal prompts for a payment choice.
  - Mag stripe cards must be inserted in the card reader with the magnetic stripe facing upward and to the left.
  - The caller must remove the card to proceed with the call.
  - The card is read twice, on entry and removal.
  - If the card is not removed from the reader, the terminal will prompt the caller to remove the card. The call will not proceed until the card is removed.

**Note:** If the number is dialed before a payment type is chosen, the terminal will flash the default rate on the VFD. This is usually the coin rate.

2. When the caller inserts a card, the terminal makes sure there is a magnetic stripe on the card and then makes a data connection to the Millennium Manager.  
If the caller uses a calling card, the terminal may connect to a card validation service.
3. Card validation occurs, the verification call is disconnected, and the terminal selects the carrier chosen by the caller, or the default carrier if one was not selected.
4. If the caller has not dialed the telephone number, the terminal prompts for the number. If the card and the number are valid, the terminal dials out to the switch.
5. Once the call is answered, call supervision occurs. At this time the terminal may begin creating a call detail record (CDR) for the call, depending on what types of calls it has been configured to record.
6. When the caller hangs up, the terminal returns to the idle state. If the card is forgotten in the card reader, an alarm is generated and sent to the Millennium Manager.

**Note:** Terminals can be configured so that calling cards are validated by the Automated Calling Card Service (ACCS) at the Central Office Network or to Alternate Operator Services instead of through the Millennium Manager.

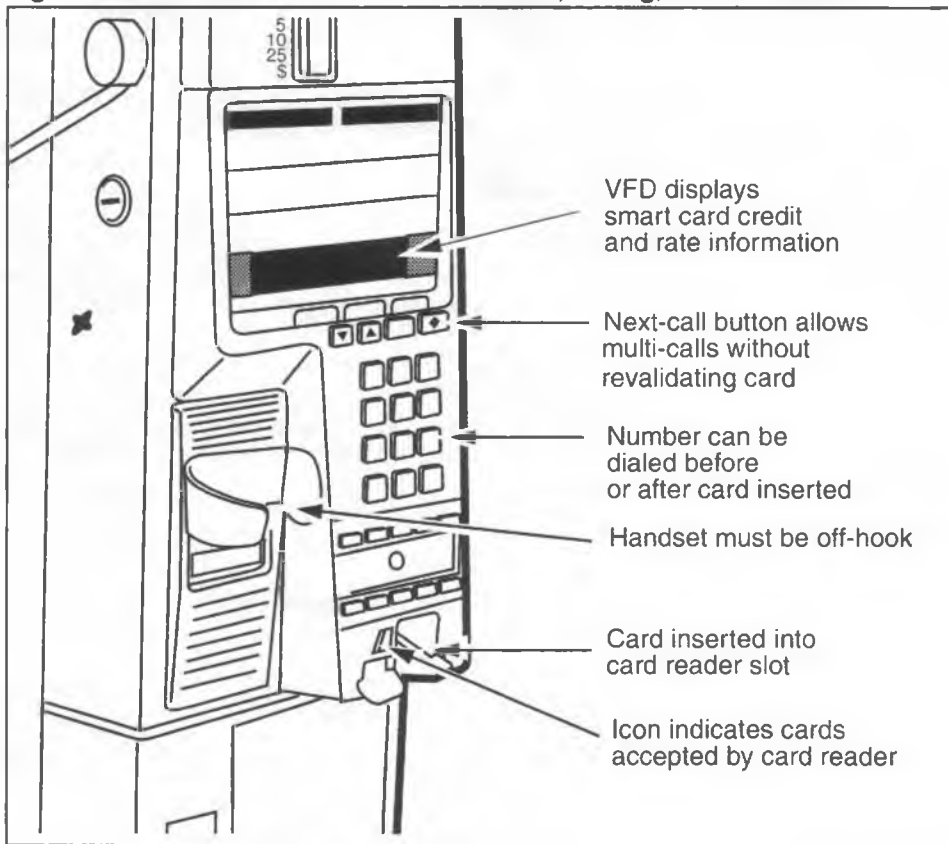
## Using smart cards

1. The caller inserts the smart card either before or after a number is dialed.
  - Smart cards must be inserted with the chip facing up and towards the front of the card.
  - These cards are left in the card reader for the duration of the call.
  - The VFD shows the value on the card. If the number has been dialed, it also shows the initial rate.
  - When the call is complete, a visual prompt reminds the caller to remove the card.

**Note:** If the number is dialed before a payment type is chosen, the terminal will flash an initial rate on the VFD. This is usually the coin rate, however, the operating company can configure the default rate to be the smart card rate, if desired. If the initial rate is a coin rate, and the caller inserts a smart card, the terminal will correct the rate amount shown.

Figure 1-2 shows the terminal features which support using cards to make a call.

**Figure 1-2: Multi-card reader can read credit, calling, or smart cards**



2. The terminal makes sure there is a data chip present, with a valid card number sequence. An optional feature allows the terminal to call the Millennium Manager for further checks.

3. The VFD displays the money remaining on the card and prompts the caller to dial the number, if that has not already been done. If no money is left on the card to initiate a call, the caller is asked to insert a different card.

**Note:** There is a system setting which can allow the terminal to initiate one local call for cards with less value remaining than the local rate, but more than zero. The rate shows as the local rate and the card is reduced to zero once the call is connected. The terminal records will indicate the actual amount removed from the card.

4. The terminal performs a rate request for long distance calls, and displays the initial and subsequent long distance charges.
5. If the card has sufficient value, the terminal dials out the number entered by the caller.
6. The terminal selects the carrier chosen by the caller, or the default carrier if a carrier was not selected.
7. Once the call is answered, call supervision occurs. The terminal creates a summary record for each new type of smart card used, up to 12 different cards. These records create CDRs. The operating company uses these records to track the different types of smart cards being used.
8. The VFD displays the time left on the card as the call proceeds. If the call has a flat rate charge, no count-down is shown.
9. If the caller removes the card before hanging up, the timer shows the remaining pre-paid time left on the call. If a new card is not inserted before this time expires, the call ends and the caller is prompted to **Please Hang-up**. The call is also shut down when no money remains on the card in the card reader.
10. If the caller hangs up and there is money left on the card, the VFD displays the balance briefly and prompts the caller to remove the card.
  - If a card contains both a chip and a magnetic stripe on the same side of the card, the chip



takes precedence and is used to pay for the telephone call. If the magnetic stripe and chip are on different sides of the card, the caller selects payment by card orientation.

- Any time the caller hangs up or presses the next call button (◆), the set displays the balance remaining on the card.
- **Smart card alert:** on terminals equipped with this feature, an alarm will sound if a smart card is left in the card reader for a pre-determined time after the handset is put back on-hook. The operating company can disable the alarm for cards which have zero value.

## Using coins to make a call

**Make a local call,** the caller inserts the correct change and dials the number. Or the caller may first dial the number.

If a caller deposits more than the amount for a local call, the terminal will not refund the difference. However, if the caller has not replaced the handset on-hook, the ◆ button can be used to make more calls until the balance is used up or is less than the cost of a local call.

### **Make a long distance (toll) call:**

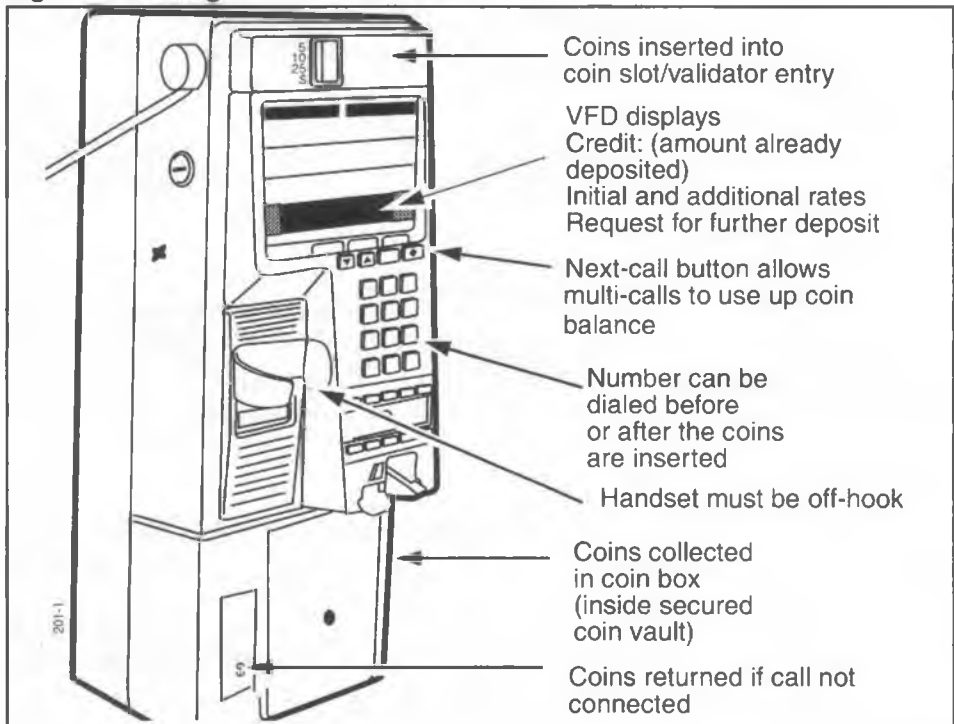
1. The caller picks up the handset, hears the dial tone, and dials the telephone number or inserts a coin.
2. A data connection is made between the terminal and Millennium Manager.
  - If the number is dialed before a payment type is chosen, the terminal will flash an initial rate on the VFD. This is usually the coin rate. However, the operating company can configure the default rate to be the smart card rate. If the initial rate is a smart card rate, and the caller inserts coins, the terminal will correct the rate amount shown.
  - If a coin is inserted before the number is dialed, the terminal displays the amount required to complete a local call. Once the number is dialed,

the terminal downloads the call rate from the Millennium Manager and displays the amount of money needed for the initial call period.

- If the caller inserted enough coins before dialing the number, the terminal dials out immediately.
3. When the caller inserts the correct amount, the terminal selects either the default carrier or the carrier chosen by the caller and dials the call.
  4. Once the call is answered, call supervision occurs. If the terminal is configured to collect call records for coin calls, a record would be started at this point.
  5. When the caller hangs up, the terminal returns to the idle state. Extra payment is not returned.

Figure 1-3 shows the terminal features which support coin calls.

**Figure 1-3: Using coins to make a call**



## Free calls

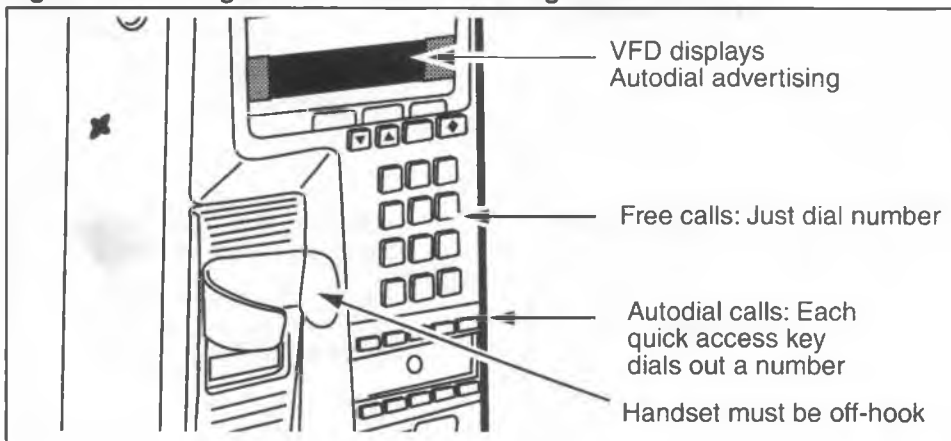
For free calls, including operator calls, the caller lifts the handset off-hook and dials the number. The number is automatically dialed out.

## Autodial calls

Quick access keys dial pre-selected numbers, such as taxi companies or car rental agencies or free or emergency numbers, when the caller presses the appropriate button. The numbers are entered by the operating company and can be designated as free or can be individually rated. This is an optional feature.

Figure 1-4 shows the terminal features which are used to make free calls and autodial calls.

**Figure 1-4: Dialing out for free calls or using autodial buttons**



## Incoming calls

The terminal can be configured to accept incoming calls. When this feature is active and a call comes in, the terminal emits a specific DTMF tone which indicates to the switch that an incoming call has been answered. At that point, no numbers dialed out from the terminal are acknowledged by the switch until the handset is replaced on-hook, ending the incoming call.

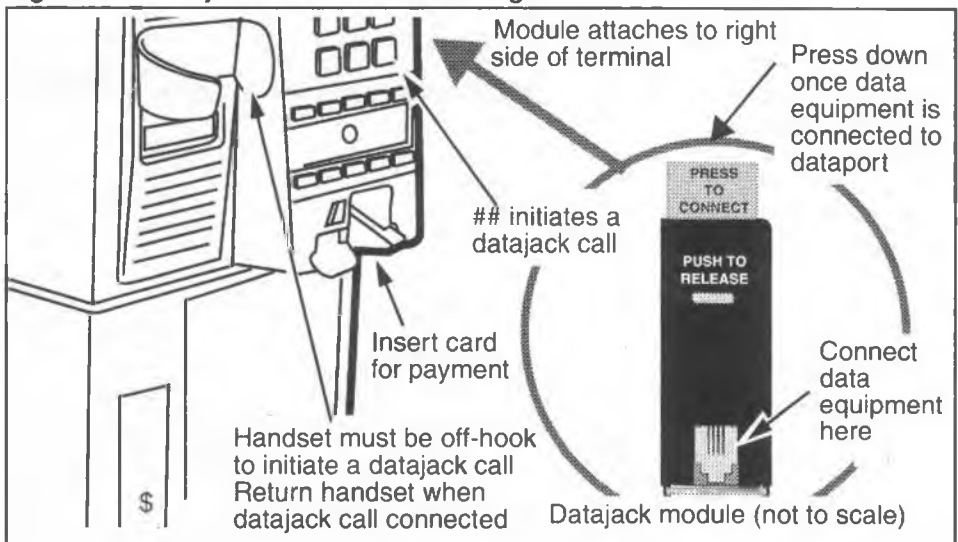
## Datajack calls

1. Datajack calls are initially set up in the same manner as other calls. The caller dials a number or inserts a card.
  - Datajack calls cannot be made using coins.
  - The cards are validated as normal.
2. The caller presses # twice (##) to initiate a data call.
3. If the caller has not already done so, the data equipment is plugged into the datajack on the side of the terminal. When the plug is in, the caller presses down on the button on the top of the APC unit to complete the circuit. Refer to Figure 1-5.
4. The modem in the equipment dials the number and proceeds with the call.

The terminal prompts the caller to return the handset on-hook. This prevents the data from being interrupted by outside noise.

5. The call is complete when the modem hangs up. The caller then presses the disconnect button on the datajack and unplugs the equipment.

**Figure 1-5: Datajack calls are made using cards**



## Using the ADS feature

If the ADS (Audio-gram Delivery System) is available to the terminal, the caller can choose to leave a voice message for the number being called. There are two situations when this feature can be activated, both are described in the following call process:

1. The caller uses one of the call processes described above to initiate a call.
2. There are two choices open to the caller:
  - If the caller just wants to leave a message for the called party, as soon as the number is dialed out, the caller presses the \* key on the keypad, or, if the terminal has quick access keys, there may be a message key.
  - If the caller receives a pre-configured number of busy or ring-no-answer, the terminal will prompt the caller to press the \* or the message key if the caller wishes to leave a message for the called party.
3. Once the \* key or the message key is pressed, the ADS service prompts request additional payment, if the original call was a coin call, or display the ADS call rate.
4. The prompts direct the caller to leave a message.
5. The service is disconnected with the caller hangs up.

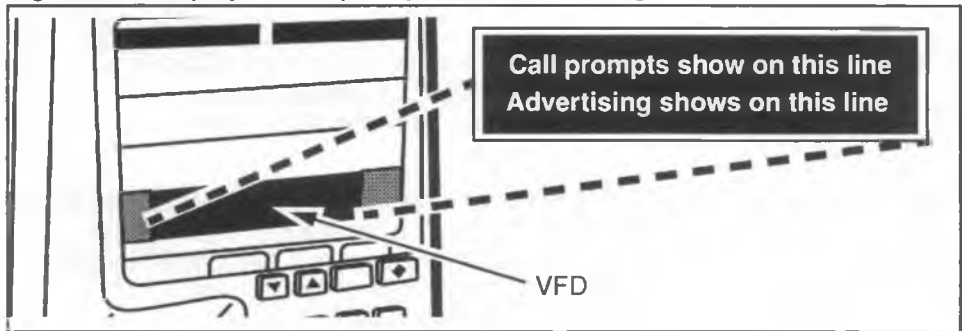
## Functional features

The Millennium multi-pay terminal has the following functional features:

### Visual display

The terminal uses a high-quality, 2-line-by-20-character, 5X7 dot matrix VFD that provides visual prompts. The prompts guide callers through the process of making calls, notify the caller of errors in procedures, and are used to run terminal testing with the craft interface. Refer to Figure 1-6.

**Figure 1-6: Display shows prompts and advertising**



### Voice prompts

Voice prompts, heard through the handset, back up the visual prompts. Knowledgeable callers can proceed quickly without waiting for the voice prompts.

### Card reader

The card reader accepts credit and calling cards and/or smart cards. Which cards are accepted is decided by the operating company and the type of card reader installed.

- The terminal handset must be off-hook before the card reader will read a card.
- The multi-card and the mag stripe card readers read credit and calling cards with mag stripes. The specific cards accepted are configured by the operating company.
- The smart card reader and the multi-card reader can read smart cards.
- Once the caller hangs up, a card must be inserted before another call can be placed.

## Smart card alert

If a caller forgets to remove a smart card from the card reader after hanging up, an audible alarm sounds. The operating company controls the delay time to start the alarm, the duration of the alarm, and the cadence of the alarm.

The alarm can be configured to ignore cards with zero value.

## Card reader blocked alarm

If one or more of the card reader sensors are active when the set is on-hook or in the hang-up-off-hook state for a specified period, an alarm is generated and transmitted to the Millennium Manager by the terminal. Service is restricted to coin-only.

This alarm is not sent if the smart card alert is active.

## Language button

The voice and visual prompts can be heard and displayed in an alternative language. The language button allows callers to toggle between the two languages. Refer to Figure 1-7.

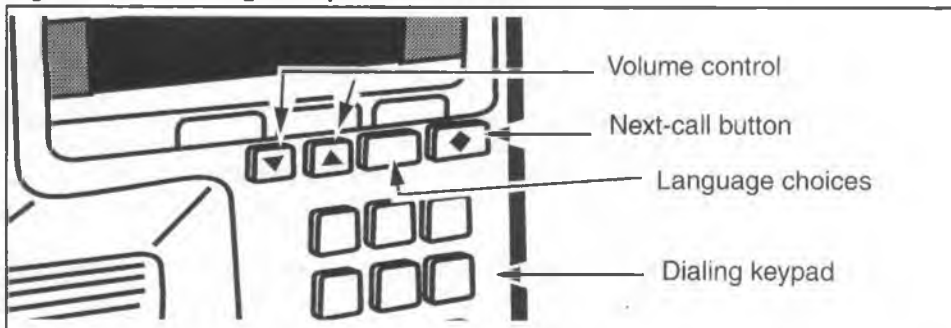
## Next-call button

The  $\blacklozenge$  button allows callers to place another call without reinserting a card, providing the handset has not been returned on-hook. During call setup and when the craft interface is being run, this button acts as an erase button to correct dialing mistakes. Refer to Figure 1-7

## Volume control

Two buttons,  $\blacktriangle$  and  $\blacktriangledown$ , allow callers to change the volume of the handset. Four levels are available. The volume reverts to the lowest level when the handset is replaced on-hook. Refer to Figure 1-7.

Figure 1-7: Locating the special buttons



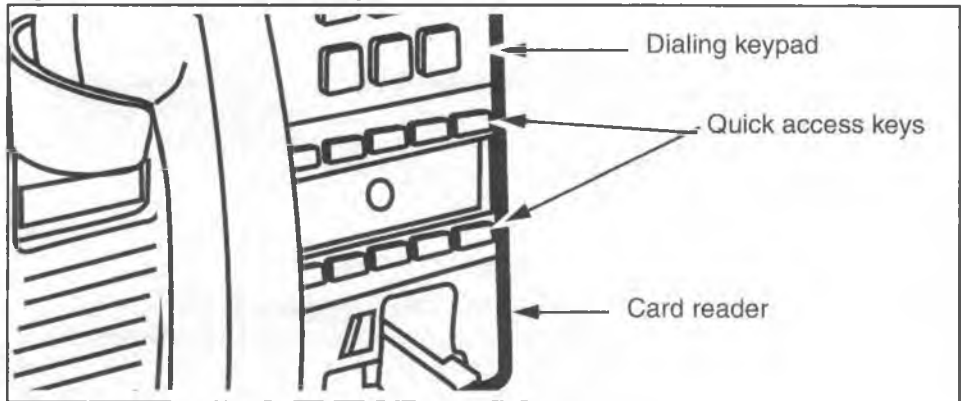
## Quick access keys

Quick access keys are a set of optional buttons located below the standard keypad on the terminal. Each key is individually configured by the telephone company. The table controlling the keys is downloadable. Therefore, they can be changed and downloaded to an installed terminal.

- Each quick access key dials a pre-selected number.
- Each button can be billed at individual rates, including no-charge.
- Each button can have a message attached which displays on the VFD when the button is pushed.

Quick access keys are available in five or ten button arrays, with a label space in the middle of the bezel. Terminals without this option come with a blank bezel. Refer to Figure 1-8

**Figure 1-8: Quick access keys**



## Advertising

The bottom line of the VFD can be used to display advertising or information messages on a continuous basis.

The memory can hold 20 message lines of 20 characters, which are entered by the operating company.

The messages can be configured by the operating company either to display only when the handset is on-hook; or ten messages can be configured to display in sequence when the handset is on-hook, and the other ten can be configured to display in sequence when the handset is off-hook.



## Date/time

At the beginning of each advertising cycle, the date and time are displayed.

## Coin handling

The coin validator tests the thickness, diameter, and metallic composition of deposited coins.

The validator accepts American and Canadian coins of: 25¢, 10¢, and 5¢ denominations, including the Canadian \$1 coin. It returns rejected coins into the coin return assembly.

It also detects blockages and jams in the coin path.

As a measure against fraud, the validators have been fitted with a partition in the coin rejection chute to trap coins forced off the upper runway, thus preventing coin jams. Since legitimate coins which are warped or irregular might fall off the runway and not be delivered to the coin return, some telcos choose to remove this partition. Instructions for removing this partition are included in Chapter 7.

## Datajack

The terminal can be connected to datajack equipment to provide connection for data equipment such as laptop computers for faxing or other data services. This feature is accessed through an APC datajack module attached to the side of a standard terminal. The module is mounted on the terminal at the factory, when a terminal is ordered with this option. The module is field replaceable.

**Note:** If an alternative datajack device is chosen, it is up to the operating company to connect the device. A datajack telephony and firmware upgrade would be required before the feature would function.

## Voice and data on a single central office (CO) line

The terminal can make data and voice calls on the same line. This allows the terminal to receive validation for credit and calling cards and rate information for coin and smart card toll calls before it dials out the number.

When the terminal performs a rate request for coin or smart card toll calls, it displays the initial and subsequent charges on the VFD. When the call is connected, the VFD displays the remaining time left on the card as the call proceeds.

If no card validation or rate information is required, then no data call is made, and the voice call proceeds as normal.

## **Supplementary power**

Each terminal requires a supplementary low voltage direct-current power source, typically less than 500 mA at 24 volts DC. A wall transformer connected to a commercial 110 V AC source can provide this. The supplementary power source must be supplied by the operating company. The supplementary power requirements are described in Chapter 12.

If the supplementary power supply fails, the terminal reverts to the power-fail mode, so caller can make emergency and operator-assisted calls. Volume control is available in this mode. The type of calls that can be made are dictated by the operating company.

## **Answer supervision**

The terminals use answer supervision to time calls for billing records and payphone statistics.

If answer supervision is not available on the line, an inferred answer supervision (IAS) module can be installed inside the terminal.

The IAS module can be ordered in either of two versions.

- One version is most compatible with high-quality lines, where weaker signals are clearly discernible.
- A second version can be used where the CO equipment is older or the lines or environment are noisier.

Firmware on a basic module design defines the version.

## **Remote alarms and diagnostics**

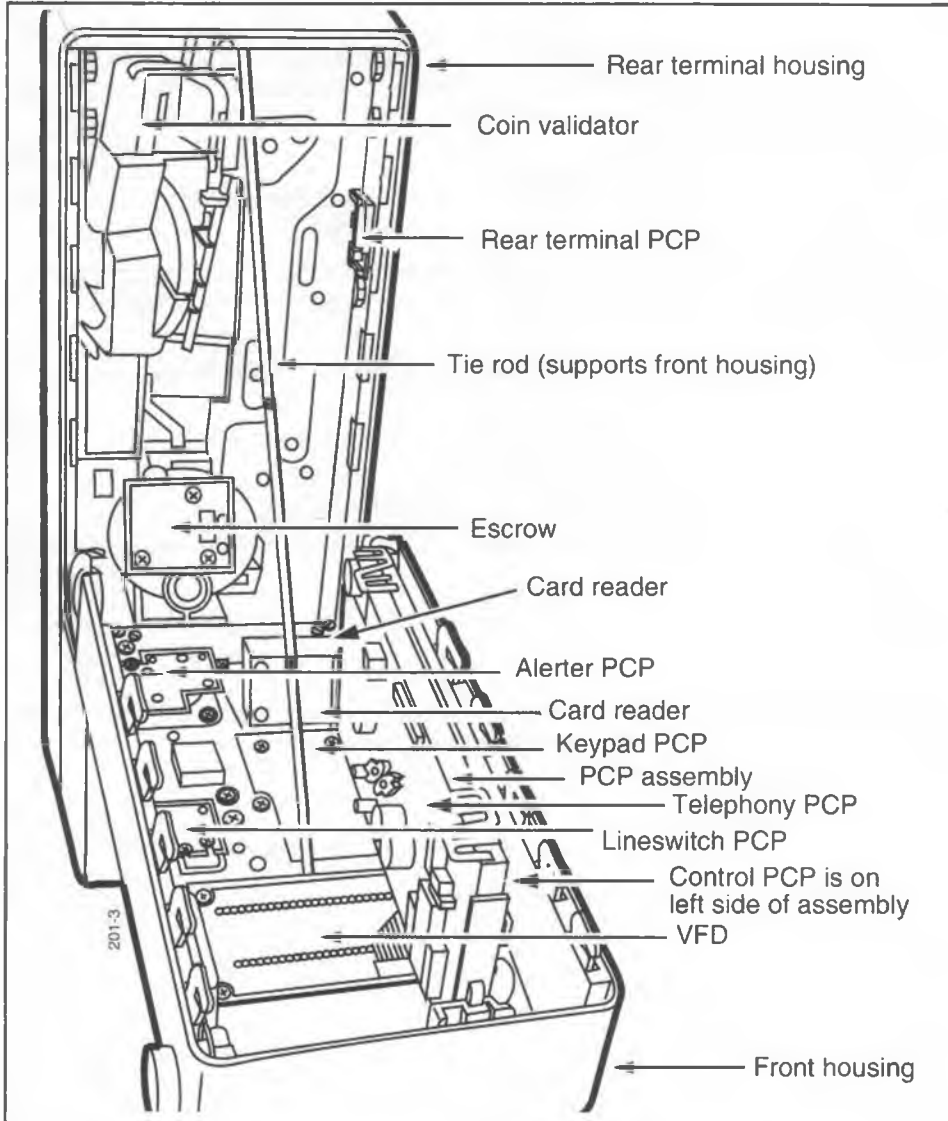
The Millennium multi-pay terminal transmits alarms to the Millennium Manager when interruptions in service occur. The messages are passed on to whatever service destinations the operating company has designated. These alarm messages are listed in Appendix A.

At the terminal, the craftsperson uses the craft interface to pinpoint the area of the problem and the module causing the problem. These error messages are listed in Appendix B.

# Internal components of the terminal

Figure 1-9 identifies the internal components of the Millennium multi-pay terminal, visible when the housing is open.

Figure 1-9: Inside the Millennium multi-pay terminal



These components have both mechanical and electronic components. The validator, for instance, creates the actual coin path, but also contains electronic sensors which evaluate the coin as it goes by.

Two main boards control the functions of the terminal. These are the control PCP and the telephony PCP, which are bundled together in a plastic frame called a PCP assembly.

The functions of the internal components are described below:

### **Control PCP**

The control PCP contains the integrated circuits that control all the functions of the terminal, except those available in the power-fail mode. In the power-fail mode, it is possible to make emergency and operator-assisted calls because the control PCP is connected to the telephony PCP.

### **Telephony PCP**

The telephony PCP contains the circuits which interface with the telephone line. This board controls the power-fail mode functions.

### **Card reader**

The card reader assembly has two components: the actual card reader, which sits inside the terminal, and the card reader bezel, on the outside of the terminal. The bezel contains a card slot that feeds into the card reader slot. A decal on the bezel indicates the type of cards — mag stripe and/or smart cards — the terminal accepts.

### **Special adaptations**

**Card guide:** To prevent curled cards from being lost inside the terminal, a card guide is attached to the multi-card reader. The card guide fits over the bottom edge of the card reader. Chapter 7 describes this piece and how to replace it.

**Rain shield:** Card bezels which accept smart cards have a wider slot than mag stripe readers. In locations exposed to heavy rain, it is possible for water to enter this slot and spray on the internal boards. To prevent this, a plastic shield attaches to the back of the card reader.

This shield and how to replace it is discussed in Chapter 7.

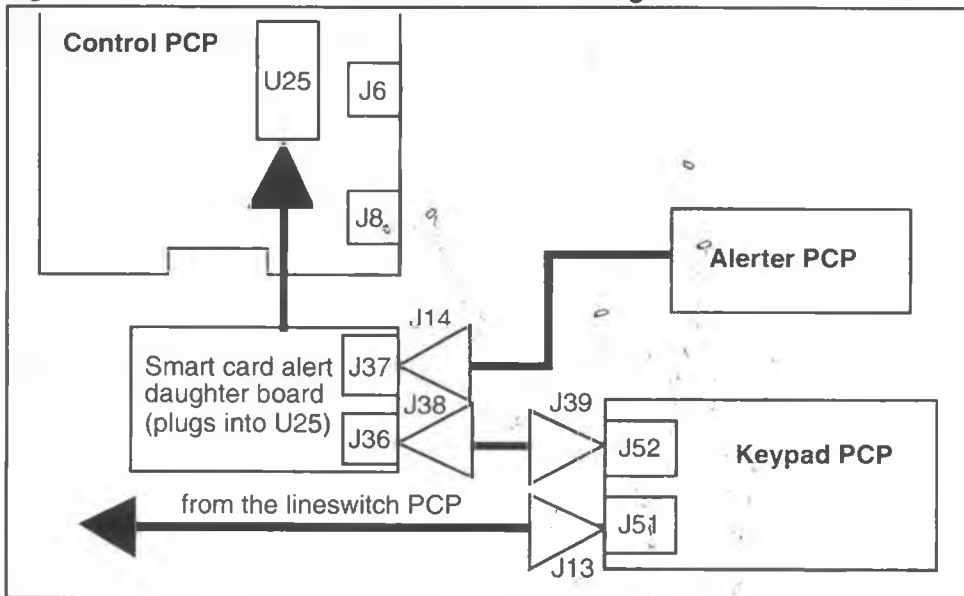
### Alerter PCP/ smart card alert

The alerter PCP contains a dynamic transducer of the same type used for the receiver. The transducer produces the warble alerter sound.

The **smart card alert** is an optional feature for this release.

- The alerter PCP cable and a two-wire cable connected to the alerter connector (J52) on the keypad PCP are attached to connectors on a daughter board mounted on the control PCP.
- When the cables are connected, the circuits created provide the alerter functions.
- Refer to Figure 1-10, which shows these connections.

Figure 1-10: Smart card alert interconnections diagram



## Lineswitch PCP

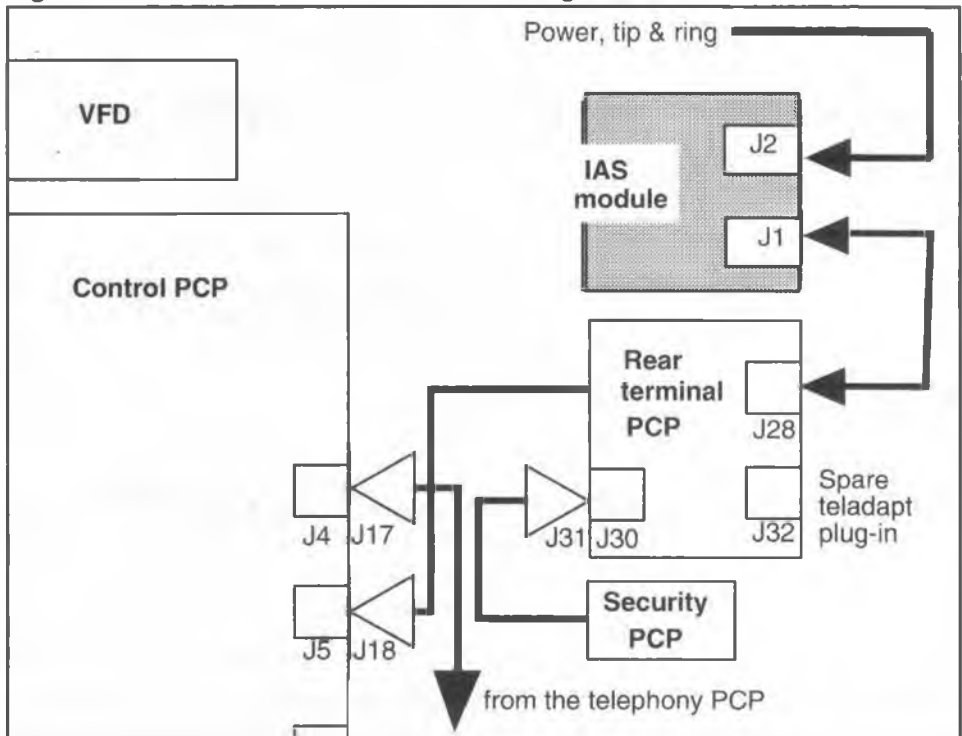
The terminal does not have a traditional hookswitch. When the handset is lifted from its cradle or replaced, the resulting movements of the plunger causes a microswitch to operate. The state of the microswitch is sensed by the telephony microprocessor and a relay makes the connection to the telephone line. The lineswitch PCP handles this process.

## IAS module

If the CO line to the terminal does not provide answer supervision, an inferred answer supervision (IAS) module must be installed inside the terminal.

This module connects between the CO wires and the rear terminal PCP. Figure 1-11 shows a block diagram of how the IAS module interconnects.

**Figure 1-11: IAS module interconnection diagram**



## Coin operations

Figure 1-12 identifies the components of the Millennium multi-pay terminal which deal with coin handling.

### Coin guide

The coin guide, which is attached to the ID bezel, accepts coins and routes them into the validator.

### Coin validator

The validator tests the thickness, diameter, and metallic composition of deposited coins. The sensors along the coin path in the validator test each coin as it passes. If the coin is accepted, it is stored in the escrow. Otherwise, it is rejected and sent to the coin return assembly. The validator also detects blockages and jams in the coin path.

### Escrow

The escrow holds deposited coins until a call is connected, then the coins are dumped into the cash box. If no connection is made, the coins go to the coin return assembly when the handset is replaced on-hook.

### Cash box

The cash box is a removable container with a separate secured lid. In the coin vault, it is protected by sensors which detect its removal. The terminal can also be configured to send an alarm signal to the Millennium Manager when the box reaches a pre-configured fullness.

Not all multi-pay terminals are shipped with a cash box. If a cash box is not included, the sensors which detect its removal are still included.

### Coin return

The coin return assembly is the holding place for coins returned by the terminal.

### Security PCP

Inside the coin vault, a security module monitors the state of the vault door and the coin box. If the vault door is left open beyond a certain length of time, or if the coin box is not replaced, an alarm is sent to the Millennium Manager. Refer to Appendix A.

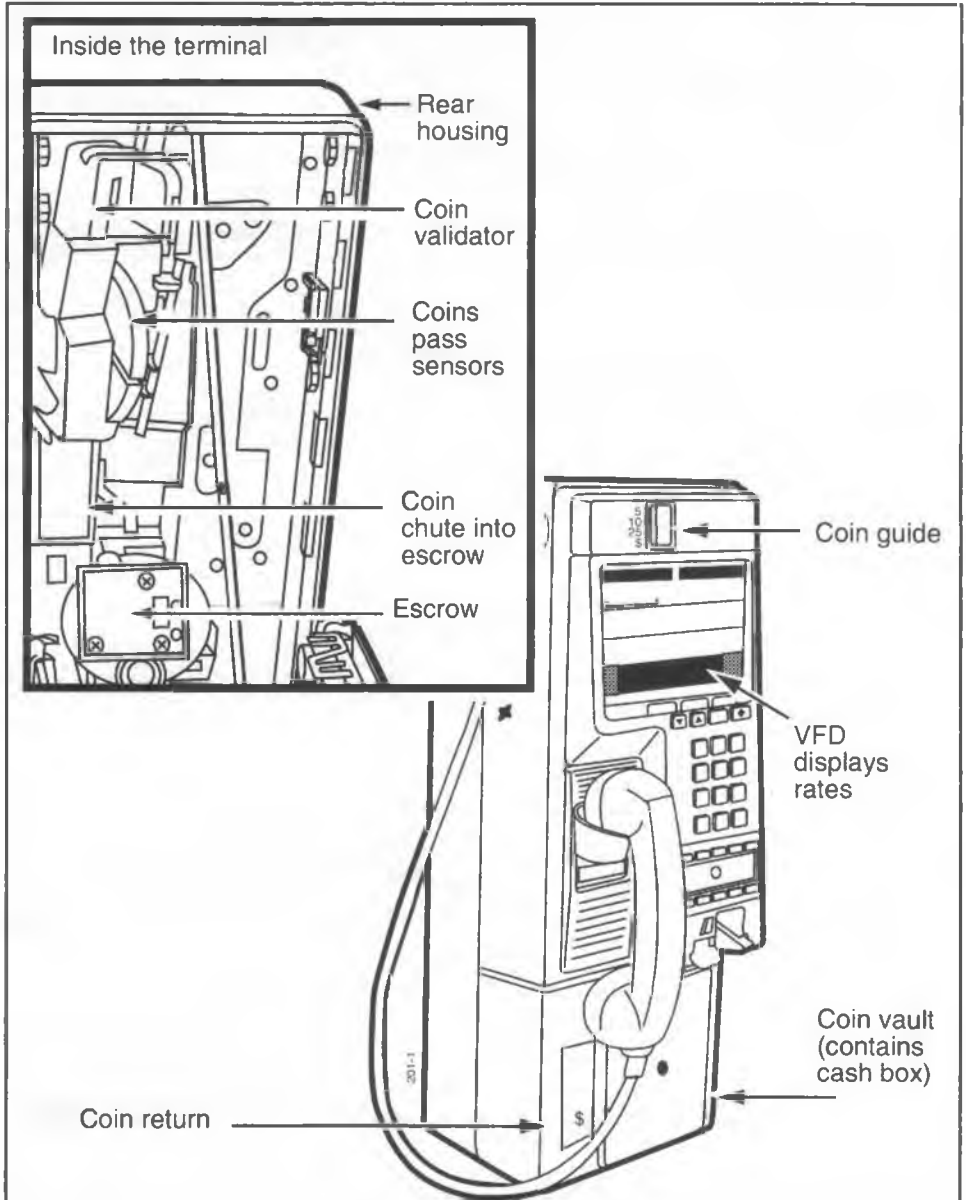
### e-lock security

The e-lock (electronic lock) security module monitors the position of the coin box only. The bolt alarm is jumpered into the connector.

**e-locks**

Coin vaults can be secured using either a mechanical or electronic lock. These locks are customer-specific.

**Figure 1-12: Coin features on the Millennium multi-pay terminal**





# Interconnections of internal components

The components of the terminal have snap-together connectors for easy replacement. Most components connect on the control or telephony PCPs. Figure 1-13 and Figure 1-14 show the connections for a standard telephony PCP with datajack connector and for the control PCP without the smart card alert or IAS module connections.

Chapter 7 describes the procedures for removing and replacing components in the terminal.

**Figure 1-13: Telephony PCP interconnection diagram, basic**

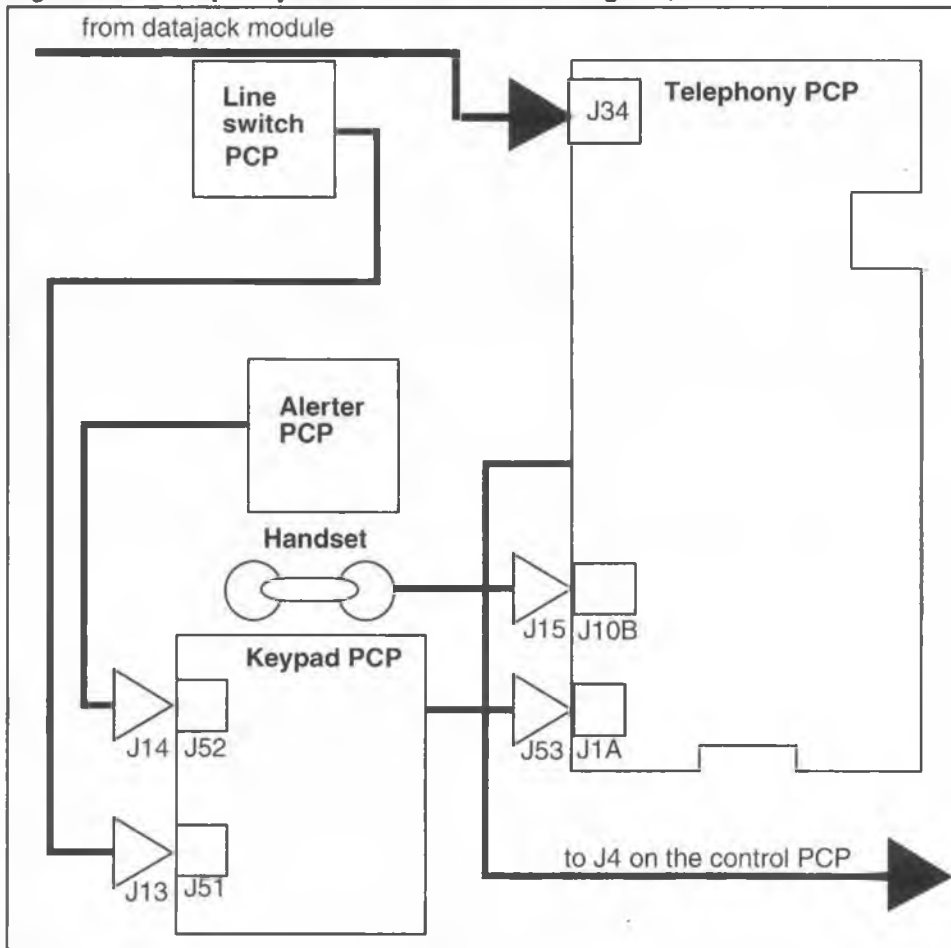


Figure 1-14: Control PCP interconnect diagram, basic

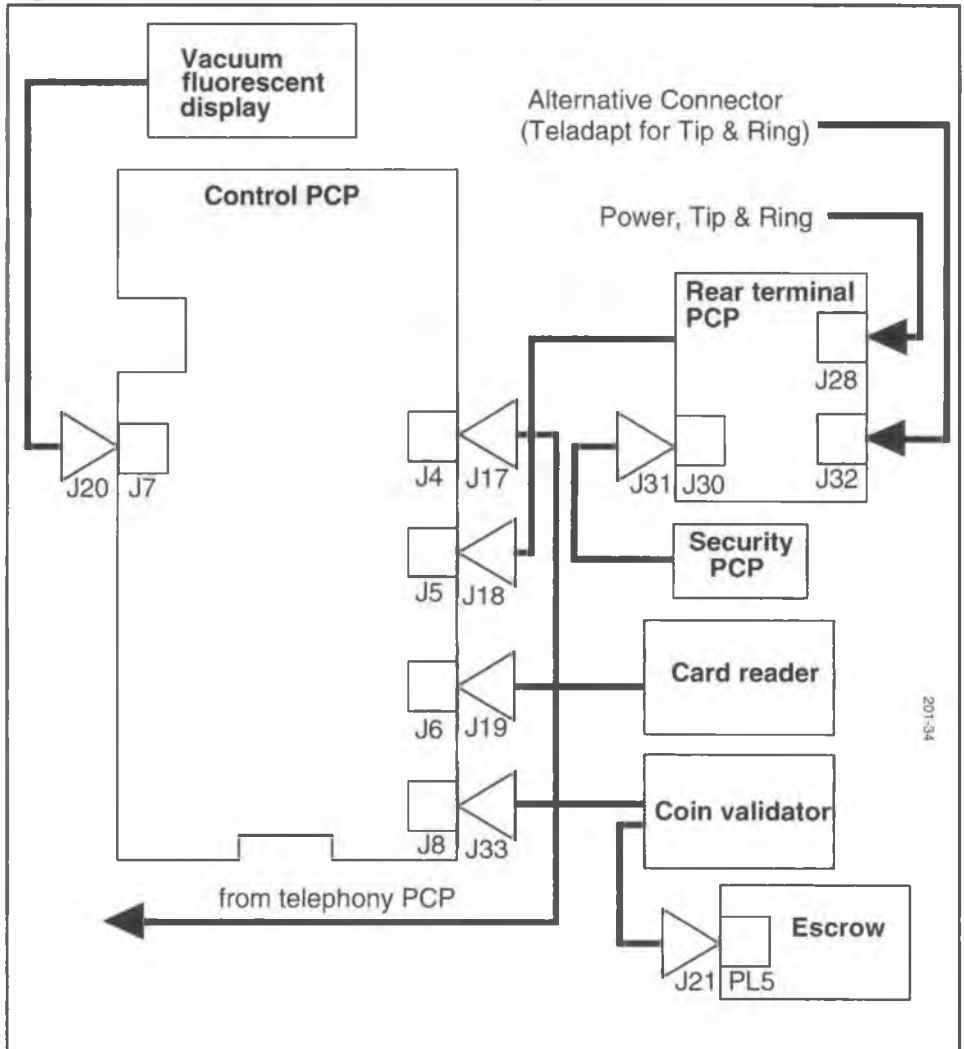


Figure 1-15 and Figure 1-16 show a line drawings indicating the standard cable connections.

Figure 1-15: Multi-pay terminal internal cabling, view 1

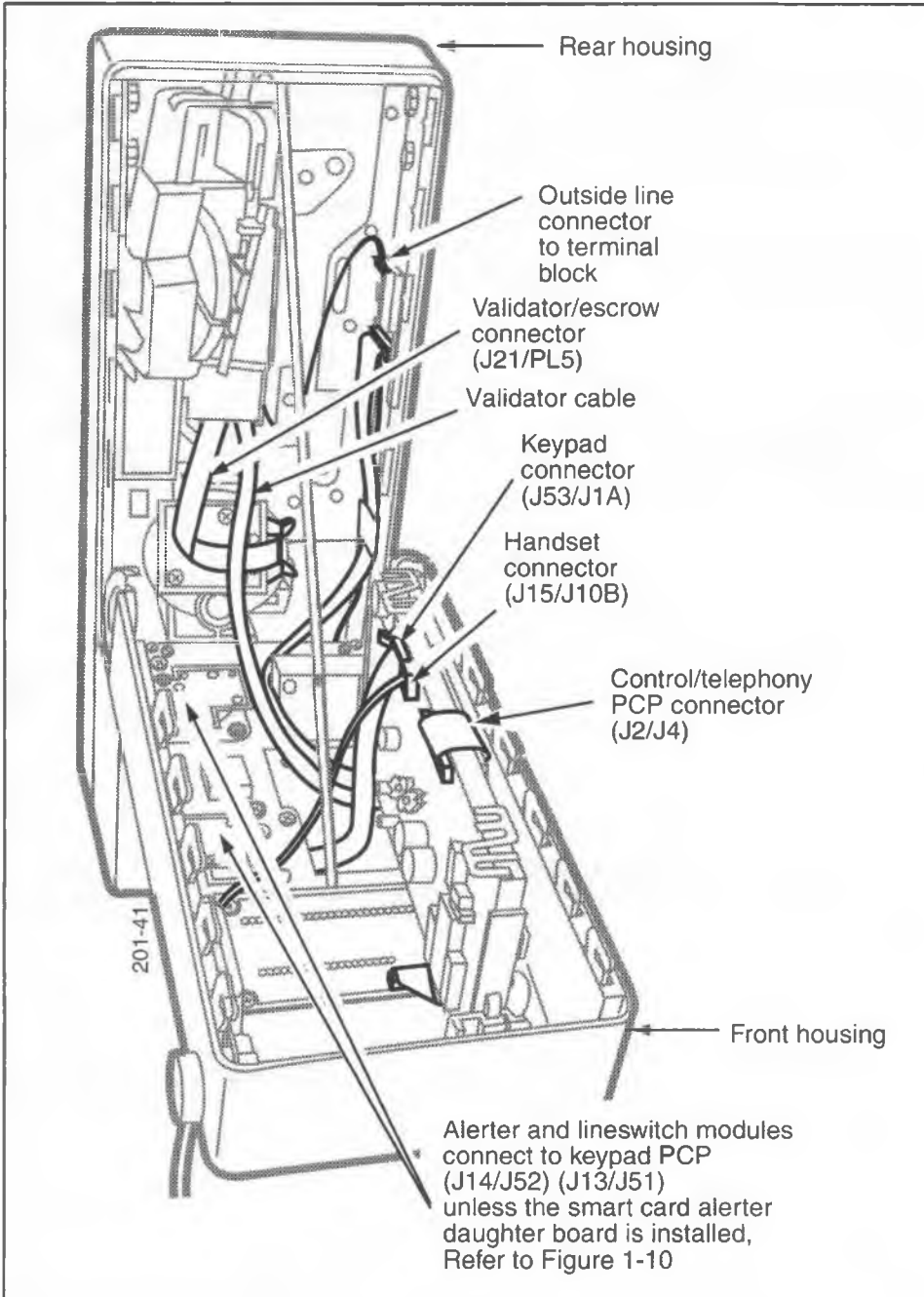
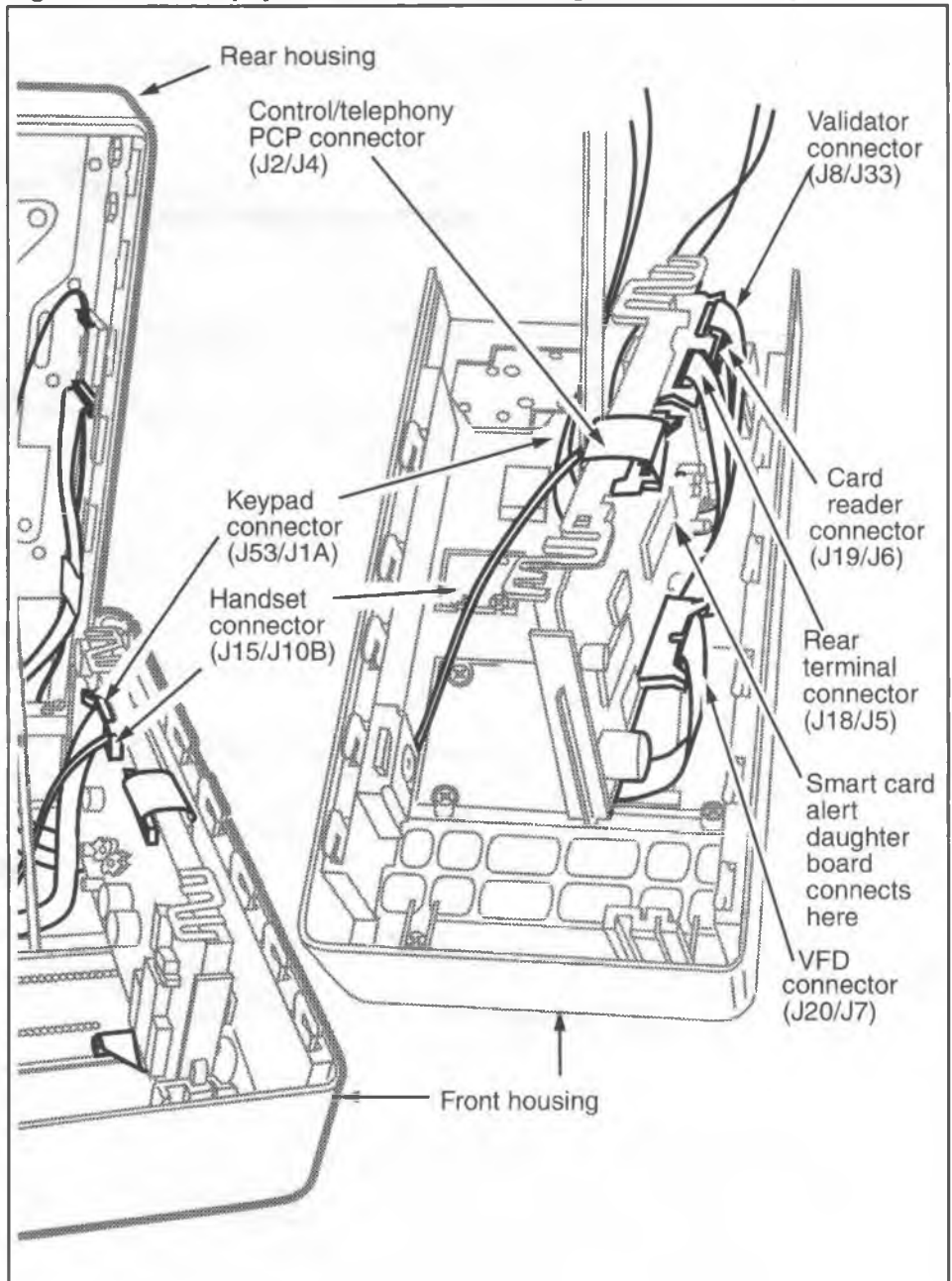


Figure 1-16: Multi-pay terminal internal cabling, view 2



## Describing the craft interface

This section outlines the craft interface for the Millennium multi-pay terminal.

Although most administration of Millennium multi-pay terminals is done by the Millennium Manager, craftspeople must visit the terminals to perform maintenance procedures. They use the craft interface to install software into the terminals and troubleshoot problems.

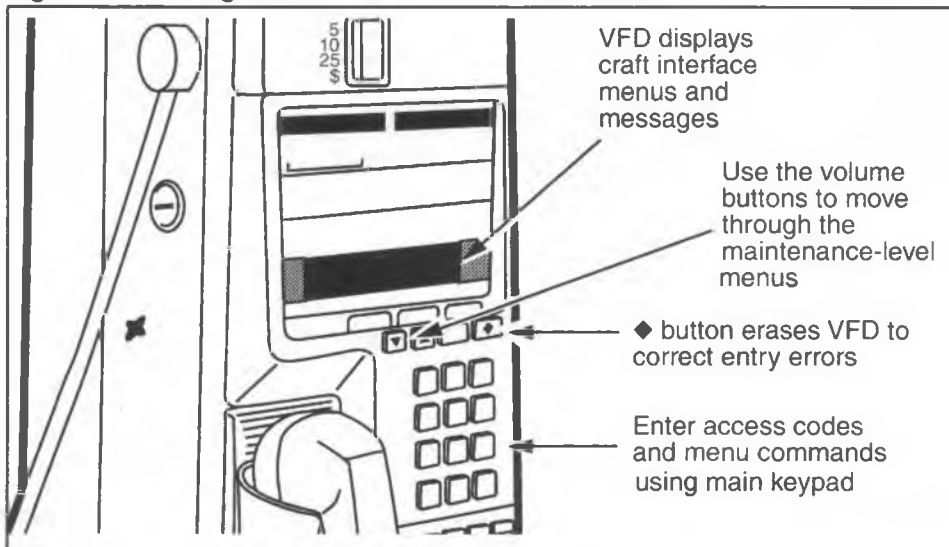
The craft interface provides prompts on the VFD. You communicate with the interface using the main keypad.

The craft interface resides on firmware, read-only memory, in the terminal. The following is required before the craft interface can be accessed:

- supplementary power
- an operational VFD
- an operational control PCP

Figure 1-17 points out the communication tools for the craft interface.

**Figure 1-17: Using the terminal to work with the craft interface**



## Entering the craft interface

To access the craft interface, you will enter an access code and a PIN (personal identification number) on the main keypad. These codes serve as security gates and as notifiers to the Millennium Manager for operation code purposes.

The access code and PINs are configured in the Millennium Manager by the system administrator based on the decisions of the operating company maintenance personnel requirements. PINs can be assigned according to the levels of access privileges required. For instance a craftsperson who only does coin collections would have a different PIN from someone who replaces modules inside the terminal.

The seven-digit **access code** is downloaded to the terminal from the Millennium Manager when the terminal is installed. There is also a default access code, which is resident in the terminal firmware.

Use the default access code if the assigned code is not in the memory, such as when:

- a power failure has caused the terminal to lose its memory
- the control PCP or the firmware was replaced
- the terminal has just been installed.

## Privilege levels

When you use the craft interface, your privilege level determines the craft interface level you can access. Your five-digit PIN determines your privilege level.

The two levels of the craft interface are:

- the operation-code interface
- the maintenance interface

## Operation-code interface

Operation-code interface lets you enter operation codes in the 1 to 899 range to send information to the Millennium Manager.

The codes tell the telephone company about the status of the terminal, including any maintenance required or done on the terminal. For example, code 87 could mean the card reader needs repairing, and code 15 could mean the booth has been cleaned.

The telephone company specifies the meaning of the operation codes.

**Note:** A craftsperson with operation code interface access can do exterior maintenance only. Craftspeople must have maintenance access to open the terminal. Opening the terminal without this access triggers an alarm message.

For instructions on accessing the operation-code interface of the craft interface, see **Entering operation codes** in Chapter 5.

When you access the operation code interface, if you have operation-level privileges,

this message  
appears  
on the VFD:



## Maintenance-level interface

The maintenance interface lets you perform diagnostic routines on the components of the terminal, the INSTALL terminal-configuration routine, and administrative functions such as a forced download of terminal tables or upload of terminal records. You can enter all operation codes at this.

For instructions on accessing the maintenance level, running the tests, and entering restricted operation codes, refer to Chapter 5.

When you access the maintenance interface, you will be prompted to unlock the terminal. When the terminal has been unlocked:

- If the terminal is in working condition,

this message  
appears  
on the VFD:

**Use \*=MENU, #=INSTALL  
or dial item number**

At this prompt, you can do one of three things:

- Access the maintenance menu by pressing the \* button. This process is described in Chapter 5.
  - Initiate the INSTALL terminal-configuration routine by pressing the # button. This process is described in Chapter 3.
  - Access a maintenance activity by entering its numeric or mnemonic code. This allows you to bypass the maintenance menu and access restricted activities not available on it. The codes are given in Chapter 5.
- If the terminal needs to have the software installed,

this message  
appears  
on the VFD:

**Not installed  
Use # to INSTALL**

If this message appears, refer to Chapter 3 and perform the INSTALL terminal-configuration routine.





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## 2 Mounting the terminal

---

This chapter provides instructions for selecting a site, and installing the Millennium multi-pay terminal on-site. Once the terminal is installed, function tables must be downloaded to it using the craft interface.

The major steps to installing a Millennium multi-pay terminal are:

### **Installing the terminal on-site**

1. Selecting the site.
2. Installing a backboard, if required., and other pre-mounting considerations.
3. Attaching the terminal to the backboard or to standard furniture backboards and connecting it to the outside line.

### **Installing and testing terminal function**

Once the terminal is installed, the function tables must be downloaded into the terminal using the craft interface. Chapter 3 describes these final steps to activating the terminal functions:

4. Installing software in the terminal.
5. Testing the terminal.

## Selecting a site

Follow the standards and guidelines of the operating company when selecting a site. As a guideline, the site should be:

- easily accessible for public use
- adequately lit
- private for the user
- free from excessive noise or vibration
- away from grease, smoke, and dust
- away from moving machinery, piled merchandise, narrow aisles, and stairways
- at least 152 mm (6 in.) from neon lights, transformers, and other equipment with inductive effects
- inexpensive to repair if the terminal is removed
- close to a supplementary power source that is not accessible to the public, to prevent vandalism

## Tools and equipment required

Table 2-1 lists the tools and equipment required for installing, maintaining, and testing the multi-pay terminal.

**Table 2-1: Tools and equipment required**

<b>Tool</b>	<b>Use to</b>
T-tool	open the housing assembly. Refer to Figure 2-3.
L-tool	open the housing assembly if space does not permit use of the T- tool. Refer to Figure 2-3.
upper housing and lower housing keys	unlock the terminal housing; used in conjunction with the T- and L-tool to open the terminal.
butt-end test set	test the line to the terminal, and to use during fault-clearing procedures.

**Table 2-1: Tools and equipment required (continued)**

<b>Tool</b>	<b>Use to</b>
voltmeter	test the voltage of the supplementary power supply.
ESD wrist strap	protect electronic components from electrostatic discharge (ESD) damage.
dry type cleaning card	clean the card reader.
test cards: mag stripe and smart card	test the ability of the terminal to process card calls.
calibration coins, actual coins	test coin validator calibration.
knuckle saver (lifter)	remove external instruction cards.
small slot-head screw-driver	attach the tip and ring leads and the supplementary power-supply leads to the terminals on the rear terminal circuit pack.
#1 type 1A cross-recess screwdriver	tighten and loosen M3 screws and to remove the number-card window.
#2 type 1A cross-recess screwdriver	tighten and loosen M3.5 screws and M5 screws.
chip puller	replace control and voice chips on the control PCP.

## Installing peripheral equipment

Machines, such as TDD/TTY (electrotype for the deaf) units are tied into the line outside the terminal. Refer to the instructions accompanying the particular machine for the installation and operation instructions. Otherwise, follow the installation procedures given by the operating company installing the devices.

### **Making a call using such a device:**

1. A call is placed from a Millennium terminal. The sequence dialed indicates that the call is being directed to another TDD device.

2. When the call goes through and connects with a similar TDD/TTY device at the other end, the device is activated. The handset is left off-hook for the duration of the call.
3. When the call is finished, the handset on the terminal is replaced on-hook.

## Pre-mounting considerations

The following components, if required, can be installed before the terminal is mounted, such as when the operating company prepares the terminals for distribution. In addition, the terminal may have a datajack module or a smart card alert daughter board installed at the factory.

You will need to test these features once the terminal is installed.

## Installing an IAS module

Millennium terminal billing functions require answer supervision to be present on the line. If this feature is not available from the outside line, you will have to install an inferred answer supervision (IAS) module in the terminal.

Refer to **Installing and replacing an IAS module** in Chapter 7 to install the module in the terminal.

The module connects between the outside line and the rear terminal PCP, where power connects otherwise.

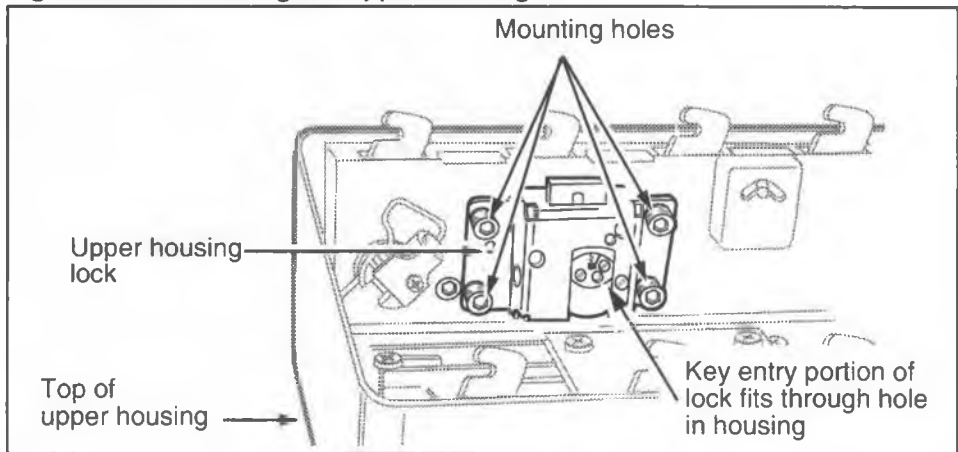
Power must be disconnected from the terminal to install this module, but it may be installed either before or after the terminal is mounted.

## Installing a lock on the terminal

The upper housing lock of the card terminal is customer-specific, so it may not be installed on the terminal at the factory. To install the lock, follow these steps:

1. Make sure the key operates the lock to be installed.
2. Insert the lock so the key entry protrudes through the round hole in the front housing assembly.
3. Align the four mounting holes with the four threaded holes in the cover plate. Refer to Figure 2-1.
4. Insert the four 1/4 inch no. 28 screws (shipped loose with each terminal) and tighten with a 5/32 Allen key.

**Figure 2-1: Positioning the upper housing lock**



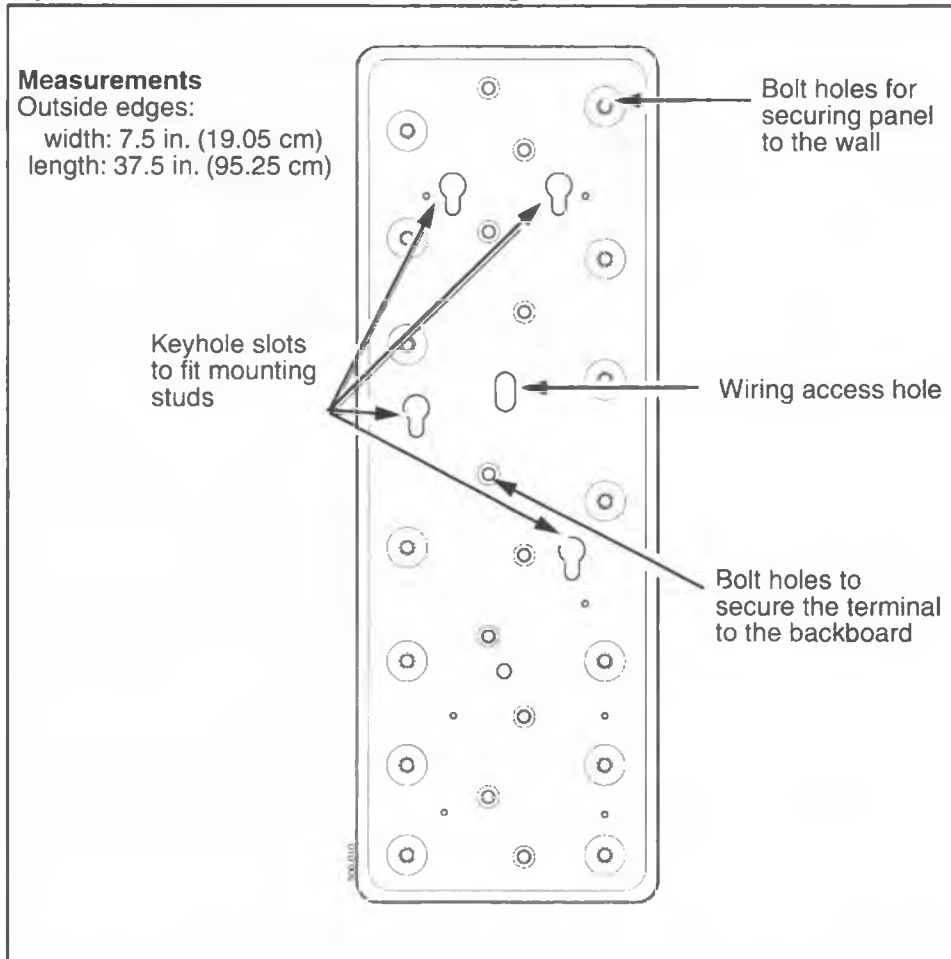
## Setting up the site: the backboard

The Millennium multi-pay terminal can be mounted in recessed and non-recessed furniture and Jaro tubes. Spacers are available to bring the terminal forward, if necessary. It is important to ensure that the key lock and the T-tool aperture on the side of the terminal are easily accessible for maintenance purposes.

## 2-6 Mounting the terminal


If the furniture selected does not already have a backboard installed, a backboard must be ordered when the terminal is ordered. Figure 2-2 shows a diagram of the backboard.

**Figure 2-2: Terminal backboard mounting holes**



## Mounting the backboard

The surface on which the terminal is mounted should be vertical.

<p><b>CAUTION</b></p> 	<ul style="list-style-type: none"> <li>• The Millennium multi-pay terminal must be mounted on a vertical surface.</li> <li>• A tilt greater than 1.5 degrees in any direction may cause malfunction.</li> </ul>
---	---

1. Consult Table 2-2 and select the fasteners suited to the installation.
2. Make a mark at the desired height.
3. Guide the station wiring through the wiring-access hole in the backboard.

**Table 2-2: Fasteners for backboards**

Mounting surface	Hole size required	Size and type of fastener	Minimum number of fasteners
Softwood	0.125 inch (1/8 inch) or no. 30	1.75 inch no. 14 FH wood screw	7
Hardwood	0.125 inch (1/8 inch) or no. 30	1.75 inch no. 14 FH wood screw	7
Masonry, concrete, or brick	0.3125 inch (5/16 inch)	2 inch no. 14 wood screw in no. 16 plastic anchor	7
Cinder block, hollow tile	0.75 inch (3/4 inch)	1.25 inch X 4 inch RH toggle bolt	6

4. Align the backboard so it is vertical.

**Note:** The terminal might not work if there is a tilt greater than 1.5 degrees in either direction.



5. Locate its top edge at the mark determined in Step 2.
6. Secure the backboard with one fastener.
7. Make fine adjustments so the backboard is correctly aligned and level, and mark that position.
8. With the backboard in the vertical position, use the remaining fasteners to attach it. Additional fasteners may be used to make sure the backboard is secure.

## Testing the line to the terminal

Before you install the terminal, you need to make sure the telephone line is supplying tip and ring and the proper level of supplementary power.

- use your butt-end set to test the telephone line to the terminal. If the line does not have answer supervision, you will need to install an IAS module, which is described in **Installing an IAS module** in Chapter 7.
- use a voltmeter to test the voltage of the supplementary power supply. Acceptable voltages are listed under **Supplementary power requirements** in Chapter 1.

### DANGER



### Do not:

- install a terminal during a lightning storm
- install telephone jacks in wet locations, unless they are designed for wet locations
- touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface

## Mounting and connecting the terminal

### CAUTION



- The Millennium multi-pay terminal must be mounted on a vertical surface.
- A tilt greater than 1.5 degrees in any direction may cause malfunction.

The following procedures describe how to install a Millennium multi-pay terminal in a variety of furniture.

### Installing the terminal in recessed furniture

Most manufactured enclosures come with a backboard installed. As you prepare to install the terminal, you will have two considerations:

1. Whether the backboard hole pattern fits the pattern on the terminal.
2. Whether the terminal will require spacers to bring it forward so it is accessible for use and maintenance. This is not a likely problem with the multi-pay terminal, as it is fairly deep. But the key lock and the aperture for the T- or L-tool must be accessible.

If either of these conditions need addressing, an adapter kit can be ordered from the manufacturer of the enclosure.

Use the instructions included with the adaptor to install the kit.

Then install the terminal onto the backboard. Refer to the procedure in **Installation in a non-recessed area**, in the next section.

## If a backboard is not installed

If the installation site does not have an installed backboard, a backboard and spacer kit can be ordered from Nortel. Order numbers are listed in Chapter 9.

1. Install the backboard. Refer to the instructions in **Mounting the backboard**, earlier in this chapter.
2. Attach the spacer adaptor, if required, by following the instructions enclosed with the kit.
3. Install the terminal onto the backboard. Refer to **Installing a terminal in non-recessed furniture**.

## Installing a terminal in non-recessed furniture

If required, mount the backboard according to the instructions in **Mounting the backboard**, covered earlier in this chapter. Refer to Figure 2-2. Check the lines as described in **Testing the line to the terminal**. Then continue:

### A. Positioning the terminal on the backboard

1. Prepare the inside service wires (ISW) by cutting off the exposed ends and wrapping them with electrical tape. The tape ensures that the bare wires will not touch the internal components when you insert the wires into the terminal.

Observe normal electrical wiring precautions when handling the wires.

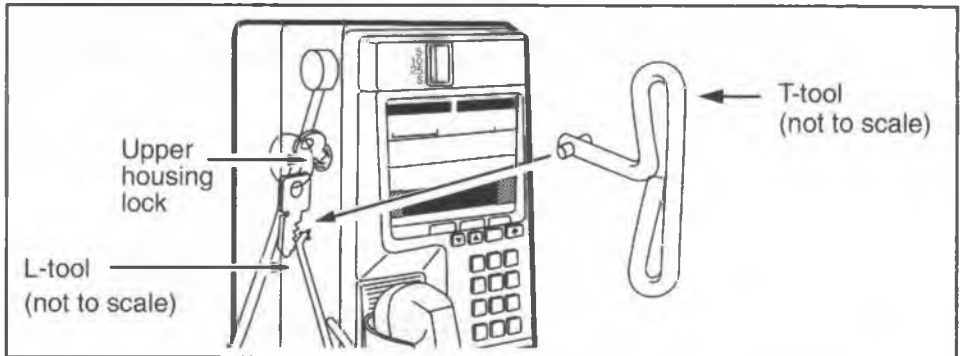
2. Feed the wires through the access hole in the backboard.
3. Insert three security studs in the threaded holes in the back of the mounting plate of the terminal rear housing.
4. Line up the ISW with the oval 25 mm by 12.5 mm (1 in. by 1/2 in.) wiring access hole in the housing assembly of the terminal, as you move the terminal towards the backboard.

5. Engage the security studs in the keyhole slots in the backboard. Then let the terminal slide down into position.

## B. Unlocking and opening the terminal

1. Put the key in the lock on the upper terminal housing, as shown in Figure 2-3, and turn the key clockwise. If it is difficult to turn the key, insert the T- or L-tool into the hole below the key lock hole and apply a slight force counterclockwise to relieve the pressure on the key, while also turning the key clockwise.
2. With the T- or L-tool inserted into the hole below the key lock, rotate the tool clockwise to release the locking mechanism.

**Figure 2-3: Key and tool needed to open the terminal housing**



3. Remove the handset from its cradle and let it hang by the armored cord.
4. Grasp the front housing assembly firmly by both sides and tip it forward until it clears the rear housing.

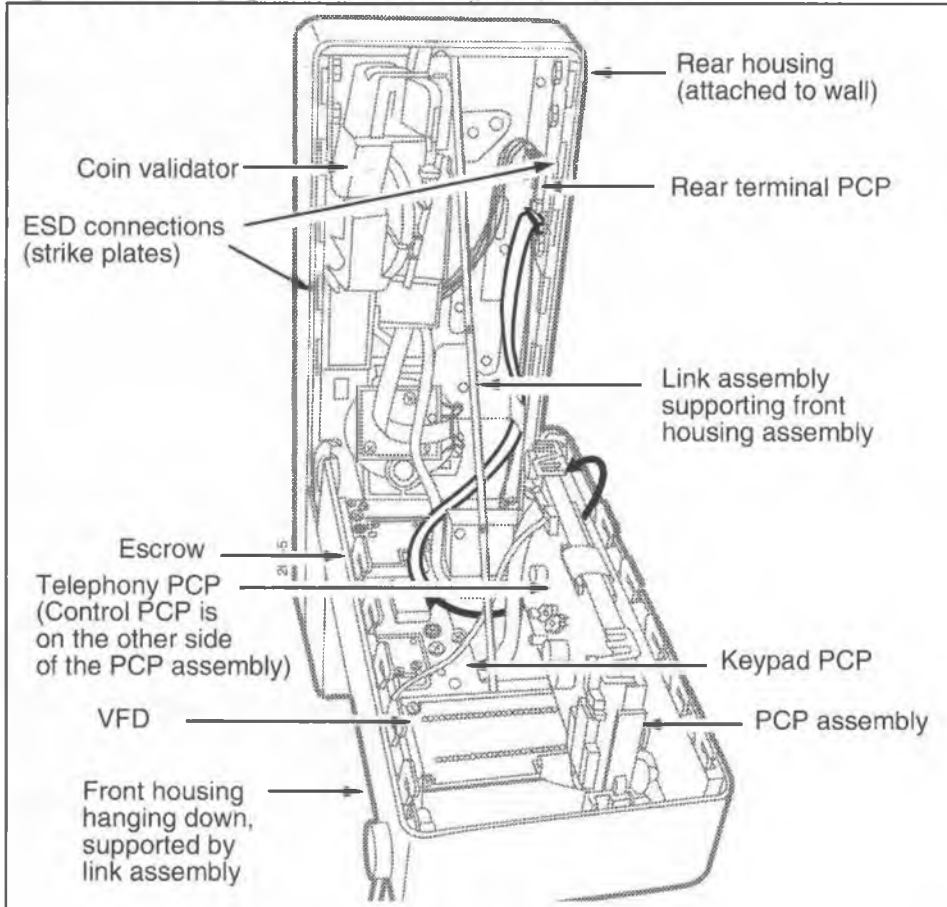
Allow the front housing to hang downwards, as shown in Figure 2-4. In the fully opened position, the weight of the front housing is supported by the link assembly, a tie-rod which is attached to the front and rear housing.

**Electrostatic discharge (ESD) precautions**



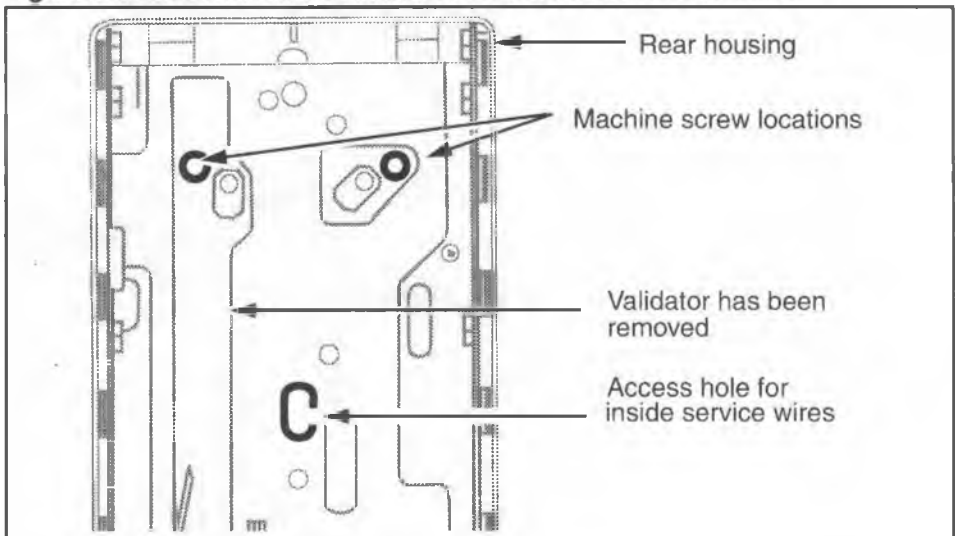
- To prevent damage to the ESD-sensitive devices inside the terminal, wear your ESD wrist strap.
- Refer to Figure 2-4. Attach your ESD wrist strap to either the left or right strike plates inside of the rear housing assembly.
- Disconnect power at the rear terminal PCP or between the rear terminal PCP and the control PCP before removing any modules.
- Do not reconnect power until you are ready to close the terminal.

**Figure 2-4: Multi-pay terminal housing in open position**



5. Look for the serial number of the terminal, found on a sticker on the rear housing of the terminal. Record this number to use in the INSTALL terminal-configuration routine, described later in this chapter.
6. Secure the housing assembly to the backboard using two pan-head machine screws. The location of the holes on the inside of the rear housing are shown in Figure 2-5. Use 1/4-inch no. 20 1/2-inch-long screws.

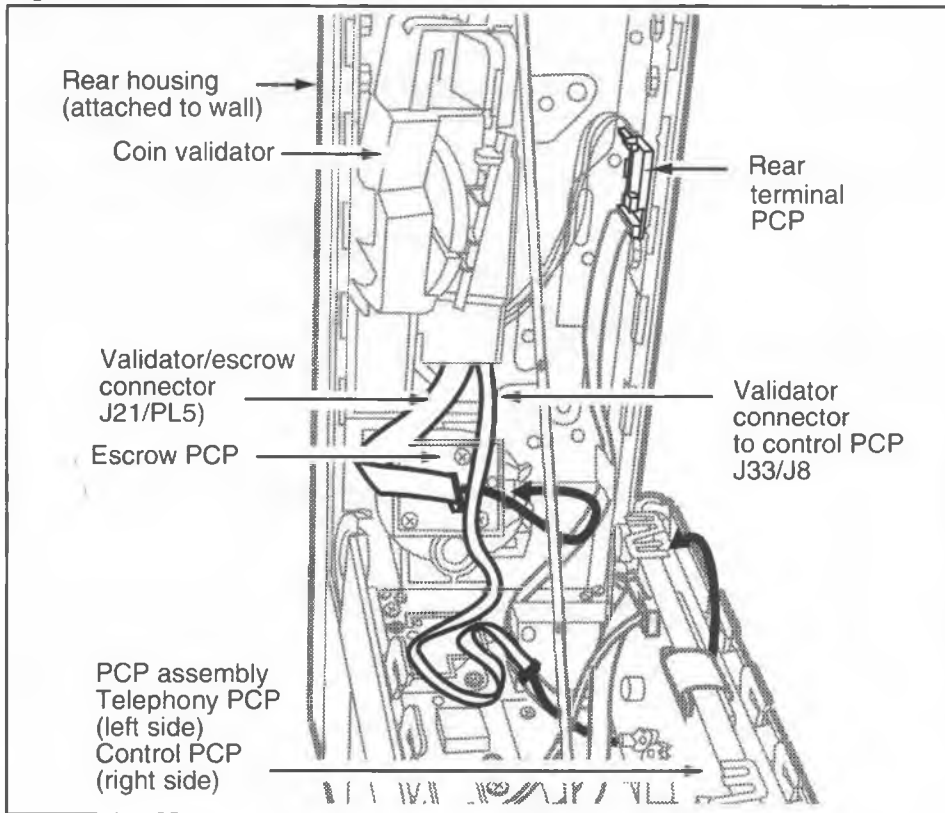
**Figure 2-5: Machine screw locations on the back of the terminal**



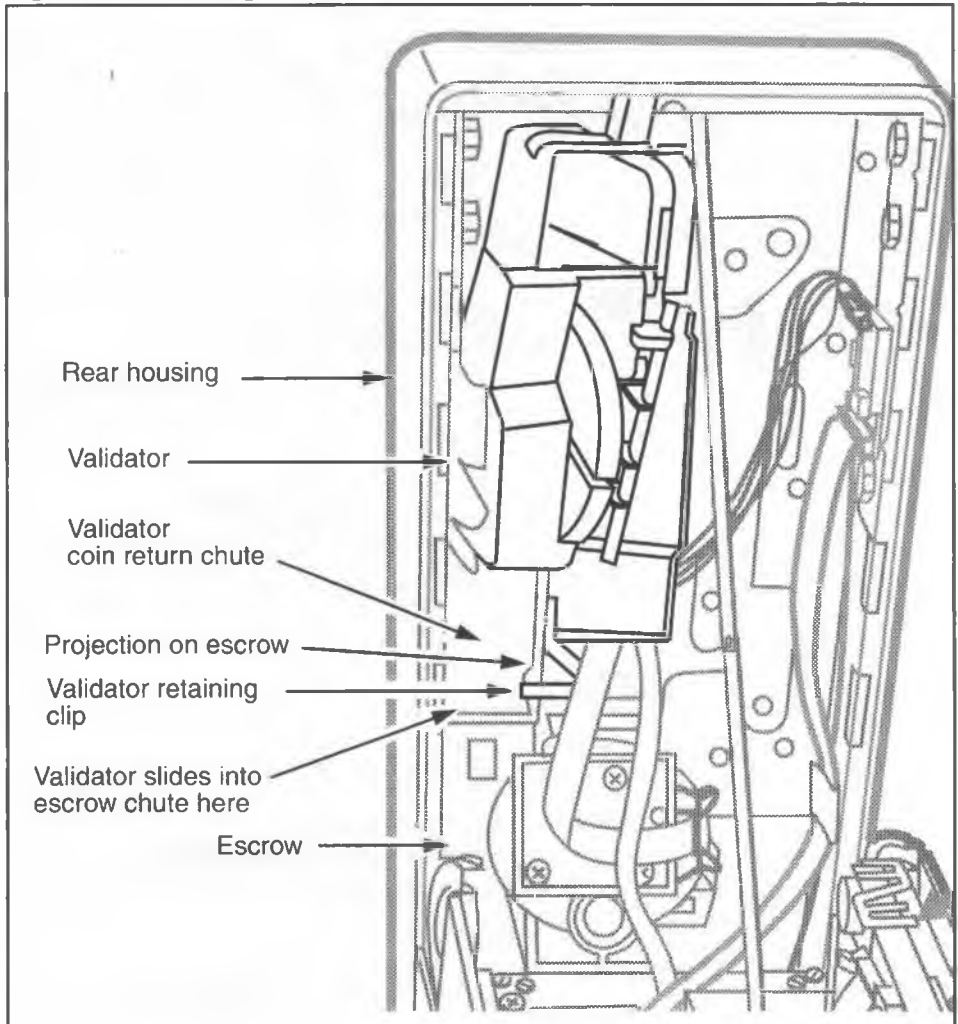
7. To attach one of the screws, you need to remove the coin validator. Refer to Figure 2-5.
  - a) Disconnect the validator cable (J33) from the control PCP connector (J8). Feed the cable under the PCP assembly.
    - Disconnect the cable to the escrow (J21) from the escrow connector (PL5).
    - Keep the bend in the cable leading to J7; this ensures the cable will not get pinched when the front housing is closed.
    - Refer to Figure 2-6 to see where the various components are.

**Note:** If you are unsure of cable connections, look for the name of the connection printed on the PCP, or refer to **Interconnections of internal components** in Chapter 1.

**Figure 2-6: Coin validator cable connections**



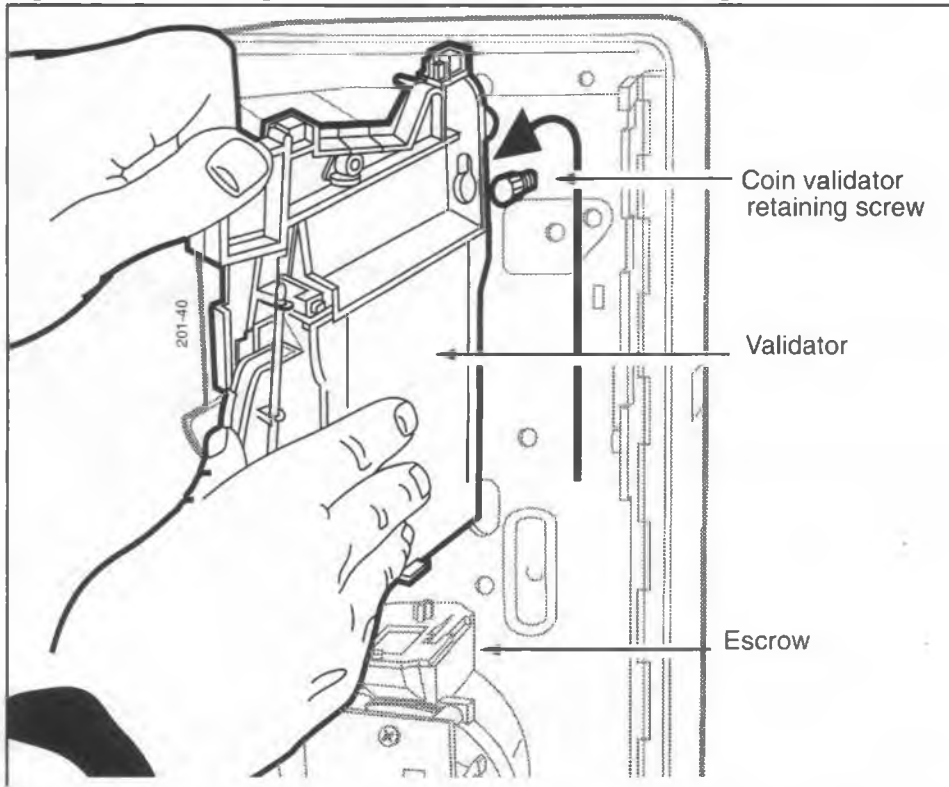
- b) Remove the rubber spacer between the top of the validator and the top of the rear housing assembly, if it is present.
- c) Remove the plastic retainer strip located between the reject chute and the housing of the validator, if it is present. Discard the retainer. The retainer is required for protection during transportation only.
- d) Release the retaining clip securing the validator to the escrow, indicated in Figure 2-7.

**Figure 2-7: Locating the validator retaining clip**

- e) Slide the validator up until the large portion of the keyhole on the validator is aligned with the validator retaining screw. Refer to Figure 2-8.
- f) Remove the validator by tilting it outward at the top, then lifting it up and out of the rear housing.



Figure 2-8: Removing the coin validator from the retaining screw



8. Insert the second pan-head screw into the hole uncovered by removing the validator and then replace the validator by reversing the above steps.

Before setting the validator keyhole on the screw, slide the coin rejection chute on the validator into the top of the coin chute on the escrow as indicated in Figure 2-7.

**Note:** It is not necessary to ground the terminal during installation. If the terminal is inadvertently grounded, the terminal will still work. Compliance with both UL and FCC specifications is met with or without a ground.

### C. Attaching the outside wires to the terminal block

1. Pull the inside service wires (ISW) through the oval wiring access hole in the rear housing, shown in Figure 2-5. Make sure the ISW is routed down towards the bottom of the terminal to prevent interference with the PCPs when the front housing assembly is closed.

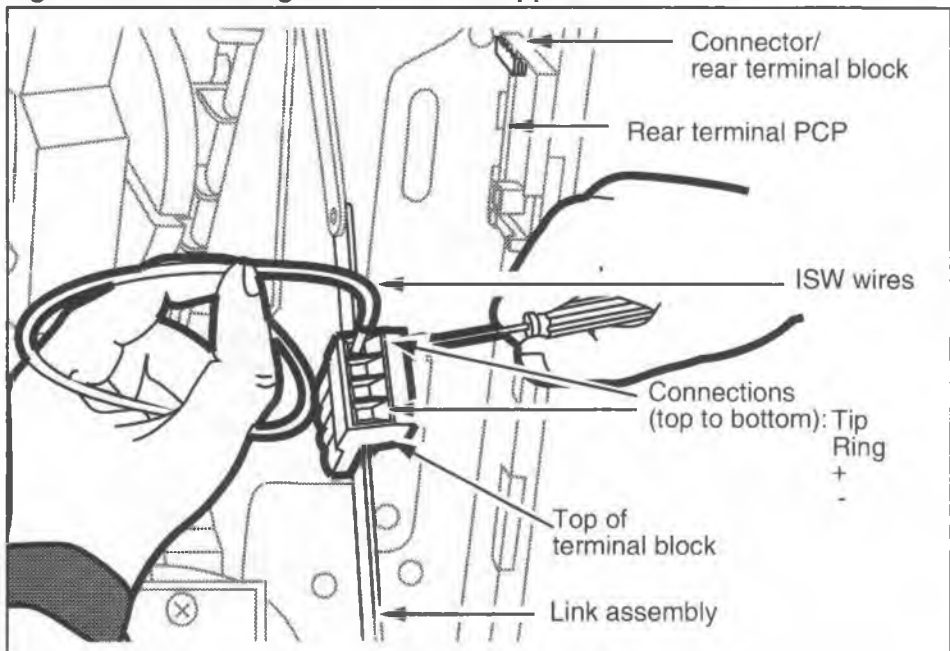
#### CAUTION



- Make sure that the ISWs do not touch the internal components of the terminal.

2. Locate the terminal block on the rear terminal PCP, which is on the right side of the rear housing. Pull off the upper terminal block and snap it to the upper arm of the link assembly, as shown in Figure 2-9. This secures the upper terminal block in place so you can attach the service wires.

**Figure 2-9: Connecting the ISWs to the upper terminal block**



3. Remove the tape from the ISW and strip the end of each wire.
  - a) Connect the service wires to the terminal block you snapped to the link assembly. Use a small screwdriver to connect the leads.
    - There are tip and ring terminals, and positive and negative terminals for the supplementary power supply, these connections are shown in Figure 2-9.
    - Follow your operating company instructions for proper connections.

**CAUTION**



**Installing inside service wires**

- When connecting the supplementary power wire, ensure that the proper polarity is achieved. Reverse polarity does not cause damage, but the terminal does not work.
- Observe the usual electrical precautions when working with the wiring.
- Conceal the outside wiring cables near the telephone or use approved moulding or tubing.
- Locate protectors and connecting blocks where they will be inaccessible to the public.

- Leave the upper terminal block attached to the link assembly until you are ready to close the terminal.

## D. Removing the PCP assembly to install components

If you have to install an internal instruction card or quick access keys label card, you must first remove the PCP assembly from the front housing assembly. The PCP assembly consists of a plastic frame which secures the control and telephony PCPs. The following procedure describes how to remove this assembly.

First, confirm that the following has been done:

- Your ESD wrist strap is connected to an ESD-grounding point inside the terminal. Refer to Figure 2-4.

- The upper terminal block is disconnected from the rear terminal PCP. Snap the upper terminal block to the link assembly to keep it out of the way.

Now you are ready to remove the PCP assembly.

1. Refer to Figure 2-10 and disconnect the cables, as described in Table 2-3.

**Figure 2-10: PCP assembly cable connections**

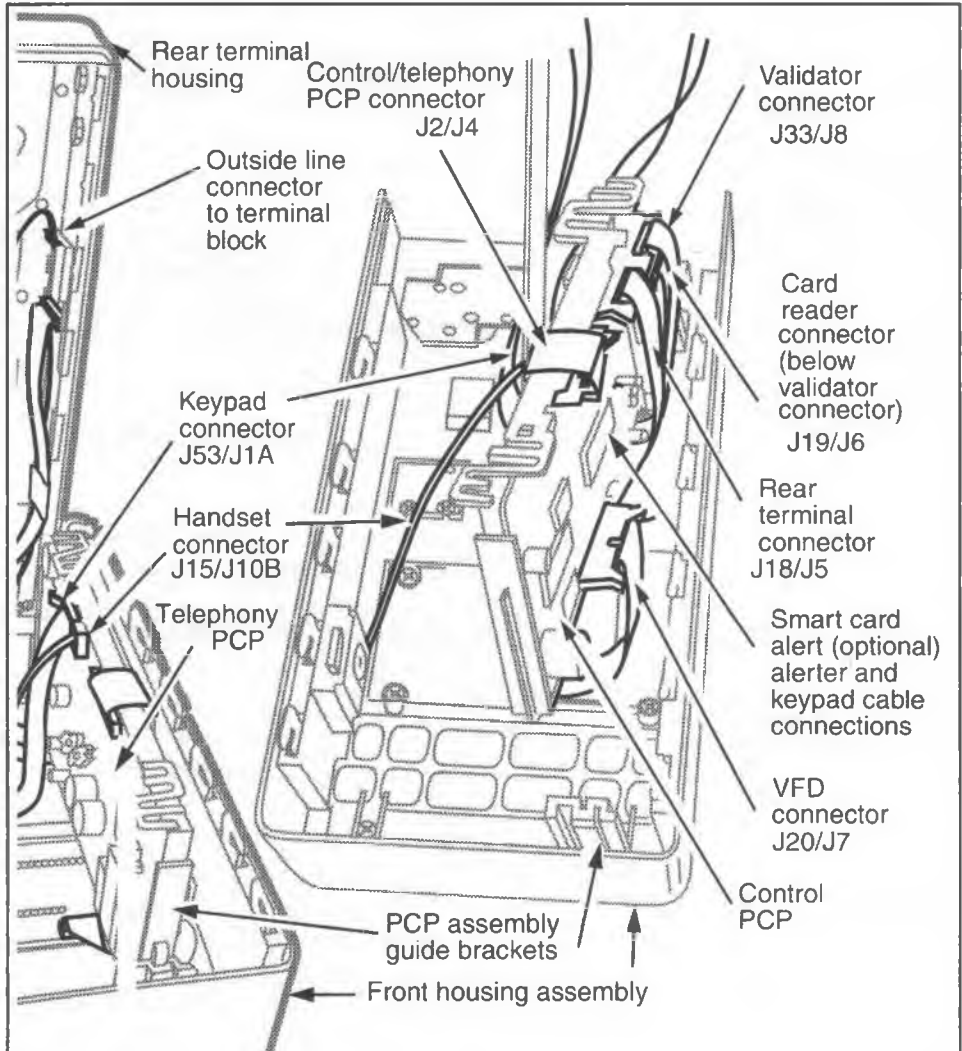


Table 2-3: Module connector numbers

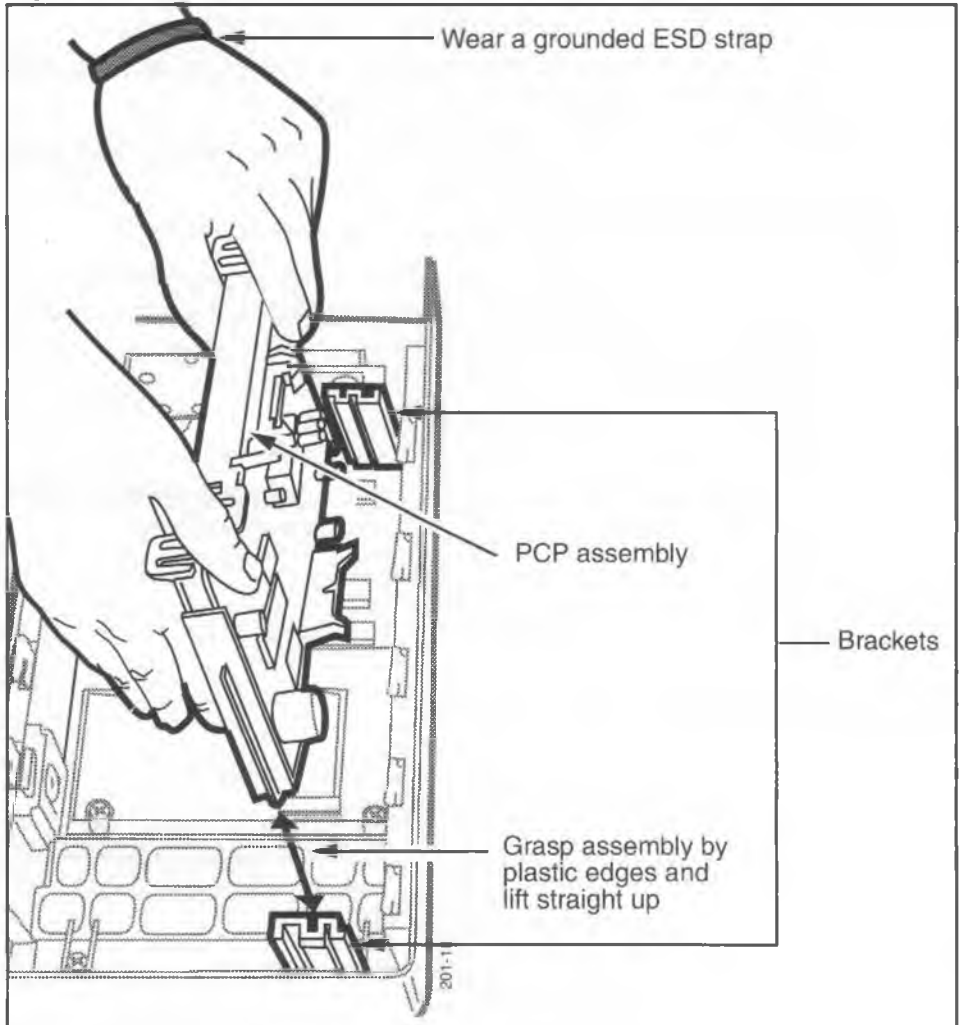
Disconnect this cable	from connector
<b>Remove this cable first. Reconnect this cable last.</b> J18, rear terminal PCP	J5 on the control PCP
J15, handset	J10B on the telephony PCP
J53, keypad PCP	J1A on the telephony PCP
J19, card reader	J6 on the control PCP
J20, VFD display	J7 on the control PCP
J33, coin validator PCP	J8 on the control PCP
<b>Optional features</b>	
If the terminal has an IAS module, the outside line is attached to that module.	
Datajack: disconnect the datajack module cable	J34 on the telephony PCP
Smart card alert: J14, disconnect the alerter cable J38, keypad cable	J3 on the smart card alert daughter board J2 on the smart card alert daughter board

If you are unsure of cable connections, look for the name of the connection printed on the PCP

**(ESD) precautions**

- Wear your ESD wrist strap at all times.
- When working with the board separately from the PCP assembly, keep the parts you are not working with in an anti-static bag.
- Never put boards on top of each other.

2. Remove the PCP assembly by sliding it up and out of its guide brackets, as shown in Figure 2-11. You may need to press the guides away from the PCP assembly to free it.

**Figure 2-11: Removing the PCP assembly bracket**

- a) Store the PCP assembly in a safe location in an anti-static bag.

If you need remove the PCPs from the PCP assembly frame, disconnect the cable across the top of the assembly from the connector on the control PCP (J4). Then release the snaps that retain the PCPs in the frame.

3. Install any upgrade features at this point, if they were not installed during pre-mounting installations.

Install the IAS module or the smart card alert daughter board by following these steps:

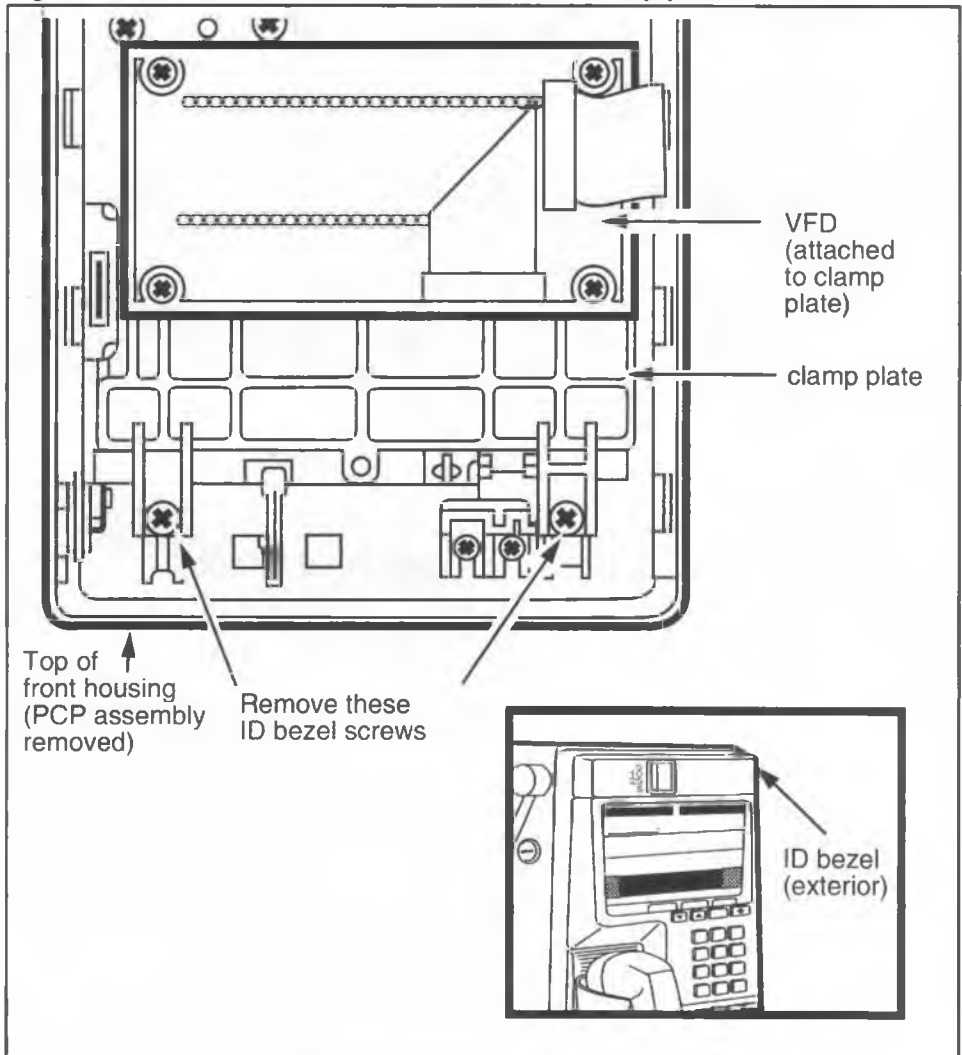
- a) **IAS module.** Refer to Chapter 7 for the following procedures to install this feature:
  - **Installing and replacing an IAS module**
- b) **Smart card alert.** Refer to Chapter 7 for the following procedures to install the smart card alert feature:
  - **Installing a smart card alert daughter board** for instructions about installing the daughter board on the control PCP
  - **Replacing firmware chips on the control PCP** for instructions about replacing the firmware

**Note:** A terminal with a datajack module cannot support the smart card alert feature.

## E. Installing internal components

1. If the operating company has decided to use internal instruction cards, install them now, as follows:
  - a) Support the ID bezel on the exterior of the terminal with one hand
  - b) Remove the two screws inside the housing assembly which secure the ID bezel. The screws are labelled in Figure 2-12.
  - c) Remove the ID bezel from the front of the terminal.

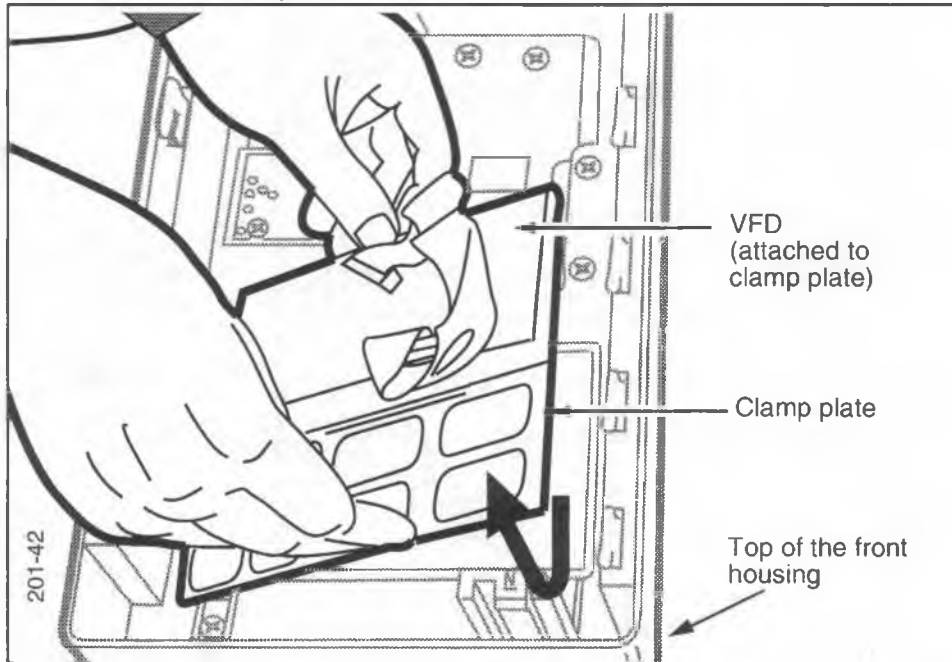
Figure 2-12: ID bezel screws also secures the clamp plate



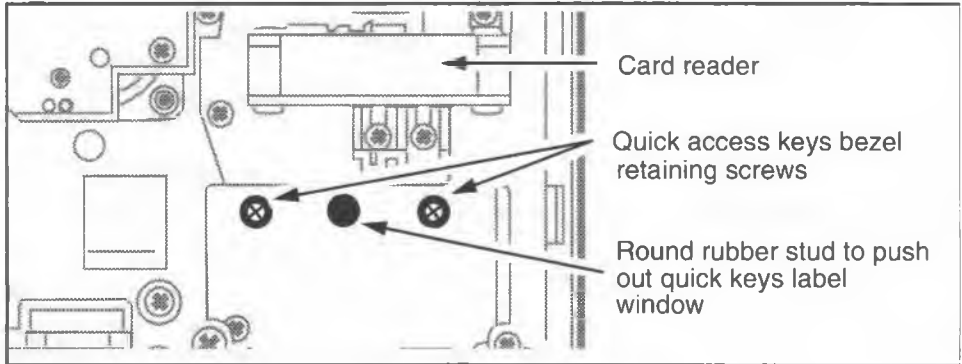
- d) Remove the clamp plate, which has the VFD assembly attached to it. Refer to Figure 2-13.



Figure 2-13: Removing the clamp plate



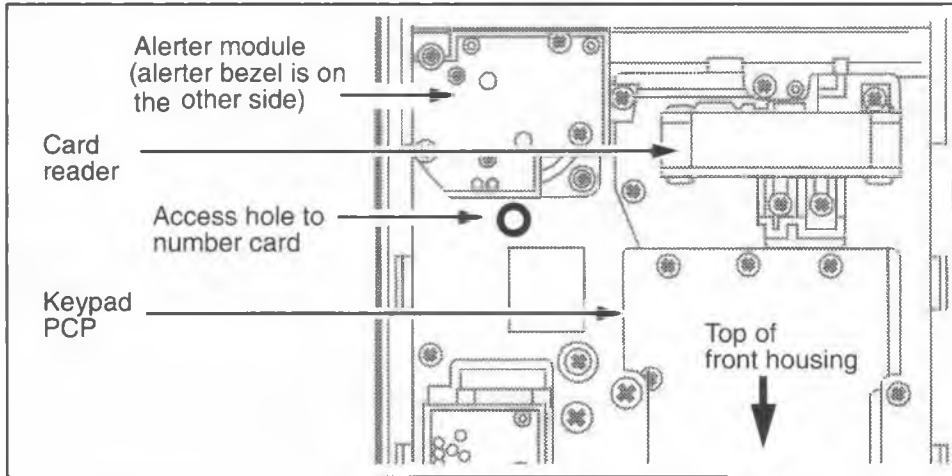
- e) Set the internal instruction card against the display window, with the instructions facing the exterior of the terminal. Align the notch in the lower edge of the card and the hole in the tab at the top of the card are properly located over their corresponding pins on the upper bezel.
  - f) Return the clamp plate to its proper position. Keep the bend in the cable for the VFD connector (J20).
  - g) Reassemble the ID bezel: ensure that the coin slot gasket is fitted properly over the opening, then replace the two screws inside the front housing assembly to secure the ID bezel and clamp plate.
2. If the terminal has quick access keys, install the label card:
- a) Push on the round rubber stud between the two screws securing the quick access keys bezel, indicated in Figure 2-14.

**Figure 2-14: Rubber stud pushes the quick access keys label**

This will bend the label window outward until the centre of the window is high enough to grasp. Pull it out.

- b) Insert the card behind the window.
  - c) Insert one end of the quick access keys label window in position in the opening in the quick access keys bezel. Bend the window outward, insert the opposite end into position and release it.
3. To install the number card on the hookswitch/alerter bezel, under the handset, proceed as follows:
- a) Remove the number card window, if it is installed. Use a type 1A cross-recess screwdriver of less than 8 mm (5/16 inch) diameter or an equivalent tool to push on the window from inside the terminal. Refer to Figure 2-15 to locate the hole, and push until the number card is free of the alerter bezel.
  - b) Insert the number card behind the window.
  - c) Insert one end of the window in position in the opening of the alerter bezel. Bend the window outward, insert the opposite end into position, and release it.

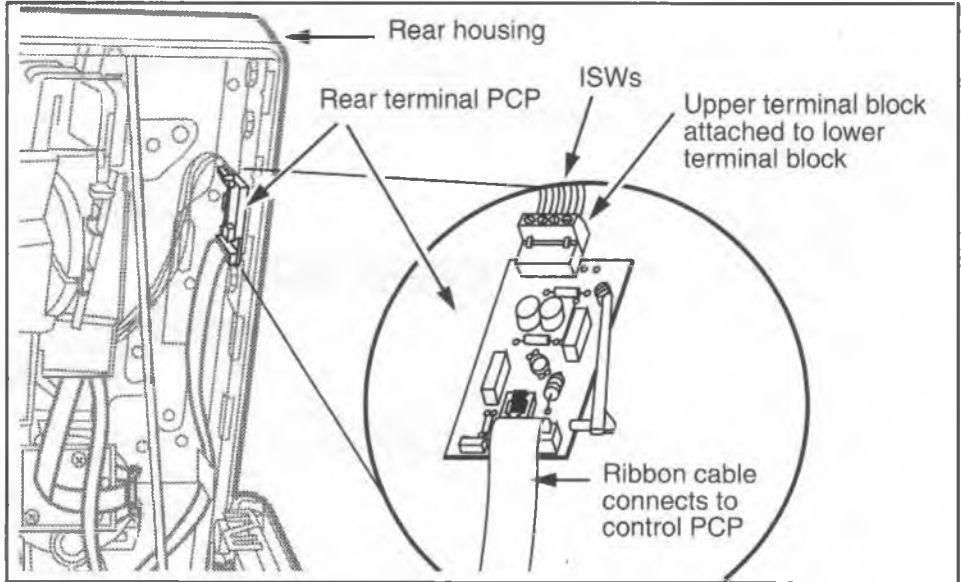
**Figure 2-15: Access hole used when installing the number card**



## F. Completing the installation

1. Re-install the PCP assembly by reversing the steps in **Removing the PCP assembly to install components.**
  - Ensure that the cables are fully seated in their connectors and excess cable is folded and tucked away from the edges of the terminal.
  - Before you push the PCP assembly fully into the brackets, ensure that the rear terminal PCP and validator PCP cables are threaded under the PCP assembly. As you fit the assembly into the brackets, you should hear a click when they fit into place.
  - **If the terminal has a smart card alert**, the cable from the alerter PCP to the smart card alert daughter board also has to be routed under the PCP assembly.
2. Reconnect the upper terminal block to the lower terminal block on the rear terminal PCP. This returns power to the terminal. Refer to Figure 2-16.

**Note:** If the terminal has an IAS module, the power connects to this module.

**Figure 2-16: Reconnecting the upper terminal block**

If **Telephony board not responding** appears on the display, with the terminal open and the handset on-hook, allow the terminal to power up for three minutes.

During this time, the terminal will not respond to any further install or maintenance instructions. If **Telephony board not responding** is still displayed after the three minutes, replace the telephony PCP. Refer to **Removing the telephony and control PCPs** in Chapter 7.

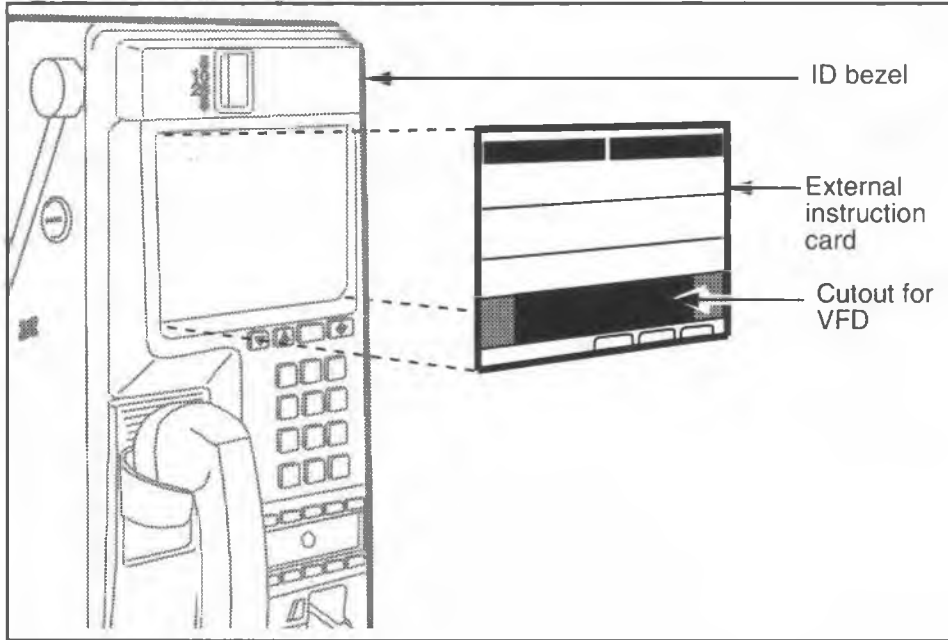
3. Close the terminal. Put the handset on-hook and lock the terminal, first with the T-tool, then by turning the key.

After ten seconds **Out of service** appears on the display and you are ready to proceed with the **INSTALL** terminal-configuration routine described in Chapter 3.

4. If the operating company has decided to use external instruction cards, refer to Figure 2-17 and install them following these steps:
  - a) Insert the corners of the card under the lip between the display window and the upper bezel.

- b) Slide your fingers along the edges of the card, pressing the edges under the lip.
- c) Position the card so that all its edges are covered.

**Figure 2-17: Replacing the external instruction card**



### G. Installing a coin box

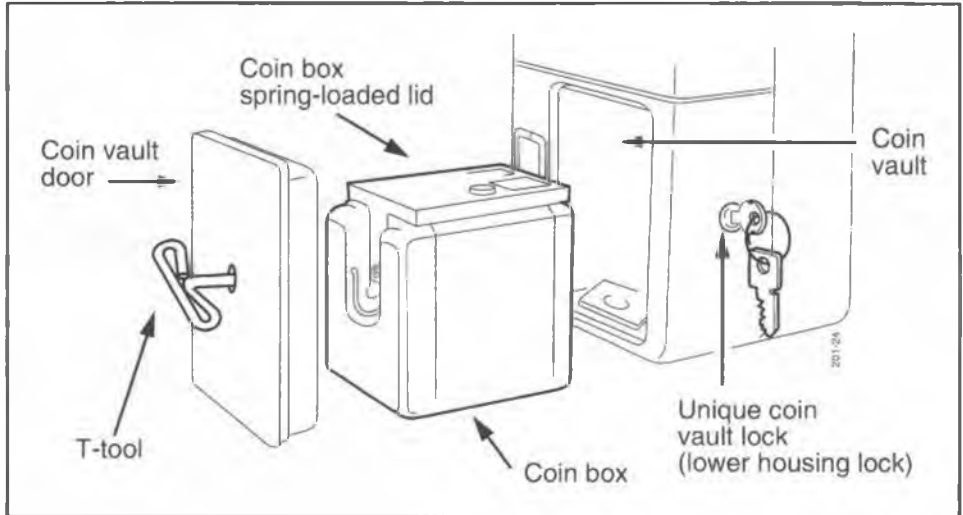
If the terminal does not have a coin box, install one.

Refer to Figure 2-18 and proceed as follows:

1. Insert the coin vault key into the key slot at the lower right side of the terminal and rotate the key clockwise to unlock the compartment.
2. Insert the T- or L-tool into the slot on the front of the vault door and turn the tool counterclockwise 45 degrees.
3. Pull the tool and vault door away from the terminal.

4. Insert the coin box, aligning the top with the upper coin rail, then replace and lock the vault door by reversing Steps 1 to 3.

**Figure 2-18: Removing the vault door and coin box**



You have now completed the hardware portion of the multi-pay terminal installation. Refer to Chapter 3 to complete the software installation and testing of the terminal functions.

## Other documentation

- For a description of all Millennium terminals, refer to the *Millennium terminals product guide*.
- The *Millennium terminals troubleshooting guide* is a pocket-size book containing the instructions for accessing the craft interface, as well as the alarm messages and error code tables.
- Order codes for these documents can be found in Chapter 9.



---

## 3 Installing terminal software

---

This chapter provides instructions for downloading software, and testing the Millennium multi-pay terminal once the tables are downloaded.

The INSTALL terminal-configuration routine prepares the terminal for operation, or upgrades, by downloading data into the terminal memory.

You use the keypad to respond to prompts displayed on the vacuum fluorescent display (VFD) of the terminal.

### When to do an INSTALL

The INSTALL terminal-configuration routine must be carried out whenever the control PCP memory is blank. This occurs when:

- the terminal is initially mounted.
- the memory has been corrupted because the terminal has been without supplementary power for an extended period.
- the control PCP, firmware on the control PCP, validator, or escrow have been replaced.

For more information on the craft interface and its levels of operation refer to Chapter 1.



## Performing an INSTALL routine

The INSTALL terminal-configuration routine first asks for the information to set up the initial call to the Millennium Manager. It then leads you through a series of terminal function tests.

The steps of the INSTALL routine include:

- testing the central-office (CO) line
- entering the telephone number of the terminal
- entering the serial number of the terminal
- entering a pre-dial string number, if required
- entering the telephone number of the Millennium Manager
- doing the answer supervision test
- downloading required information from the Millennium Manager (NCC) to the terminal
- testing the buttons of the terminal
- testing the card reader
- testing the coin paths


**Note:** To end the routine at any time, close and lock the terminal.

## Terminal-timeout during an INSTALL session

During an INSTALL session, if 30 minutes elapse between button presses, the terminal times out, the session ends and the VFD blanks out completely.

If you then close the terminal:

this message  
appears  
on the VFD:



```
yy-mm-dd
* out of service *
```

If you have not done so already, lock the terminal and start again.

**Note:**The time-out provision does not apply during certain time-consuming processes, such as downloads. Such exceptions are noted in the text. Refer to Chapter 5 for more information.

## Error codes

Error codes are two-digit identifiers generated by the terminal and displayed on the VFD, which give you feedback on craft interface tasks.

These codes are not uploaded to the Millennium Manager, rather they are information pointers within the terminal for troubleshooting terminal problems.

Appendix B contains a description of these codes and a recommended action, if required.

Error codes can indicate the successful completion of a task as well as failed tasks.

- If a task is successful, other than a Millennium Manager (NCC) download:

this message  
appears  
on the VFD:

```
Completed          00
Press * to continue
```

- After a successful Millennium Manager download,

this message  
appears  
on the VFD:

```
Completed          0X
Press * to continue
```

0X indicates the terminal type. It may be a 01, 02, 03, or 04, where 01 indicates a card or desk terminal, 02 indicates a multi-pay terminal, 03 indicates a coin terminal, and 04 indicates an Inmate terminal.

- If a task fails,

this message  
appears  
on the VFD:

```
Failed:          XX
Press * to try again
```

XX is the error code you refer to in the error code chart found in Appendix B.

## Accessing the INSTALL prompt

After mounting the terminal, connecting the power, and closing and locking it,

this message  
appears  
on the VFD:

```
* out of service *
```

1. While the handset is on-hook, enter the default access code given to you by your operating company. You will not be able to use the access code on your instruction card because it has not yet been downloaded to the terminal.

If you make a mistake, press **◆** to enter the correct number. If the buttons work but the access code produces no effect, use the default access code.

This message  
appears  
on the VFD:

```
Enter PIN: ■■■■■
◆=Fix, *=Save, #=STOP
```

2. Enter your five-digit personal identification number (PIN) code

6. If the terminal was not in operation before the installation procedure began,

this message  
appears  
on the VFD:

```
Not installed
Use # to INSTALL
```

Otherwise,

this message  
appears  
on the VFD:

```
Use *=MENU, #=INSTALL
or dial item number
```

Press # in either case.

## Starting the INSTALL routine

To use the INSTALL terminal-configuration routine, proceed as follows:

1. Access the INSTALL prompt as described in the previous section.
2. Press #.

The INSTALL terminal-configuration routine first checks the line for dial tone.

This message  
appears  
on the VFD:

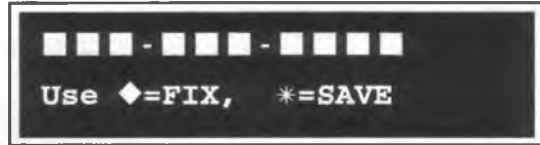
```
CO line check
Go offhook
```

3. Lift the handset off-hook.

This message  
appears  
on the VFD:

```
Checking CO
connection
```

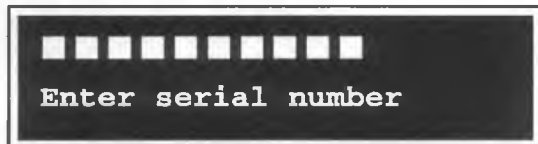
this message  
appears  
on the VFD:



If you make a mistake, press ♦ to correct it. Be careful to enter the correct number as this is what the Millennium Manager uses to download the correct tables.

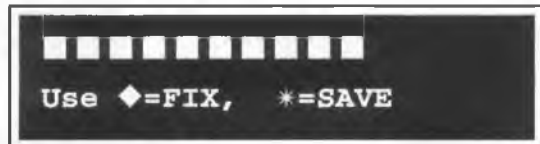
8. Press \*.

This message  
appears  
on the VFD:



9. Enter the ten-digit serial number of the terminal.  
As you enter the digits,

this message  
appears  
on the VFD:




The operating company uses the serial number for tracking purposes. If you make a mistake, press ♦ to correct it.

10. Press \*.

This message  
appears  
on the VFD:

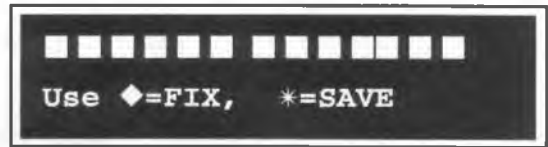


11. Enter the telephone number of the Millennium Manager.  
This may be a 7- or a 10-digit number.

<p><b>See this</b></p>	<p>If a pre-dial string is required, enter the <b>pre-dial string</b> number before the Millennium Manager number. For instance: @ @ @ X-XXX-XXX-XXXX, where @ @ @ is the predial string, and XXX-XXX-XXXX represents the numbers of the Millennium Manager modem pool number.</p>
	<p>The pre-dial string can be from one to eight digits long and is assigned by the operating company.</p>
<p><b>Pre-dial string</b></p>	

As you enter the number,

this message  
appears  
on the VFD:



If you make a mistake, press ♦, then enter the correct number.

12. Press \*.

This message  
appears  
on the VFD:



13. To initiate the answer supervision test, lift the handset off-hook.

This message  
appears  
on the VFD:



If the terminal detects answer supervision,

this message  
appears  
on the VFD:

```
Completed:      00
To continue, press *
```

14. Press \* and go to Step 15 after

this message  
appears  
on the VFD:

```
Go back onhook
```

**Failed test:** If the terminal does not detect answer supervision,

this message  
appears  
on the VFD:

```
Failed:      51
```

**CAUTION**



**Failed answer supervision**

If there is no answer supervision, do not cut the power to the terminal or abort the INSTALL process by closing the housing.

Either action would require you to restart the INSTALL terminal-configuration routine from the beginning.

**If the CO test fails:**

- Use your butt-end test set to make a call.
- When the call connects, listen for a click in the handset or monitor the line with your digital meter and watch for polarity reversal.
- If answer supervision is not being supplied from the CO, contact your CO support. Ask the CO personnel to verify that the line has been set up properly.

**CO test failure (continued)**

- When the line is set up properly, press \* to retry the answer supervision test, then carry out the remaining steps of the INSTALL terminal-configuration routine.

If the problem is not with the line, refer to the appropriate troubleshooting section in Chapter 5.

**Note:** The routine will not continue until the test completes successfully.

15. Hang up the receiver.

This message  
appears  
on the VFD:

```
Press * to start NCC
download
```

16. Press \* to download information from the Millennium Manager (NCC) to the terminal.

This message  
appears  
on the VFD:

```
* Please wait *
```

Then this  
message  
appears on the  
VFD:

```
Download in progress
* Please wait *
```

**Stopping the download**

If you want to stop a download after it is initiated, press #.

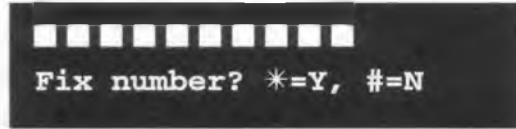
**Note:** You must stop the download before the terminal connects to the modem pool. After the terminal connects, the keypad is disabled.

**(Continued on the next page)**



### Stopping the download (continued)

This screen appears:



- If you want to exit the program, press #. This takes you back to the download prompt.
- If you want to correct the number, press \*. The following prompt appears:



- Press ♦ to clear the number.
- Enter the number, which can be from 7 to 10 digits long.
- Press \*. This takes you back to the download prompt.

### See this



**Note:** The terminal time-out provision which normally applies in the maintenance level does not apply during the downloading procedure.

### Problems in the download process

During the download process, the following problems may occur.

- When the modem tries to contact the Millennium Manager, there may be no response.
- The line to the Millennium Manager may be busy.
- A pre-dial string may be required or may have been entered incorrectly.

(Continued on the next page)

**Problems in the download process (continued)**

If the Millennium Manager does not respond, this message appears on the VFD:

```

  ■ ■ ■ ■ ■ ■ ■ ■
  Fix string? *=Y, #=N
  
```

If you do not want to re-enter the pre-dial string, press #. This message appears on the VFD

```

  ■ ■ ■ ■ ■ ■ ■ ■
  Fix number? *=Y, #=N
  
```

- If the number is correct, press # to retry the test.
- If the number displayed is not the correct telephone number for the Millennium Manager, press \*.
- This takes you back where you enter the pre-dial string, if needed, and the Millennium Manager number.

If you want to enter a new pre-dial string number, press \*. This message appears on the VFD.

```

  ■ ■ ■ ■ ■ ■ ■ ■
  Use ◆=FIX, *=SAVE
  
```

- Press ◆ to clear the number.
- Enter the number, which can be from one to eight digits long.
- Press \*.
- This message appears on the VFD:

```

  ■ ■ ■ ■ ■ ■ ■ ■
  Fix number? *=Y, #=N
  
```

(Continued on the next page)

**Download problems (continued)**

- If the number is correct, press # to retry the test.
- If the number displayed is not the correct telephone number for the Millennium Manager, press \*, and go back to the download prompt.

**Failed test:** If the download fails, this message appears on the VFD:

```
Failed:          0X
Press * to try again
```

Refer to the appropriate error code in Appendix B to troubleshoot the problem.

Once you have addressed the problem, press \* to retry downloading.

17. When the download succeeds,

this message  
appears  
on the VFD:

```
Completed:      0X
To continue, press *
```

0x indicates the terminal type. It may be a 01, 02, 03, or 04: 01 indicates a card or desk terminal, 02 indicates a multi-pay terminal, 03 indicates a coin terminal, and 04 indicates an Inmate terminal.

18. Press \*.

This message  
appears  
on the VFD:

```
Go offhook, press all
buttons, then onhook
```

19. Lift the handset off-hook and press each keypad button to ensure the DTMF tones sound for the dialpad but-

If there is no blockage,

this message  
appears  
on the VFD:

Please insert and  
remove your card

**Note:** If you hesitate to put your card in,

this message  
appears  
on the VFD:

Insert card in slot  
black strip to left

21. Insert your test card, a valid mag-stripe card.

After a successful card reader test,

this message  
appears  
on the VFD:

\* Please remove \*  
your card

22. Remove the card.

This message  
appears  
on the VFD:

(the card mag stripe no.)  
To continue, press \*

The number on the VFD is the number from the mag stripe of the card. The number of digits will vary according to card type.

**Note:** If you leave the card in the terminal too long,

this message  
appears  
on the VFD:

\* Please remove  
your card \*

**See this**

**Failed test:** If the test fails, try a different card. If that still does not work, replace the card reader. Refer to **Replacing the card reader** in Chapter 7.

23. Press \* to begin the coin validator test.

When the coin validator passes the first part of the test,

this message  
appears  
on the VFD:

**Deposit a  
calibration coin**

**Note:** Calibration coins can be inserted in any order. Actual coins may be used. The use of in-circulation coins or calibration tokens depends on the validator configuration.

24. Deposit calibration coin number one. The VFD goes blank while the test occurs.

When the validator passes the test,

this message  
appears  
on the VFD:

**Deposit a  
calibration coin**

25. Deposit calibration coin number two.

The VFD goes blank during the test.

When the validator passes the test,

this message  
appears  
on the VFD:

**Deposit a coin  
to test escrow unit**

26. Deposit calibration coin number three.

The VFD goes blank during the test.

When the validator passes the test,

this message  
appears  
on the VFD:

```
Completed:      0X
To continue, press *
```


The calibration coins are then deposited into the coin return.

27. Press \*.

This message  
appears  
on the VFD:

```
Install is complete
Close terminal now
```

**Note:** The message remains on display for ten seconds. If the terminal remains open beyond that time, the initial maintenance prompt appears on the VFD.

<b>CAUTION</b>	<ul style="list-style-type: none"><li>• Before locking the terminal with the T- or L-tool, make sure that the handset is on-hook.</li></ul>
	

28. Close and lock the terminal. The terminal reverts to the idle state.

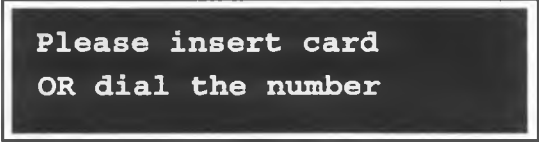
**The INSTALL terminal-configuration routine is finished.**

Once the terminal is closed and appears to be in working order, proceed as follows:

## Testing the special buttons

1. Lift the handset off-hook

This message appears on the VFD:



**Please insert card  
OR dial the number**

The handset emits a dial tone.

- If the terminal has a card reader that does not read smart cards, the voice prompt says: **“Please insert and remove your card, or dial the number you are calling.”**
  - If the card reader accepts smart cards, the voice prompt says: **“Please completely insert your card, or dial the number you are calling.”**
2. Press the language button, which is beside the **◆** button and the VFD display will change to the alternate language and the voice prompt will also be in the alternate language.
  3. Press the language button again and the VFD and the voice prompts will return to the first language.
  4. Press the V+ (**▲**) button.

Each time you press the button, the volume of the dial tone and voice prompts goes up a level. Four levels are available.
  5. Press the V- (**▼**) button.

Each time you press the button, the volume of the dial tone and voice prompts goes down a level. Four levels are available.

## Testing the card reader

1. Insert your test card (credit card) completely, and following a short delay, an attention tone sounds.

The voice prompt says: **"Please remove your card"**.

This message  
appears  
on the VFD:

```
* Please remove *  
your card
```

**Note:** If the VFD or voice prompts ask you to hang up, do so and continue following the current step. If you use a calling card as a test card, the prompts may be slightly different. Follow the prompts you receive.

2. Remove your card in one smooth movement.

The terminal performs a preliminary plausibility check on the data read from the card. If the card fails the plausibility check, an attention tone sounds and

this message  
appears  
on the VFD:

```
Insert entire card then  
remove quickly
```

The voice prompt says: **"Try again. Please completely insert your card"**.

In this case, go back to Step 1. If that still does not work, use a different card. If that does not work, replace the card reader.

If the card passes the plausibility check:

This message  
appears  
on the VFD:

```
* Thank you *  
Dial the number
```

The voice prompt says: **"Please dial the number"**.



**Note:** If the terminal also accepts smart cards, also insert a test smart card which has a value greater than zero and follow the prompts to make sure the card reader is working properly.

## Making a call

1. Dial a telephone number.

During dialing, the handset emits DTMF tones. The number being dialed appears on the VFD, along with a message telling you to press **◆** to make corrections.

After you finish dialing the number, the terminal sends the card data to the Millennium Manager for validation.

This message appears on the VFD:

```
* Card validation *  
in progress
```

Then this message appears on the VFD:

```
* Please wait *
```

The voice prompt says: **"Please wait"**.

**Note:** If you use a calling card, the two previous prompts may differ.

**Invalid card:** If the card is invalid, this message appears on the VFD:

```
Not an accepted card  
See list, try again
```

The voice prompt says: **"Your card is not valid. Please hang up and then start again. Please use a different card"**.

Go back to Step 1 and re-try using a different card or find out why the card is invalid.

**Valid card:** If the card is valid, the terminal dials the number. The handset then produces the ringback signal, a normal ringing sound.

When your call connects with the other end,

this message  
appears  
on the VFD:

To make another call  
press the **◆** button

**Note:** If the terminal has been enabled for advertising messages, the VFD displays **Use **◆** for next call** on the first line and advertising on the second line.

2. Press **◆**.

This message  
appears  
on the VFD:

Dial your next call

The handset produces a dial tone and you receive a voice prompt: "**Please dial the number.**"

3. Insert a non-valid coin, such as a slug, to make sure it is rejected by the terminal.
4. **Coin call:** insert a coin, and dial a number.
5. **Free call:** call a free number. Free numbers are determined by the operating company in the Call Screening List.

During dialing, the handset produces DTMF tones. The number dialed appears on the VFD, along with a message telling you to press **◆** to make corrections.

After dialing is completed, the display prompt tells you the number being called. The handset emits the ring-back signal.

When you establish two-way conversation,

this message  
appears  
on the VFD:

**To make another call  
press the ♦ button**

6. To complete the test, replace the handset on-hook.

## Checking the line

1. Lift the handset off-hook and call the operator.  
Ask the operator to verify the telephone number of the terminal and that the telephone is designated as a Millennium terminal.
2. If the terminal can receive incoming calls, ask the operator to call you back.
3. If the line to the terminal supports the Automated Calling Card Service, dial 0 plus the number and, in response to the bong tone, enter the calling card number. Make sure the call connects.

## Testing the quick access keys

If the terminal has quick access keys, lift the handset and press one of the keys on the quick access keys bezel.

- The handset produces DTMF tones.
- The number being dialed appears on the VFD.
- After dialing is completed, the handset produces the ringback signal

When you establish a two-way conversation,

this message  
appears  
on the VFD:

**To make another call  
press the ♦ button**

## Testing the datajack module

To test a terminal equipped with a **datajack connection**, you will need a portable computer with a fax modem.

1. Insert a valid card into the card reader. You cannot make a data call with coins.
2. On the keypad, press # twice (##).
3. Hook up the data equipment to the datajack module, located on the lower right side of the terminal.

**Note:** You can also connect the device before ## is entered.

4. Press down on the top button of the datajack module to engage the datajack.
5. Allow the modem in the portable to dial the number and send a test.
6. When the modem hangs up, press the button on the face of the datajack module to release the connection.
7. Remove the data equipment jack from the module.

### Using a butt-end set to test the datajack

If you do not have a portable computer setup available, you can use a butt-end set to ascertain that the cabling is connected and the firmware and electronic configurations are correct.

If your set has a speed dialers, you can complete the test up to the point of connection to a fax or other data equipment.

1. Before you start the test, program the speed dialers with a valid card number and a telephone number connected to a fax or data modem.
2. Connect the butt-end set to the datajack module.
3. Press down on the button on top of the datajack module to engage the datajack.

4. Press # twice (##) on the keypad.  
You should get a dialtone. This indicates the connection is possible.
5. If your set has speed dialers programmed with a card and telephone number, press the speed dialers to dial out the two numbers.
6. After you get connection to the other end, initiate a hang-up to return to the dial tone.
7. Press the release button on the front of the datajack module and remove the butt-end set connection.

## Testing the smart card alert feature

If the terminal is equipped with the **smart card alert**, test it with these steps:

1. Take the handset off-hook.
2. Insert a smart card with a value greater than zero into the card reader.
3. Replace the handset on-hook.
4. When the alarm sounds, remove the card.

**Note:** If an existing terminal needs to be upgraded to include the smart card alert feature, refer to **Optional features: datajack and smart card alert** in Chapter 7.

**You have now finished installing the Millennium multi-pay terminal.**

## In case of problems

If the operation tests reveal a problem, the usual repair method is to replace the defective component. The replaceable components and the instructions to remove and install them can be found in Chapter 7.

---

## 4 Operation codes interface

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Operation codes are messages you send to the Millennium Manager from the terminal.

- Each code is up to three digits long.
- The operating company specifies the meanings of most operation codes. There are four codes which are defined by the Millennium Manager and are not accessible by the craftsperson.
- If you have operation code-level privileges in the craft interface, the operating company provides you with an instruction card that explains the codes relevant to your task.

Refer to Figure 4-1 and Figure 4-2 for a sample of two sides of an instruction card.

Here are examples of codes an operating company could specify:

87	Repair required (8); to the card reader (7)
97	Repair performed (9); new card reader installed (7)
15	Contractor (1); booth cleaned (5)
160	Contractor (1); quality-booth clean verification (6); unsatisfactory performance (0)

Figure 4-1: Example of an operation-code instruction card, front


<p><b>Telco</b> </p> <p>Entering Op-Codes</p> <ul style="list-style-type: none"><li>● <b>Follow the Display ●</b></li></ul> <ol style="list-style-type: none"><li>1. Without lifting the receiver, dial your access code: nnn-nnnn</li><li>2. When it asks, enter your PIN.</li><li>3. Enter the op-code(s), press the <input type="checkbox"/>* key to save each one.</li><li>4. To exit, press the <input type="checkbox"/># key.</li></ol>	<p><b>Sue Browning</b> <b>PIN: 23456</b></p> <ul style="list-style-type: none"><li>● Op-Codes ●</li></ul> <table><tr><td>106</td><td>Cleaned booth</td></tr><tr><td>206</td><td>Cleaned phone</td></tr><tr><td>114</td><td>Need new book</td></tr><tr><td>115</td><td>Need new sign</td></tr><tr><td>116</td><td>Need new card</td></tr><tr><td>40</td><td>Need booth repair</td></tr><tr><td>50</td><td>Need phone repair</td></tr><tr><td>45</td><td>Power off</td></tr></table>	106	Cleaned booth	206	Cleaned phone	114	Need new book	115	Need new sign	116	Need new card	40	Need booth repair	50	Need phone repair	45	Power off
106	Cleaned booth																
206	Cleaned phone																
114	Need new book																
115	Need new sign																
116	Need new card																
40	Need booth repair																
50	Need phone repair																
45	Power off																

Figure 4-2: Example of the operation-code instruction card, back

<p><b>Trouble Shooting</b></p> <hr/> <p><b>It won't accept the access number:</b></p> <ul style="list-style-type: none"><li>● You might have waited too long while dialing. Pick up and replace the receiver, then try again.</li><li>● The terminal may have been powered off. Try dialing the default access code: nnn-nnnn</li></ul> <hr/> <p><b>You make a dialing mistake:</b></p> <ul style="list-style-type: none"><li>● Press the <input type="checkbox"/>◆ key to erase the number and start again.</li></ul> <p style="text-align: right; font-size: small;">500-010</p>
--

## Entering operation codes

Use the operation code level to send operation codes to the Millennium Manager. In a single session you can enter up to eight codes.

The codes are sent to the Millennium Manager when the session ends. You can do multiple sessions if necessary.

**Note:** If you have maintenance level privileges in the craft interface, refer to **Entering operation codes from the maintenance level** in Chapter 5.

### How to enter operation codes

1. While the handset is on hook, dial the seven-digit access code.

For a terminal in normal operation, use the access code on your instruction card. If that code is not in the memory of the terminal, use the default access code on your instruction card.

As you enter the code, the numbers do not appear on the vacuum fluorescent display (VFD). This is to discourage vandals and curious users.

#### Entry timeout

If 12 seconds elapse between button presses while entering the access code, the terminal times out. It does not give a time-out notification.

#### Correcting entry errors

If you make a mistake while entering the code or suspect the terminal has timed out, lift the handset, and put it back on hook. Alternatively press the **◆** button. Then re-enter the access code.



After you enter the access code correctly,

this message  
appears  
on the VFD:



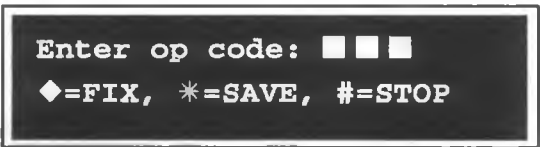
2. Enter your five-digit personal identification number (PIN).

As you enter the numbers, they appear on the VFD.

If you make a mistake, press ◆ to erase the VFD and re-enter the number.

3. When the number is correct, press \*.
  - If you have only operation code-level privileges,

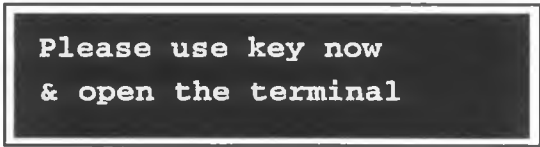
this message  
appears  
on the VFD:



Follow the remaining steps of this procedure.

- If you have maintenance-level privileges in the craft interface,

this message  
appears  
on the VFD:



If this message appears, refer to **Entering operation codes** in Chapter 5.

**Terminal time-out**  
If 30 minutes elapse between button presses during a session, the terminal times out, and returns to the idle state, and you must start from the beginning.

4. Enter operation codes.
  - Each code that you enter during the session displays on the VFD.
  - If an operation code has only one or two digits, do not enter leading zeros.
  - If you make a mistake, press **◆** and re-enter the code.

5. When the operation code is correct, press **\***.

After you save each operation code for the session, up to the eighth code, the code just entered disappears from the display, and the rest of the prompt remains unchanged.

6. To end the session after entering eight or fewer operation codes, do one of the following:
  - Press the **#** (STOP) after keying in the final code. This action saves the final operation code.
  - Press **\*** (SAVE) and then **#** (STOP).

The terminal returns to the idle state.

7. If you need to enter an eighth operation code, enter it and press **\***.
  - After saving the eighth code in a single session, a message appears on the VFD saying you have entered the maximum of eight codes and the session is ending.
  - The message remains on display for 4.5 seconds, then the terminal returns to the idle state.
  - If you want to enter more operation codes, you need to initiate a new session.

If you try to enter more than eight operation codes in a single session,

this message  
appears  
on the VFD:

**Last code not saved  
Maximum of 8 codes**

When the session ends, the entered codes are sent to the Millennium Manager along with your PIN. The Millennium Manager checks that your PIN grants you access to the terminal.


## Reserved codes

Operation codes in the 900 to 999 range are terminal-status indicators used to notify the Millennium Manager of events during maintenance level sessions.

Only users with maintenance-level privileges can use these reserved codes.

If you enter a reserved operation code but lack maintenance level privileges,

this message  
appears  
on the VFD:



**Not a valid op code  
Try again**

The message displays for 4.5 seconds, then

this message  
appears  
on the VFD:



**Enter op code: ■ ■ ■  
◆=FIX, \*=SAVE, #=STOP**

---

## 5 Maintenance-level interface

---

The maintenance level of the craft interface allows you to perform administrative and testing procedures at the terminal.

You can use the menus at this level to:

- run diagnostic tests on the components of the terminal in response to error messages received at the Millennium Manager, customer complaints, or terminal reduced-service or out-of-service conditions
- download terminal configuration data from the Millennium Manager to the terminal
- upload terminal status records and call detail records (CDRs) from the terminal memory
- put the terminal in or out of service
- check or change various terminal functions

### Maintenance menu options

The maintenance menu of the craft interface lists maintenance-level activities. The menu options appear on the vacuum fluorescent display (VFD).

The options on the menu are:

- 227. Check cardreader
- 264. Check coin unit
- 546. Check C.O. line
- 347. Check display

- 539. Check dialpad
- 225. Make/Answer call
- 835. Show tel. number
- 622. Show NCC number
- 673. Enter op codes
- 369. Force download
- 732. Call records
- 267. Answer detect
- 274. VFD brightness
- 636. Check memory
- 688. Out of service

Scroll through the menu options to select the desired option or enter the code.

Each menu option displays the name and the code of an activity and a prompt to initiate the activity (1), or to pass on to the next item (\*).

The maintenance menu is circular. When you arrive at the **688. Out of service** option and press the \* (NEXT) button, the **227. Check cardreader** option reappears.

## Bypassing the maintenance menu

To perform a maintenance-level activity, you do not need to scroll through the menu to find the desired option. You can enter the appropriate numeric or mnemonic code at the initial maintenance prompt. Table 5-1 lists the codes.

**Table 5-1: Codes maintenance activities on menu**

Activity	Numeric	Mnemonic
Check the card reader	227	CAR
Check the coin unit	264	COI
Check the CO line	546	LIN
Check the display (VFD)	347	DIS

**Table 5-1: Codes maintenance activities on menu (continued)**

Activity	Numeric	Mnemonic
Check the dialpad	539	KEY
Make/Answer a call	225	CAL
Display the terminal telephone number	835	TEL
Display the Millennium Manager number	622	NCC
Enter operation codes	673	OPE
Force download	369	DOW
Send CDRs to the Millennium Manager	732	REC
Testing answer supervision	267	ANS
Change the VFD brightness	274	BRI
Testing memory of the terminal	636	MEM
Put the terminal out of or back in service	688	OUT

After you enter the activity code, the activity proceeds as if selected from the maintenance menu. When the activity is finished, the initial prompt reappears on the VFD.

## Accessing the initial prompt

To enter the craft interface to perform maintenance-level activities, proceed as follows:

1. With the handset is on-hook, enter the **access code** on your instruction card.

If the buttons work but the access code produces no effect, enter the default access code.

This message appears on the VFD:

Enter PIN: ■■■■■■  
 ◆=FIX, \*=SAVE, #=STOP

2. Enter your personal identification number (PIN) code

As you enter the digits, they appear on the VFD. If you make a mistake, press the **◆** button to erase the VFD and then enter the correct number.

**See this:**



Open the terminal quickly after entering your PIN.

If you do not open the terminal within three minutes, the terminal times out and the idle prompt **Please lift receiver** reappears on the VFD.

**Note:** If the buttons do not seem to work, refer to **If the buttons do not respond**, following this section.

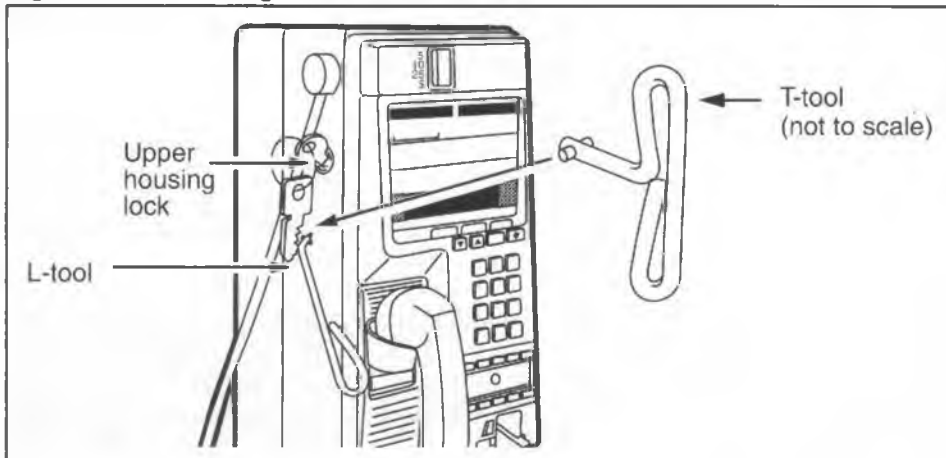
3. Press **\***.

This message appears on the VFD:

**Please use key now  
& open the terminal**

4. Put the key into the key lock on the left side of the terminal housing assembly, and turn the key clockwise. Refer to Figure 5-1 to locate the upper housing lock.

**Figure 5-1: Unlocking the terminal to access the maintenance level**



5. Release the housing locking mechanism:
  - a) Insert the T-or L-tool in the hole below the key lock.
  - b) Rotate the tool approximately 90degrees clockwise to release the locking mechanism.

**It is not necessary to actually open the terminal housing.**

If the terminal is in working condition,

this message  
appears  
on the VFD:

```
Use *=MENU, #=INSTALL  
or dial item number
```

If the terminal is not in working condition, or has been deliberately uninstalled,

this message  
appears  
on the VFD:

```
Not installed  
Use # to INSTALL
```

If the terminal needs to be installed, refer to Chapter 3, **Starting INSTALL terminal-configuration.**

## Using the maintenance menu

This section describes the process of using the craft interface maintenance-level menus, including:

- how to start a session
- how to scroll through the menus
- how to activate each test
- how to properly end the session.

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**, in the above section.



This message  
appears  
on the VFD:

**Use \*=MENU, #=INSTALL  
or dial item number**

2. Press \*.

The first option on the menu is displayed.

This message  
appears  
on the VFD:

**227. Check cardreader  
Use 1=DO IT, \*=NEXT**

3. If you don't want to test every item, scroll through the menu to locate the desired activity.
  - To advance from one activity to the next, press \*.
  - You can also press ▲ to select the next activity or ▼ to select the previous activity.
4. When you find the appropriate menu item, press 1 to initiate the DO IT function.
  - Follow the prompts that appear on the VFD.
  - For details, refer to the descriptions of each activity given below.
5. When the activity is finished, the option you chose reappears on the VFD.  
Press \* to select other menu options.
6. To end the maintenance session at any time, close and lock the terminal.  
Ensure that the handset is on-hook before you lock the terminal.

## Checking the card reader

The first menu item checks the operation of the card reader. Make sure you have a test mag-stripe card which is accepted by the terminal to do this test.

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. Press \*.

This message appears on the VFD:

```
227. Check cardreader
Use 1=DO IT, *=NEXT
```

This will always be the first menu item when you enter the craft interface.

3. Press 1.

The card reader test begins. It checks the two sensors of the card reader: the card-present sensor and the card-fully-seated sensor.

- If either sensor reports a blockage,

this message appears on the VFD:

```
Card reader problem
Check for blockage
```

- If there is no blockage,

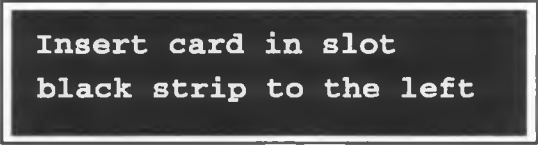
this message appears on the VFD:

```
Please insert and
remove your card
```

4. **Insert your mag stripe test card:** an ordinary credit card will do.

- If you hesitate,

this message  
appears  
on the VFD:

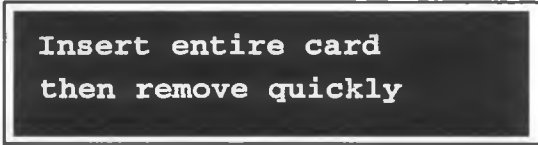


Insert card in slot  
black strip to the left

This message alternates with the previous message until you insert a card.

- If you do not completely insert the card,


this message  
appears  
on the VFD:



Insert entire card  
then remove quickly

When the test is successful,

this message  
appears  
on the VFD:




\* Please remove \*  
your card

**Failed test:** If the test is unsuccessful or if any other messages appear during the card reader test, refer to **Card reader test errors**.

5. **Remove the card.**

This message  
appears  
on the VFD:



To continue, press \*

**Note:** The number on the mag stripe of the card is displayed. The number of digits displayed will depend on the type of card you are using.

**6. Press \*.**

This message  
appears  
on the VFD:

**227. Check cardreader**  
**Use 1=DO IT, \*=NEXT**

7. **Press \*** to continue to the next item.
8. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

**Card reader test errors**

During the card reader test, the following problems may occur:

- When the card is in the card reader, one or both sensors may fail to send a signal that the circuit closed.
- A card-reading failure may occur.

**Sensor failures:** The card reader has two sensors, the **card-present sensor** and the **card-fully-seated sensor**. When a card is inserted, both sensors should go on, that is, send a closed signal.

- If the card-present sensor does not activate,

this message  
appears  
on the VFD:

**Sensor error.**  
**Try cleaning or replace**

- If the card-fully-seated sensor does not activate,

this message  
appears  
on the VFD:

**Insert entire card**  
**then remove quickly**

**Card-reading failures:** If the card reader cannot read the card, you may get one of these errors:

- If the reader cannot detect a magnetic stripe on the card,

this message  
appears  
on the VFD:

**Try card face down  
black strip to left**

- If the reader cannot read the numbers on the card, or if that card type is not accepted by the terminal,

this message  
appears  
on the VFD:

**Not an accepted card  
See list, try again**

- After the second failed attempt to read a card,

this message  
appears  
on the VFD:

**Cannot read card  
Try a different card**

- After the third failed attempt to read a card,

this message  
appears  
on the VFD:

**Clean and try again  
May need replacement**

**Note:** If the card reader is still not functioning after you have tried using a different card and after cleaning the card reader, refer to **Replacing the card reader** in Chapter 7 and replace the card reader.

If the card reader still does not work, refer to **Removing the PCP assembly** in Chapter 7 and replace the control PCP.

## Checking the coin unit

To carry out the coin unit test:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message appears on the VFD:

```
227. Check cardreader
Use 1=DO IT, *=NEXT
```

3. **Press \*** or type in 264 on the keypad.

This message appears on the VFD:

```
264. Check coin unit
Use 1=DO IT, *=NEXT
```

4. **Press 1**.

The presence and status of the validator is tested.

This message appears on the VFD:

```
Deposit a
calibration coin
```

5. **Deposit** calibration coin number one.

This message appears on the VFD:

```
Deposit a
calibration coin
```

**Note:** Calibration coins may be inserted in any order. Actual coins may be used as per operating company instructions. The coins can be of the same denomination.

6. **Deposit** calibration coin number two.

This message  
appears  
on the VFD:

```
Deposit a coin  
to test escrow unit
```

7. **Deposit** calibration coin number three.

This message  
appears  
on the VFD:

```
Completed:      00  
To continue, press *
```

8. **Press \*** to end the test.

The escrow dumps the three calibration coins into the coin return area.

This message  
appears  
on the VFD:

```
264. Check coin unit  
Use 1=DO IT, *=NEXT
```

9. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Problems in the coin unit test

If, during any of the coin tests,

this message  
appears  
on the VFD:

```
Failed          XX  
Use 1=DO IT, *=NEXT
```

Look up the XX number in the error codes table in Appendix B and troubleshoot the problem, then repeat the coin unit test.

## Checking the central office line

Before checking the central office (CO) line, use your butt-end test set to check the telephone line to the terminal battery voltage and dial tone.

To test the line to the CO:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. Press \*.

This message appears on the VFD:

**227. Check cardreader**  
Use 1=DO IT, \*=NEXT

3. Type in 546 on the keypad or press \* repeatedly until:

this message appears on the VFD:

**546. Check C.O. line**  
Use 1=DO IT, \*=NEXT

4. Press 1.

This message appears on the VFD:

**C.O. line check**  
Go offhook

5. Lift the handset off-hook.

The test checks line voltage and dial tone.

This message appears on the VFD:

**Checking C.O.**  
**connection**



If the test detects both voltage and dial tone,

this message  
appears  
on the VFD:

**Completed: 00**  
**To continue, press \***

6. **Press \***.

This message  
appears  
on the VFD:

**Go back onhook**

7. **Replace** the handset on-hook.

This message  
appears  
on the VFD:

**546. Check C.O. line**  
**Use 1=DO IT, \*=NEXT**

8. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Problems with the CO test

If the test does not detect voltage or dial tone, the VFD displays an error code, informing you of the problem.

Troubleshoot the problem and press \* to retry the test, or press # to end the test and refer to Appendix B for troubleshooting suggestions.

If you end the test, you end the INSTALL routine.

## Checking the display (VFD)

The VFD is tested to ensure that all the pixels are working. To run this test:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message appears on the VFD:

```
227. Check cardreader
Use 1=DO IT, *=NEXT
```

3. **Press 347** on the keypad or **press \*** repeatedly until:

This message appears on the VFD:

```
347. Check display
Use 1=DO IT, *=NEXT
```

4. **Press 1**. The test proceeds as follows:
  - All the pixels are displayed for five seconds. Then the screen blanks out. The pixels in each character space may form the shape of a diamond or rectangle.
  - Then, one at a time, the pixels turn on and off.

When the test is finished,

this message appears on the VFD:

```
347. Check display
Use 1=DO IT, *=NEXT
```

5. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Checking the keypad

Use the dialpad test to make sure the buttons work. Press each button to check that the DTMF tones sound.

### To perform the test:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. Press \*.

This message appears on the VFD:

**227. Check cardreader**  
**Use 1=DO IT, \*=NEXT**

3. Press **539** on the keypad or press \* repeatedly until:

This message appears on the VFD:

**539. Check dialpad**  
**Use 1=DO IT, \*=NEXT**

4. Press **1**.

This message appears on the VFD:

**Go offhook, press all buttons, then onhook**

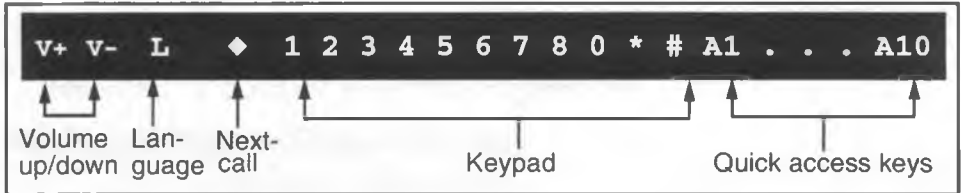
5. Lift the handset off-hook.

This message appears on the VFD:

**Go onhook when done**

6. **Press each button.** As you press each keypad button, its DTMF tone sounds and the characters shown below appear on the VFD.

Special keys and quick access keys do not have DTMF tones.



7. **Replace** the handset back on-hook.

This message appears on the VFD:

**539. Check dialpad**  
Use 1=DO IT, \*=NEXT

8. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Making and answering calls

Use the menu item titled **Make/Answer call** if you need to make or answer a call during a maintenance-level session.

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message appears on the VFD:

**227. Check cardreader**  
Use 1=DO IT, \*=NEXT

3. **Press 225** on the keypad, or **press \*** repeatedly until:

This message  
appears  
on the VFD:

**225. Make/Answer call**  
**Use 1=DO IT, \*=NEXT**

4. **Press 1.**

The terminal switches into the idle or on-hook state.

This message  
appears  
on the VFD:

**Please lift receiver**

5. **Lift** the handset off-hook.

This message  
appears  
on the VFD:

**Please insert card**  
**OR dial the number**

6. **Make or answer** a call.

If you dial the number first, you are prompted to insert a card or deposit some money. If you insert a card first, you are prompted to dial a number.

- If you pause:

this message  
appears  
on the VFD:

**Insert card in slot**  
**under dial pad**

- If you do not enter the number or insert a card before the timer expires:

This message  
appears  
on the VFD:

**Please hang up**  
**and start again**

- When you hang up, you can choose to make another call. Otherwise the craft interface starts running again.

This message appears on the VFD:

**225. Make/Answer call**  
**Use 1=DO IT, \*=NEXT**

7. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Checking the telephone number of the terminal

The telephone number of the terminal is stored in the memory of the control PCP. To display this number:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message appears on the VFD:

**227. Check cardreader**  
**Use 1=DO IT, \*=NEXT**

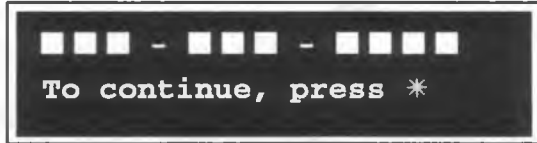
3. **Press 835** on the keypad **or press \*** repeatedly until:

This message appears on the VFD:

**835. Show tel. number**  
**Use 1=DO IT, \*=NEXT**

4. **Press 1**.

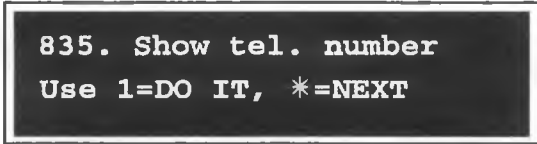
This message  
appears  
on the VFD:



This is the telephone number which acts as the unique identifier for the telephone.

5. **Press \***.

This message  
appears  
on the VFD:



6. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

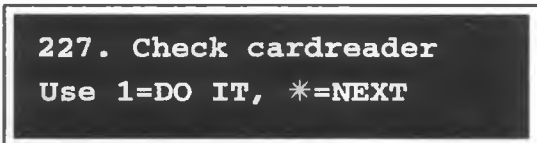
## Checking the number of the Millennium Manager

The telephone number of the Millennium Manager is in the memory of the control PCP in the terminal. The modem in the terminal uses this number when making a data call to the Millennium Manager.

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.

2. **Press \***.

This message  
appears  
on the VFD:



3. **Press 622** on the keypad or **press \*** repeatedly until:

This message  
appears  
on the VFD:

```
622. Show NCC number
Use 1=DO IT, *=NEXT
```

4. **Press 1.**

This message  
appears  
on the VFD:

```
■■■■■■■■■■
To continue, press *
```

- The number displayed is the telephone number of the Millennium Manager modem pool. The pre-dial string is not included in this display.
- The number of digits will depend on whether the data call is local or long distance.

5. **Press \*.**

This message  
appears  
on the VFD:

```
622. Show NCC number
Use 1=DO IT, *=NEXT
```

6. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.



## Entering operation codes

With maintenance-level privileges, you must initiate an operation code session through the maintenance menu.

- In a single session, you can enter up to eight codes.
- The codes are sent to the Millennium Manager when the session ends.
- You can initiate multiple sessions if necessary.

Chapter 4 describes the use of operation codes.

### To enter operation codes:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. Press \*.

This message appears on the VFD:

```
227. Check cardreader
Use 1=DO IT, *=NEXT
```

3. Press 673 on the keypad or press \* repeatedly until:

This message appears on the VFD:

```
673. Enter op codes
Use 1=DO IT, *=NEXT
```

4. Press 1.

This initiates an operation-code-entry session.

This message appears on the VFD:

```
Enter op code: ■ ■ ■
◆=FIX, *=SAVE, #=STOP
```

5. Enter the operation codes.

Refer to the operation codes card issued by the operating company for the codes. When the code is correct, press \*.

- Do not enter leading zeros.
  - If you make a mistake while entering a code, press **◆** to erase the code from the VFD and re-enter the code.
  - After you save a code, it disappears from the display. The rest of the prompt remains unchanged.
6. **Press #** to end the operation code entry session. This saves the final operation code.

You can also press \* and then #. This action exits the operation code level and re-enters the maintenance-level interface.

**Note:** The session also can end if a non-reserved operation code is entered as the ninth or subsequent code for the session, or if a time-out occurs.

- Regardless of how the session ends,

this message  
appears  
on the VFD:

**673. Enter op codes**  
**Use 1=DO IT, \*=NEXT**

- When the session ends, the terminal automatically sends the codes, including the 996 code indicating that a session took place, and your personal identification number (PIN) to the Millennium Manager.
  - The Millennium Manager checks that your PIN gives you access to the terminal you were working on.
7. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

**Entering more than eight codes**

You can enter more than eight operation codes in a single session if the ninth and subsequent codes are reserved operation codes.

Reserved codes entered as the ninth and subsequent codes take priority over any non-reserved codes entered earlier. Therefore, no more than eight codes can be sent to the Millennium Manager per session.

The session ends automatically if you try to enter a non-reserved code as the ninth or subsequent code. The session will also end if 30 seconds elapse between button presses.

When the session ends, the terminal returns to the maintenance level prompt.

## **Reserved operation codes**

Operation codes in the 900 to 999 range are used as terminal-status indicators, to notify the Millennium Manager of events which occurred during maintenance sessions.

Only users with maintenance-level privileges can enter reserved operation codes.

The following reserved operation codes are defined by the Millennium Manager:

- 996 maintenance-level access has occurred
- 997 craftsperson has placed the coin validator out of service
- 998 craftsperson has placed the card reader out of service
- 999 craftsperson has placed the terminal out of service

## Forced Millennium Manager (NCC) download

Use this procedure to download terminal configuration and rate tables from the Millennium Manager. This procedure also downloads the cashbox status.

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. Press \*.

This message appears on the VFD:

```
227. Check cardreader
Use 1=DO IT, *=NEXT
```

3. Press 369 on the keypad or press \* repeatedly until:

This message appears on the VFD:

```
369. Force download
Use 1=DO IT, *=NEXT
```

4. Press 1.

This message appears on the VFD:

```
Press * to start NCC
download
```

5. Press \* to begin the download.

This message appears on the VFD:

```
* Please wait *
```

**Note:** If you need to stop the download for any reason, you must do so while the Please wait prompt is still showing. See **Stopping the download**, below.

Once the terminal connects to the modem pool,

this message  
appears on the  
VFD:

```
Download in progress
*   Please wait   *
```

### Stopping the download

If you want to stop a download after it is initiated, press #. This screen appears:

```
■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Fix number? *=Y, #=N
```

**Note:** You must stop the download before the terminal connects to the modem pool. After the terminal connects, the keypad is disabled.

- If you want to exit the program, press #. This takes you back to the download prompt.
- If you want to correct the number, press \*. The following prompt appears:

```
■ ■ ■ ■ ■ ■ ■ ■ ■ ■
Use ◆=FIX, *=SAVE
```

- Press ◆ to clear the number.
- Enter the number, which can be from 7 to 10 digits long.
- Press \*. This takes you back to the download prompt.

When the download is complete,

This message  
appears  
on the VFD:

```
Completed:      0X
To continue, press *
```

**0x** indicates the terminal type. It may be a 01, 02, 03, or 04: 01 indicates a card or desk terminal, 02 indicates a multi-pay terminal, 03 indicates a coin terminal, and 04 indicates an Inmate terminal.

6. **Press \***.

This message appears on the VFD:

**369. Force download**  
**Use 1=DO IT, \*=NEXT**

7. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

**Download error conditions:** Refer to the download section of the INSTALL procedure in Chapter 3 for information.

## Sending CDRs to the Millennium Manager

Use the call-records item on the maintenance menu to send the Millennium Manager copies of the call-detail records (CDRs) and the summary local smart card records from the memory of the control PCP in the terminal.

### Warning



### Remember to upload CDRs

It is important to upload all CDRs from the terminal before performing maintenance tasks inside the terminal. This is especially critical if you are changing the control board, the firmware, the validator, or the escrow.

Although records may not be directly affected by what you are doing, uploading the CDRs assures that the terminal records are up-to-date as of the time of maintenance, should something prevent the terminal from regaining operation.

This function also saves a the cash box status amount if it has been updated since the last upload.

Follow this procedure to upload CDRs:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt.**

2. Press \*.

This message  
appears  
on the VFD:

**227. Check cardreader**  
**Use 1=DO IT, \*=NEXT**

3. Press 732 on the keypad or press \* repeatedly until:

this message  
appears  
on the VFD:

**732. Call records**  
**Use 1=DO IT, \*=NEXT**

4. Press 1.

- If there are **CDRs** in the memory of the terminal:

This message  
appears  
on the VFD:

**Call records present**  
**Press \* for NCC call**

**Go to Step 5.**

- If there are **no CDRs** in the memory and the cash box status does not need to be uploaded:

this message  
appears  
on the VFD:

**No call records**  
**To continue, press \***

**Go to Step 6.**

5. **Press \*** to send copies of the CDRs to the Millennium Manager.

- While the terminal is contacting the Millennium Manager,

this message  
appears  
on the VFD:

**\* Please wait \***

- While the records are being sent,

this message  
appears  
on the VFD:

**Download in progress**  
**\* Please wait \***

**See this:**



It is at this point that the cash box status is uploaded to the terminal. If there is no CDR present, the terminal will create one so the cash box status can be uploaded.

- When the process is finished,

this message  
appears  
on the VFD:

**Completed:           00**  
**To continue, press \***

6. **Press \*.**

This message  
appears  
on the VFD:

**732. Call records**  
**Use 1=DO IT, \*=NEXT**

**Note:** To make sure that all CDRs were uploaded, repeat Step 4 to 6, until:



this message  
appears  
on the VFD:

**No call records**  
**To continue, press \***

7. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Testing answer supervision

Answer supervision is provided on the line to the terminal, or through an inferred answer supervision (IAS) module installed inside the terminal between the outside line and the rear terminal PCP. To test for answer supervision:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message  
appears  
on the VFD:

**Use \*=MENU, #=INSTALL**  
**or dial item number**

3. **Enter 267** on the keypad or **press \*** repeatedly until:

This message  
appears  
on the VFD:

**267. Answer detection**  
**Use 1=DO IT, \*=NEXT**

4. **Press 1**.

If the handset is on-hook:

This message  
appears  
on the VFD:

```
Answer detect check
Go offhook
```

5. **Go off-hook.**

This message  
appears  
on the VFD:

```
Checking answer
detection
```

When the check is complete:

This message  
appears  
on the VFD:

```
Completed:      00
To continue, press *
```

6. **Press \*** and go back on-hook.

This message  
appears  
on the VFD:

```
267. Answer detection
Use 1=DO IT, *=NEXT
```

7. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Answer supervision errors

If there are problems with answer detection,

this message  
appears  
on the VFD:

```
Failed:          XX
Press * to try again
```

Check the error code chart in Appendix B to diagnose the problem, then press \* to try the test again.

## Changing the brightness of the VFD

The VFD has four levels of brightness.

You may want to change the brightness of the display depending on the surroundings. For instance, if a terminal is inside, away from direct lighting, you may want to increase the brightness.

To change the brightness of the VFD, follow this procedure:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message  
appears  
on the VFD:

```
Use *=MENU, #=INSTALL
or dial item number
```

3. **Enter 274** on the keypad **or press \*** repeatedly until,

this message  
appears  
on the VFD:

```
274. VFD brightness
Use 1=DO IT, *=NEXT
```

**4. Press 1.**

This message  
appears  
on the VFD:

**Choose level: 1 - 100%**  
**2 - 75%, 3 - 50%, 4 - 25%**

**5. Press** the button corresponding to the desired brightness level.

For example, to reduce the brightness, press 3.

The brightness is set at the indicated level,

This message  
appears  
on the VFD:

**274. VFD brightness**  
**Use 1=DO IT, \*=NEXT**

**6. Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you lock the terminal.

## Testing the memory of the terminal

One of the tests you may want to run if the terminal is not functioning properly is a memory test.

The following test checks the memory for corruption.

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message  
appears  
on the VFD:

**Use \*=MENU, #=INSTALL**  
**or dial item number**

3. **Enter 636** on the keypad **or press \*** repeatedly until,

this message  
appears  
on the VFD:

```
636. Check memory
Use 1=DO IT, *=NEXT
```

4. **Press 1.**

- While the memory is checked,

this message  
appears  
on the VFD:

```
* Please wait *
```

- When the check is finished,

this message  
appears  
on the VFD:

```
Completed:      00
To continue, press *
```

5. **Press \*.**

This message  
appears  
on the VFD:

```
636. Check memory
Use 1=DO IT, *=NEXT
```

6. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.

## Memory errors

If there are memory errors,

this message  
appears  
on the VFD:

```
Failed:           XX
Press * to try again
```

Check the error code chart in Appendix B to diagnose the problem, then press \* to try the test again.

## Putting the terminal out of service

When you use this feature, an operation code is transmitted to the Millennium Manager. Use this code to:

- put a terminal out of service
- put the terminal back in service when it has been previously put out of service with this menu item.

**To put the terminal out of service:**

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message  
appears  
on the VFD:

```
Use *=MENU, #=INSTALL
or dial item number
```

3. **Enter 688** on the keypad or **press \*** repeatedly until:

this message  
appears  
on the VFD:

```
688. Out of service
Use 1=DO IT, *=NEXT
```

4. **Press 1.**

This message appears on the VFD:

**Press 1 = card reader  
2 = coin, 3 = whole set**

- **If the card reader is not working**, press 1.  
Operation code 998 is sent to the Millennium Manager.

This message appears on the VFD:

**Message activated  
Op code sent to NCC**

Close and lock the terminal.

This message appears on the VFD:

**COIN SERVICE available**

- **If the coin unit is not working**, press 2.

This message appears on the VFD:

**Message activated  
Op code sent to NCC**

Operation code 997 is sent to the Millennium Manager.

Close and lock the terminal.

This message appears on the VFD:

**CARD SERVICE available**

- **If the whole terminal is not working**, or you want to take it out of service, press 3.

This message appears on the VFD:

```
Message activated
Op code sent to NCC
```

Operation code 999 is transmitted to the Millennium Manager.

Close and lock the terminal.

This message appears on the VFD:

```
YY-MM-DD
* out of service *
```

## Putting the terminal back in service

If the terminal has been put out of service with the procedure described above, return it to service with this procedure:

1. Access the initial maintenance prompt as explained in **Accessing the initial prompt**.
2. **Press \***.

This message appears on the VFD:

```
Use *=MENU, #=INSTALL
or dial item number
```

3. **Enter 688** on the keypad or **press \*** repeatedly until:

this message appears on the VFD:

```
688. Out of service
Use 1=DO IT, *=NEXT
```



4. **Press 1.**

The terminal goes back into service.

5. **Press \*** to continue to the next item. To end the maintenance session, close and lock the terminal.

**Note:** Make sure the handset is on-hook before you turn the T-tool to lock the terminal.


## If the keypad buttons do not work

If you cannot enter an access code because the keypad buttons do not seem to work:

1. Unlock the terminal by turning the key in the lock clockwise, and turning the T-tool counterclockwise 90 degrees.
2. Be prepared to enter your PIN followed by a \* as soon as the terminal is unlocked.

As soon as you open the terminal, an alarm goes to the Millennium Manager.

This message appears on the VFD:



\* ALARM SENT \*  
\* COVER OPEN \*

3. Enter your PIN within 20 seconds of opening the terminal to make the initial maintenance prompt appear.

**Note:** If you take longer than 20 seconds, the terminal ignores your PIN and you must close and lock the terminal and start again.

As soon as you open the terminal, a diagnostic test of the telephony PCP begins.

If the test finds that the telephony PCP is not communicating with the control PCP,

this message  
appears  
on the VFD:

**Telephony board is  
not responding**

This message alternates with the alarm-sent message at 4.5-second intervals. You may not be able to enter the maintenance level until the problem is solved.

4. Check the keypad/telephony PCP cable connector for damage. If necessary replace the telephony PCP following the instructions in **Removing the PCP assembly** and **Removing the telephony and control PCPs** in Chapter 7.

## Terminal timeout at the maintenance level

During a maintenance-level session, if 30 minutes elapse between button presses, the terminal times out.

When this happens, the maintenance-level session ends.

This message  
appears  
on the VFD:

**\* ALARM SENT \***  
**\* COVER OPEN \***

The message remains on display until you close the housing.

**Note:** The timeout provision does not apply during certain time-consuming processes. Such exceptions are noted in the text.

## Uninstalling the terminal

Use the following procedure to uninstall terminals when you need to replace the control PCP, the firmware, the validator or the escrow.

This procedure ensures that terminal records are uploaded to the Millennium Manager. Otherwise, replacing these components would result in the loss of the records.

1. Put the terminal out of service, as described in **Putting the terminal out of service**, in this chapter.
2. Download the CDRs. Refer to **Sending CDRs to the Millennium Manager** in this chapter.

Collection messages are stored in the memory of the control PCP in the terminal. If the collection message is not received by the Millennium Manager, it is stored with the CDRs and downloaded with them.

If no CDRs are present, the craftsman must generate a CDR, then download the CDR to the Millennium Manager. If the CDRs are not received by the Millennium Manager, an error message is produced.

Use the error codes chart in Appendix B to troubleshoot any problems which arise.

3. Close and lock the terminal.
4. Access the craft interface again.
5. Press # on the keypad. The terminal is now uninstalled.
6. Do whatever maintenance procedures required. These procedures are described in Chapter 7.

When you are finished, close and lock the terminal,


this message  
appears  
on the VFD:

**Not installed**  
**Use # to INSTALL**

## 6 Troubleshooting strategies

This chapter provides details on how to diagnose and troubleshoot problems with the terminal. These procedures are performed through the craft interface.

The *Millennium terminals troubleshooting guide* provides a pocket-size version of this material, including the craft interface prompts. Refer to Chapter 9 to order this book.

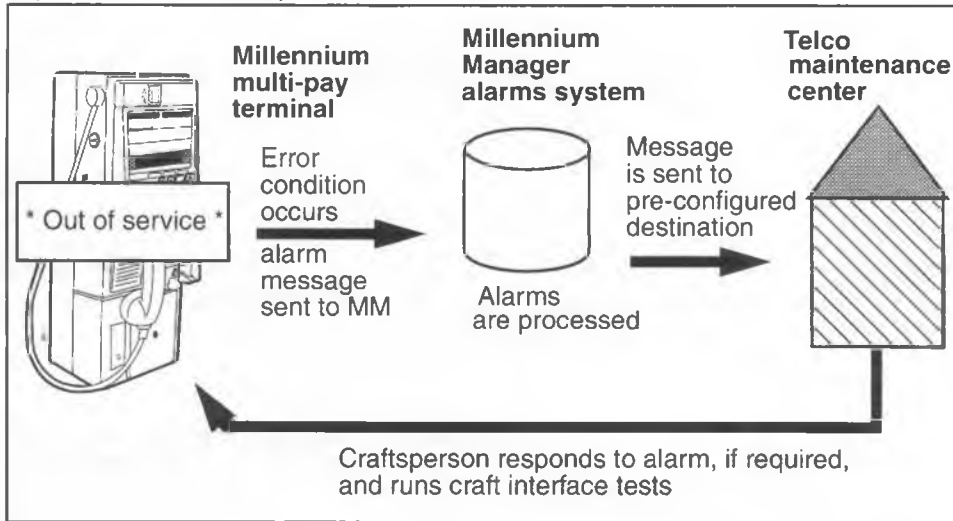
<p><b>Electrostatic discharge (ESD)</b></p>  <p><b>Failure to follow these procedures may damage the electrostatic-sensitive components.</b></p>	<ul style="list-style-type: none"> <li>• When working inside the terminal, prevent damage to the electrostatic-sensitive devices by wearing your ESD strap connected to the ESD connection points shown in Figure 7-2.</li> <li>• Disconnect the power from the terminal before removing any boards. <b>Do not reconnect the power until you are ready to close the terminal.</b></li> <li>• If you put a module down, put it on an anti-static surface or into an anti-static bag. <b>Do not put boards on top of each other.</b></li> </ul>
<p><b>Remember to upload CDRs before you start!</b></p>	<ul style="list-style-type: none"> <li>• If you are going to do work inside the terminal, upload the CDRs.</li> <li>• This is imperative if you have to replace the control or telephony PCPs or the firmware chips on the control PCP.</li> <li>• To send the CDRs to the Millennium Manager, see <b>Sending CDRs to the Millennium Manager</b> in Chapter 5.</li> </ul>

## Internal error detection

Diagnostic tests are run at the terminal.

- Some diagnostics run automatically in the terminal as background tasks. Disruptions cause alarm messages to be transmitted to the Millennium Manager. The Millennium Manager determines further actions. Figure 6-1 shows this process. These alarm messages are listed in Appendix A.

**Figure 6-1: The alarm process, from terminal to telco**



- You can also initiate diagnostics using the maintenance level of the craft interface, as discussed in Chapter 5. Use the tests to check how the terminal and its components are operating. Faulty components create error message codes. These codes are listed in Appendix B.
- The alarm messages or error codes can help to isolate the problem down to the module level or to one area of operation. The repair person troubleshoots the problem at the terminal, and replaces any defective components.
- Refer to Chapter 7 for instructions on replacing components.

---

## Security features

The following alarms may indicate unauthorized activities at the terminal:

**Handset discontinuity:** This alarm is issued when there is a discontinuity in the handset circuit and may indicate a severed handset cord.

**Station access cover:** This alarm is issued when someone opens the housing assembly without first entering the access code and a PIN. It may indicate someone has broken into the terminal by forcing open the housing assembly.

**Power fail:** This alarm is issued when there is a power failure. A power failure may be used as a means of disguising fraudulent activity.

## False un-alarms

The terminal assumes that when you exit from the craft interface, any problems that may have existed have been fixed. At this point an un-alarm (99) is sent to the Millennium Manager.

If the problem has not, in fact, been fixed, once the terminal is powered up again and the problem is re-encountered, such as a blocked card reader or a coin jam, the error code is again sent to the Millennium Manager. Meanwhile, you may have left the sight, believing that the problem has been fixed.

After every maintenance session, be sure and run the basic call and payment tests described in Chapter 3 to make sure the problems reported have, indeed, been fixed.

# Troubleshooting

To troubleshoot, use the maintenance level. To operate the craft interface:

- supplementary power must be available
- the display must be at least partially functional
- the control board must be at least partially functional
- the keypad must be functional
- the keypad must be properly attached
- The interprocessor connector must be properly attached to J2 on the telephony PCP and to J17 on the control PCP, refer to the interconnect diagrams in Chapter 2, if necessary.

If you cannot access the craft interface, check the above conditions.

**See this:**



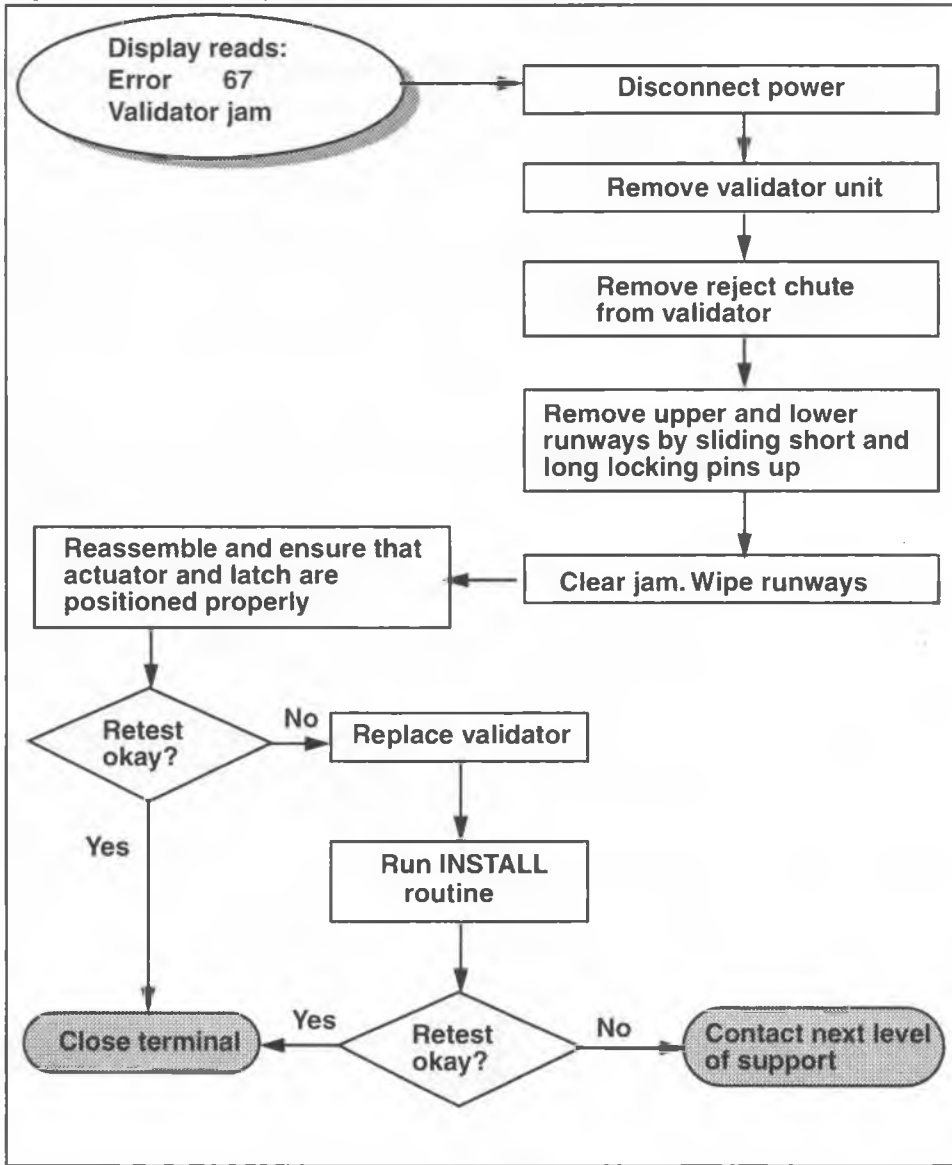
Check for loose connections or damaged cables, before replacing components.

Always run the craft interface tests for component you have replaced or after any maintenance activity affecting the internal components or functions.

This is to ensure that all the components function properly, especially the card reader and coin options.

Exiting the craft interface without fixing a problem, such as a blocked card reader, will cause an erroneous un-alarm to be sent to the terminal and the terminal will return to service until the problem recurs and shuts down service again.

Figure 6-2: Validator jam (Error 67 on craft interface)





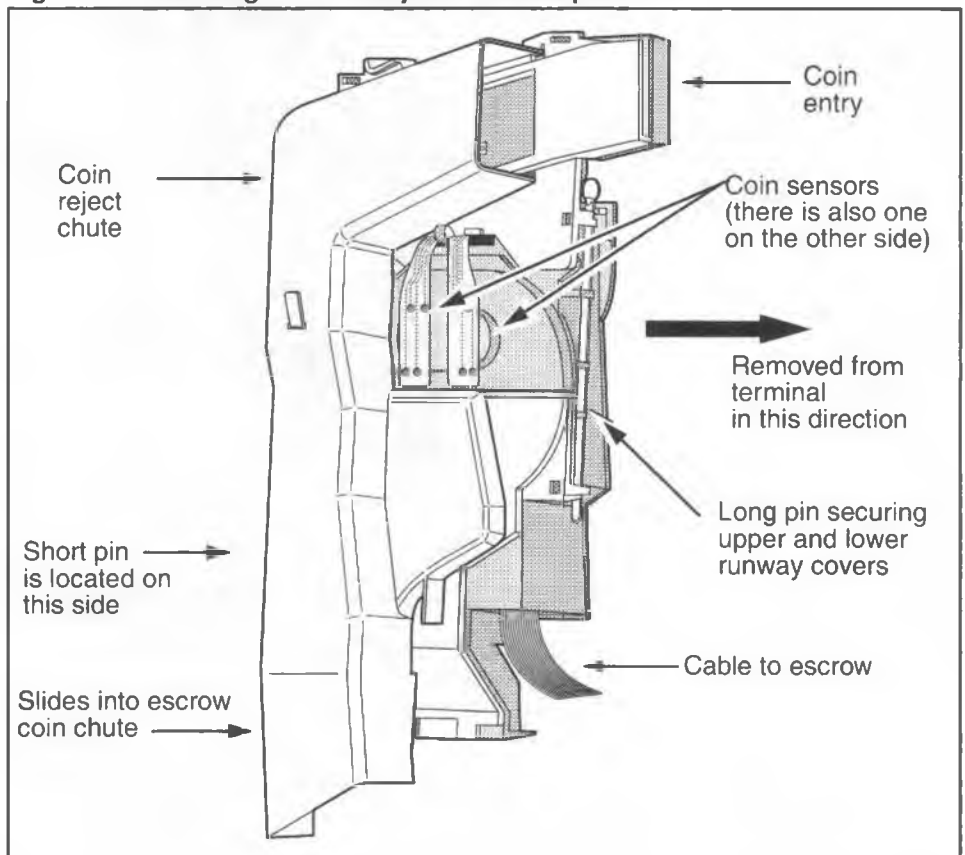
**To clear a jammed validator:**

1. Remove the coin validator as explained in **Replacing the coin validator** in Chapter 7.

The steel pins on either side of the validator release the coin rejection chute and the upper and lower runways, where jams may occur.

Figure 6-3 shows the left profile of the validator, which shows the coin reject chute and the pin securing the upper and lower runways, which are located under the coin reject chute.

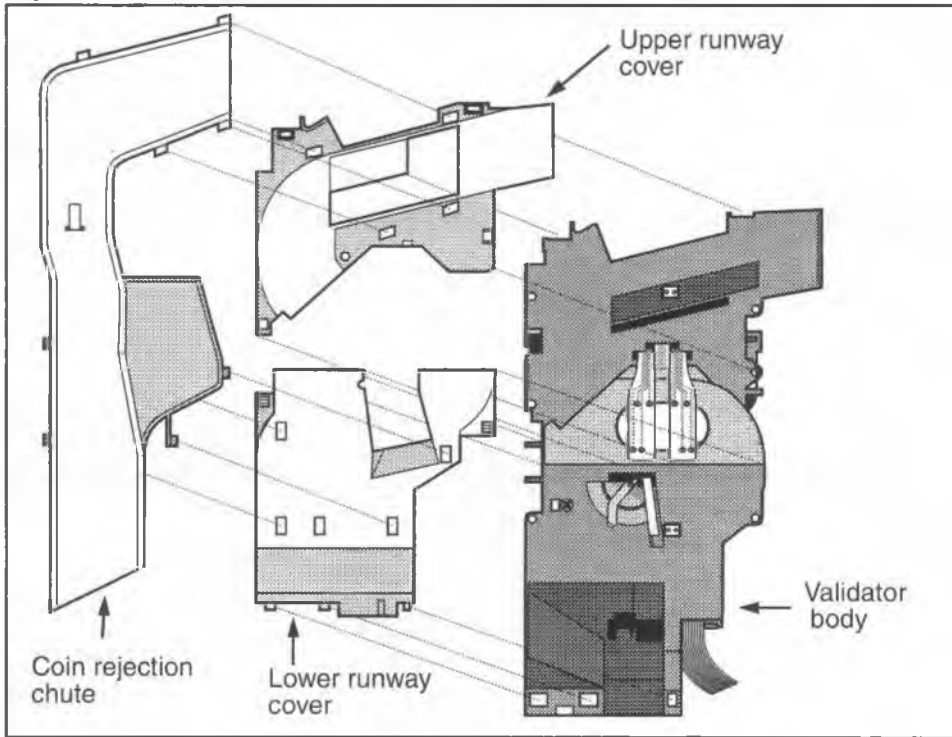
**Figure 6-3: Showing the coin rejection chute profile**



2. Slide the short steel pin up and remove the coin reject chute.

3. Remove the lower and/or the upper runway by sliding the long pin up. Figure 6-3 shows the location of this pin. Figure 6-4 shows an exploded view of all the validator components.

Figure 6-4: Exploded view of the coin validator



4. Clear the coin jam.  
**Note:** Be careful of the sensors when clearing jams.
5. To replace the coin validator in the terminal or if you need to replace the validator module if the jam cannot be cleared, refer to **Replacing the coin validator** in Chapter 7.  
**Note:** Ensure that the flex PCP is not pinched under the upper runway.
6. Perform the coin unit test, see **Checking the coin unit** in Chapter 5.

7. Close the terminal.
8. Initiate a local and long-distance coin call to confirm that the coin system is working properly.

## Escrow unit jam

If the coin jam did not occur in the coin validator, then it may be in the escrow unit.

1. Remove the coin validator as explained in **Replacing the coin validator** in Chapter 7.
2. Check the throat of the escrow unit for trapped coins or debris and remove them. DO NOT use any tools to try and unjam the escrow as this could result in damage to the gears or the escrow motor. Use the following procedure to attempt to clear the escrow:
  - a) Turn the escrow upside down and rock the escrow with a side-to-side motion to empty out any debris or coins which may be blocking the coin path.
  - b) If no debris or coins fall out, use your finger to gently apply steady pressure to move the coin bucket. If the bucket does not move with gentle, steady pressure, replace the escrow and send the jammed escrow in for repair.
  - c) If you replace the escrow you will have to rerun the INSTALL procedure to reset the light levels in the escrow sensors. This process is described in Chapter 3.
3. Replace the escrow in the terminal.
4. Perform the coin unit test; see **Checking the coin unit** described in Chapter 5.
5. Initiate a local and long-distance coin call to confirm that the coin system is working properly.

## Craft interface coin unit problems

If the terminal passes the craft interface coin unit test, but when it is closed the **Card Service available** prompt appears on the VFD within about three minutes, indicating there is still a coin problem, do the following:

1. If the coin box volume exceeds 80%, arrange a coin pickup.
2. Re-try the coin unit test and close the terminal.
3. If the **Card Service available** prompt still appears on the VFD, replace the escrow unit.

If the **Complete 00, To continue, press \*** prompt appears on the VFD before all three calibration coins have been deposited, a coin blockage or sensor failure in the coin validator or escrow unit has likely occurred. Check for blockages in the coin validator, in the throat of the escrow unit or in the coin box area. If no coin blockages are found, replace the coin validator. If this fails to work, replace the escrow unit.

Figure 6-5 to Figure 6-8 show diagrams with suggestions for troubleshooting coin errors.

Figure 6-5: Card service only, part 1

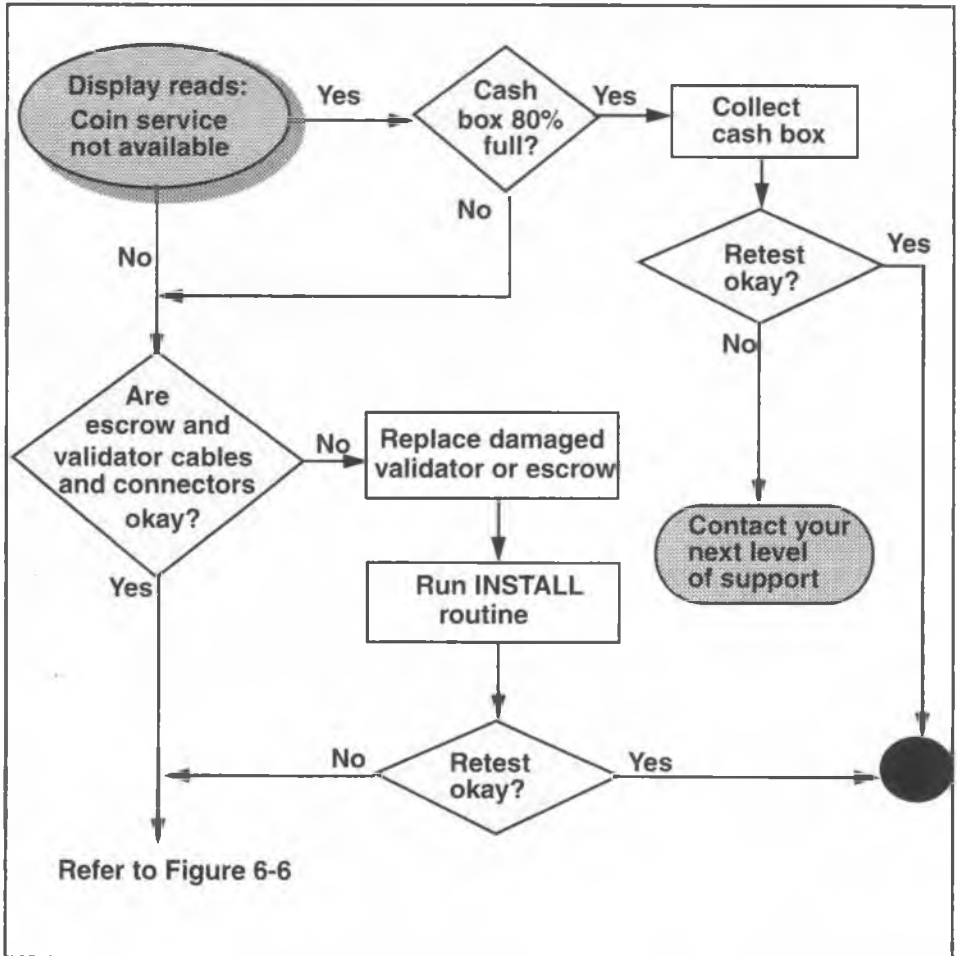


Figure 6-6: Card service only, part 2

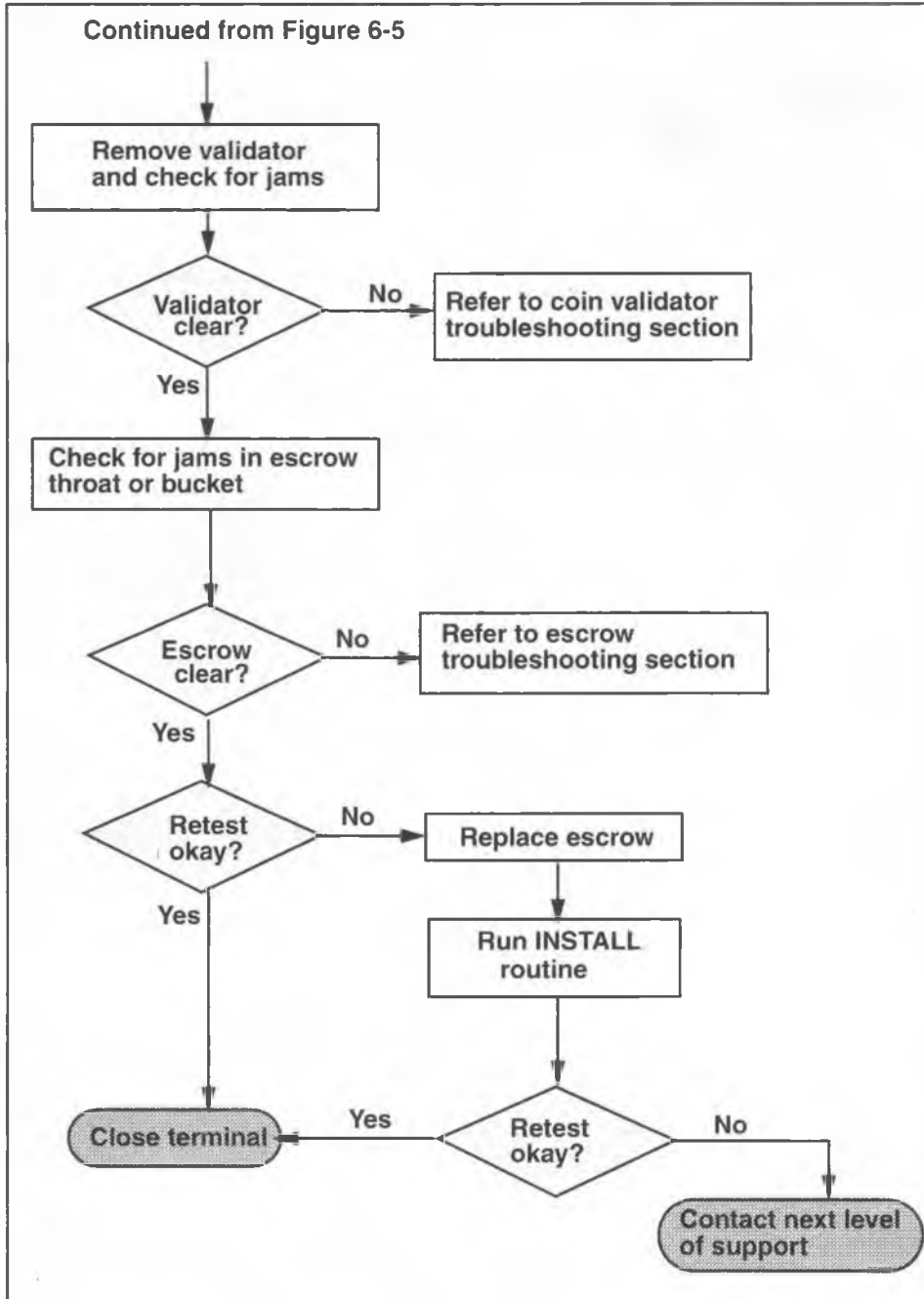


Figure 6-7: Coin test errors, chart 1

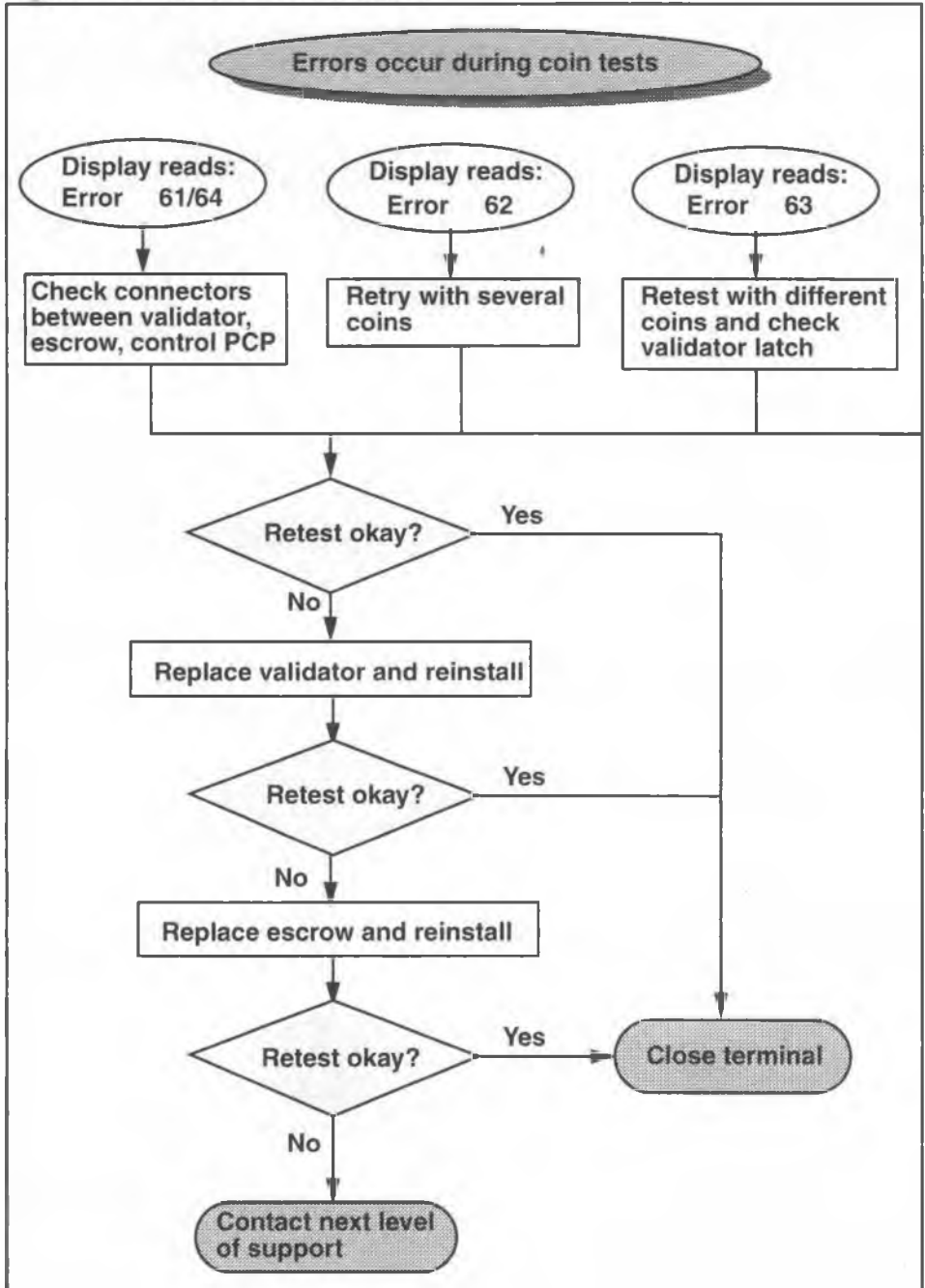
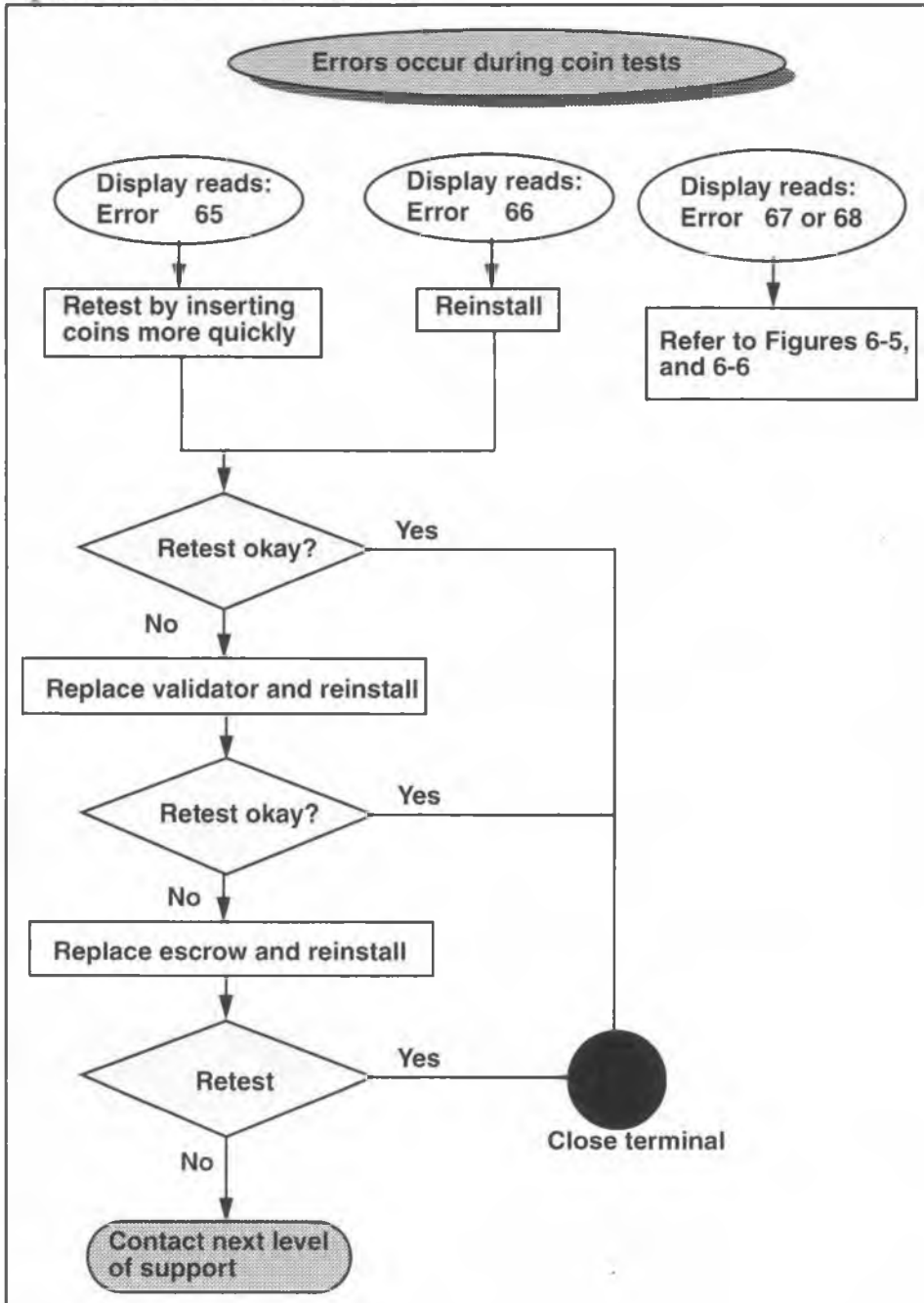


Figure 6-8: Coin test errors, chart 2





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## Security PCP fault indications

Since coin vault security PCPs seldom fail, there is no direct error to indicate a failure in the micro-switches for the security PCP in the coin vault. However, a fault can be deduced by considering some of the following conditions:

### Error messages

There are error messages if the coin box key is left in the lock or if the vault is closed with no cash box. If closer inspection shows that neither of these conditions actually exists, despite the alarms, check that the micro-switch on the security PCP inside the coin vault is being properly activated.

The micro-switch should be activated when the lock is closed and a coin box is inserted into the coin vault, and deactivated if the lock is open or the coin box removed. If either case fails to activate a micro-switch, replace the security PCP.

### Coin box discrepancies

A faulty security PCP may be indicated if:

- a coin box is removed and there is no message sent to the Millennium Manager to indicate this; coin box switch may be stuck closed.
- the **coin box full** message is transmitted, yet upon inspection, the coin box is not full
- a new coin box is installed, yet the **Card Only service** prompt appears on the VFD when the terminal is closed
- an alarm has indicated there is no coin box, but there is one and the terminal displays **out of service** on the VFD
- an alarm indicates that the coin vault is open, but this is not the case.

To correct, replace the security PCP as described in **Replacing the security PCP** in Chapter 7.

**If a security PCP is faulty, you must simulate a coin pickup to reset the terminal counter to zero**

- Turn the cash box key to the locked position.
- Hold the micro-switch down or insert a lid-less cash box.
- Power up the terminal, still holding the switch closed.
- Turn the cash box key to the unlocked position. The terminal will reset the count to zero.
- Remove the lid-less cash box and insert a regular cash box.

**Note:** Inform the cash box collection service that they will have to count the contents of the last two boxes to reconcile their coin count records.

## Power

If the terminal does not provide any services, including emergency and operator-assisted calls, check the supplementary power.

## Supplementary power

If the terminal loses power, the VFD goes blank. Trace the power from its source, through the rear terminal PCP to the control and the telephony PCPs.

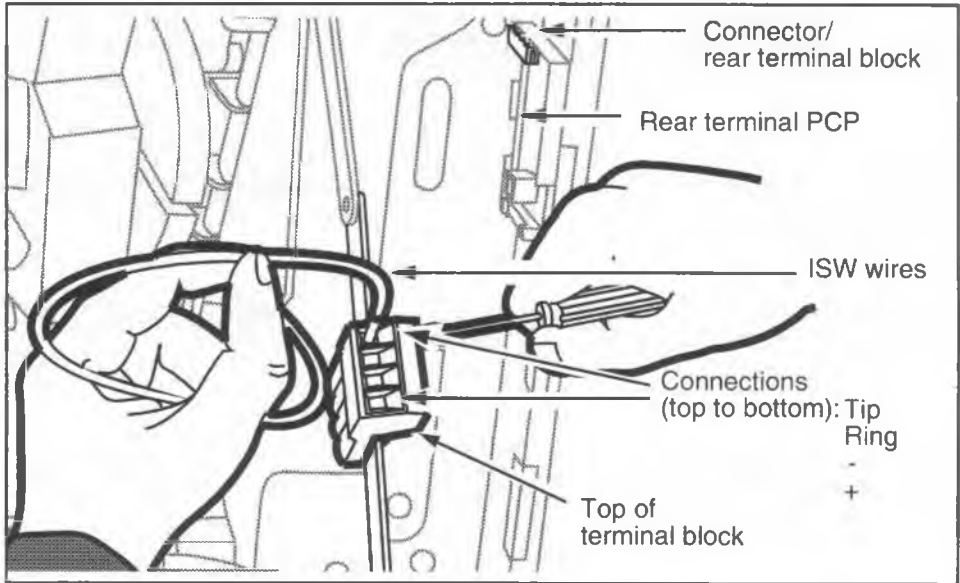
**Electrostatic shock (ESD) precautions**



- To prevent damage to the electrostatic-sensitive devices inside the terminal, wear your ESD wrist strap and connect it to the ESD connection points shown in Figure 7-2.
- Disconnect power from the terminal. **Do not reconnect power until you are ready to close the terminal.**
- Failure to follow these procedures may damage the electrostatic-sensitive devices.

1. Disconnect the rear terminal PCP cable (J18) from the control PCP connector (J5).
2. Pull off the top terminal block from the rear terminal PCP and snap it to the upper arm of the link assembly.

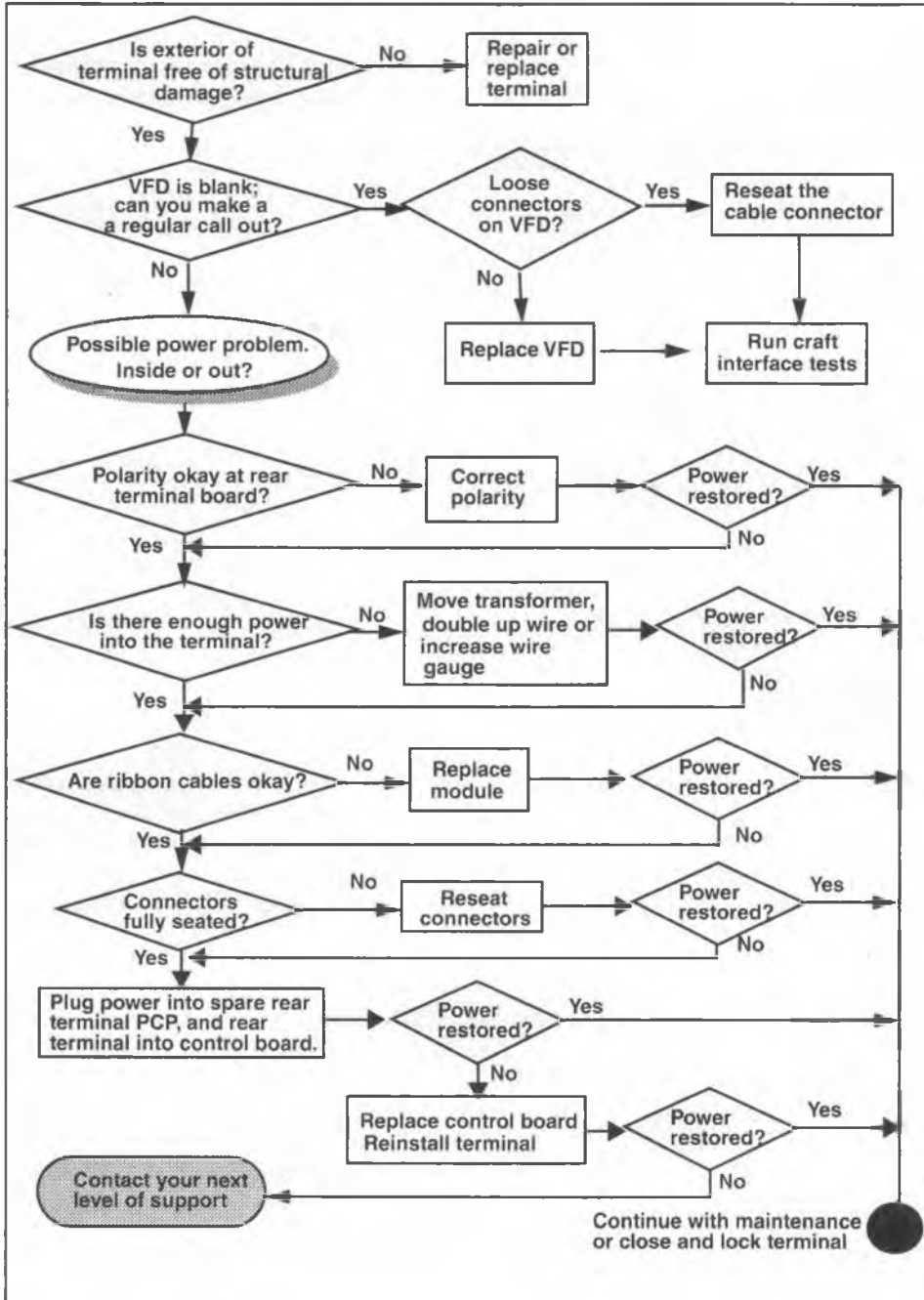
**Figure 6-9: Connecting inside service wires to terminal block**



3. Probe from the positive and negative terminals on the terminal block of the rear terminal PCP looking for approximately 25 V DC. If this voltage is not present at the terminal block or the polarity is reversed, there is a defective transformer or transformer wiring problem.
4. If voltage is present, reconnect J18 to J5. If the VFD remains blank, replace the rear terminal PCP. Refer to **Replacing the rear terminal PCP** in Chapter 7.
5. If this does not correct the problem with the terminal closed, check for dialtone on the telephone line. If dialtone is present and the VFD remains blank, replace the control PCP. Refer to **Removing the telephony and control PCPs** in Chapter 7.

Figure 6-10 shows a flow chart for diagnosing power problems.

Figure 6-10: Power troubleshooting flow chart



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## Borderline power anomalies

A more subtle form of power problem may occur if the cable length/diameter ratio is not correct, as described in the specifications section in Chapter 1. Some indications are:

- You receive customer complaints that the terminal accepts coins but does not dial out. Or, credit card calls do not go through, but there is no **Out of Service** prompt.
- You upgrade the control board on an older version of terminal, but you are unable to complete a download because the terminal keeps powering out.
- The terminal consistently fails to make its scheduled call into the Millennium Manager for no apparent reason.

In all these situations, the increased voltage required by components to initiate coin activities or make data calls pushes the power requirements above the threshold supplied by the line.

### Troubleshooting the problem

One way of deducing a power problem outside the terminal is to try and download tables. If the download fails repeatedly, and the Millennium Manager modems are okay, then a power problem is a possibility

1. Is the VFD working? If so, then the problem is probably outside the terminal.
2. Since you know that power is getting to the terminal, since it powered up, you might speculate that the problem is a borderline power problem.

**Check the power** by attaching a 22  $\Omega$  (10 Watt) resistor to the supplementary points on the terminal block. Attach a voltmeter between the resistor and the terminal block and check for between 13 V and 22 V DC.

**Correcting the problem:** Check the power supply to make sure it is functioning properly. If it is, check the length of the power circuit, considering wire joints and junctions. Compare to the cable chart in Chapter 1. If the error is in this area, double the pairs of the circuit to increase the power.

## Checking the CO line

If the terminal loses the telephone line voltage or dialtone (error codes 21, 41 and 42), and the VFD works, trace the line voltage and dial tone from their source, through the rear terminal PCP, to the control PCP and the telephony PCP.

### Electrostatic shock (ESD) precautions

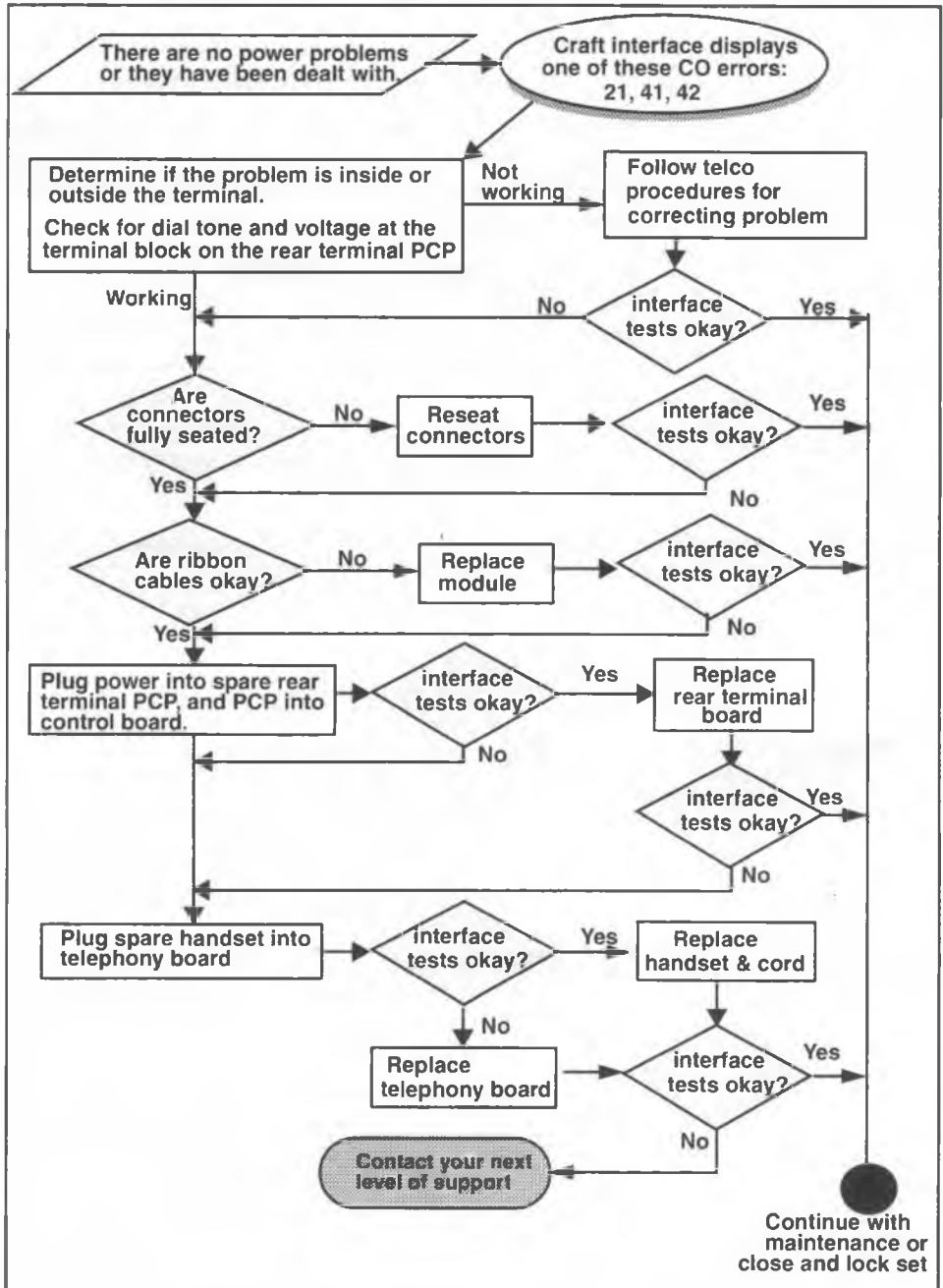


- To prevent damage to the electrostatic-sensitive devices inside the terminal, wear your ESD wrist strap and connect it to the ESD connection points shown in Figure 7-2.
- Disconnect the power from the terminal. Do not reconnect the power until you are ready to close the terminal.
- Failure to follow these procedures may damage the electrostatic-sensitive devices.

1. Pull off the top terminal block from the rear terminal PCP and snap it to the upper arm of the link assembly.
2. Probe the tip and ring (T and R) on the terminal block of the rear terminal PCP. Look for approximately 48 V DC. If voltage is not found at the terminal block, there is a telephone line problem.
3. If voltage is present, listen for dialtone using a dial hand test set. If dialtone is not heard, there is a telephone line problem.
4. If dialtone is heard on the dial hand test set and the problem continues, replace the handset. Refer to **Replacing the handset and cord or the swivel** in Chapter 7.
5. If this does not correct the problem, replace the rear terminal PCP, and if necessary, the telephony PCP and control PCP. Refer to **Replacing the rear terminal PCP** and **Replacing the control and telephony PCPs** in Chapter 7.

Figure 6-11 shows a flow chart demonstrating CO line troubleshooting procedures.

Figure 6-11: CO troubleshooting flowchart

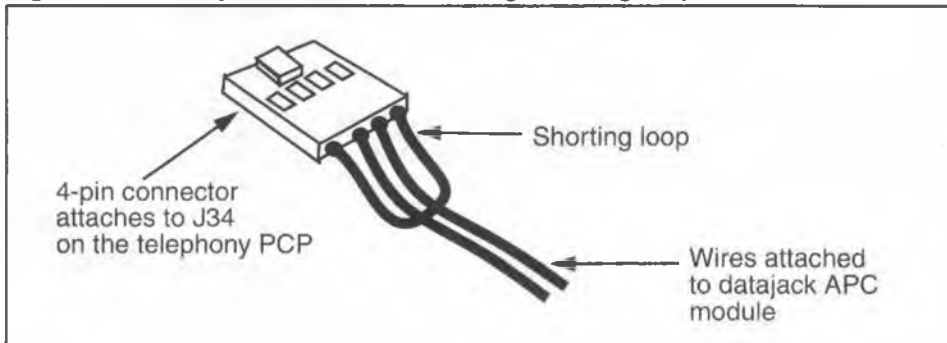


## Datajack telephony PCP power

If the terminal is experiencing power problems during datajack operation, check the following conditions:

- If the terminal has a telephony PCP which supports the datajack function and a datajack module is attached, but the updated firmware chip was not installed, datajack operation may cause power fluctuations.
- The datajack cable connector wiring is shown in Figure 6-12. Note that there must be a loop between the two outside connections. This shorting loop prevents the modem from drawing excess current off the line during datajack operation. If this loop is not present on the connector of the datajack module connector attached to the telephony PCP, make the adjustment to the wiring leads.

**Figure 6-12: Datajack connector showing shorting loop connections**





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## 7 Installing replaceable parts

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The multi-pay terminal contains components that can be replaced in the field. If you discover a problem while installing or maintaining a terminal, the usual repair method is to replace the defective component.

**The replaceable components include:**

- front housing assembly
- lock for the housing assembly, customer specific
- telephony printed-circuit pack (PCP)
- control PCP, control and voice firmware
- handset and cord assembly, swivel assembly, cotter pin
- vacuum fluorescent display (VFD)
- upper bezel assembly with integral keypad
- display window
- instruction card, provided by the operating company
- card reader assembly
- alerter PCP
- number card, provided by the operating company
- lineswitch PCP
- hookswitch alerter bezel assembly
- five- and ten-button quick access key sets, (optional)
- ID bezel and coin guide
- coin validator
- vault door

- coin box rail
- vault security PCP
- coin compartment lock, mechanical or electronic
- coin box and coin box cover
- escrow
- rear terminal PCP
- IAS (inferred answer supervision) module (optional)
- data jack connector (optional)
- smart card alert daughter board (optional)

Table 9-2 in Chapter 9 contains a complete list of orderable modules for the terminal.

## Saving call detail records (CDRs)

It is important to upload all CDRs from the terminal before performing maintenance tasks inside the terminal. Although records may not be directly affected by what you are doing, uploading the CDRs assures that the terminal records are up-to-date as of the time of maintenance, should something prevent the terminal from regaining operation.

During this procedure, the cash box record is also uploaded, to ensure a current cash box status is maintained should a terminal failure occur.

## Before you enter the terminal

To access the inside of the terminal you require maintenance-level privileges, an upper housing key, and a locking tool (T- or L-tool) to access the terminal.

You may need to access the terminal if the terminal is out of service or if you have run the craft interface tests and discovered a faulty component.

- If you know you will be replacing the control PCP or firmware on it, you need to uninstall the terminal before you

start replacing parts, then re-INSTALL it when you have completed your tasks.

- If you will be replacing the validator or the escrow, you do not need to uninstall the terminal, but you do need to run the INSTALL routine when you are finished.
- If you do not plan to change any of the modules described in the above two paragraphs, you will not be required to re-INSTALL the terminal when you complete your tasks. However, it is recommended that you still upload the CDRs as a precautionary measure.

## Preparing the terminal for maintenance

If you need to enter the terminal to replace parts, or for further testing, use the following procedure first:

1. Access the maintenance level of the craft interface and the initial prompt, as explained in **Accessing the initial maintenance prompt** in Chapter 5.
  - a) Enter the access code
  - b) Enter your PIN.
  - c) Press \*.

This message appears on the VFD:

**Please use key now  
& open the terminal**

2. Put the key into the key lock on the left side of the housing assembly and turn it clockwise, refer to Figure 7-1. If it is difficult to turn the key, insert the T- tool or the L- tool into the hole below the key lock, and apply a slight force counterclockwise while turning the key clockwise.
3. If you have not already done so, insert the T- tool or L- tool into the hole below the key lock.

**Figure 7-1: Locating the locking mechanisms for the upper housing**



4. To release the locking mechanism, rotate the T-tool or L-tool clockwise.

**Note: Do not open the terminal housing.**

5. Upload the terminal status and CDRs by referring to **Sending CDRs to the Millennium Manager** in Chapter 5.
  - a) Enter 732 from the keypad.
  - b) Press 1.
  - c) Press \*.
  - d) If there were call records in the terminal, repeat Steps 5b and 5c until,

this message  
appears  
on the VFD:

**No call records  
To continue, press \***

e) Press \*.

**Collection messages** are stored in the memory of the control PCP. If the collection message is not received by the Millennium Manager, it is stored with the CDRs and downloaded with them. If there are no CDRs, indicated by the prompt **No call records**, the craftsperson will need to create one by making a call.

**Cash box status:** If there are no CDRs but the cash box status has been updated since the last upload, the terminal will automatically create a CDR so the cash box status can be uploaded.

6. If you do not need to uninstall the terminal, go to the section **Opening the terminal**.

### If you need to uninstall the terminal

7. Close and lock the terminal.
8. Access the craft interface again, as described in **Accessing the initial prompt** in Chapter 5.
9. Press # on the keypad. The terminal is uninstalled.
10. Go to the section **Opening the terminal**.

## Opening the terminal

Once you have completed the section **Preparing the terminal for maintenance**, you are ready to open the terminal housing to gain access to the internal components. These components are described in Chapter 1.

This procedure describes:

- the proper ESD precautions to take
- how to properly disconnect the terminal
- how to restore the terminal once the maintenance is finished

**Electrostatic discharge (ESD) precautions**



**Failure to follow these precautions may damage the electrostatic-sensitive components.**

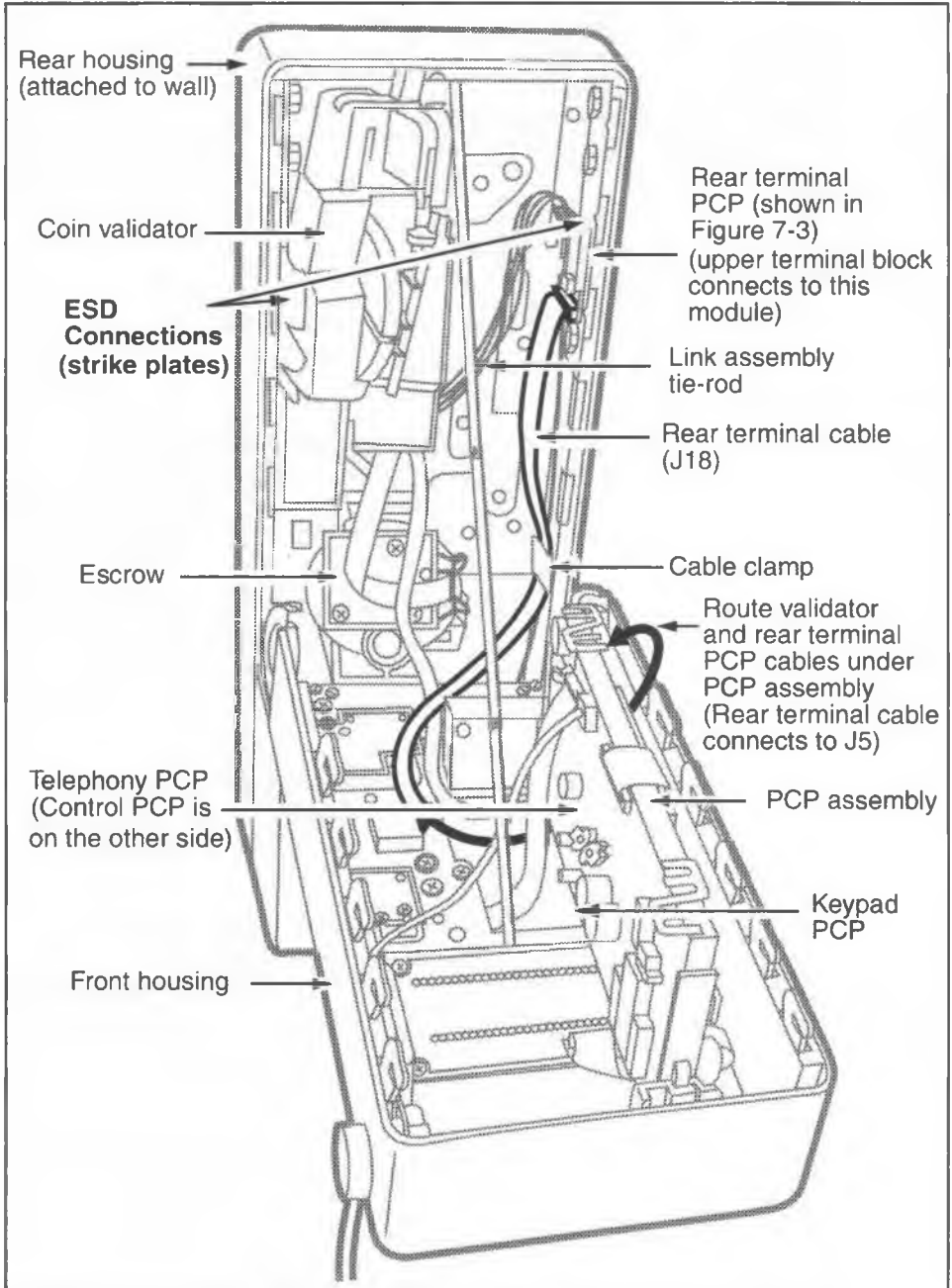
- Electronic components are sensitive to electrostatic discharge. Before working with the modules in the terminal, put on your ESD wrist strap and connect it to the ESD connection points shown in Figure 7-2.
- Before replacing any component, disconnect the supplementary power supply.
- When removing any component with a PCP, put it in an anti-static bag or on an anti-static surface to work with it.
- Do not get any components wet.

1. Remove the handset from its cradle and let it hang by the armored cord.
2. Grasp the front housing assembly firmly by both sides and tip it forward until the housing clears the rear of the terminal.
3. Hold the front housing and move it downwards to the open position, as shown in Figure 7-2.

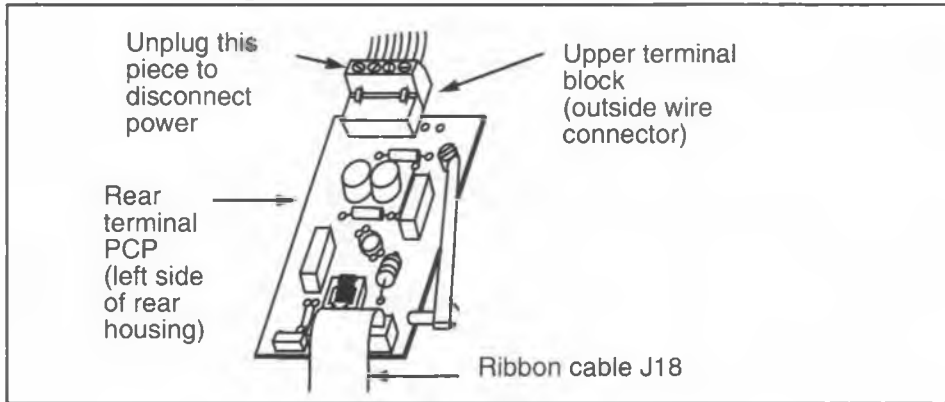
In the fully open position, the weight of the front housing is supported by the link assembly tie rods attached to the front and rear housing, also indicated in Figure 7-2.

4. Attach your ESD wrist strap to an ESD connection point, which is indicated in Figure 7-2.
5. Disconnect the power to the terminal in one of the following ways:
  - Disconnect the rear terminal PCP cable (J18) from the control PCP connector (J5). Refer to Figure 7-2.
  - If you will be working with the rear terminal PCP, disconnect the upper terminal block, shown in Figure 7-3, which attaches at the rear terminal PCP.

Figure 7-2: ESD and power connections inside the terminal



**Figure 7-3: Locating the terminal block connector**



6. Install or replace the necessary parts. Procedures for replacing the various parts follow in this chapter.
7. To close the terminal, reverse Steps 1 to 5, making sure to:
  - a) Route the cable leading from the coin validator (J33), and from to the rear terminal PCP (J18) to the left of the card reader and between the PCP assembly brackets before replacing the assembly.
  - b) Secure the J18 cable using the cable clamp under the rear terminal PCP. If the terminal has an IAS module installed, this cable clamp will have been removed. Position the cable between the PCP assembly brackets before replacing the assembly.
  - c) If the terminal has a smart card alert daughter board, route the alerter cable between the PCP assembly brackets before replacing the assembly.
  - d) Fold excess cable and tuck away from the sides of the terminal housing so it doesn't get caught when the housing is closed.



8. If, after connecting power to the terminal, **Telephony board not responding** appears on the display, with the terminal open and the handset on the hook, allow the terminal to power up for three minutes.

During this time, the terminal will not respond to install or maintenance instructions.

If **Telephony board not responding** still shows after three minutes, replace the telephony PCP by following the steps in **Removing the PCP assembly** and **Removing the telephony and control PCPs** later in this chapter.

9. Close the terminal.
10. Turn the L- or T-tool counterclockwise in the housing aperture to secure the housing, then turn the key in the lock counterclockwise to lock the terminal.

**Note:** The handset should be on-hook before the housing is locked.

11. If necessary, return the terminal to operation with the appropriate procedure listed below:
  - If you took the **terminal out of service** manually, return it to service through the craft interface. Refer to **Putting the terminal back in service** in Chapter 5.
  - If you **uninstalled the terminal and replaced the control PCP, the firmware, the validator, or the escrow**, run the INSTALL terminal-configuration routine, described in Chapter 3. Run the craft interface tests for the component you replaced or performed maintenance on to make sure the problem is fixed.
  - If you replaced the telephony PCP, use the maintenance level of the craft interface to perform a forced download.
12. Perform operation tests to make sure the terminal works properly. These tests are described in Chapter 3.

## Replacing the front housing assembly

### Electrostatic discharge (ESD)



Failure to follow these precautions may damage the PCPs.

- Electronic components are sensitive to electrostatic discharge (ESD). Before working with the PCP assembly, put on your ESD wrist strap and connect it to the ESD connection points shown in Figure 7-2.
- Before replacing any component, disconnect the rear terminal board (cable J18) from the control board connector (J5). This disconnects the supplementary power supply, and the tip and ring connections. The control PCP is on the right side of the PCP assembly.

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power should be disconnected from the control PCP.
2. Disconnect the coin validator cable (J33) from the control PCP connector (J8).

Make sure you remove the cables from the cable clamp. If you are unsure of cable connections, look for the name of the connection printed on the PCP, or see **Interconnections of internal components** in Chapter 1.

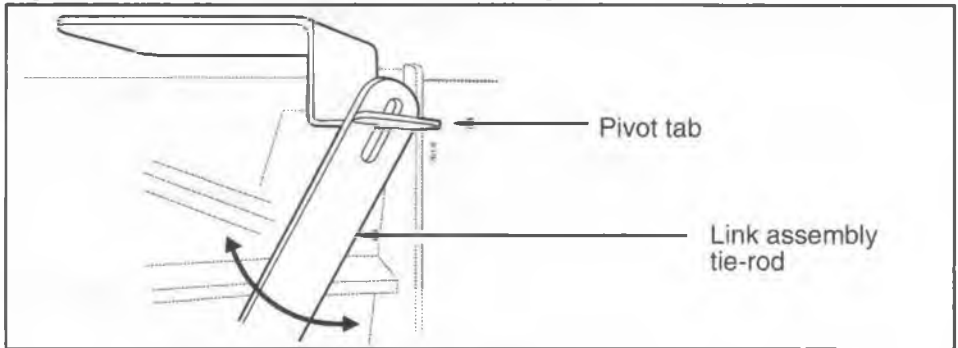
3. With the terminal open, you will see that the front housing is supported by a link assembly tie-rod which hooks onto a bracket at the top of the rear housing and about mid-way in the center of the front housing.

Remove the link assembly arm from one of the brackets in the following manner:

- a) While supporting the front housing assembly, lift the link assembly until the top link is loose and almost parallel to the top of the housing, as shown in Figure 7-4.

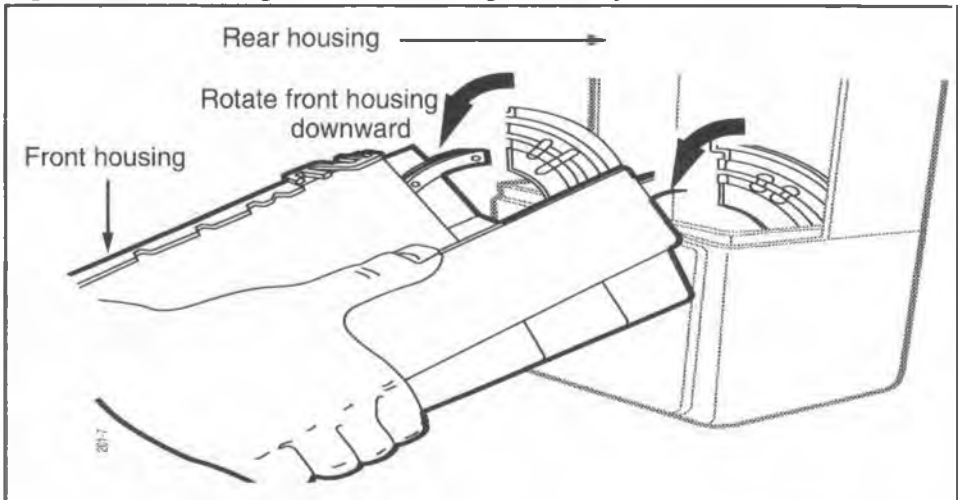
- b) Move the top link upward and sideways so the slot on the tie-rod aligns with the pivot tab.
- c) Release the link.

**Figure 7-4: Link bracket on the rear housing**



4. With the top link released, the front housing can be removed by rotating it downward until the hinges at the bottom of the two housing pieces disengage, as shown in Figure 7-5.

**Figure 7-5: Removing the front housing assembly**



5. To reinstall the front housing assembly, reverse the preceding steps.

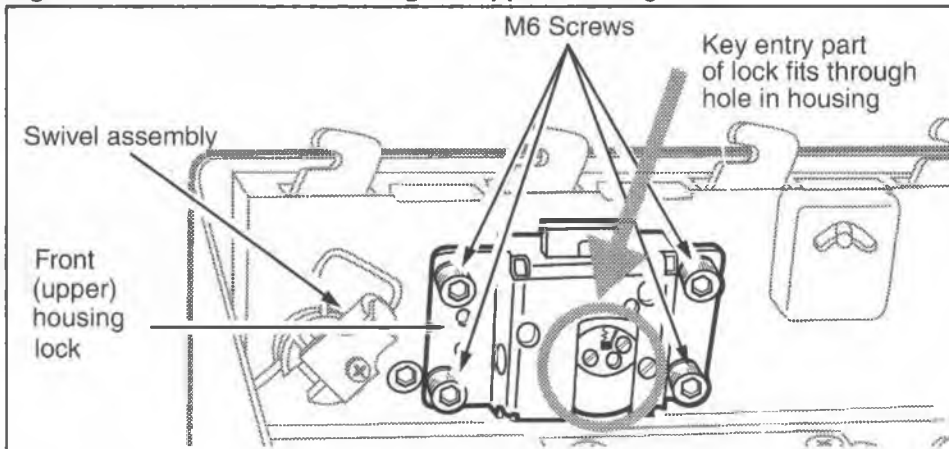
6. Reverse the steps in **Preparing the terminal for maintenance** and **Opening the terminal** to return the terminal to operation.

## Replacing the upper housing lock

This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. While it is not necessary to disconnect the power for this procedure, it is recommended that you do so.

1. Make sure the key operates the lock.
2. Insert the lock so the key entry protrudes through the round hole in the front housing and the four mounting holes align with the four threaded holes in the cover plate. Refer to Figure 7-6.

**Figure 7-6: Four screws securing the upper housing lock**



3. Insert the four M6 screws and tighten.
4. To remove the lock, reverse the preceding steps, with the key in the unlocked position.
5. When complete, reconnect power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Removing the PCP assembly

The PCP assembly must be removed to replace a telephony or control PCP. Also, it may need to be removed to access several of the components. The PCP assembly includes the telephony and control PCPs and the plastic frame holding them.

To perform an orderly removal, follow these procedures:

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power should be disconnected from the control PCP.

### Electrostatic discharge (ESD)



- Before working with the PCP assembly, put on your ESD wrist strap and connect it to the ESD connection points shown in Figure 7-2.
- Disconnect the supplementary power supply. Do not reconnect until the end of this procedure.
- Place any components you remove from the terminal into an anti-static bag or onto an anti-static surface.

**Failure to follow these precautions may damage the electrostatic-sensitive components of the PCPs.**

### Remember to upload CDRs before you start!

- Upload the CDRs to the Millennium Manager before you start. This is especially important if you have to replace the control PCP, firmware, the validator, the escrow, or remove the cash box.
- To upload the CDRs, see **Sending CDRs to the Millennium Manager** in Chapter 5.
- In some cases it will not be possible to do this step because of problems on the control PCP, such as a modem failure. In these cases, notify the operating company that the CDRs could not be downloaded.

2. Disconnect the cables from the telephony and control PCPs, folding them back out of the way. The cables and connectors are labelled in Figure 7-7 and Figure 7-8.

Figure 7-7: Cable connections, open housing left view

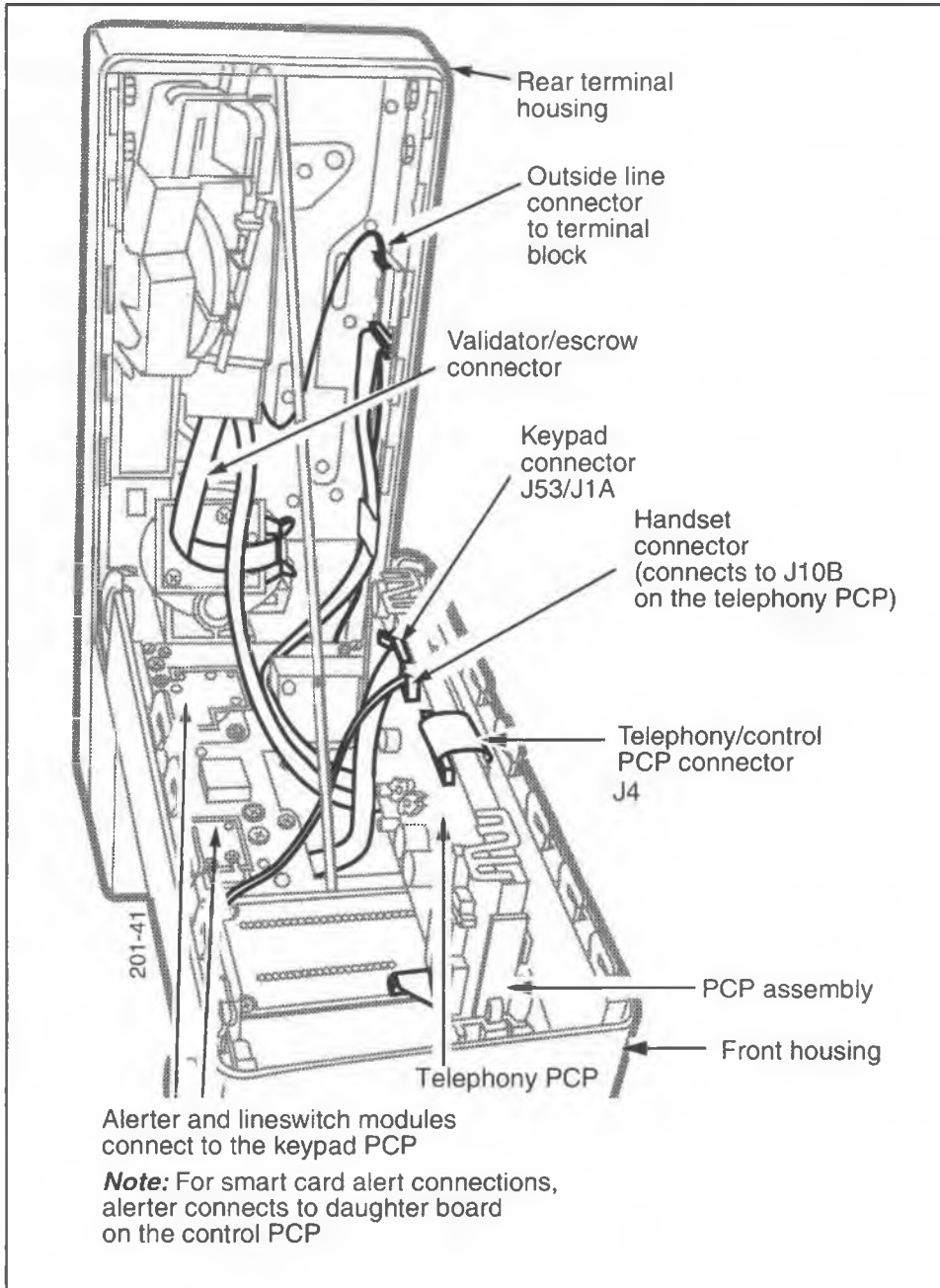
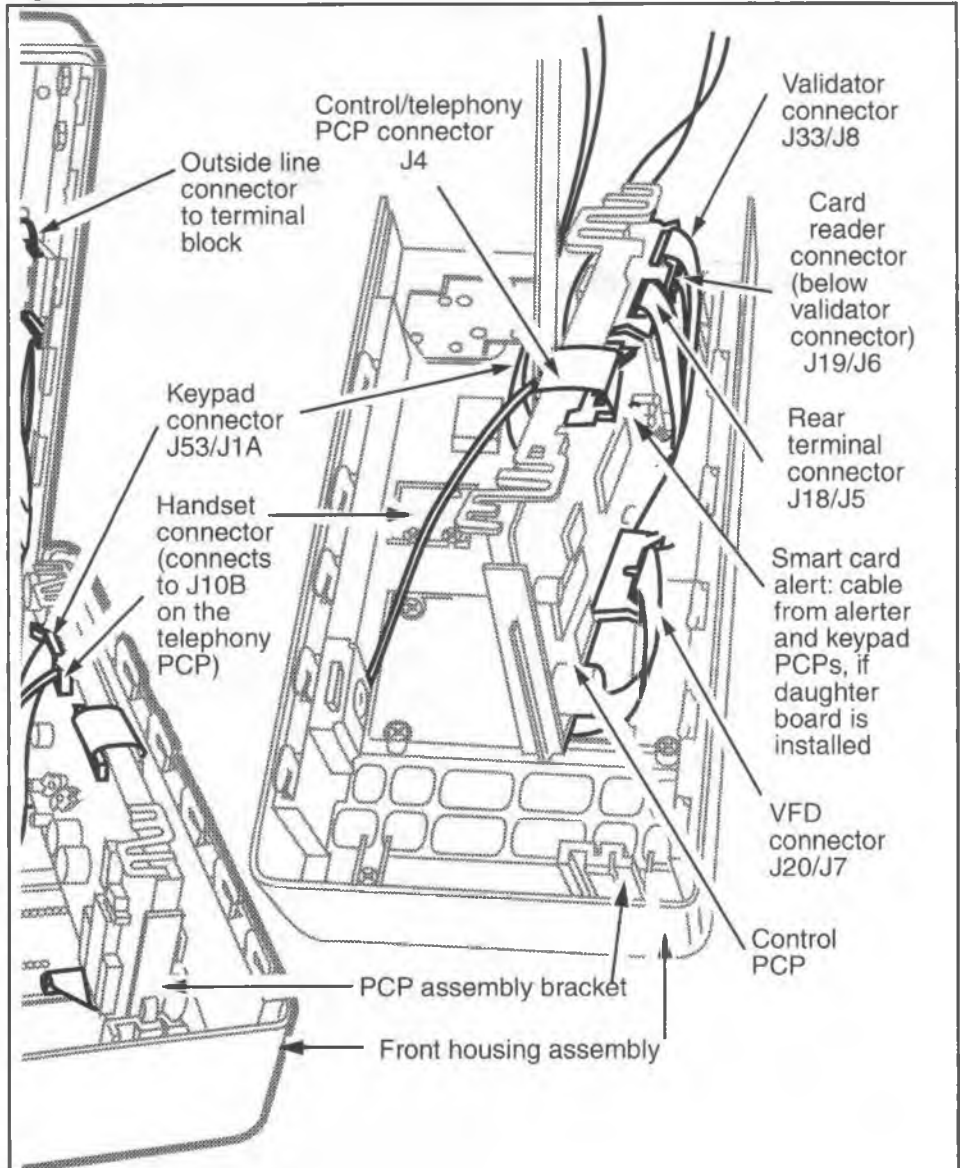


Figure 7-8: PCP assembly cable connections



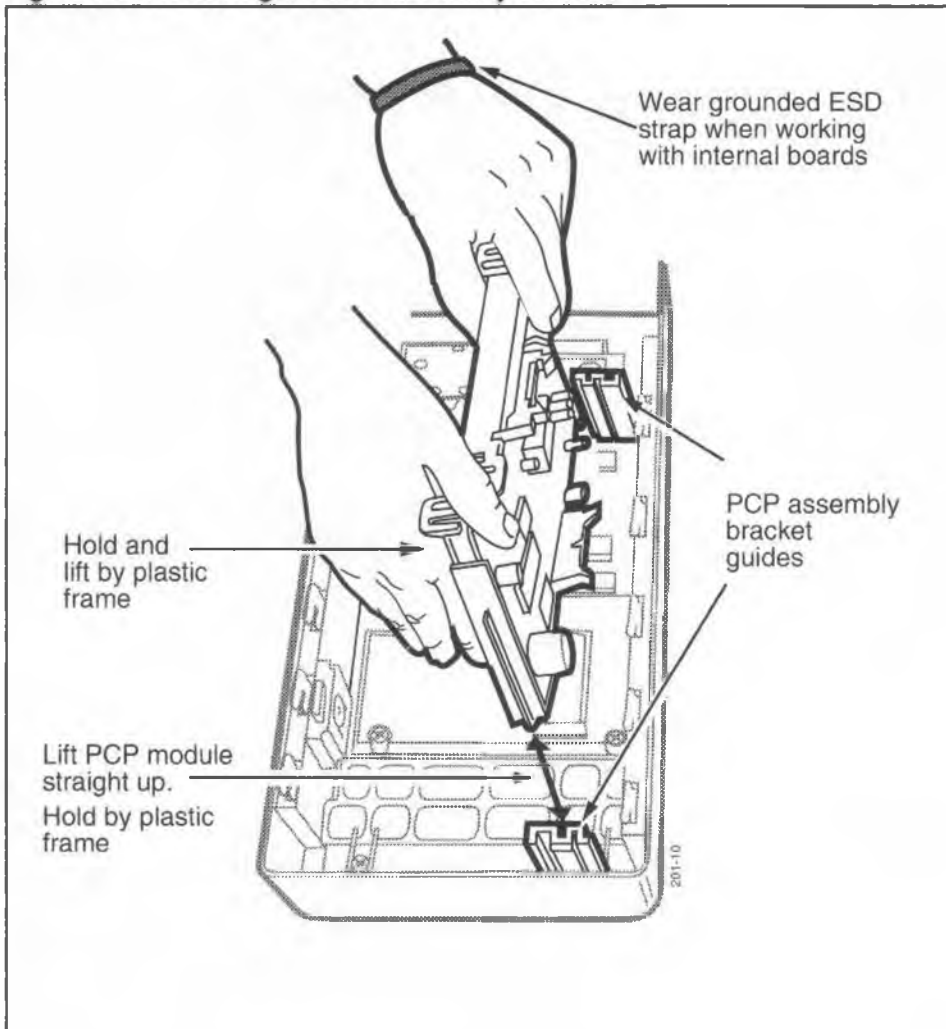
3. Refer to Figure 7-9 and remove the PCP assembly by sliding it out of its guides. If necessary, press the guides away from the PCP assembly to free it.

### Electrostatic discharge



- Take anti-static precautions when removing the PCP. Wear your ESD wrist strap.
- If you put a PCP assembly down, put it on an anti-static surface or store the PCP assembly in an anti-static bag.
- If you send a PCP to be repaired, ship it in an anti-static bag.

Figure 7-9: Removing the PCP assembly bracket



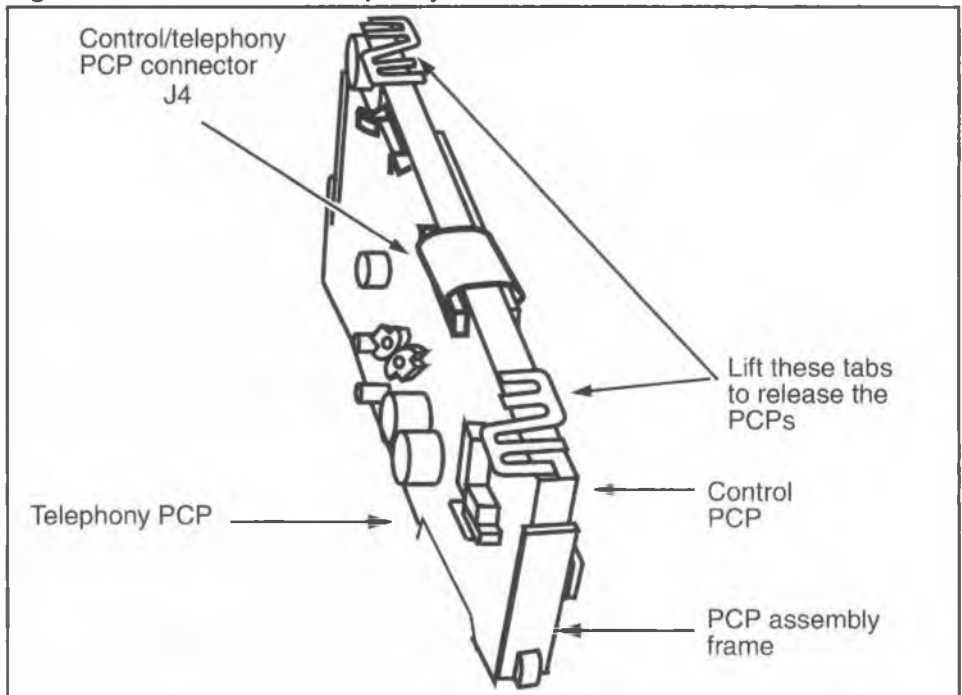


## Removing the telephony and control PCPs

To remove and replace the control PCP or the telephony PCP, or to change firmware on the control PCP, first remove the PCP assembly from the terminal, as described in the previous section. The PCP assembly includes the telephony and control PCPs and the plastic frame holding them.

1. Refer to Figure 7-10 and follow these procedures to remove a PCP from the PCP assembly after the PCP assembly has been removed from the terminal, as described in the previous section.
2. Disconnect the cable connection between the telephony PCP and the control PCP (J4).
3. Release the tabs holding the PCPs into the frame. Handle the PCP only by the edges and lift it away from the PCP assembly.

**Figure 7-10: Control and telephony PCP cable connection**



4. To replace the PCPs, reverse the previous steps. To replace the PCP assembly, reverse the steps in the preceding section.
  - The cable connections are listed in Table 7-1. Also refer to Figure 7-8 and Figure 7-9.

**Table 7-1: Component cable connections**

<b>Connect:</b>	<b>to:</b>
J15, handset	J10B on the telephony PCP
J53, keypad PCP	J1A on the telephony PCP
J19, card reader PCP	J6 on the control PCP
J20, display (VFD) PCP	J7 on the control PCP
J33, coin validator PCP	J8 on the control PCP
<b>This reconnects the power; do it last:</b> J18, rear terminal PCP	J5 on the control PCP
<b>Optional features</b>	
J35, datajack module (if one is installed)	J34 on the telephony PCP
If a smart card alert daughter board installed:	
J39, keypad PCP	J36 on the smart card alert daughter board
J14, alerter PCP	J37 on the smart card alert daughter board


5. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
  - After replacing the control PCP, perform the **INSTALL** terminal-configuration routine to store data in the memory. Refer to **Starting INSTALL terminal-configuration** in Chapter 3.
  - After replacing a telephony PCP, perform a forced download. Refer to **Forced Millennium Manager (NCC) download** in Chapter 5.

6. Perform operation tests to make sure the terminal works properly. These tests are described in Chapter 3.

## Replacing firmware chips on the control PCP

When the firmware gets updated, you may be required to replace chips on the control PCP rather than replacing the entire board.

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. You have:
  - read and followed the ESD and CDR upload directions

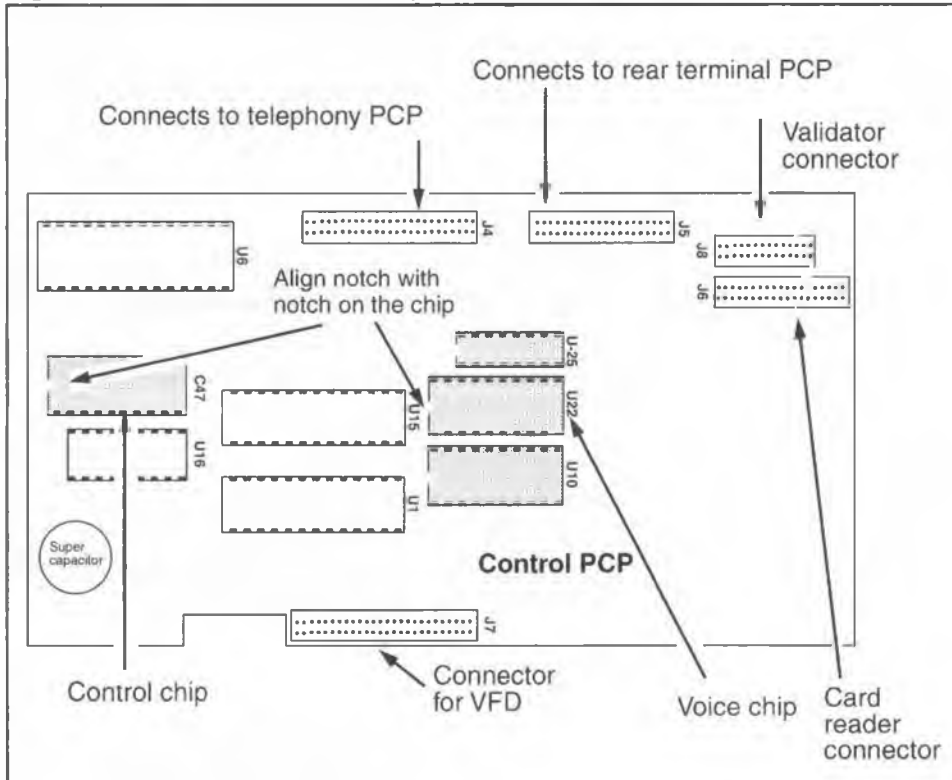
<p><b>Electrostatic discharge (ESD)</b></p> 	<ul style="list-style-type: none"> <li>• Connect your ESD wrist strap to the ESD connection points shown in 2..</li> <li>• Disconnect the power.</li> <li>• If you put a PCP down, put it on an anti-static surface or store in an anti-static bag.</li> </ul> <p><b>Failure to follow these procedures may damage the electrostatic-sensitive devices.</b></p>
<p><b>Remember to upload CDRs before you start!</b></p>	<ul style="list-style-type: none"> <li>• Upload the CDRs to the Millennium Manager if you have to replace the control or telephony PCPs or chips on the control PCP.</li> <li>• Upload the CDRs to the Millennium Manager. Refer to <b>Sending CDRs to the Millennium Manager</b> in Chapter 5.</li> </ul>

- disconnected the power
  - removed the PCP assembly as explained in **Removing the PCP assembly** in this chapter
  - removed the control PCP from the PCP assembly as explained in **Removing the telephony and control PCPs**
2. Set the control PCP on an anti-static pad on a flat and stable surface.

3. Refer to Figure 7-11 to locate the appropriate chip. Use a chip puller from your kit to grasp the chip and pull it straight up, out of the board socket.
4. Line up the new chip in the socket on the board and press down firmly to seat the chip.
 

**Note:** There is a notch or tab on the socket that matches a notch or tab on the chip; match up the notches or tabs to ensure the chip is orientated properly.

Figure 7-11: Control PCP with replaceable chips indicated



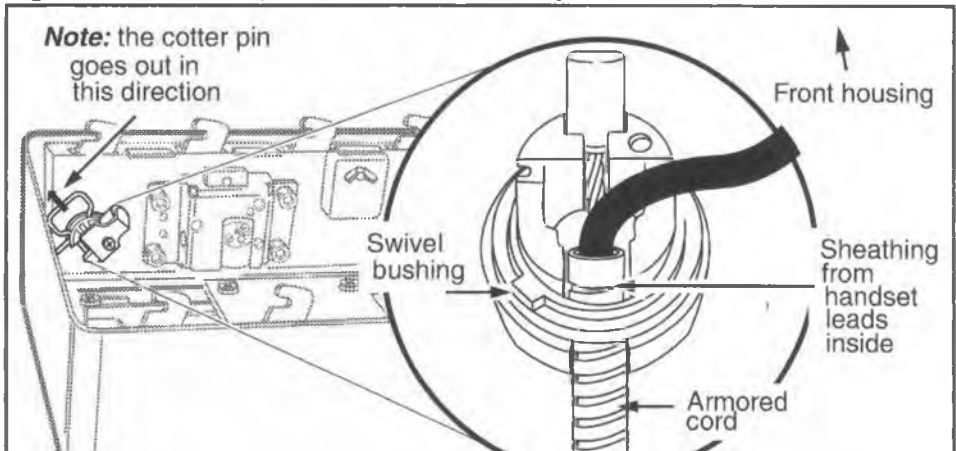
5. Replace the control PCP and the PCP assembly reversing the steps in **Removing the telephony and control PCP** and **Removing the PCP assembly**.
6. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

7. Perform the **INSTALL** terminal-configuration routine, as described in **Performing the INSTALL routine** in Chapter 3.
8. Perform operation tests to make sure the terminal works properly. The tests performed will depend on the version of the firmware. Contact your Technical Assistance Manager (TAM) for the correct testing procedure for the version of firmware you have installed.

## Replacing the handset, cord, and swivel

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.
2. Remove the handset cord connector (J15) from J10B on the telephony PCP. Look for the name of the connection on the PCP or refer to **Interconnections of internal components** in Chapter 1.
3. Inside the front housing, remove the cotter pin from the swivel as shown in Figure 7-12. The cotter pin fits into a groove in the swivel, and lies flush against the inside of the housing.

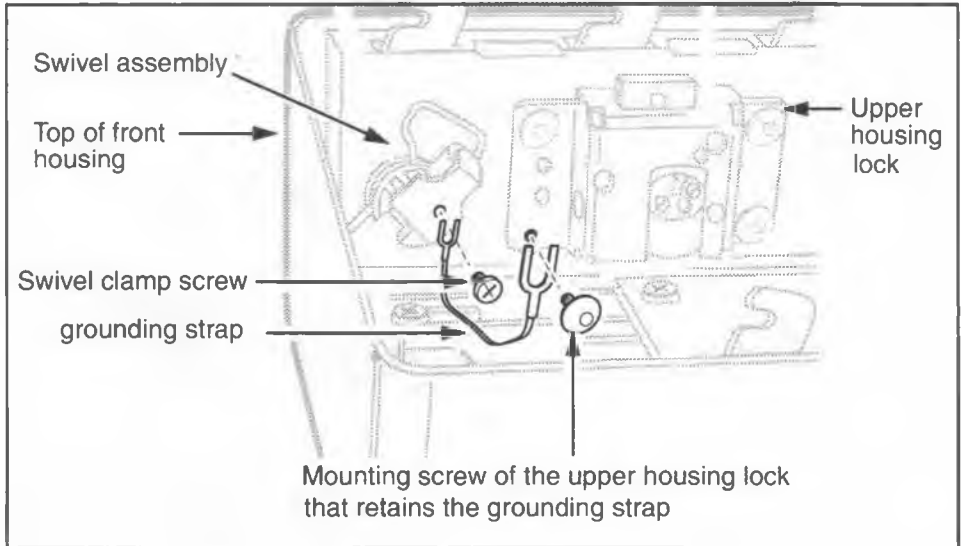
Figure 7-12: Close-up of the swivel assembly



4. Slide the swivel assembly out of the housing.
5. Guide the armored cord and the handset leads, which are in the same black sheathing, through the opening in the housing.
6. Remove the screw retaining the swivel clamp and ESD strap to the swivel. Refer to Figure 7-13 to locate the screw. The swivel clamp retains the lanyard end-fitting of the armored cord to the swivel.
7. Remove the swivel bushing from the swivel. Refer to Figure 7-12.
8. Slide the end fitting on the armored cord out of its retaining slot.
9. Slide the armored cord and handset leads out of the retaining slot in the swivel.
10. To replace the handset and swivel, reverse the preceding steps. Make sure the black sheathing is inserted into the lanyard by at least an inch.
11. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the grounding strap

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. It is not necessary to disconnect the power to perform this procedure.
2. Refer to Figure 7-13 and loosen the mounting screw of the upper housing lock that retains the grounding strap. Remove the strap from beneath the lock.
3. Loosen the screw retaining the swivel clamp to the swivel and remove the grounding strap from the swivel.
4. To replace the grounding strap, reverse the preceding steps.

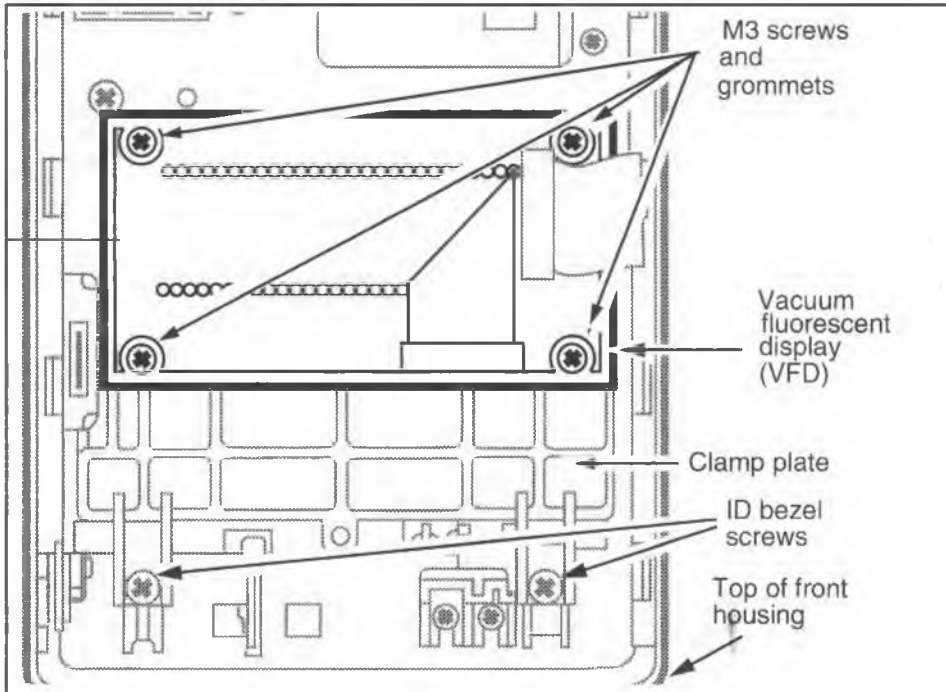
**Figure 7-13: Attaching the grounding strap**

## Replacing the VFD

The VFD is located behind the PCP assembly. It is attached to the clamp plate, which provides some protection from the display being damaged through the display window.

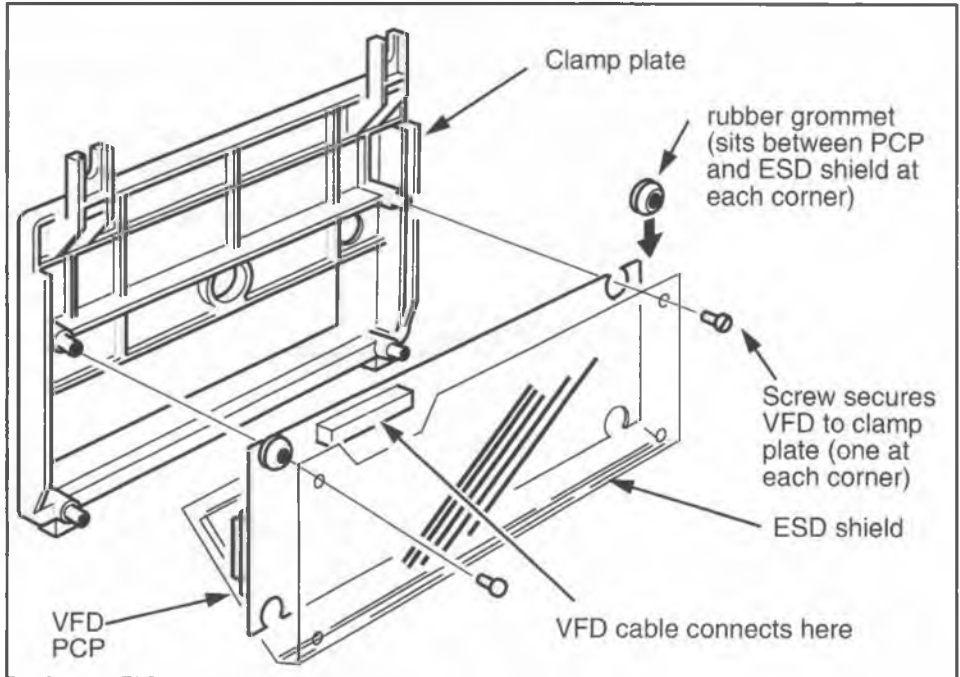
1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.
2. Remove the four M3 screws that attach the display to the clamp plate. Use a #1 type 1A cross-recess screwdriver. Refer to Figure 7-14.

**Figure 7-14: Locating the screws for the VFD and ID bezel**



3. Remove the display from the plastic ESD shield if the replacement VFD does not have one. Refer to Figure 7-15.
4. To replace the display:
  - a) Insert the display into the plastic ESD shield.
  - b) Insert the rubber grommets between the VFD PCP and the top leaf of the ESD shield.
  - c) Place the assembly over the clamp plate and reattach the screws in all four corners. Refer to Figure 7-14.
  - d) Maintain the bend in the cable so it will sit under the PCP assembly and connect to the J20 connector on the control PCP.
5. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.



**Figure 7-15: Attaching the VFD to the clamp plate**

6. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

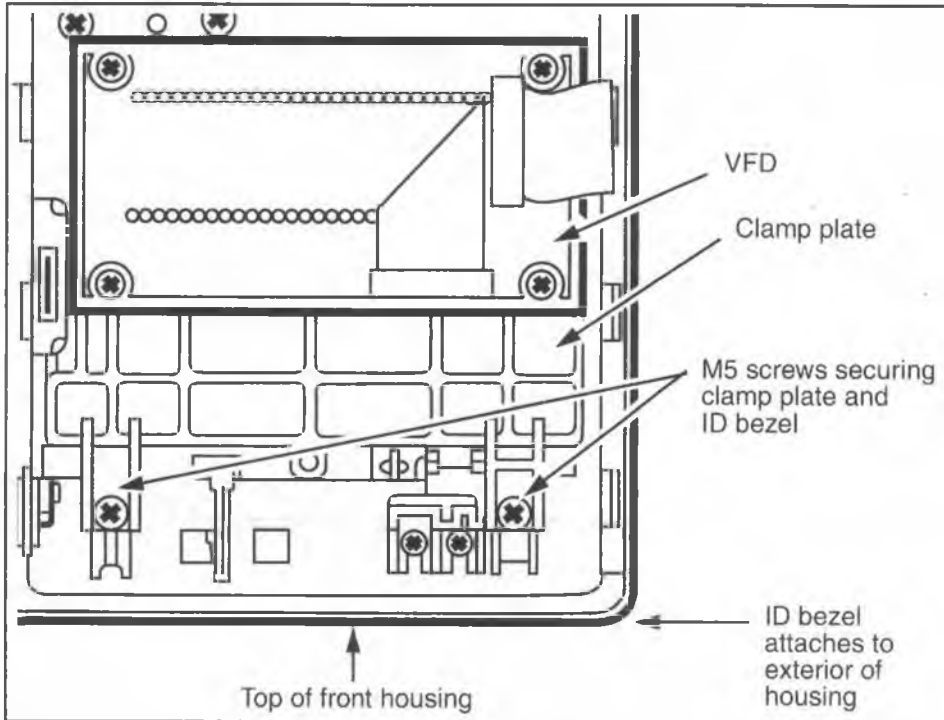
## Replacing the upper bezel assembly

The upper bezel assembly attaches to the front housing. It contains the keypad assembly and the frame for the display window. The following procedure describes removing this assembly from the front housing.

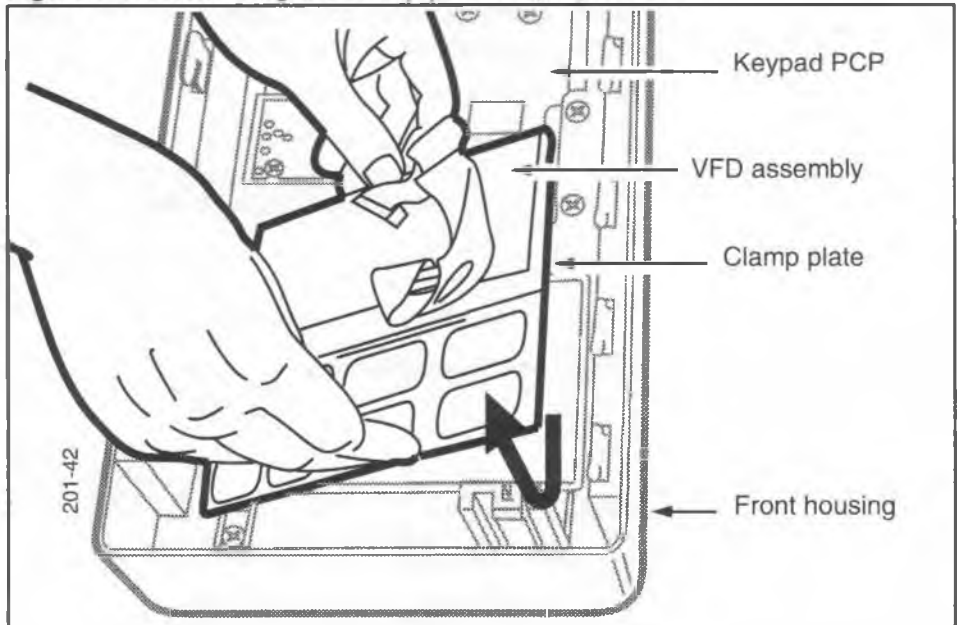
1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.

2. Disconnect the lineswitch module cable (J13) from the keypad PCP connector (J51).
3. Disconnect the alerter module cable (J14) from the keypad PCP connector (J52).  
If the terminal has a smart card alert daughter board, this module should already be unplugged.
4. Loosen the two M5 screws holding the ID bezel and the clamp plate. Refer to Figure 7-16 to locate these screws.

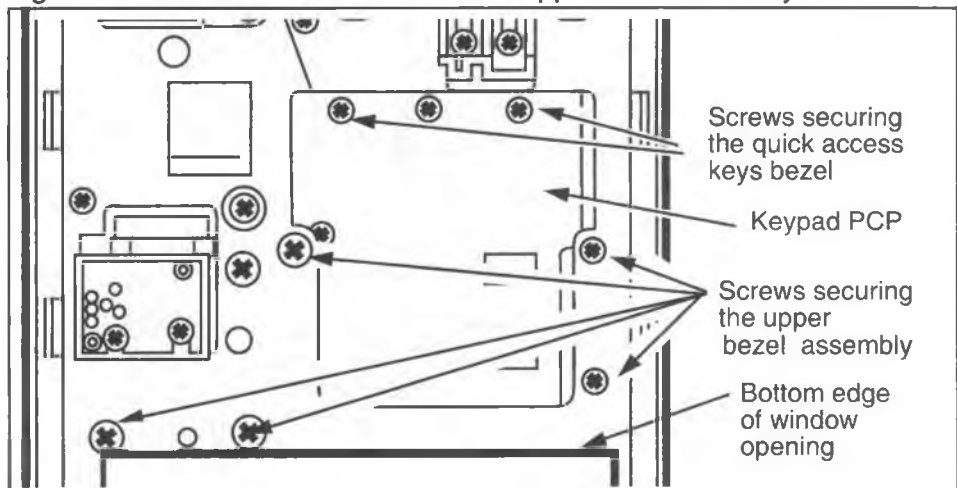
Figure 7-16: Locating the ID bezel screws



5. With one hand, support the ID bezel on the outside of the terminal. With the other hand, remove the two screws from inside the terminal, then remove the ID bezel from the front of the terminal.
6. Lift out the clamp plate, with the VFD attached. Refer to Figure 7-17.

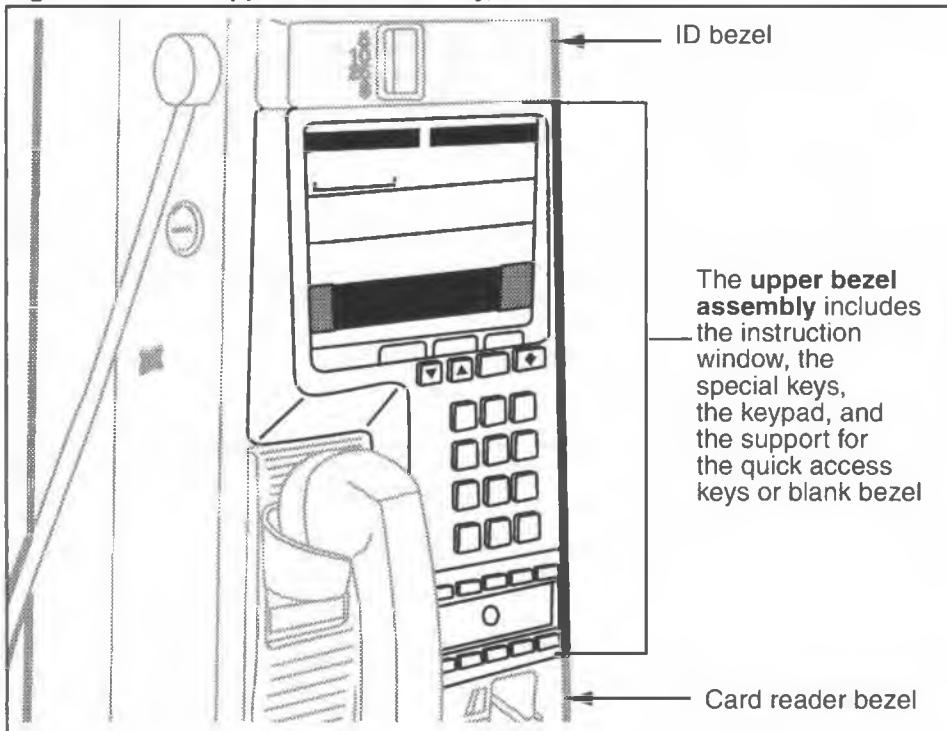
**Figure 7-17: Removing the clamp plate/display bracket**

7. Use Figure 7-18 to locate the five M5 tapping screws which secure the upper bezel assembly.
8. Remove four of the five screws. Use a #2 type 1A cross-recess screwdriver.

**Figure 7-18: Inside access screws to the upper bezel assembly**

9. With one hand, hold the upper bezel assembly from the exterior of the terminal. Do the following to completely release the bezel from the terminal housing:
  - a) Remove the last M5 screw.
  - b) Loosen three turns the bottom two screws on the keypad PCP; this releases the dialer bezel interlock. These screws are indicated in Figure 7-18.
  - c) Remove the upper bezel assembly by moving it down from the front of the terminal. Figure 7-19 shows the outside of the terminal.

**Figure 7-19: The upper bezel assembly, outside view**



10. Remove the quick access keys or blank bezel from the upper bezel assembly as described in **Installing quick access keys** later in this chapter.
11. To replace the upper bezel assembly, reverse the preceding steps.

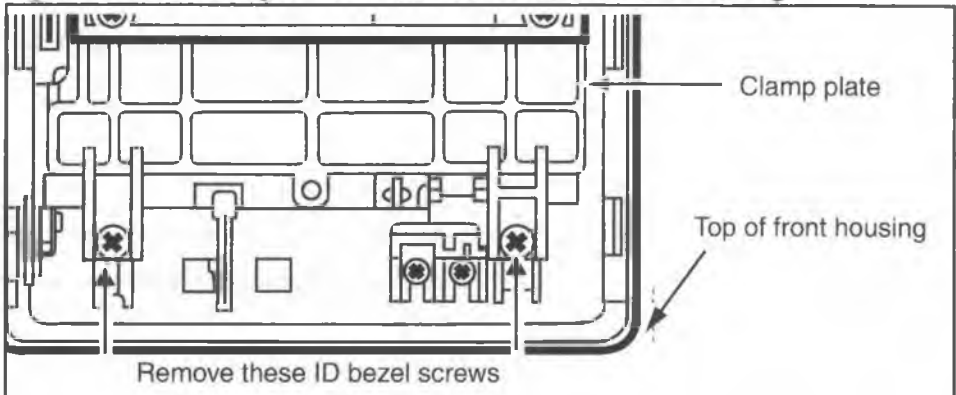
12. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.
13. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the display window

The display window is the clear, high-impact plastic covering that sits in front of the clamp plate and under the upper bezel assembly. This window is replaced from inside the terminal, as described below.

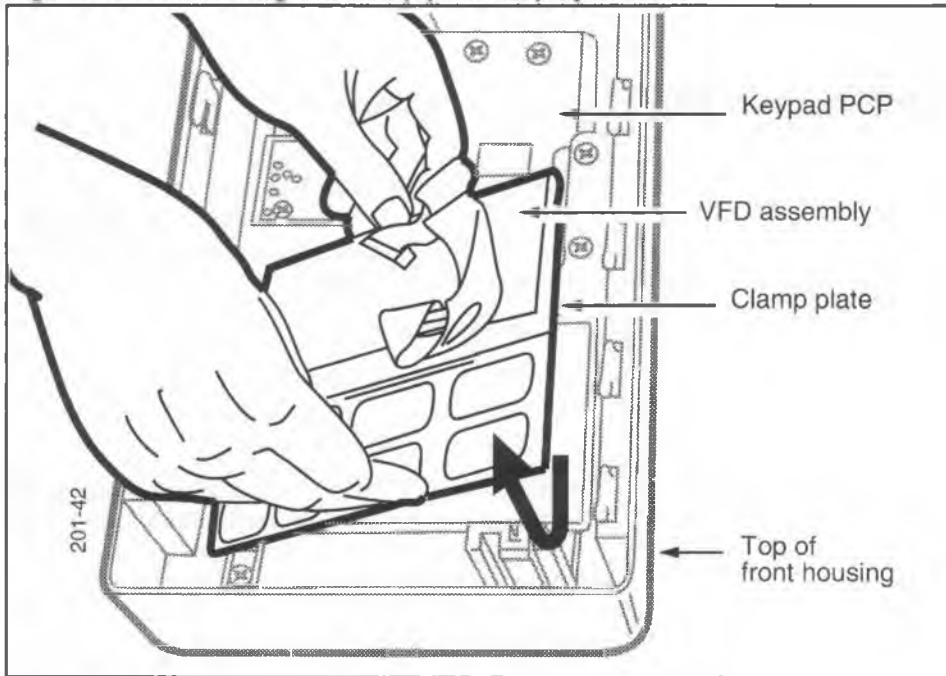
1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power should be disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.
2. On the outside of the terminal, hold your hand over the ID bezel. Refer to Figure 7-19.
3. On the inside of the terminal, remove the two screws holding the ID bezel in place. Refer to Figure 7-20.

**Figure 7-20: Locating ID bezel screws inside the front housing**



4. From the front of the housing, remove the ID bezel.
5. On the inside of the terminal, remove the clamp plate and attached VFD assembly, shown in Figure 7-21.

**Figure 7-21: Removing the clamp plate/display bracket**



6. Remove the window by pushing it inward from the outside and lifting the window and gasket away from the terminal.
7. To replace the window, make sure the tab on the gasket of the new window is positioned to the top right, the handset side.

### **Installing an internal instruction card**

If there is an internal instruction card, insert it now.

Position the internal instruction card on the window.

Ensure that the notch in the lower edge of the card and the hole in the tab at the top of the card are properly located over the corresponding pins.

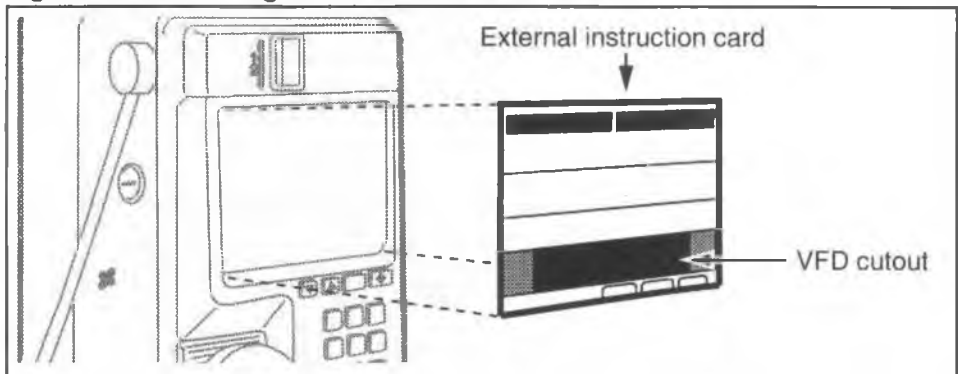
8. Reassemble the components by reversing Steps 1 to 5. Make sure the locating pin of the window bezel fits into the location hole in the top center of the clamp plate.
9. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.
10. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the external instruction card

The operating company may choose to use external instead of internal instruction cards. To remove and install an external instruction card:

1. Make sure the terminal is closed and the card to be removed is clean. Press the suction cup firmly on to the center of the card on the terminal.
2. Pull on the suction cup until the card bends enough to pop out of the window.
3. To install the new card, place its lower edge under the bottom lip of the window opening, and apply pressure to the outer edges of the card, bending it until it snaps under all four edges. Figure 7-22 shows the positioning.
4. Position the new card so all its outer edges are covered.

**Figure 7-22: Installing the external instruction card**



## Replacing the card reader

The card reader is attached to the exterior card reader bezel. As a unit, this is inserted into the housing and then secured to the housing.

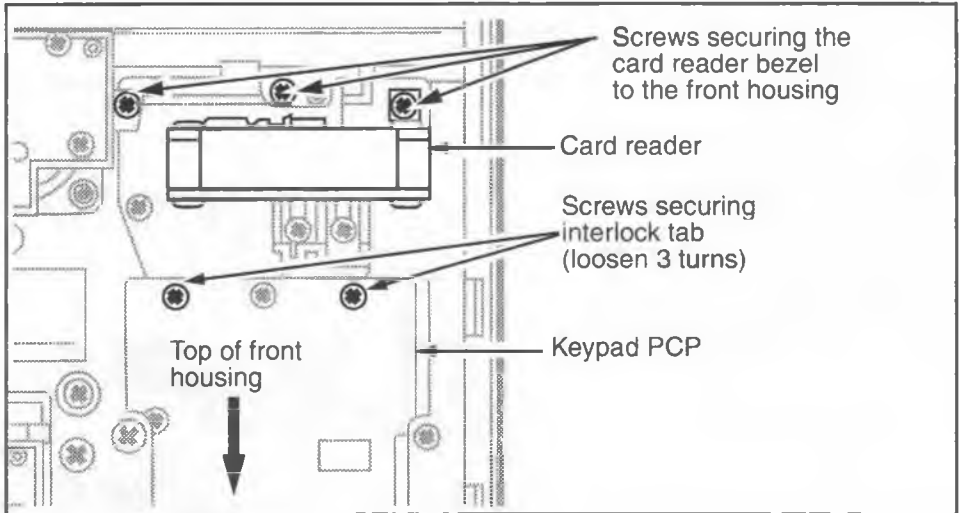
1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.
  - **Terminals with multi-card readers only:** removed the PCP assembly as explained in **Removing the PCP assembly**, place in an anti-static bag and set aside.
2. If you did not need to remove the PCP assembly, disconnect the card reader connector (J19) from the control PCP connector (J6).
3. If the card reader has a rain shield, remove this now. Rotate the top of the rain shield down and away from the card reader and gently pull it free.
4. Remove the M5 tapping screw located under the card reader, in the middle. Use a #2 type 1A cross-recess screwdriver. Refer to Figure 7-23.
5. Remove the two M3.5 tapping screws located on either side of the M5 screw. Use a #1 type 1A cross-recess screwdriver. Refer to Figure 7-23.

These three screws attach the card reader bezel to the front housing assembly.

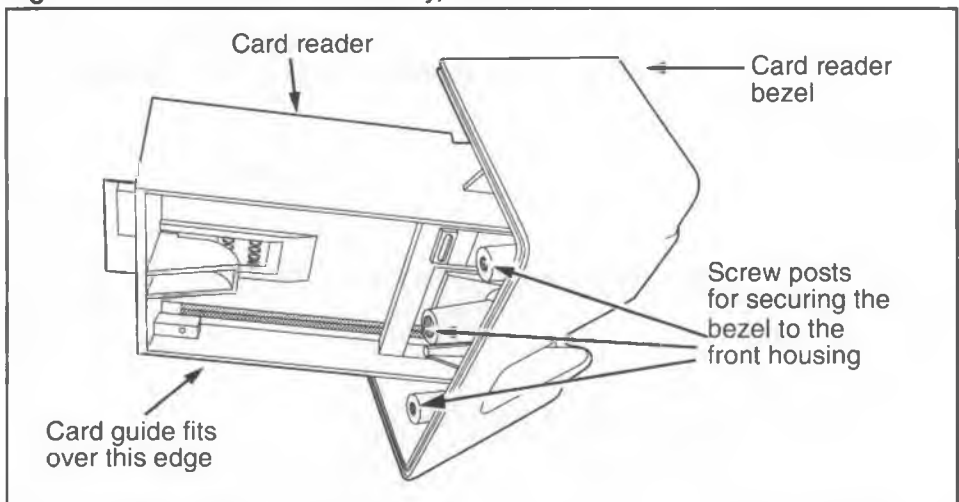
- If you are removing a multi-card reader, loosen three turns the bottom two screws on the keypad PCP, which hold the quick access keys bezel.

This releases the interlock tab at the top of the card reader bezel. Refer to Figure 7-23.



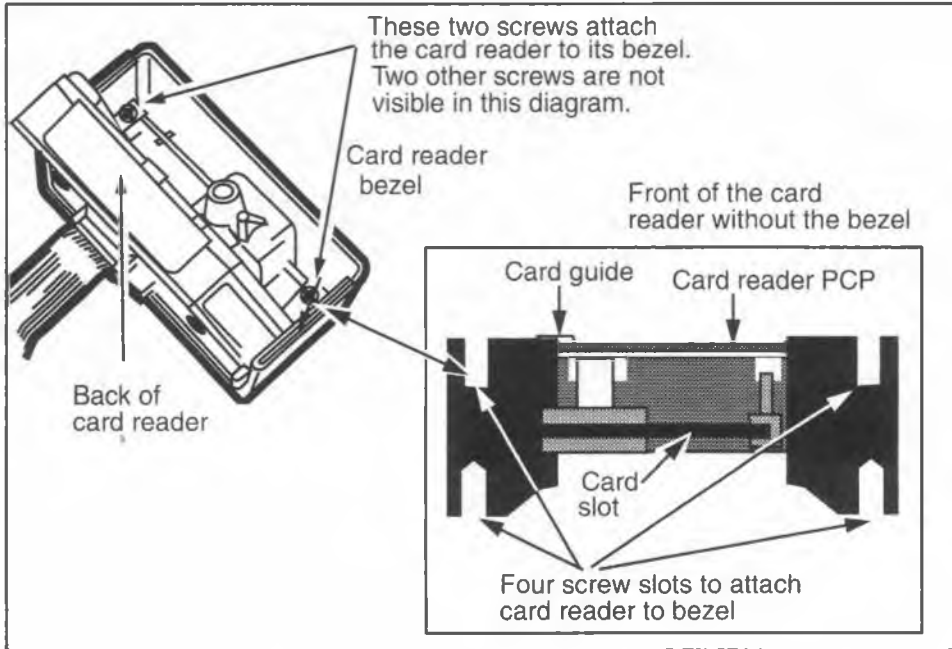
**Figure 7-23: Card reader screws**

6. Lift the front housing and remove the card reader assembly from the front of the terminal. Refer to Figure 7-24.

**Figure 7-24: Card reader assembly, lower view**

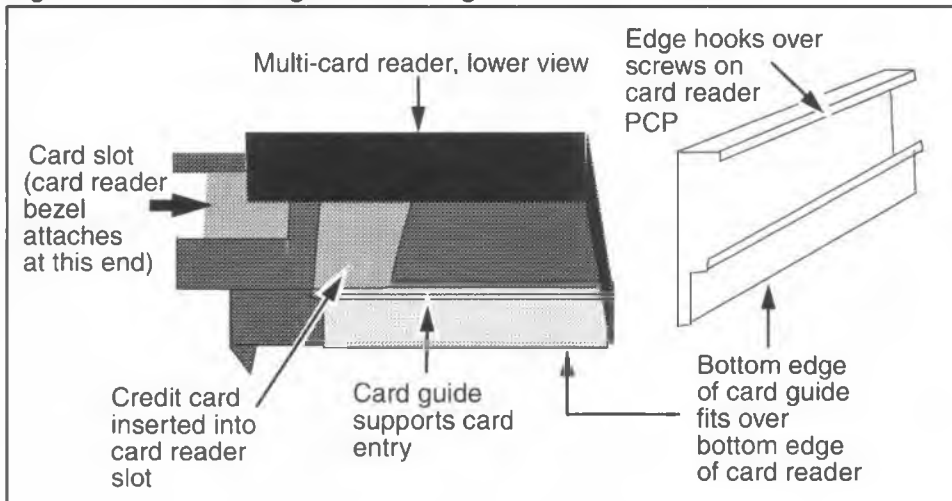
7. Remove the four M3.5 screws that attach the card reader to its bezel. Refer to Figure 7-25.

**Figure 7-25: Card reader removal and replacement**



8. If a new multi-card reader does not have a card guide, check the old reader for this piece and snap it on to the new card reader. Refer to Figure 7-26 for positioning.

**Figure 7-26: Positioning a bent card guide on the card reader**



9. Replace the card reader by reversing the preceding steps. Make sure the card reader slot on the card reader is centered with the card reader slot of the bezel.

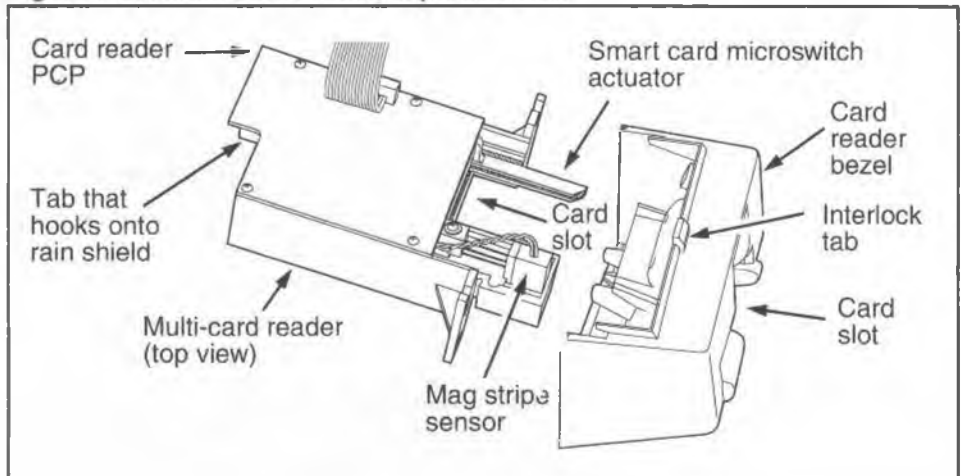
**Multi-card reader:**

- a) Make sure the micro-switch actuator of the rail is operational.

**To test:** Insert a smart card part way into the reader. When the card first enters the slot and when it is removed, you should hear a click. Figure 7-27 shows the switch actuator.

- b) Remember to re-tighten the two screws on the keypad PCP that hold the interlock tab in place. Refer to Figure 7-23.
- c) Replace the PCP assembly as explained in **Removing the PCP assembly.**

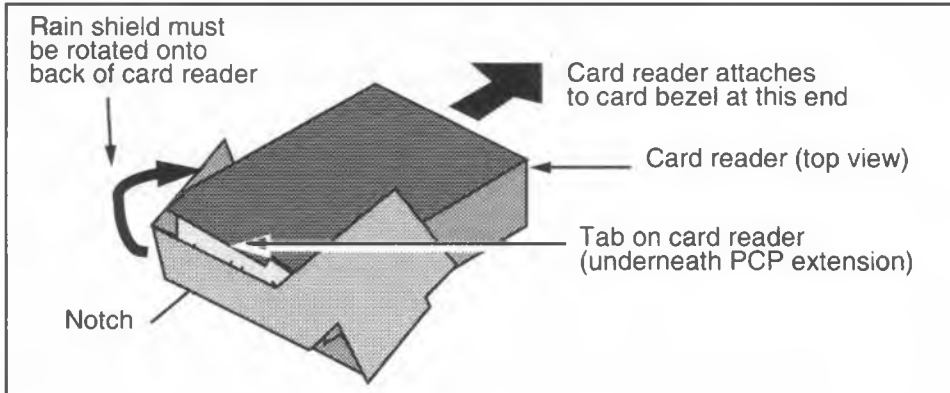
**Figure 7-27: Multi-card reader, exploded view**



10. Once the card reader and bezel are reattached to the front housing, replace the rain shield:
  - a) Position the **card reader rain shield** around the back end of the card reader.
  - b) There is a shelf formed by the extension of the top half of the rain shield.

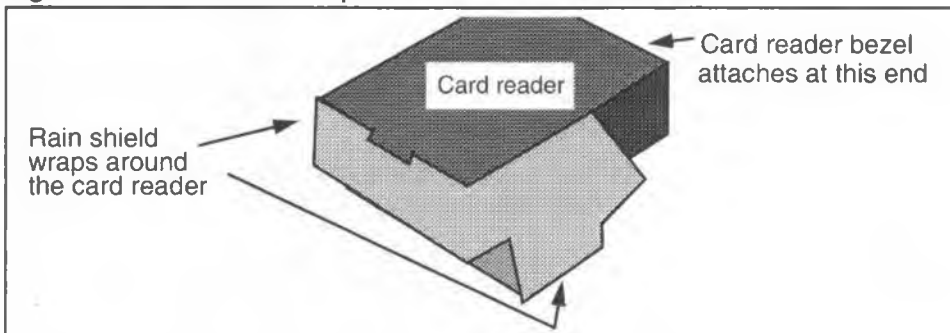
- Fit this shelf onto the end of the card reader, slipping the card reader bottom edge over the two tabs located on the shelf.
- The rain shield will be at a slight angle down from the card reader, similar to the position shown in Figure 7-28.

**Figure 7-28: Positioning the card reader rain shield**



- c) Align the notch in the top edge of the rain shield with the tab extending from below the card reader PCP in the middle of the back end of the card reader. Refer to Figure 7-27 and Figure 7-28.
- d) Rotate the top of the rain shield upwards, towards the card reader, until the notch in the rain shield clicks onto the tab on the card reader, as shown in Figure 7-29. The rain shield should fit snugly against the back end of the card reader.

**Figure 7-29: Rain shield in place behind the card reader**



11. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the alerter module

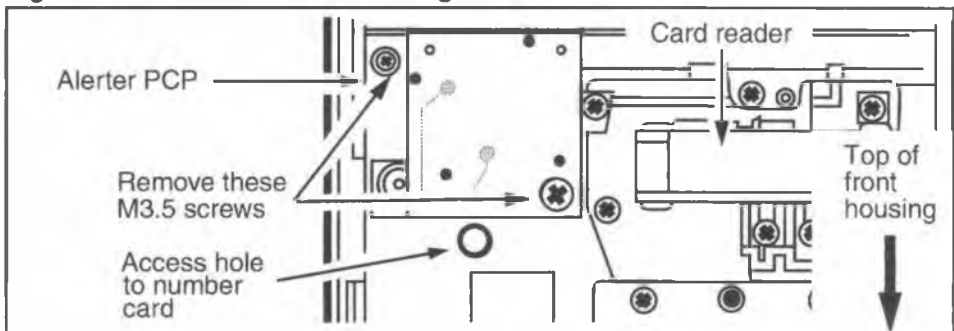
The alerter module is located on the handset side of the terminal, beside the card reader. This module produces the alerter tones.

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and the power has been disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.

**Note:** If the alerter is connected to a smart card alert daughter board, it is not necessary to remove the PCP assembly.

2. Disconnect the alerter cable (J14) from the connector on the keypad PCP (J52).  
If the terminal has the smart card alert feature, disconnect J14 from J37 on the daughter board.
3. Remove the two M3.5 tapping screws securing the alerter module to the bezel. Refer to Figure 7-30. Use a #2 type 1A cross-recess screwdriver.

**Figure 7-30: Alerter module holding screws**



4. Ensure that the acoustic membrane held between the alerter and housing assemblies remains in place when replacing the alerter module.
5. To replace the alerter module, reverse the preceding steps.
6. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.
7. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

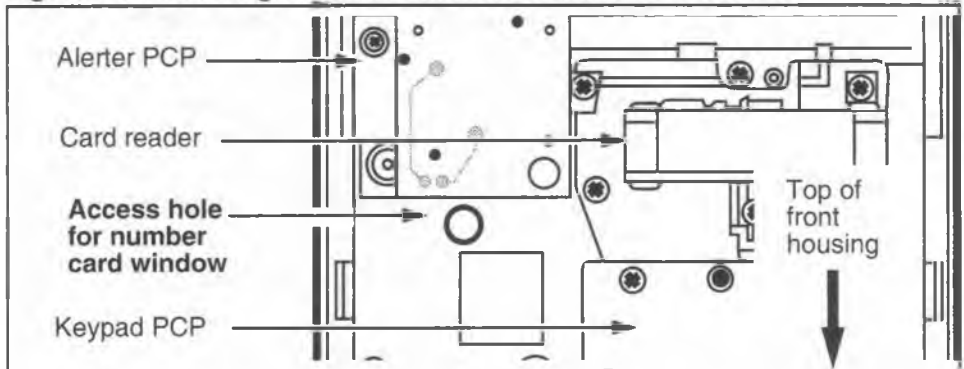
## Replacing the number card

The number card is supplied by the operating company and is the terminal ID number. The number card holder is in the hookswitch/alerter bezel.

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**.

**Note:** It is not necessary to upload CDRs or disconnect the power for this procedure.

2. Remove the number-card window.
  - a) Refer to Figure 7-31 and use a type 1A cross-recess screwdriver of less than 8 mm diameter or an equivalent instrument to push forward on the card window from inside the terminal.
  - b) Push until the number-card window is free of the terminal housing.

**Figure 7-31: Locating the hole behind the number card window**

3. Insert or remove the number card behind the window.
4. Replace the number-card window:
  - a) Insert one end of the window in position in the opening in the alerter bezel.
  - b) Bend the window outward.
  - c) Insert the opposite end into position, and release it.
5. Close and lock the terminal.

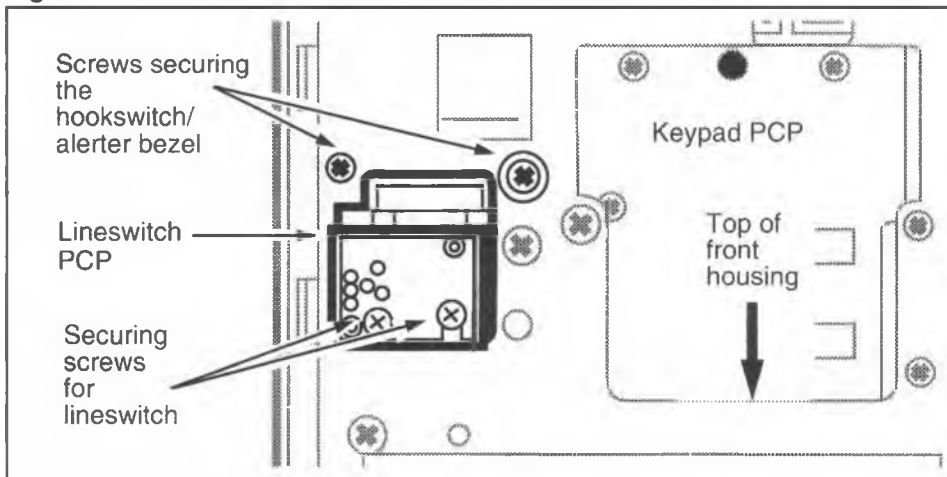
## Replacing the lineswitch PCP

The lineswitch PCP is located on the handset side of the terminal, beside the keypad PCP. This module is part of the hookswitch/alerter assembly. The position of the hookswitch – down when the handset is on-hook, up when the handset is off-hook – activates this PCP.

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.

2. Disconnect the lineswitch cable (J13) from the keypad PCP connector (J51). Look for the name of the connector on the PCP.
3. Loosen the two M3.5 tapping screws securing the lineswitch PCP assembly. This allows the lineswitch PCP to be lifted over the locating pin. Use a #2 type 1A cross-recess screwdriver. Figure 7-32 shows these screws.
4. Slide the lineswitch PCP assembly downward until the slots clear the screw heads.
5. Remove the lineswitch PCP assembly.

Figure 7-32: Lineswitch PCP and attachment screws



6. To replace the lineswitch PCP, reverse the preceding steps. Take care not to damage the switch actuator on the plunger cam.
7. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.
8. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.



## Replacing the hookswitch/alerter bezel

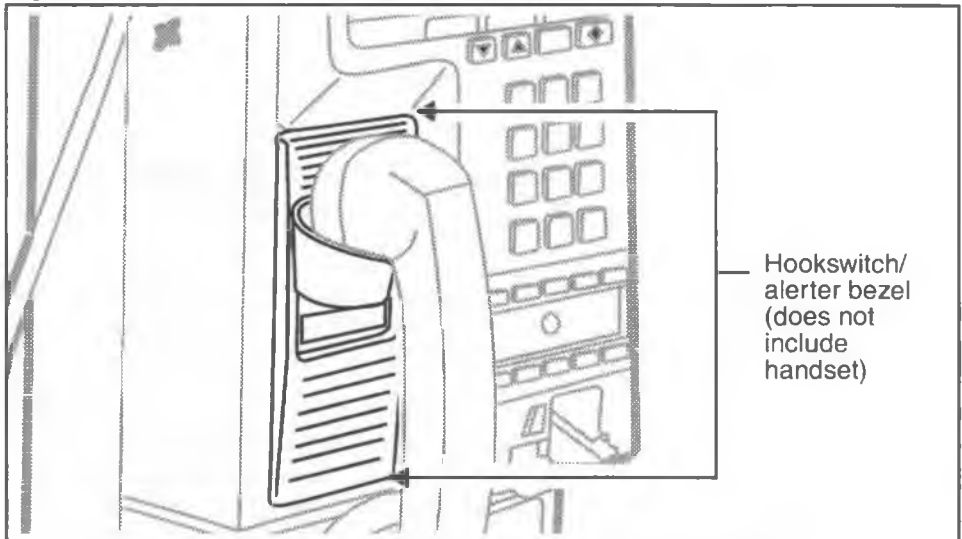
The hookswitch/alerter bezel is located on the front of the terminal housing. It is the external aspect of the lineswitch and alerter modules and provides the cradle for the handset. The bezel is attached from inside the housing.

To remove the hookswitch/alerter bezel:

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.
  - removed the alerter module as explained in **Replacing the alerter module**
  - removed the lineswitch module as explained in **Replacing the lineswitch module** in this chapter.

You can now access the screws securing the bezel. Figure 7-33 shows the bezel on the front of the terminal.

**Figure 7-33: Hookswitch/alerter bezel, exterior view**



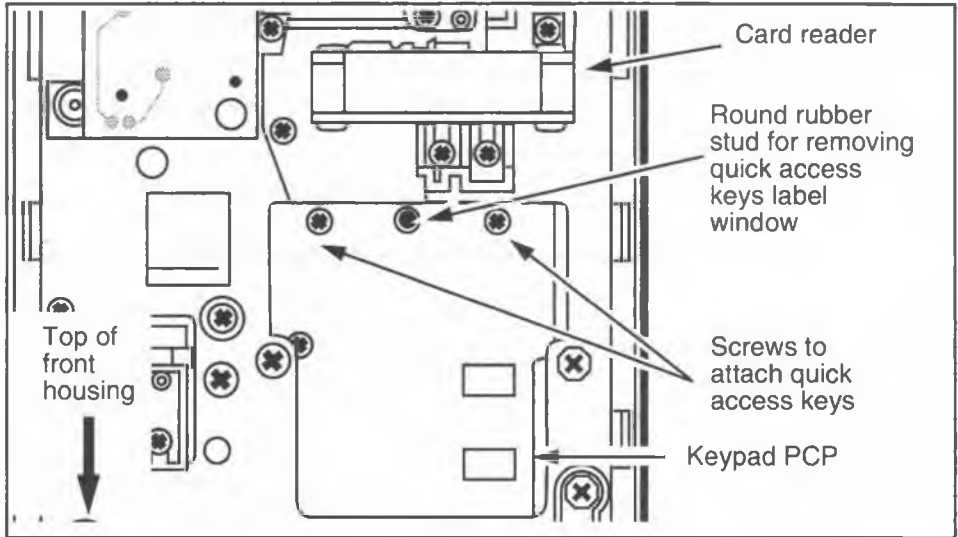
2. Remove the two M3.5 tapping screws securing the hookswitch/alerter bezel. Use a #2 type 1A cross-recess screwdriver. Refer to Figure 7-32 to locate the screws.
3. Remove the hookswitch/alerter bezel by pulling it from the front of the terminal.
4. To replace the hookswitch/alerter bezel, reverse the preceding steps.
5. Reassemble and reconnect the alerter module and lineswitch module.
6. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.
7. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the quick access keys bezel

The factory equips each Millennium multi-pay terminal with ten- or five-button quick access key sets or a blank dialer bezel, which is attached to the bottom of the keypad PCP, above the card reader.

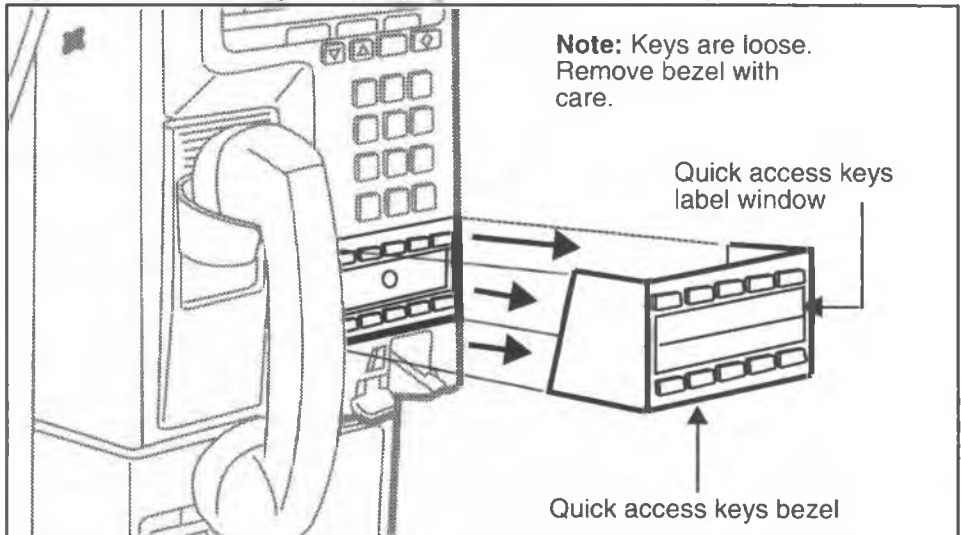
To remove the quick access keys bezel, follow these steps:

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power is disconnected.
  - removed the PCP assembly bracket as explained in **Removing the PCP assembly bracket** and put it in an anti-static bag and set it aside.
2. Remove the two M5 tapping screws securing the quick access keys bezel above the card reader on the inside of the upper housing. Use a #2 type 1A cross-recess screwdriver. These screws are labelled in Figure 7-34.

**Figure 7-34: Quick access keys attachment screws**

3. Lift the upper housing until you can remove the quick access keys bezel by pulling it from the front of the terminal, as shown in Figure 7-35.

**Note:** Keep the bezel slightly tilted forward to prevent the keys from falling out of it.

**Figure 7-35: Removing or installing the quick access keys bezel**

4. Install the quick access keys set or the blank bezel by pushing it into position on the front of the terminal.
5. Secure the quick access keys bezel from inside the front housing using the two M5 tapping screws.
6. Remove the button retainer, if there is one, from the quick access keys set bezel and discard.
7. Insert the keys label card under the quick access keys bezel window.

### Replacing a quick access keys label card

- a) From inside the front housing, push on the round rubber stud between the two screws securing the dialer bezel. This stud is labeled in Figure 7-34.
- b) Bend the window outward until the center of the window is high enough to grasp from the front of the terminal.
- c) Pull the window out of its slot.
- d) Insert the label card behind the place where the window was.
- e) Insert one end of the window in position in the opening in the dialer bezel. Bend the window outward and insert the opposite end into position and then release it.

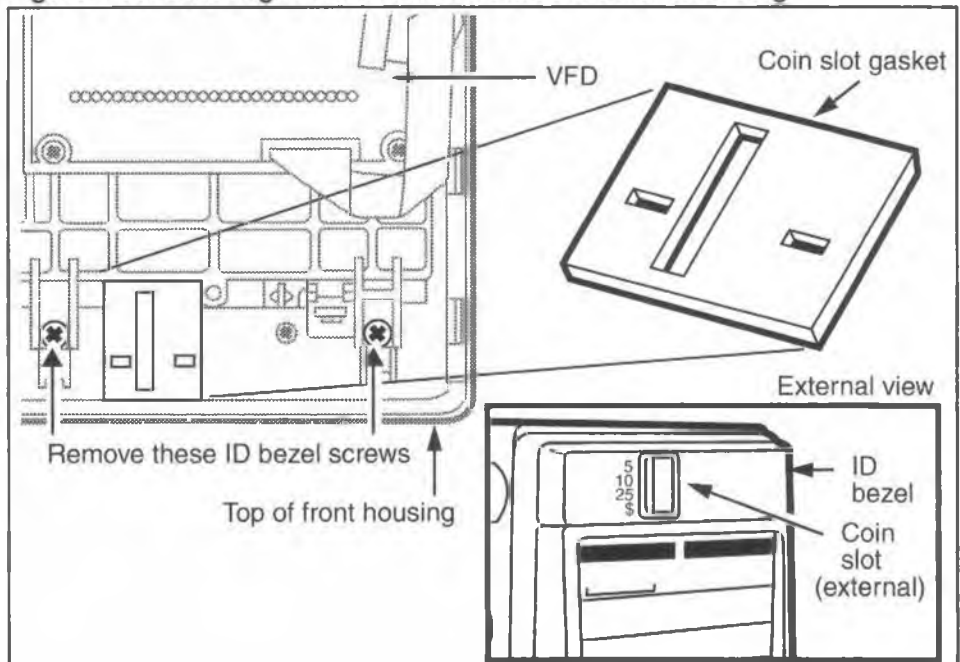
8. Reinstall the PCP assembly as explained in **Removing the PCP assembly**.
9. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
10. Force a download to acquire the table which activates the buttons if you are installing quick access keys for the first time, or if you are changing the bezel from a five-button bezel to a 10-button bezel, or vice versa. The download procedure is described in **Forced Millennium Manager (NCC) download** in Chapter 5.

## Replacing the coin guide

The coin guide is located on the ID bezel. It is the slot where coins are inserted and is the entry to the coin validator.

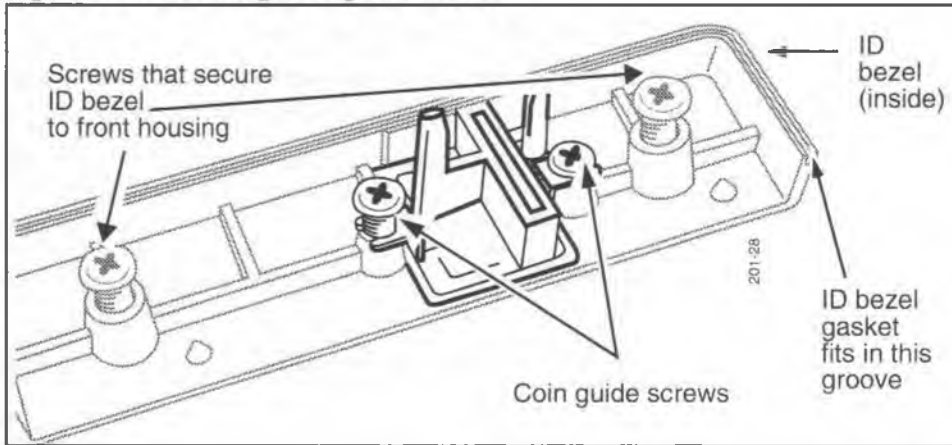
1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**.
  - optional: disconnected the power and removed the PCP assembly as explained in **Removing the PCP assembly**
2. Remove the coin slot gasket, shown in Figure 7-36, and set aside.
3. Use one hand to support the ID bezel from the outside of the terminal.
4. Remove the two screws securing the ID bezel. Refer to Figure 7-36.

**Figure 7-36: Locating ID bezel screws inside the front housing**



5. Remove the coin guide from the ID bezel by unscrewing the two M3.5 screws securing the guide to the bezel. Refer to Figure 7-37.

**Figure 7-37: Locating coin guide screws**



6. To replace the coin guide, reverse the preceding steps. Make sure both gaskets are in good condition. Replace any damaged gasket.
7. If you removed it, reinstall the PCP assembly as explained in **Removing the PCP assembly**.
8. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

# Replacing the coin validator

The coin validator has sensors which check inserted coins to make sure they are valid for the terminal. The terminal can be configured to accept American or Canadian coinage.

To replace this module:

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power is disconnected.



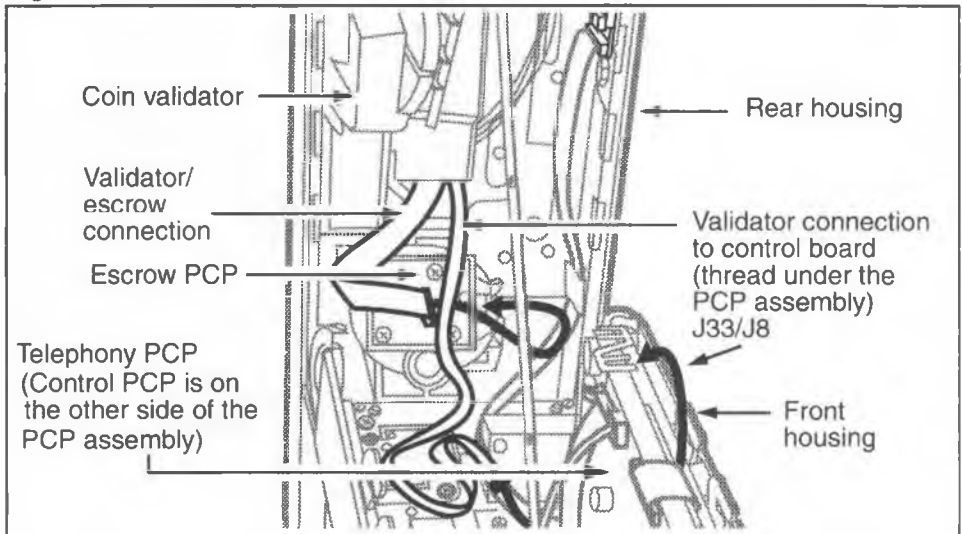
**Be sure you upload CDRs before you do this procedure.**

**You will need to run the INSTALL terminal-configuration routine if you replace this unit.**

- It is not necessary to remove the PCP assembly to work with the validator, however, you might find it more convenient to do so. Follow the instructions in **Removing the PCP assembly**.

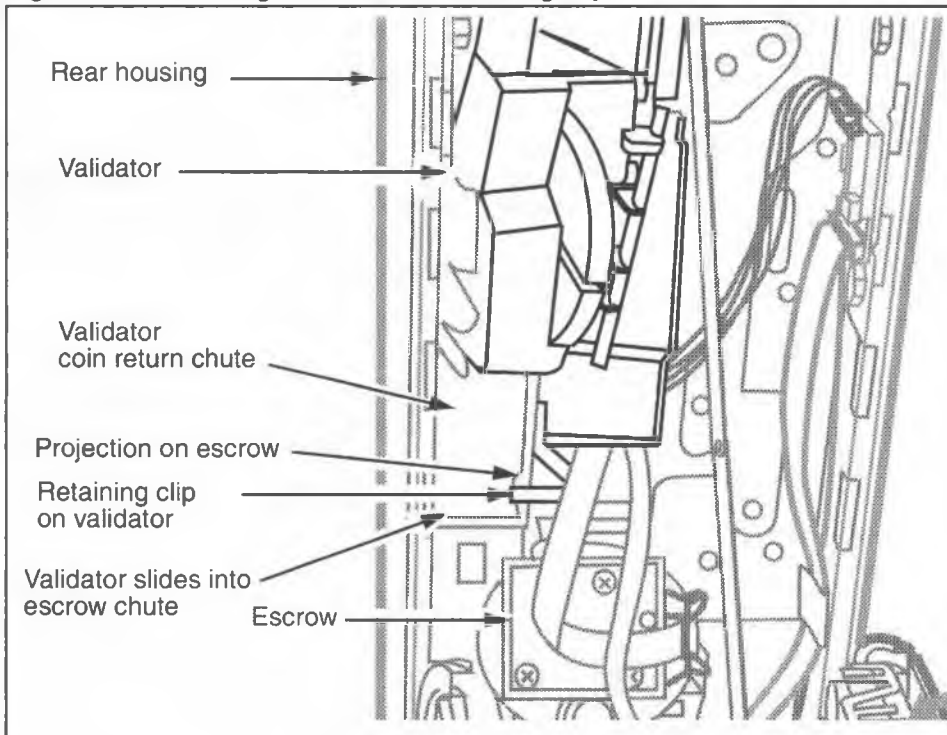
Refer to Figure 7-38 for validator cable locations.

**Figure 7-38: Validator cable connections**



2. Disconnect the validator cable (J33) from the control PCP connector (J8), and the coin validator connection on the control PCP, then feed the cable under the PCP assembly.
3. Disconnect the validator cable (J21) from the escrow connector (PL5)
4. Remove the packing foam block above the validator and discard, if this has not been done previously.
5. Release the retaining clip securing the validator to the escrow, indicated in Figure 7-39.

**Figure 7-39: Locating the validator retaining clip**

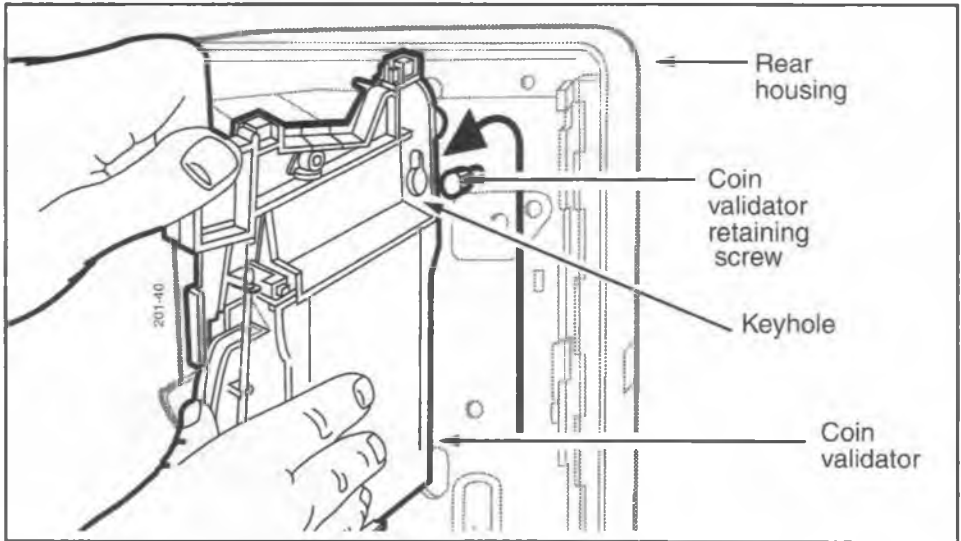


6. Slide the validator up until the large portion of the key-hole is aligned with the validator retaining screw, as shown in Figure 7-40.



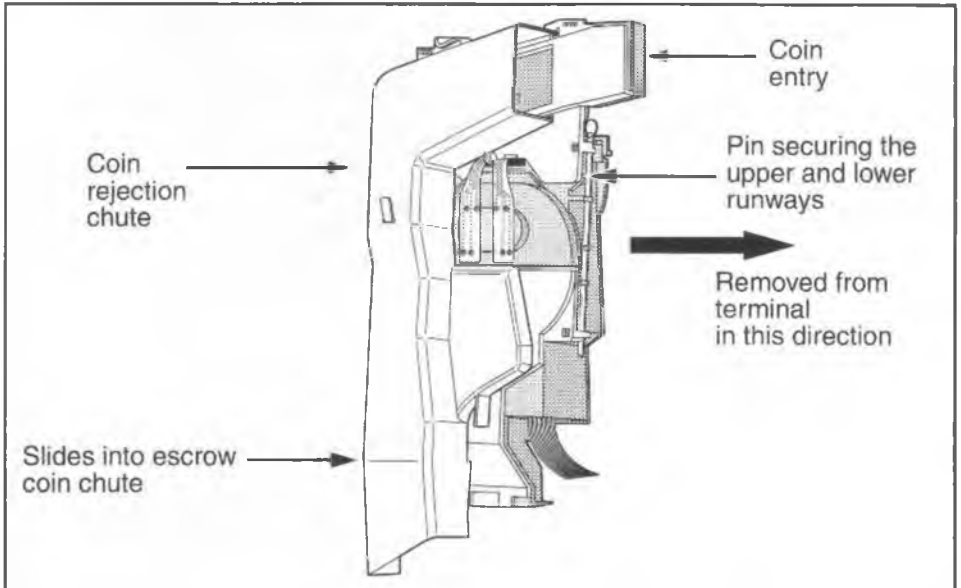
7. Remove the validator by tilting the top back and then lifting it up and out of the housing.

**Figure 7-40: Lifting the validator off the retaining screw**



The left side of the validator is shown in Figure 7-41.

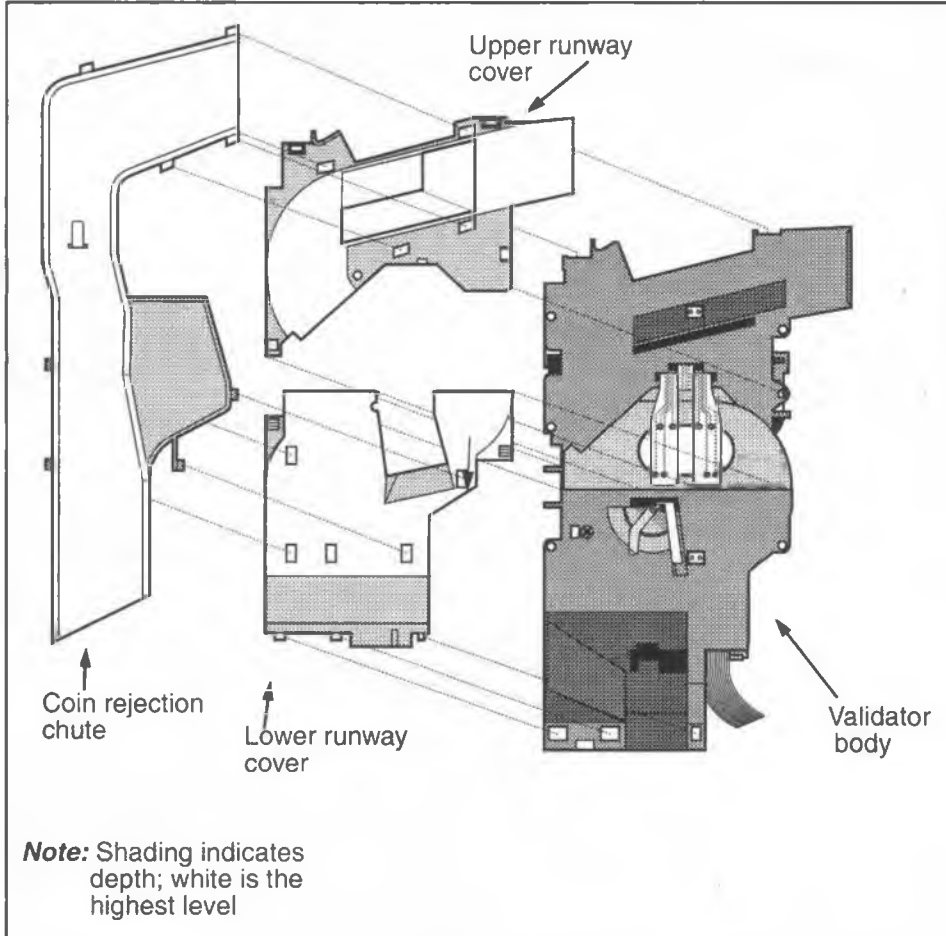
**Figure 7-41: Showing the coin rejection chute of the validator**



To troubleshoot a validator jam or to remove the internal partition that prevents such jams, the validator comes apart, as shown in Figure 7-42.

Two steel pins, one on either side of the validator, release the coin rejection chute and the upper and lower runways. Refer to Figure 7-41.

**Figure 7-42: Exploded view of the coin validator**



8. When you have removed the validator from the terminal, check to make sure the coin chute is clear. Clear it, if necessary.

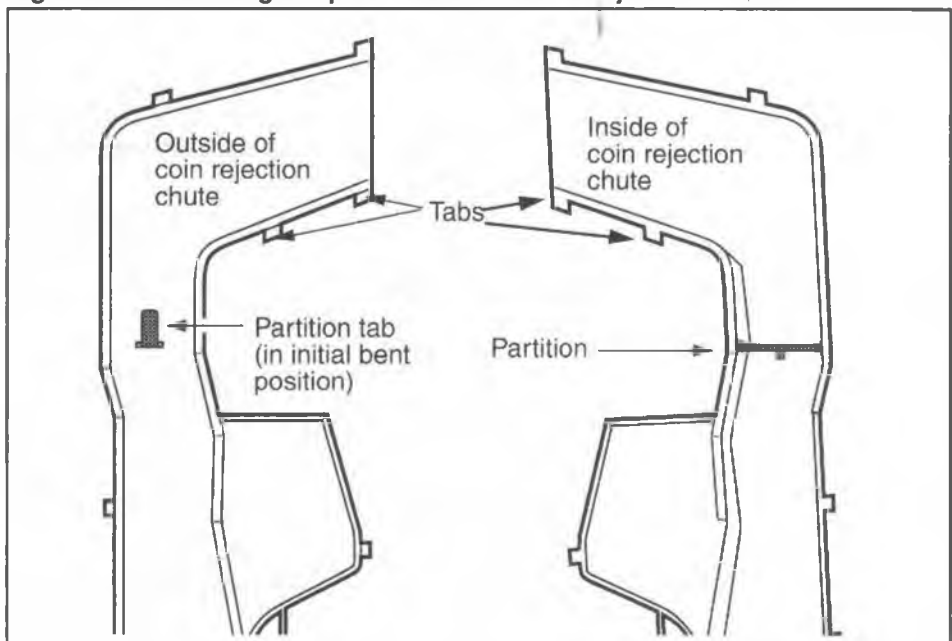
9. If you want to remove the partition from inside the validator, remove the short pin on the left side of the validator and detach the coin rejection chute by gently squeezing the sides together to free the tabs.

**Note:** The long pin attaches the upper and lower runway covers to the validator body.

### Removing the coin rejection chute tab

- Locate the partition tab which extends through the wall of the coin rejection chute. Refer to Figure 7-43.
- Bend the tab straight.
- Slide the partition out and discard.
- Slide the partition out and discard.
- Re-attach the coin rejection chute to the validator body, making sure all the tabs are inserted in the proper holes.
- Re-insert the pin.

**Figure 7-43: Locating the partition on the coin rejection chute**



10. To replace the validator in the terminal, reverse the preceding steps.
  - a) When replacing the validator, it may be necessary to detach the link assembly. To do this, remove the front housing as explained in **Replacing the front housing assembly** earlier in this chapter.
  - b) Slide the bottom of the validator coin chute into the top of the coin chute on the escrow, then slip the large part of the keyhole over the retaining screw, then slide the validator into position. Refer to Figure 7-39.
  - c) Replace the front housing if you removed it in Step 8a.
  - d) Route the ribbon cable from the validator (J33) under the control assembly before it is connected to the control PCP.
  - e) Reinstall the PCP assembly as explained in **Removing the PCP assembly** if you removed it at the beginning of this procedure.
11. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
12. Perform the INSTALL routine to store coin data in the terminal memory. Refer to **Using the Maintenance menu** in Chapter 5.

## Replacing the coin escrow

The coin escrow holds the coins until a call is connected.

- If the call is connected, the escrow dumps the coins into the coin box.
- If the call does not go through, the coins are deposited in the coin return.

To remove the escrow for replacement or to clear a coin jam, do the following:

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power is disconnected.



**Be sure you upload CDRs before you do this procedure.**

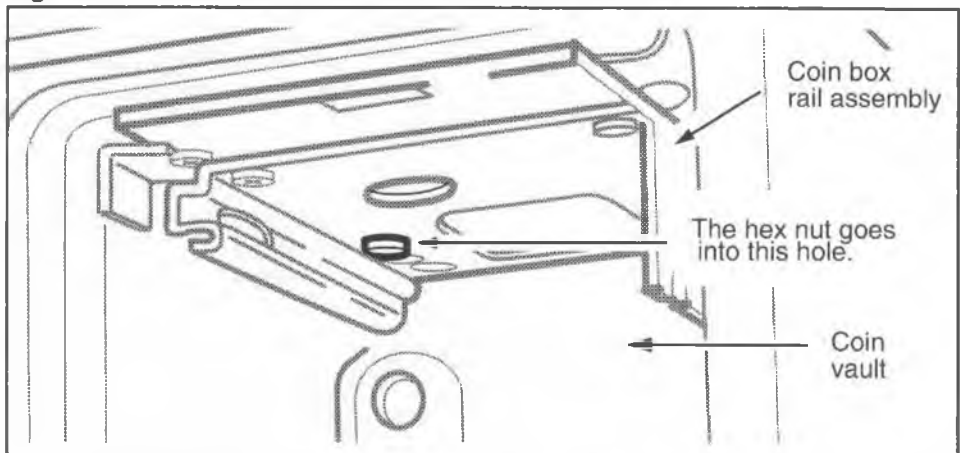
**You will need to run the INSTALL terminal-configuration routine if you replace this unit.**

- removed the coin validator as explained in **Replacing the coin validator**
  - **escrows secured through the coin vault:** removed the coin box as explained in **Replacing the vault door or coin box** later in this chapter, or arrange for a coin pickup
2. **Top-mounted escrows:** Start at Step 3.

**For escrows secured through the coin vault:**

Remove the hex nut accessed through the coin vault on the underside of the vault top through the coin box rail, as indicated in Figure 7-44.

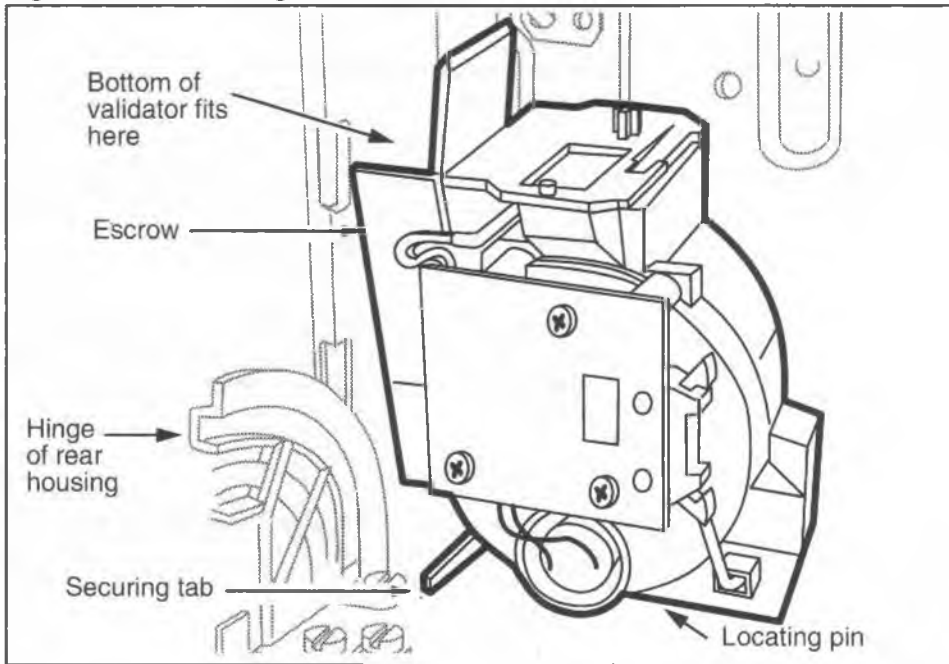
**Figure 7-44: Coin escrow hex nut inside the coin vault**



3. Push the securing tab, labelled in Figure 7-45, so it clears the vault top in the return cutout.

4. Lift the escrow until the locating pin on the bottom clears its rectangular hole in the vault top.

**Figure 7-45: Removing the coin escrow**



5. To clear a jam, do the following:
  - a) Turn the escrow upside down, and rock the unit from side to side. Coins or debris will empty out, clearing the blockage.

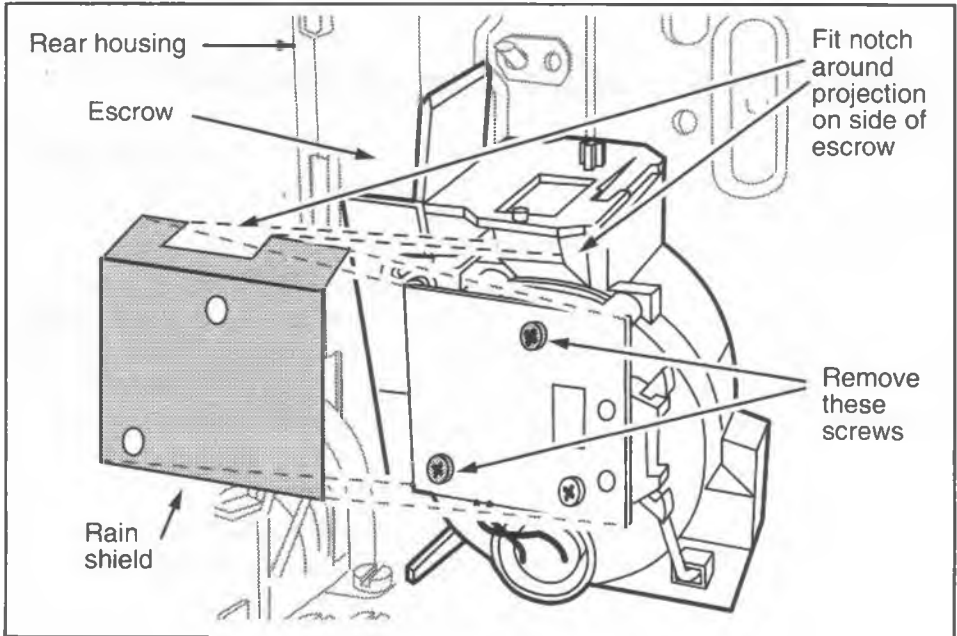


- Do not under any circumstances insert any object, such as screwdrivers, metal rods, or fingers, into the escrow unit. Attempting to clear the jam in this manner may cause permanent damage to the escrow.

- b) If the jam cannot be cleared, replace the escrow and send the jammed escrow for repair.
6. If you are installing a new escrow, you must attach the rain shield to the escrow. The positioning of the rain shield is shown in Figure 7-46.

- a) Remove the top screw and the bottom left screw from the escrow PCP board.
- b) Position the shield over the PCP and replace the screws.

**Figure 7-46: Positioning the escrow rain shield**



7. To replace the escrow, reverse Steps 1 to 4. Align the locating pin with the cut-out on the vault top.


**Negatron** the escrow retaining lock nut only until the escrow becomes slightly snug.

8. To restore the terminal to operation:
  - a) Replace the coin box as explained in **Replacing the vault door or the coin box**.
  - b) Replace the validator as explained in **Replacing the coin validator**.
  - c) When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

- d) Perform the INSTALL routine to store coin data in the terminal memory. Refer to **Using the Maintenance menu** in Chapter 5.
- e) Go into the craft interface and perform the coin test several times to confirm that the coin path is clear. If any of the coin tests fail, replace the escrow.

## Replacing the vault door or the coin box

The following procedure explains how to access the coin vault and replace the vault door or the coin box.

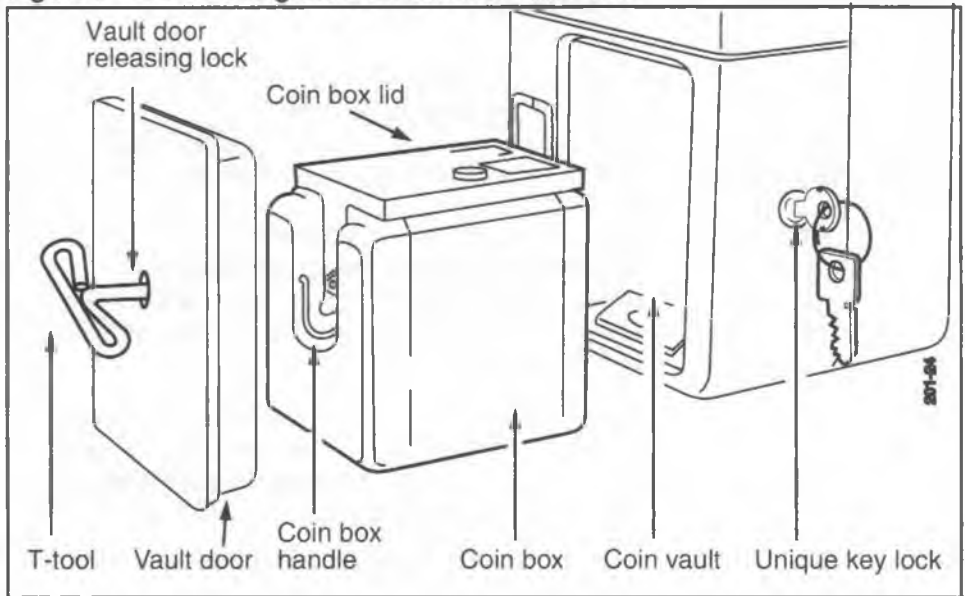
<p><b>Coin box status</b></p> 	<p>The terminal keeps track of the coin box contents. A coin box cannot be replaced once it is removed from the terminal. Make sure you arrange for a coin pickup before the terminal power is disconnected so that the terminal coin box status memory resets to zero.</p> <p><b>Do not put in a new coin box until you complete the maintenance.</b></p>
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1. Insert the coin compartment key into the lock at the lower right side of the terminal, as shown in Figure 7-47.
2. Rotate the key clockwise to unlock the coin vault lock.
3. Insert the T-tool or L-tool into the slot on the front of the vault door and turn the tool counterclockwise 45 degrees.
4. Pull the tool and vault door away from the terminal.
5. The coin box is now exposed and can be removed by pulling on its handle. Refer to Figure 7-47.

**Note:** When you remove the coin box, a notification is sent to the Millennium Manager.

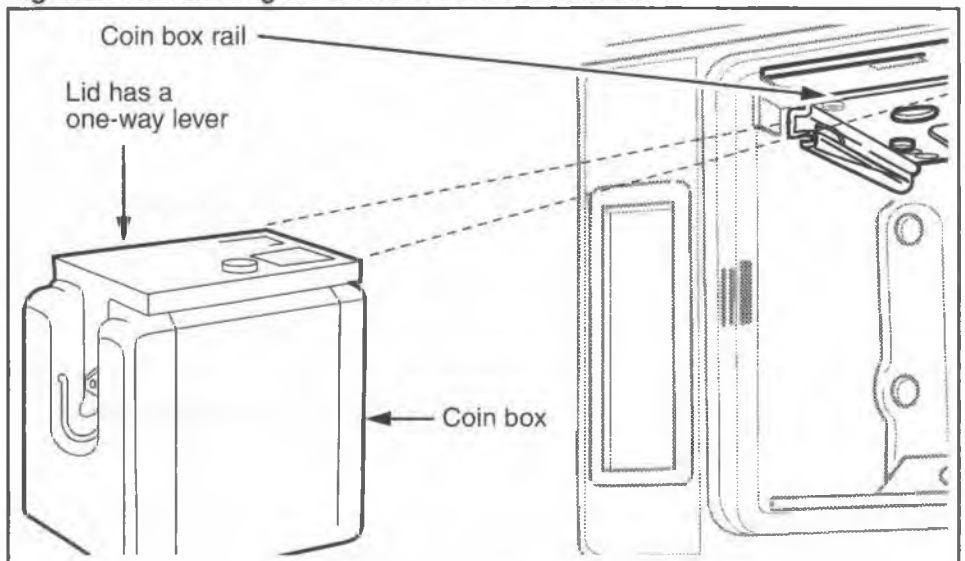


**Figure 7-47: Removing the coin box and vault door**



6. To replace the vault door or coin box, reverse the preceding steps. Make sure to align the lid lever of the coin box with the slot in the coin box rail. See Figure 7-48.

**Figure 7-48: Inserting the coin box into the coin vault**



## Removing the coin box rail

The coin box rail supports the lid of the coin box. It will seldom, if ever, need to be replaced.

### Coin box status



The terminal keeps track of the contents of the coin box.

Perform a CDR upload before you open the terminal, as explained in **Preparing the terminal for maintenance**. This uploads a copy of the coin box status, which should be zero if you have properly requested a coin pickup.

If the terminal sensors are not working, the terminal may not have recorded the coin box status amount in a record. If this is the case, you need to manually reset the coin box status before inserting a new box.

This process is described in **Replacing the security PCP**, after this section.

A coin box should not be re-inserted in the coin vault once it has been removed from the terminal.

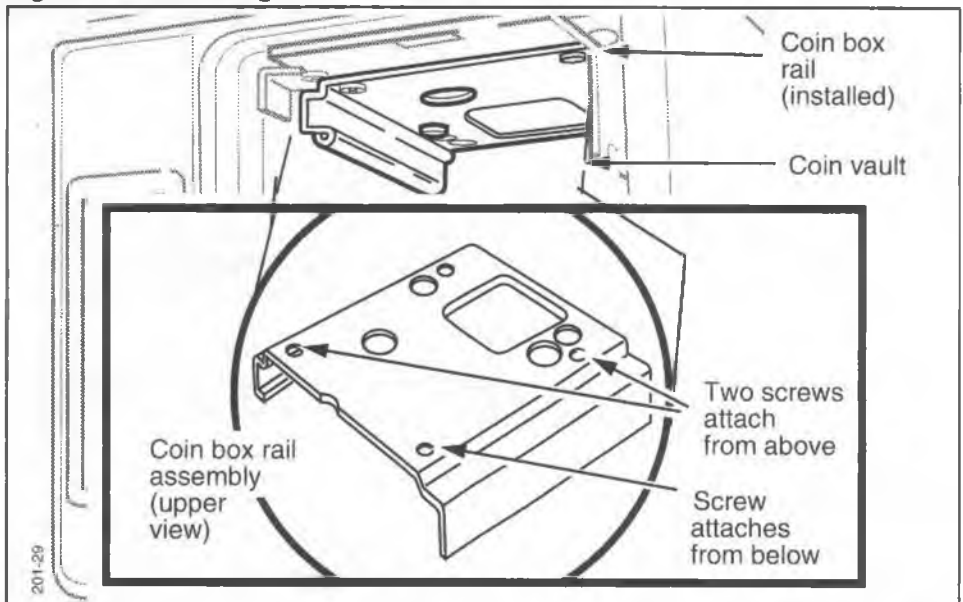
1. This procedure assumes you have:
  - arranged for a coin pickup, and have not replaced the coin box
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, including putting the terminal out of service through the craft interface. The power is disconnected.
  - removed the coin validator as explained in **Removing the validator** and put it aside
  - removed the escrow as explained in **Removing the escrow** and put it aside in an anti-static bag

**Note:** On newer versions it may not be necessary to remove the validator or escrow to access the screws.

  - accessed the coin vault as described in **Replacing the vault door or coin box**

2. Inside the rear housing:
  - a) Disconnect the vault security cable (J31) from the rear terminal PCP (J30).
  - b) Remove the two screws retaining the coin box rail to the vault top. Refer to Figure 7-49 to locate screw positions.
3. Close the front housing, but do not lock it.
4. From inside the coin vault, remove the screw(s) holding the coin box rail to the vault top. There may be one or two screws, depending on the vintage of terminal. Refer to Figure 7-49 to locate screw positions.

**Figure 7-49: Locating the coin box rail in the coin vault**



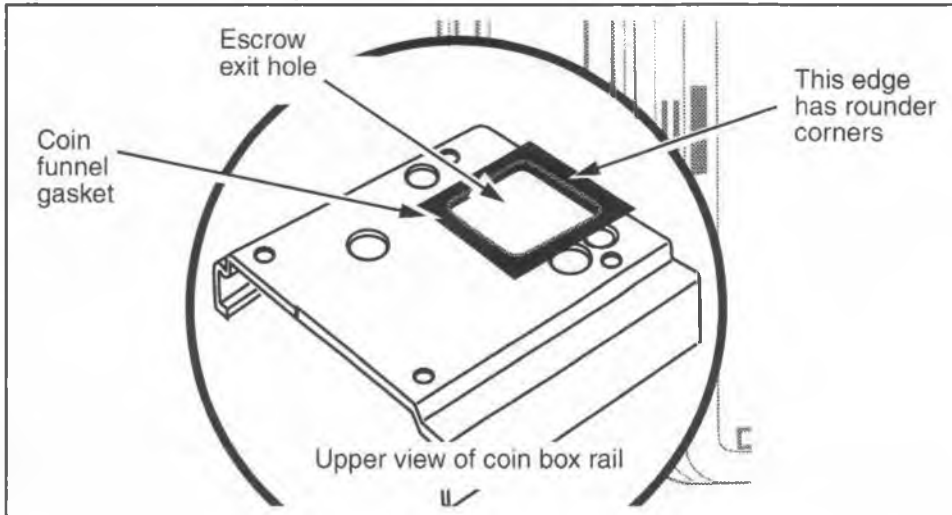
5. To replace the coin box rail, reverse the preceding steps.

**Note:** If you are installing a coin funnel gasket, set it into the coin box rail hole from above before you reattach the rail to the vault housing.

The gasket should sit flat when it is correctly inserted. There is only one way it can fit into the hole to do this.

**Note:** The edge at the back of the coin box rail has rounder corners than the other edges.  
Refer to the section **Upgraded coin box rail** and Figure 7-50.

**Figure 7-50: Positioning the coin funnel**



6. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
7. Replace the coin box last, following the procedures in **Replacing the vault door or the coin box**.

## Upgraded coin box rail

If your company is using coin boxes and coin box lids which are not Nortel issue, there may be a compatibility issue in regards to how the lid fits under the escrow exit hole in the coin box rail.

The following are some of the discrepancies experienced:

- Since the Millennium multi-pay terminal was designed to accommodate Canadian \$1 coins, the hole in the coin box rail from the escrow is large enough to accommodate this large coin.

Many non-Nortel-issued lids are designed only to accommodate a coin as big as a quarter, so there is a size discrepancy between the hole in the coin box rail and the hole in this type of lid.

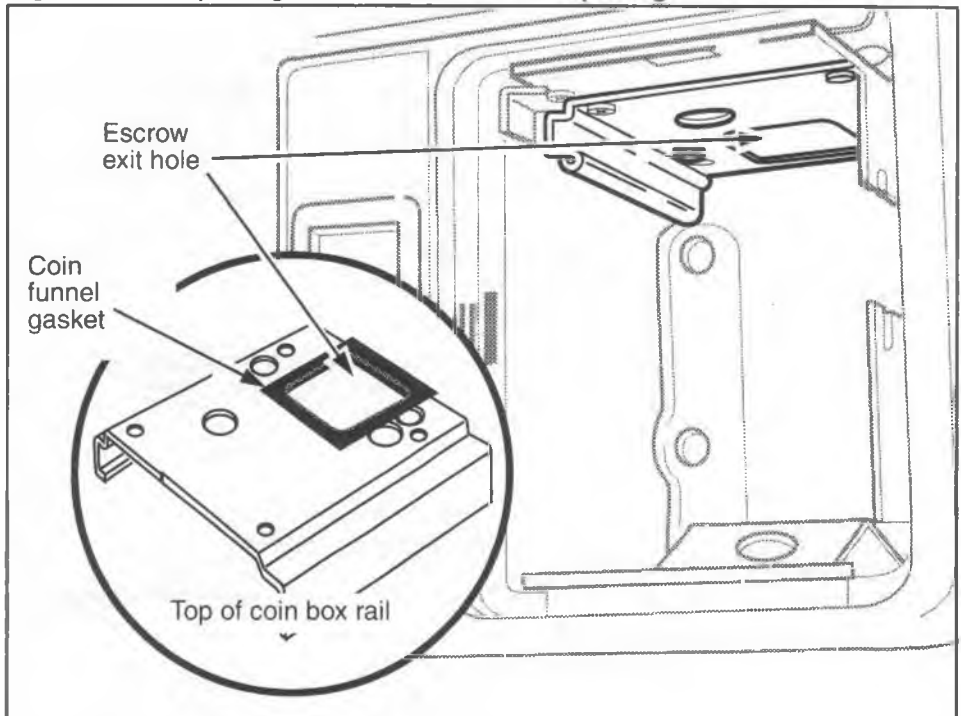
- The coin box rail and the lid do not sit tightly against each other.
- The design of the catch mechanism on the rail is such that the lids may not sit fully under the hole, leaving an overhang.

The combination of these two problems make it possible for coins to get caught in the space between the bottom of the coin box rail and the top of the lid.

In an effort to reduce this possibility a new coin box rail has been developed. As well, a coin funnel gasket can be added to close up the space between the rail and the lid.

Figure 7-51 shows these features.

**Figure 7-51: Adjusting the coin box rail coin opening**



To distinguish this coin box rail from the old model, the new model has been painted a silver color.

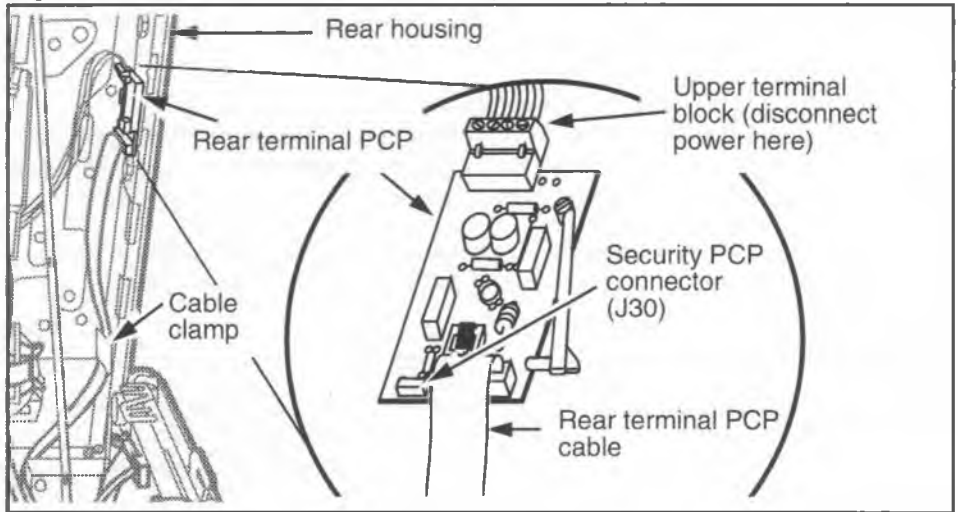
This new rail will eventually replace the existing rail. However, the coin funnel gasket is only necessary when non-Nortel-issue coin box lids are used.

## Replacing the security PCP

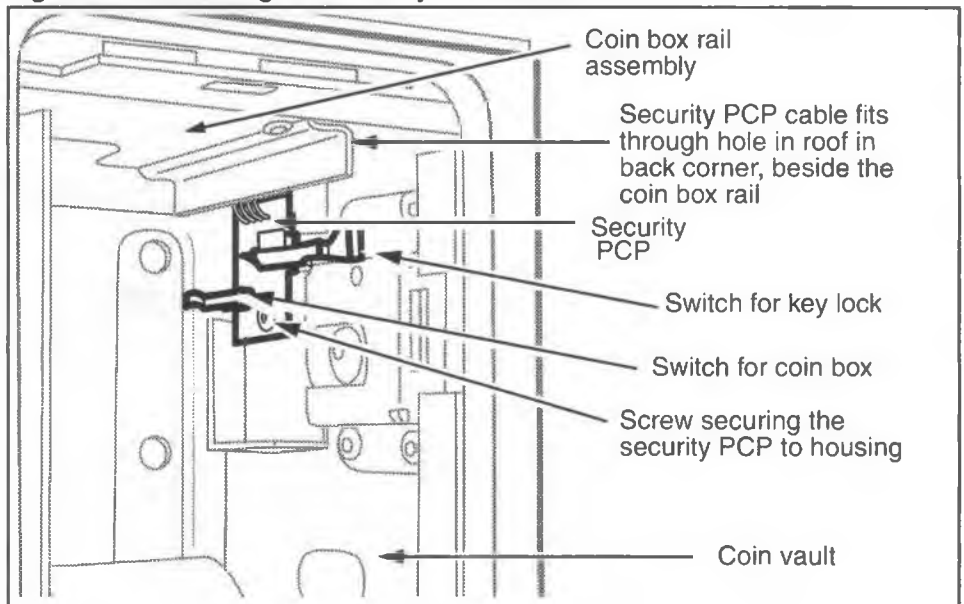
The security PCP is located inside the coin vault. It has two microswitches. One monitors the coin box and the other, the coin vault lock. This module seldom fails, so there are no specific alarms to indicate a security PCP failure.

A failure can be deduced if all other coin box factors have been eliminated as the cause of alarms or collection problems. Refer to Chapter 6 for troubleshooting suggestions.

1. This procedure assumes you have:
  - arranged for a coin box pickup
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power is disconnected by removing the upper terminal block at the rear terminal PCP.
2. Locate the cable that comes up through the bottom of the housing from the security PCP and hooks into the rear terminal PCP. Refer to Figure 7-52.
  - a) Remove the coin box security PCP cable (J31) from the rear terminal PCP connector (J30).
  - b) Remove the wires from any cable clamps.
3. Carefully guide the security PCP wires and connector through the opening in the vault top.
4. Close, but do not lock, the front housing assembly.

**Figure 7-52: Rear terminal PCP security PCP connector**

5. Take out the security PCP by removing the screw holding the security PCP and the PCP support on the inside of the coin compartment. Refer to Figure 7-53.

**Figure 7-53: Locating the security PCP inside the coin vault**

6. To replace the security PCP, reverse the preceding steps, including connecting the module cable (J31) to the connector on the rear terminal PCP (J30).
7. When complete, reconnect the upper terminal block onto the rear terminal PCP to reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
8. Simulate a coin collection in order to reset the counter in the terminal. To do this, follow these steps:

<b>Simulating a coin collection</b>	<ol style="list-style-type: none"><li>a) Turn the coin box key to the locked position.</li><li>b) Push in the coin box microswitch with your left hand, or use a lid-less coin box. Do not use a new coin box for this purpose). Refer to Figure 7-53</li><li>c) Open the terminal and reconnect the power.</li><li>d) Close the terminal and lock it.</li><li>e) Turn the lower housing key to the open position.</li><li>f) Release the microswitch, or remove the lid-less coin box. The terminal will see this as a legitimate collection and reset its coin box status to zero.</li><li>g) Insert a new coin box and close the vault as explained in <b>Replacing the vault door or the coin box</b>.</li></ol> <p><b>Note:</b> Be sure to follow procedure for notifying the coin collection service that maintenance took place involving removing the coin box.</p>
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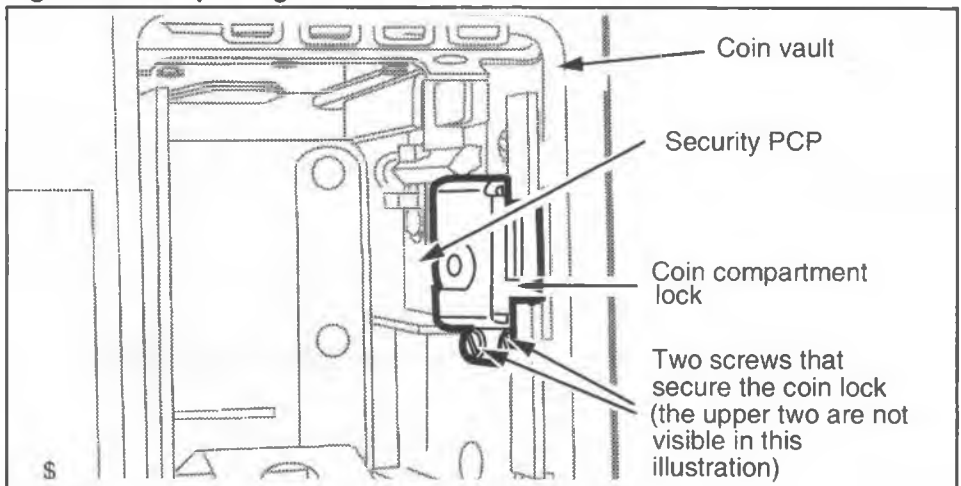
## Replacing the coin vault lock

The lower housing lock, described here as the coin vault lock, secures the coin vault door. This lock can either be a mechanical lock or an electronic lock (e-lock). These locks are customer-specific and each lock has a unique key. In the case of the e-lock, this key is a software code.

The procedure below describes how to replace a mechanical lock.

1. This procedure assumes you have followed these procedures described earlier in this chapter:
  - opened coin vault and removed the coin box as explained in **Replacing the vault door or the coin box** or arranged for a coin pickup
  - followed the steps in **Preparing the terminal for maintenance** and **Opening the terminal**.
  - removed the security PCP assembly as explained in **Replacing the security PCP**
2. Remove the key from the coin compartment lock.
3. Remove the four screws securing the coin compartment lock. Refer to Figure 7-54.

**Figure 7-54: Replacing the coin vault lock**



4. Reverse Steps 1 to 3 to replace the coin compartment lock.
5. Replace the security PCP as explained in **Replacing the security PCP**.
6. Reconnect the power, and test to make sure the lock is positioned so its micro-switch actuator is activated by locking the coin compartment and deactivated by unlocking it.
7. When complete, reconnect the upper terminal block onto the rear terminal PCP to reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
8. Insert a new coin box into the coin vault.
9. Replace the vault door and lock the vault, as explained in **Replacing the vault door or the coin box**.

## Coin vault lock upgrade

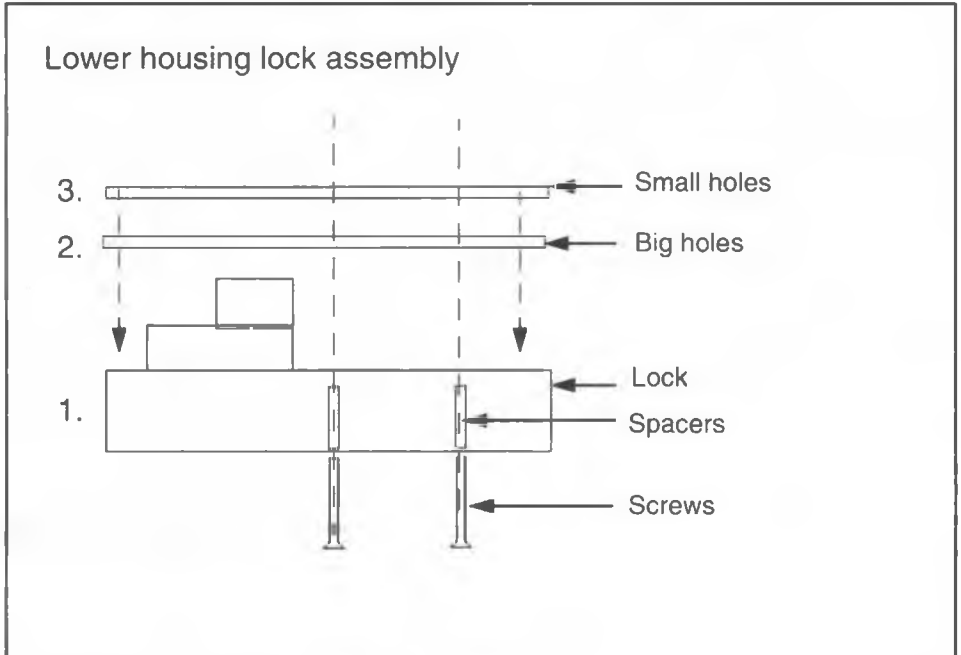
This procedure describes how to install extra lock plates on the coin vault lock.

To upgrade the lock, you need:

- one lock plate with big screw holes
- one reinforcement plate with smaller screw holes
- two spacers
- two M2.5 Phillips or Pozidriv #1 screws

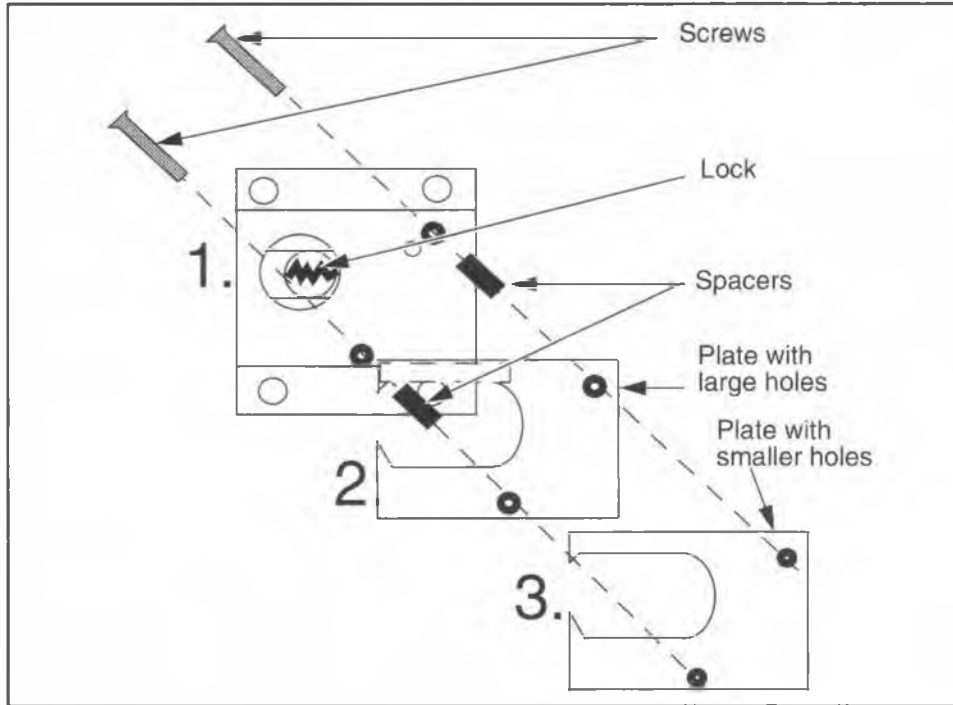
## Upgrading the lock

1. If the terminal has a lock installed, remove the lock, following the instructions in **Replacing the coin compartment lock**, in the previous section.
2. Fit the pieces of the lock together as shown in Figure 7-55 and Figure 7-56 and described below:
  - a) Place the lock in front of you, with the bolt facing to your right.

**Figure 7-55: Vault lock upgrade side view**

- b) Place one of the spacers on the top right-hand hole.
  - c) Place the other spacer on the bottom centre hole.
  - d) Place the U-shaped plate with the bigger holes on the lock plate.
  - e) Place the second plate on top of the first one.
  - f) Flip the assembly over, holding it tightly together with your fingers.
  - g) Insert the screws in the screw holes and tighten them securely.
3. Reassemble the lock by following the instructions in **Replacing the coin vault lock**.

**Figure 7-56: Vault lock upgrade exploded view**



## Installing an e-lock and security switch

Installing electronic locks in the coin vault area of Millennium coin-basic terminals requires an adjustment to the way the terminal will sense vault activity.

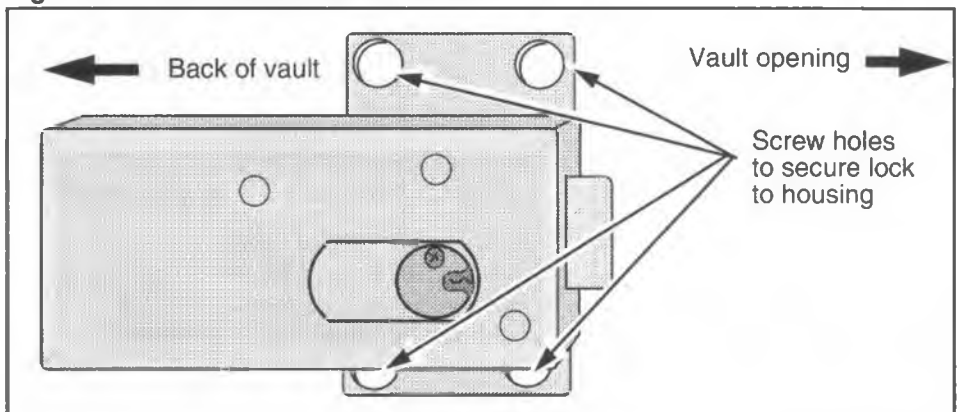
To accommodate the extended projection of the e-lock housing, a security switch and bracket assembly has been designed specifically for the e-lock. Instead of having two switches to monitor the vault, as the mechanical lock security switch does, the bolt monitor function has been wired into the coin box switch so that both activities are, in effect, monitored at the same time, while only creating one alarm if the switch is activated.

This switch and bracket can be ordered installed on new terminals, or it can be ordered as a kit to replace the security module used in terminals already in the field.

The following procedure describes how to install an e-lock, and an e-lock security switch and bracket.

1. This procedure assumes you have:
  - arranged for a coin box pickup and the terminal put manually put out of service as described in **Putting the terminal out of service** in Chapter 5. Do not put a new coin box into the coin vault, unless otherwise instructed.
  - followed the steps in **Preparing the terminal for maintenance** and **Opening the terminal**.
2. Close the terminal housing, but do not lock it.
3. Open the coin vault as explained in **Replacing the vault door or the coin box**.
4. Remove the security module as described in **Replacing the security module**.
5. Remove the mechanical lock as described in **Replacing the coin vault lock**.
6. Position the e-lock on the inside of the vault. The four holes will line up with the screw holes on the terminal shell, allowing the keyhole to fit through the appropriate hold in the housing. Refer to Figure 7-57 for screw hole locations.

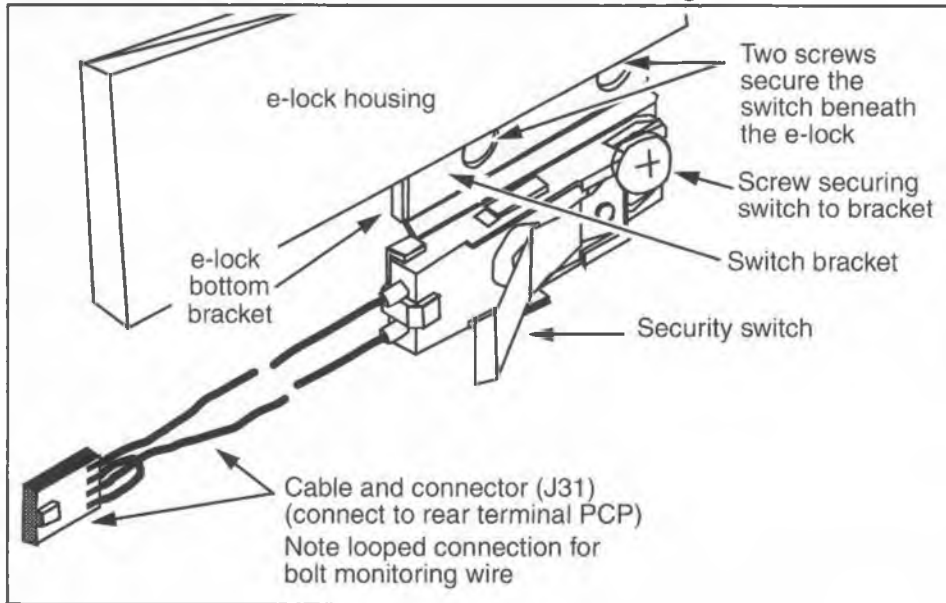
**Figure 7-57: Vault-side view of e-lock**



7. Replace the two screws above the lock.

8. Feed the connector and cable of the security switch up through the hole between the vault and the terminal chassis. The hole is located in the back, right-hand corner.
9. Position the security switch and mount underneath the e-lock. The two holes in the switch mount will match the two bottom holes of the lock. Refer to Figure 7-58.

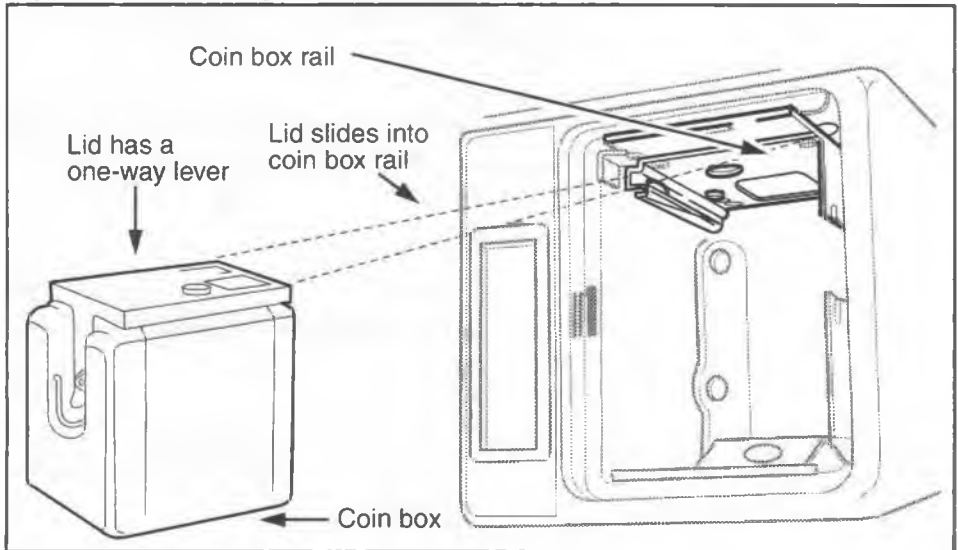
**Figure 7-58: Switch and mount fit under e-lock housing**



10. Insert the two screws under the e-lock that hold the switch in place.
11. Open the terminal housing and locate where the switch cable was pushed up through the floor of the rear housing.
  - a) Thread the cable through the cable clamp located on the side of the rear housing.
  - b) Connect the cable connector to the connector on the rear terminal PCP. Ensure the connector is properly seated.

12. Insert the coin box into the vault. Refer to Figure 7-59.

**Figure 7-59: Inserting the coin box into the coin vault**



13. Close and lock the coin vault.

**See this:**



Once the vault is closed and locked, you will not be able to get back in without re-setting the electronic key.

14. When complete, reconnect the upper terminal block onto the rear terminal PCP to reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
15. If you manually removed the terminal from service through the craft interface when the coin box was removed, restore the terminal to service by following the steps in **Putting the terminal back in service** in Chapter 5.

## Replacing the coin return assembly

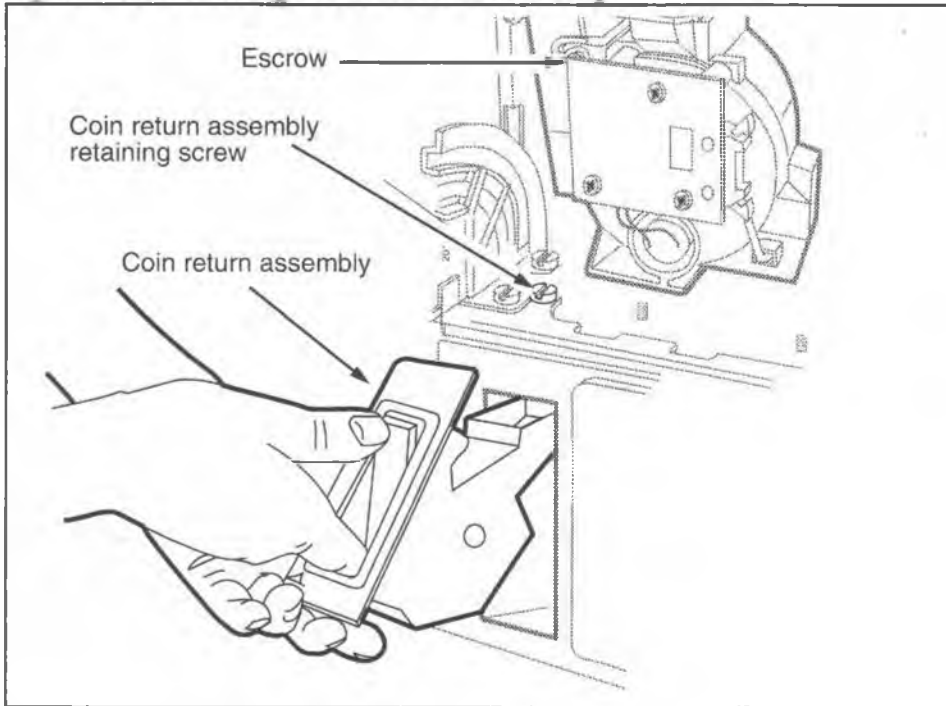
The coin return assembly is replaceable as a single unit, which is secured through the floor of the rear housing.

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected.

**Note:** It is not necessary to upload CDRs or disconnect the power to do this procedure.

2. Loosen the coin return assembly retaining screw near the set hinge on the left side on the floor of the rear housing. See Figure 7-60.

**Figure 7-60: Removing the coin return assembly**



3. Close the front housing cover to allow access to the front of the coin return assembly.



4. Grasp the coin return assembly by placing your index finger into the coin return door and your thumb on the upper surface of the coin return door, as shown in Figure 7-60.
5. Lift the coin return assembly up about 3 mm, and then pull it away from the terminal as much as possible.
6. Lift and rotate the coin return assembly above the upper end of the coin return bezel and remove.
7. To replace the coin return assembly, reverse the preceding steps.
8. When complete, close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the rear terminal PCP

The rear terminal PCP controls the power input into the terminal.

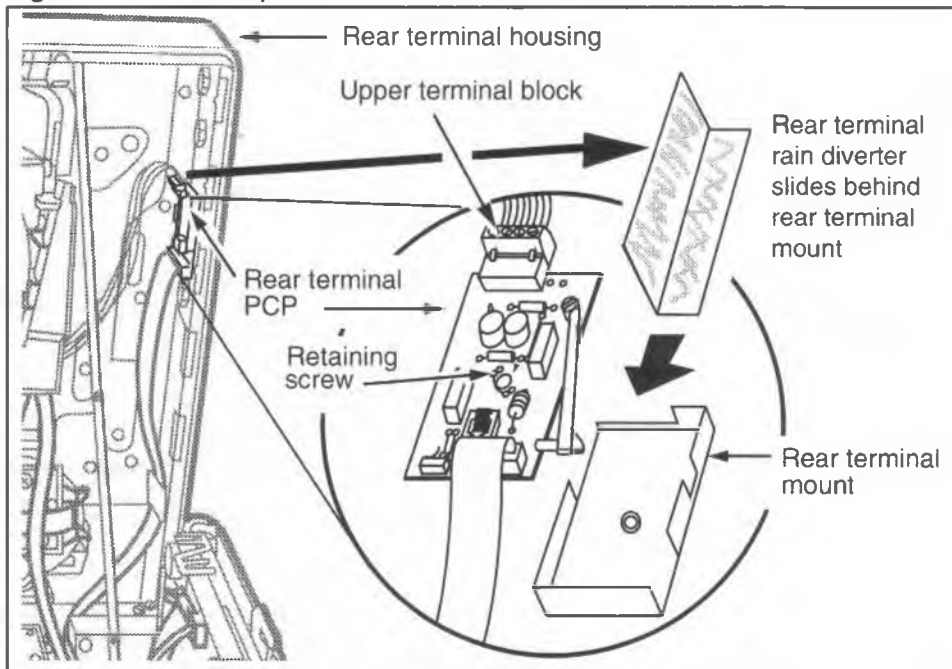
If the terminal has an IAS module installed, the rear terminal PCP will be attached to the IAS module and the IAS module will be connected to the outside line. Refer to the interconnect diagrams in Chapter 1 to see the connections.

To replace the rear terminal PCP, follow these steps:

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. Disconnect the power by disconnecting the upper terminal block, shown in Figure 7-61.
  - removed the coin validator – **do not disconnect** the cable from the control board – as explained in **Replacing the coin validator**. Set the validator carefully down on the front housing assembly.
2. Disconnect the rear terminal PCP cable (J18) from the control PCP connector (J5).

- a) Disconnect the security PCP cable (J31) from the rear terminal PCP connector (J32).
  - b) If the terminal has an IAS module, disconnect the interconnect cable between the IAS module and the rear terminal PCP.
3. Refer to Figure 7-61 and remove the rear terminal PCP retaining screw, in the middle of the rear terminal PCP.
  4. Remove the rear terminal PCP from its terminal mount.

**Figure 7-61: Close-up of rear terminal PCP and rain diverter**



5. To replace the rear terminal PCP reverse Steps 1 to 3.
  - When inserting the new rear terminal PCP, make sure the alignment pins on the terminal mount fit into the holes in the housing assembly.
  - If you are installing a rear terminal rain diverter, follow the procedure described below before tightening the central screw on the rear terminal PCP.

## Installing the rear terminal rain diverter

- a) Place the rain diverter in the corner of the rear housing assembly above the rear terminal PCP, as shown in Figure 7-61.
- b) Slide the rain diverter down behind the rear terminal mount until the top of the rain diverter is about one-quarter inch above the oval hole in the back of the rear housing.
- c) The wide side of the rain diverter fits against the back of the housing assembly.
- d) Tighten the rear terminal PCP retaining screw.

6. When complete, reconnect the upper terminal block onto the rear terminal PCP to reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Describing inferred answer supervision

Millennium terminals require that answer supervision be present so that billing records can be accurate. For lines that do not have this feature, an IAS module is installed inside the terminal.

The IAS module is installed in the Millennium multi-pay terminal below the rear terminal PCP. The module connects between the telephone line and the rear terminal board. Figure 7-62 shows the IAS module inside the rear housing.

**Figure 7-62: Locating the IAS module in the terminal**

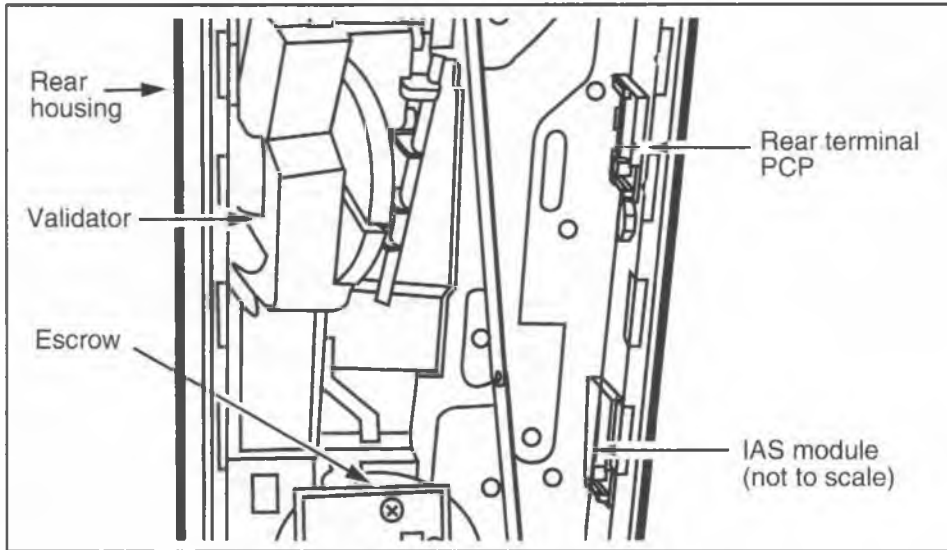
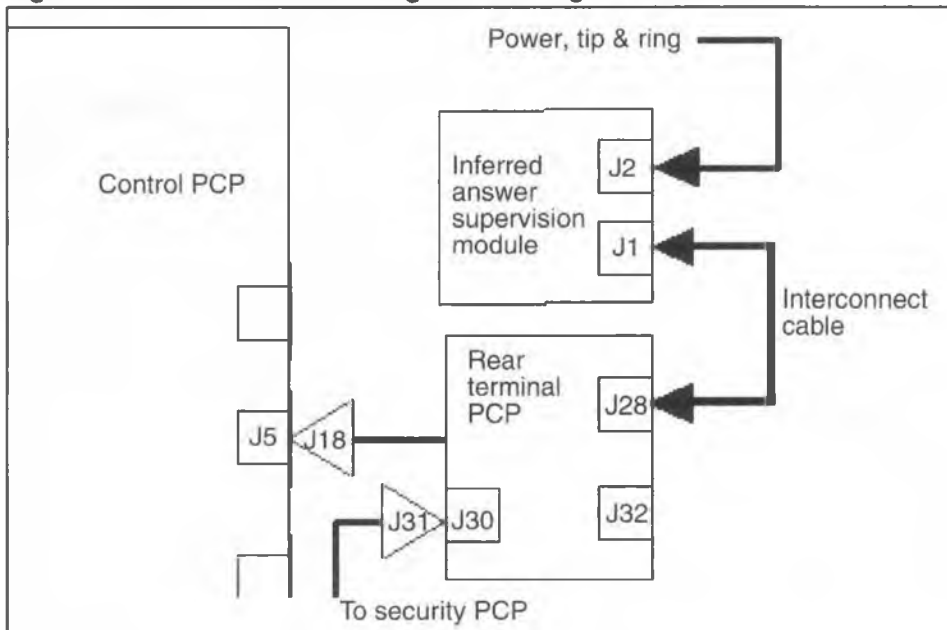


Figure 7-63 shows how the IAS module connects to the terminal.

**Figure 7-63: Interconnection diagram showing IAS connection**

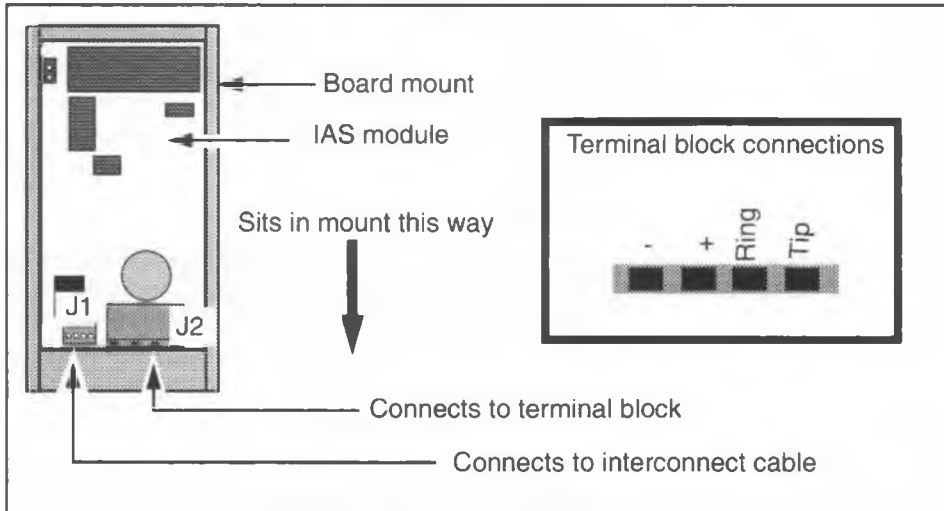


## Positioning and connecting the IAS module

The IAS module can be installed in the field. The following steps describe how to position the module in the terminal and then connect it between the outside wire connection and the rear terminal PCP.

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power is disconnected. The rear terminal PCP cable is disconnected from the control PCP connector and the upper terminal block is disconnected from the rear terminal PCP.
  - removed the rear terminal PCP as explained in **Replacing the rear terminal PCP**
2. Remove the flat self-adhesive cable retainer from the side of the terminal below the rear terminal PCP.
3. Check the placement of the board mount.
  - a) Slide the IAS PCP out of the board mount.
  - b) Leave the protective paper of the board mount, and position the mount on the side of the terminal.
  - c) Set the bottom of the mount about 25 mm (1 in.) above the top of the vault area. The white retaining stud should be at the bottom, facing the front of the terminal.
  - d) Take the board mount out; remove the protective paper from the adhesive foam on its back; and firmly press the board mount to the side of the terminal, where you placed it in Step 2c.
4. Insert the interconnect cable into J1 on the IAS PCP. Make sure the cable sits into the connector so the black wire is in the tip position, shown in the inset in Figure 7-64.
5. Slide the IAS PCP into the board mount so that connectors J1 and J2 are at the bottom of the board.

**Figure 7-64: Diagram of the IAS module**



6. Replace the rear terminal PCP as discussed in **Replacing the rear terminal PCP**.
7. Plug the interconnect cable on the IAS (J1) into the connector on the top of the rear terminal PCP (J28). Position the cable along the back of the terminal so that it does not interfere with the PCP assembly when the housing is closed.
8. If they are not already attached, connect the inside service wires to the terminal block that connects to the IAS module. This procedure is described below:

### Installing the inside service wires

- a) Pull the inside service wires (ISWs) through the oval 25 mm by 12.5 mm (1 in. by 1/2 in.) wiring access hole beside the coin validator in the rear housing assembly.

#### **WARNING**

Make sure that the ISWs do not touch the internal components of the terminal.

Observe ESD precautions described in this document.

**(Continued on the next page.)**

**Attaching the ISWs, continued**

- b) Grasp the top portion of the terminal block and pull it carefully away from the board.
- c) Snap the block to the upper arm of the link assembly. This secures the upper terminal block in place so you can use both hands to attach the wires.
- d) Remove the protective tape from the ISWs and strip the end of each wire.
- e) Connect the ISWs to the terminal block. Use a small screwdriver to connect the leads.

**CAUTION****Connecting power to the terminal**

- Ensure the proper polarity when connecting the supplementary power supply. Reverse polarity does not cause damage, but the terminal does not work if the polarity is incorrect.
- Take the usual precautions with the wiring.
- Conceal the wiring near the telephone or use approved moulding or tubing.
- Locate protectors and connecting blocks where they will be inaccessible to the terminal user.

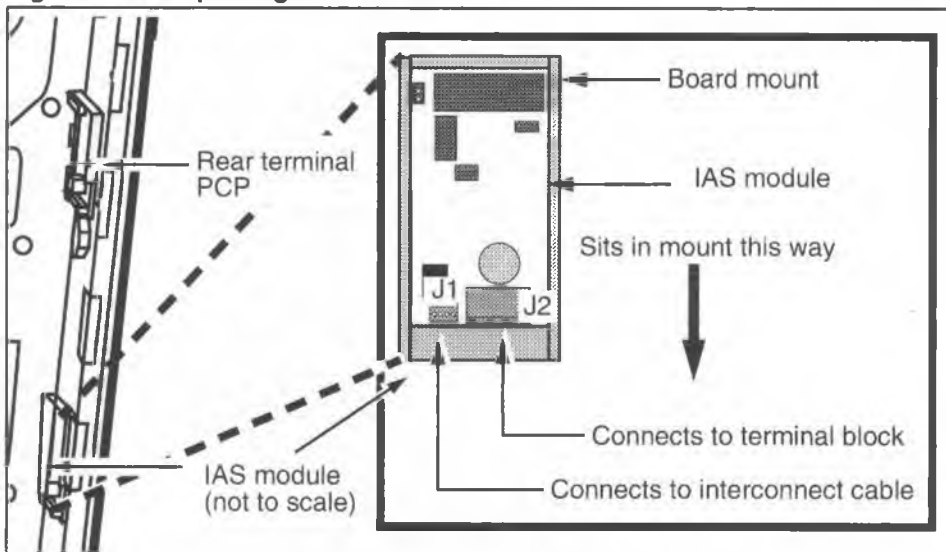
9. Once the ISWs are attached, plug the terminal block into the header J2 on the bottom of the IAS PCP. The IAS module can be slid upward in the extrusion to allow more room to plug in the connector.
10. Route the ISW to the bottom of the rear housing to prevent interference with the PCP assembly.
11. To prevent the IAS PCP from sliding up in its mount, insert a cable tie through the hole at the top of the IAS board mount and tie its ends together. Trim off the excess.
12. Reconnect the rear terminal PCP connector to the control PCP to reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Replacing the IAS module

The following procedure describes replacing an IAS module:

1. This procedure assumes you have followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power has been disconnected at the IAS module (J2). Refer to Figure 7-65.
2. Unplug the interconnect cable connector from the top of the rear terminal PCP (J28).
3. Remove the rear terminal PCP from its mount.
4. Remove the tie wrap or plug in the hole at the top of the IAS board mount and slide the IAS PCP up and out.
5. Insert the interconnect cable into J1 on the new IAS PCP. Check that the cable terminates at the plug-in connector (J2) so the black wire is in the Tip position. Refer to Figure 7-65.

Figure 7-65: Replacing an IAS module



6. Slide the new IAS PCP into the board mount so that connectors J1 and J2 are at the bottom of the board. In-



sert the tie wrap through the hole at the top of the board mount and tie its ends together. Trim off the excess.

7. Replace the rear terminal PCP in its mount.
8. Plug the interconnect cable on the IAS (J1) into the connector on the top of the rear terminal PCP (J28). Position the cable along the back of the terminal to keep it clear of the edges when the housing is closed.
9. If the ISWs are attached correctly, plug the terminal block into J2 on the IAS PCP, this reconnects the power to the terminal.  
Route the ISW to the bottom of the rear housing to prevent interference with the PCP assembly when the housing is closed.
10. When complete, close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.

## Optional features: Datajack and smart card alert

Terminals can be fitted with either the datajack or the smart card alert feature.

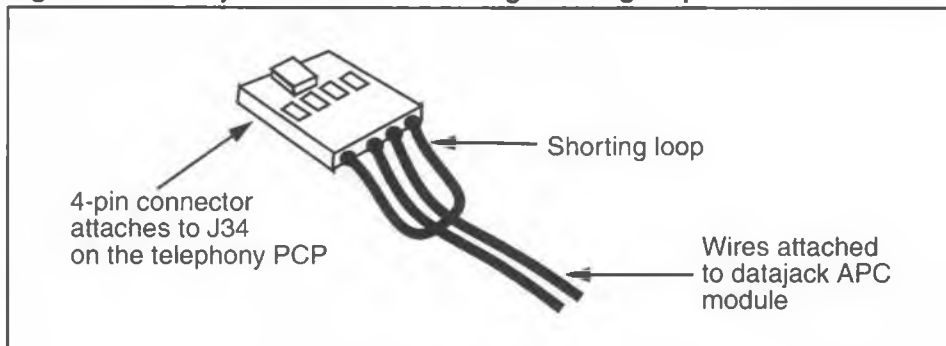
- An **APC datajack** module can be installed at the factory when a terminal is ordered. This installation requires a datajack telephony board and a firmware upgrade for the control board.
- The **smart card alert** feature requires the insertion of a daughter board into a GAL socket on a smart card control PCP. The alerter and keypad PCPs are then connected to the daughter board with two-wire cables. This feature also requires a firmware upgrade for the control board.

## About the APC datajack module

Millennium terminals can offer data transfer capability. This function is created by connecting a unit with an RJ11 connector to a telephony board with a datajack connector.

The datajack cable connector cable is shown in Figure 7-66. Note that there must be a loop between the two outside points. This shorting loop prevents the modem from drawing excess current off the line during datajack operation.

**Figure 7-66: Datajack connector showing shorting loop**



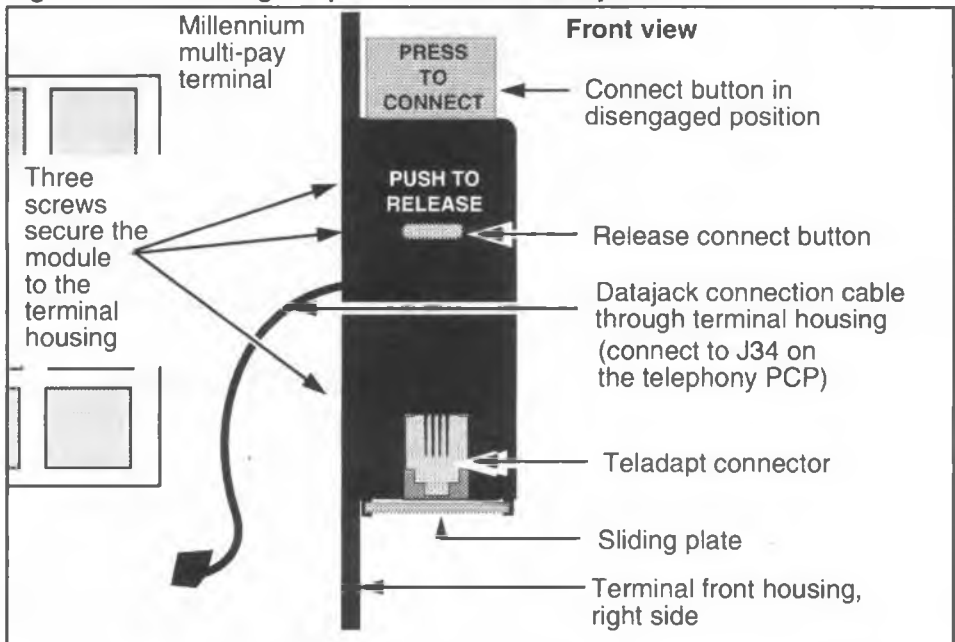
## Replacing the APC datajack module

The APC module is attached to the right side of the terminal. The datajack module can be removed from the front housing if the entire unit needs to be replaced.

1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**. The power is disconnected
  - Removed the PCP assembly as described in **Removing the PCP assembly**. This includes disconnecting the datajack module from the connector on the telephony PCP (J34). Place the PCP assembly in a static-free bag and set aside until you are ready to replace it in the terminal.

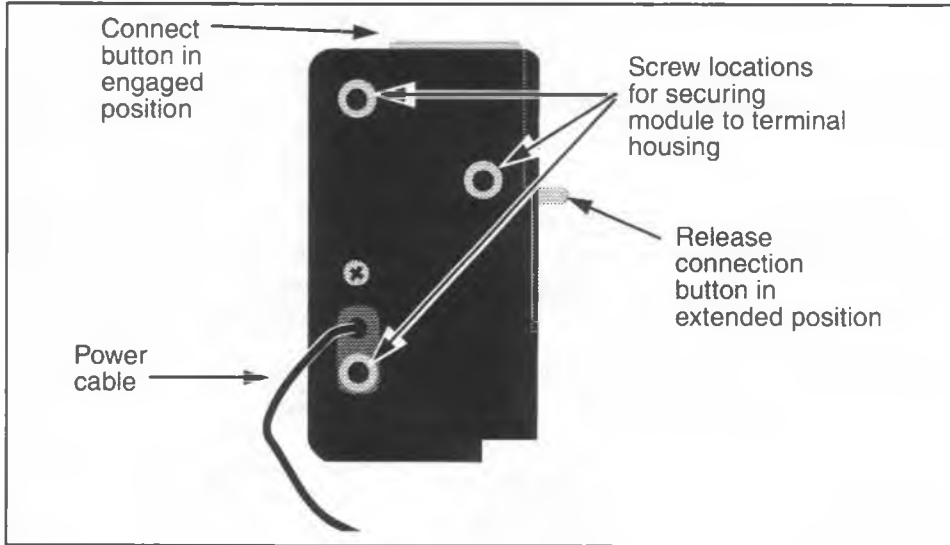
2. Remove the three screws from inside the terminal securing the module to the side of the terminal. Refer to Figure 7-67.
3. Remove the module, pulling the connecting wire free from its hole in the terminal housing. Figure 7-67 shows the module attached to the side of the terminal.
4. Feed the wire from the new module into the wiring hole and line up the screw holes on the side of the housing and the side of the datajack unit.  
The teladapt connector faces to the front.

**Figure 7-67: Locating the parts of the APC datajack module**



5. Replace the three screws, securing the datajack module to the side of the terminal.
  - Make sure the connecting wire does not get pinched between the module and the housing.
  - Figure 7-68 illustrates the side of the datajack which attaches to the side of the terminal, showing the three screw locations and the power cable.

**Figure 7-68: APC datajack side view, attachment side**



6. Feed the datajack power cable between the PCP assembly brackets on the inside of the front terminal housing. Replace the PCP assembly as described in **Removing the PCP assembly**.

When you reconnect the cables to the telephony and control board, plug in the datajack cable to the J34 connector on the telephony PCP.

7. When complete, reconnect the power and close and lock the housing assembly. Refer to **Opening the terminal**, if necessary.
8. Test the datajack by making a data call. This test is described near the end of Chapter 3.

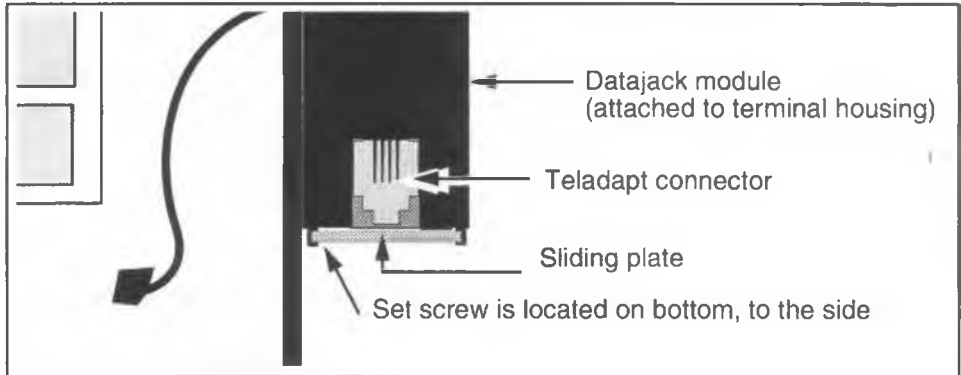
## Replacing the teladapt connector for datajack

If the teladapt connector on the APC datajack module becomes corroded or jammed with foreign matter, it is not necessary to replace the entire unit.

The teladapt, in its plastic shell, can be removed from the datajack housing and replaced using the following procedure:

1. Make sure the connect button is up. The release button should be pushed in. This means there is no power to the datajack unit.
2. Remove the set screw located on the bottom of the sliding plate shown in Figure 7-69, and to the side. This releases the bottom plate.
3. Slide the plate forward, out of the unit.

**Figure 7-69: Replacing the teladapt on the datajack module**



4. Grasp the teladapt connector by the front and back and pull it straight down, out of the housing.
5. Line the replacement module up with the guides on the sides of the datajack unit.
  - The connectors should be facing the front and at the top.
  - There are two small holes at the top of the teladapt. Push it up, into the datajack housing.

6. Reverse the procedures in Steps 1 and 3 to restore the module.
7. Run a datajack test, as described in Chapter 3.

## Installing smart card alert

The smart card alert feature is described in Chapter 1 of this document.

This procedure describes how to install a smart card alert daughter board kit into an existing terminal.

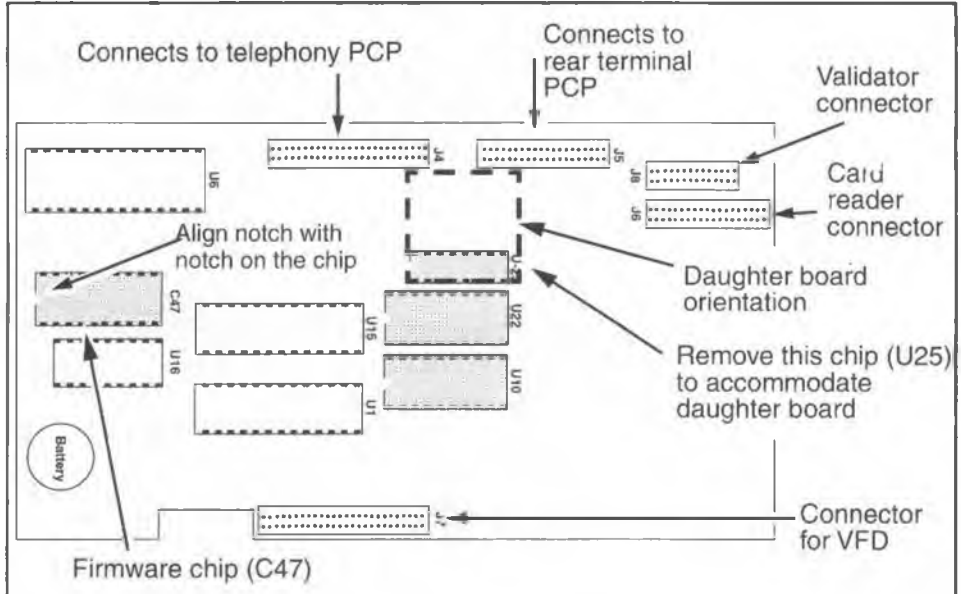
1. This procedure assumes you have:
  - followed the directions in **Preparing the terminal for maintenance** and **Opening the terminal**, and confirmed that the power has been disconnected
  - removed the PCP assembly, as described in **Removing the PCP assembly**
  - removed the alerter and keypad two-wire cable connectors from whichever PCP they are currently connected to
  - removed the control PCP as described in **Removing the telephony and control PCP**. Put the PCP assembly in an anti-static bag and set it aside
2. If you are installing the feature for the first time, go to **Installing smart card alert firmware**.

If you are replacing a daughter board, go directly to **Installing the daughter board**.

## Installing smart card alert firmware

1. Confirm you are working on a smart card control PCP. The NT number will be one of the following: NT5U4002, 4008, or 4012.
2. Set the control PCP on an anti-static pad on a flat and stable surface.
3. Refer to Figure 7-70 to locate the firmware chip (C47). Use a chip puller from your kit to grasp the chip and pull it straight up, out of the board socket.
4. Line up the smart card alert firmware chip in the socket on the board and press down firmly to seat the chip.  
**Note:** There is a notch or tab on the socket that matches a notch or tab on the chip; match up the notches or tabs to ensure the chip is orientated properly.
5. Remove the U25 chip, which is located above the voice chip. Refer to Figure 7-70.

Figure 7-70: Inserting smart card alert firmware




6. Discard the removed chips according to the operating procedures of your company.

## Installing the daughter board

If you are:

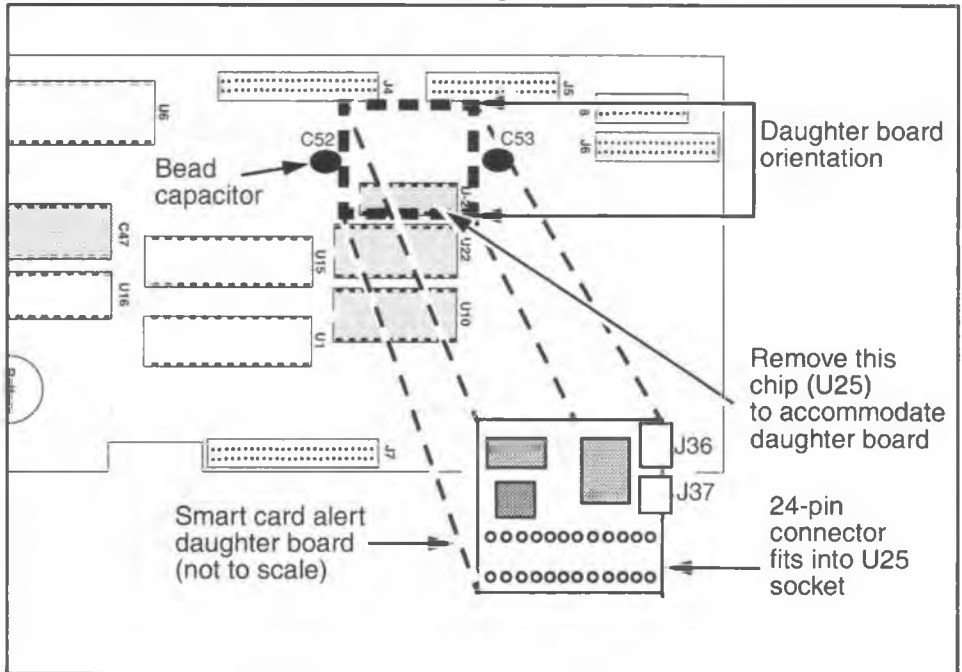
**Replacing a smart card alert board:** Start at Step 1.

**Installing the smart card alert upgrade:** Start at Step 3.

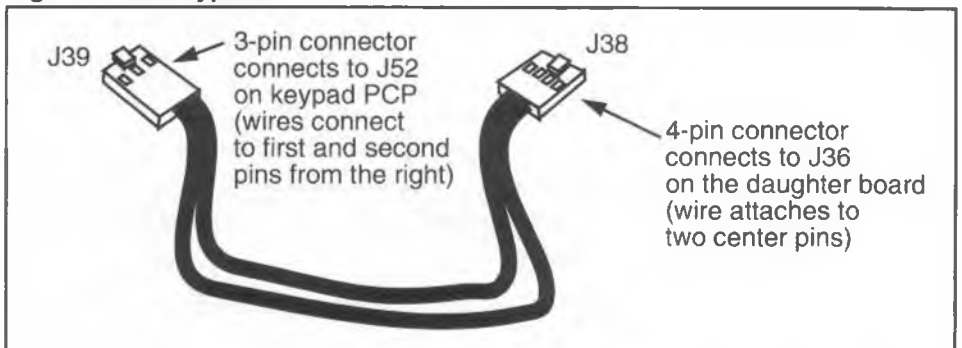
<p><b>Electrostatic discharge (ESD)</b></p> 	<ul style="list-style-type: none"><li>• Connect your ESD wrist strap to the ESD connection points shown in Figure 7-2.</li><li>• Disconnect the power.</li><li>• If you put a PCP down, put it on an anti-static surface or store in an anti-static bag.</li></ul> <p><b>Failure to follow these procedures may damage the electrostatic-sensitive devices.</b></p>
<p><b>Remember to upload CDRs before you start!</b></p>	<ul style="list-style-type: none"><li>• Upload the CDRs to the Millennium Manager if you have to replace the control or telephony PCPs or chips on the control PCP.</li><li>• To upload the CDRs, refer to <b>Preparing the terminal for maintenance</b> at the beginning of this chapter.</li></ul>

1. Prepare the control board on an anti-static surface.
2. Locate the smart card alert daughter board on the control PCP, referring to Figure 7-71, if necessary.
3. Grasp the board by its sides and pull straight up, off the control PCP.
4. Line up the connector on the bottom of the daughter board with the U25 socket and press straight down to firmly seat the board in the socket.  
Be very careful not to bend the connectors when fitting into the socket.



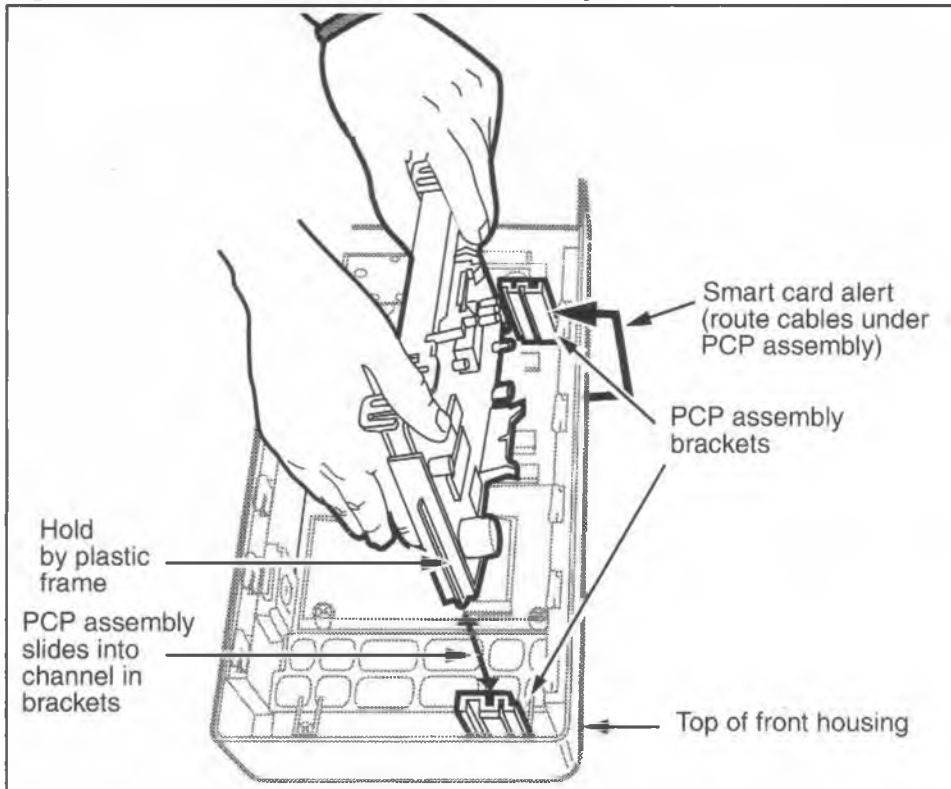
**Figure 7-71: Daughter board positioning on the control PCP**

5. If you have installed a daughter board for the first time, you may need to remove the alerter cable (J16) from its cable clamp in order to get it to reach under the control PCP to reach the daughter board.
6. Connect the J39 end of the keypad interconnect cable, shown in Figure 7-72, to the keypad connector (J52).

**Figure 7-72: Keypad PCP smart card alert cable**

7. Route the cable between the PCP assembly brackets so that the cable will be underneath the PCP assembly when it is replaced. Refer to Figure 7-73.

Figure 7-73: Route cables under PCP assembly



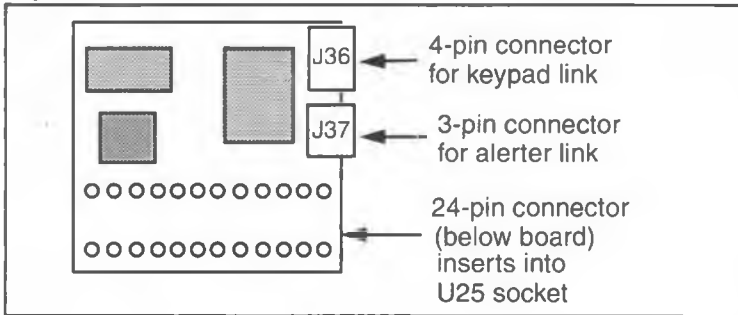
## Restoring the terminal to operation

Do the following to restore the terminal to operation so you can test the smart card alert feature.

1. Replace the control PCP in the PCP assembly, and the PCP assembly in the terminal, as described in **Removing the telephony and control PCP** and **Removing the PCP assembly**.
2. Connect the cable from the alerter module to connector J37 on the smart card alert daughter board.

3. Connect the J38 end of the keypad two-wire cable to connector J36 on the smart card alert daughter board. Refer to Figure 7-74 for daughter board connectors.

**Figure 7-74: Connectors on the smart card alert board**



4. Make sure all the connectors are properly seated.
5. Reconnect the power, close and lock the terminal, and put the terminal back in service by following the steps in **Opening the terminal**.
6. Re-INSTALL the terminal with the **INSTALL terminal-configuration routine** described in Chapter 3.  
*Note:* This step is not necessary if you replaced a smart card alert daughter board.
7. Test the alarm:
  - a) Take the handset off-hook.
  - b) Insert a smart card with a value greater than zero into the card reader.
  - c) Place the handset back on hook.
  - d) When the alarm sounds, remove the smart card.



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## 8 Cleaning the terminal

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On-site terminal maintenance requires:

- cleaning the magnetic read head of the card reader periodically
- clearing debris from the card reader slot as needed
- cleaning the exterior of the terminal
- cleaning debris from the coin guide, validator, and coin assembly as needed

### Cleaning the card reader

There are two aspects of the card reader and bezel which need maintenance attention:

- the read head for the mag stripe cards
- the card slot from the bezel to the reader

### Cleaning the read head

Under normal conditions clean the magnetic read head of the card reader every 1,000 reads or whatever interval the operating company determines.

To clean the head, insert and remove the cleaning card with the magnetic stripe up and to the left.

- Do not swipe the cleaning card more than twice through the card reader, as excessive swiping could result in head damage.
- Discard the card after 100 cleaning operations.

The only way to test the performance of a smart card reader is to make a call. If the reader will not read a valid smart card, replace the card reader as described in **Replacing the card reader** in Chapter 7.

## Clearing the card slot

The card slot is designed to allow debris inserted into it to fall to the bottom of the terminal, out of the way. However, some debris may become trapped in the slot.

If this occurs:

1. If possible, remove the debris through the entry slot.
2. Otherwise, open the terminal and remove the debris from the inside.

For instructions on opening the terminal, see **Accessing the inside of the terminal** in Chapter 7. If it is necessary to replace the card reader, refer **Removing the card reader**, also in Chapter 7. You will not be able to do this unless you have maintenance-level privileges on the craft interface.

**Note:** Do not probe the card reader with a screwdriver or other sharp instrument. If the debris is not easily moveable, replace the card reader.

## Clearing debris from the coin guide slot

If debris gets stuck in the coin guide on the ID bezel:

1. Remove the debris from the coin guide by using a suitable instrument, such as a small knife or tweezers. If the material is too firmly lodged to pull out, refer to Step 2.

**Note:** Do not probe too deeply into the validator, as this could cause damage to the sensors.

2. If you cannot remove the debris from outside the terminal, open it and remove the debris from inside. You need maintenance-level privileges in the craft interface to do this.

For instructions on opening the terminal, refer to **Accessing the inside of the terminal** in Chapter 7. For instructions on clearing out debris or coin jams in the validator, refer to **Coin validator jams** in Chapter 6.

Chapter 6 also contains a section on clearing escrow jams.

## Cleaning the exterior of the terminal

### CAUTION



### Do not:

- use excessive amounts of water or other liquids: if they enter the terminal, damage may occur
- use solvents as cleaners, except where noted
- use chlorinated hydrocarbon-based solvents

The polyester powder coat on some Millennium exterior parts is a high quality, durable finish. However, these parts are subject to abuse.

These are the cleaning and repair procedures to be used on Millennium polyester-painted parts.

**Ink stains:** Alcohol-based solvents can be used, such as isopropanol.

**Scratches:** Scratches less than one-quarter-inch wide can be repaired by brush touch up or spray painting. If the scratches are wider than one-quarter-inch, remove the terminal and send it to an authorized repair location.

**Spray paint graffiti:** Remove the terminal and send it to an authorized repair location.

The other exterior parts can be cleaned as follows.

**Display window:** The window may be cleaned using full strength Windex<sup>®</sup>, Glass Plus<sup>®</sup>, isopropanol, or Fantastik<sup>®</sup> at 20% by volume, or any window cleaner that contains no ketones, halogenated hydrocarbons, esters, strong alkalies, concentrated hydrocarbons, concentrated ammonia solutions, or amines.

**Plated die castings:** The castings may be cleaned using any non-abrasive, non-corrosive cleaner.



## 9 Customer-orderable parts

If an internal component of the terminal is not working properly, the normal procedure is to replace it.

**Note:** For customized components, such as the ID bezel; for terminal keys and locks; and for the most up-to-date codes for documentation, contact your Millennium support person.

### Installation and maintenance hardware

Table 9-1 lists the installation and maintenance hardware required for the Millennium multi-pay terminals.

**Table 9-1: Installation and maintenance hardware**

Part Number	Description
A0858551	<i>Millennium multi-pay terminal installation, operation, and maintenance guide</i> for MTR 1.9 terminals
P0832806	<i>Millennium terminals product guide</i>
P0858572 (English) P0858573 (French)	<i>Millennium terminals troubleshooting guide</i>
M1211	Millennium multi-pay terminal with mag stripe card reader
M1221	Millennium multi-pay terminal with smart card reader
M1231	Millennium multi-pay multi-card terminal

**Table 9-1: Installation and maintenance hardware (continued)**

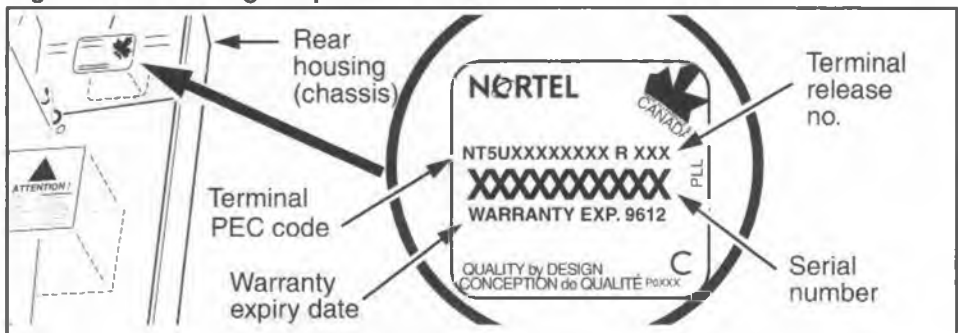
Part Number	Description
A0241119	QBA3A Backboard for wall installations
A0371813	NT5U01AL Spacer kit
<del>P0692050</del>	Spacer
P0719168	Shoulder screw
<del>A0351364</del>	NPS50332-01 L15 Wrist strap
A0351370	NPS51055-01 L1 Knuckle saver
<del>P0532301</del>	Locking tool – L-tool
<del>P0896911</del>	Locking tool – T-tool
R0117488	Lock lubricant (case of 12)
<del>P0713140</del>	Cleaning card
A0398913	NT5U0116 ESD Strap

## Identifying your terminal type

Each terminal has a product ID label located in the top right hand corner on both the inside and outside of the rear housing. The inside location is as shown in Figure 9-1.

This label tells you the type of terminal and the release number, which you may need to refer to when ordering components. This label also has the warranty expiry date of the terminal and the serial number.

**Figure 9-1: Locating the product ID label**



## Orderable parts list

Table 9-2 lists the replaceable components of the Millennium multi-pay terminal which can be ordered by the customer. See Figure 9-2 to Figure 9-4 for exploded and internal views of the terminal, which reference the item number from the table below.

**Table 9-2: Parts list for the Millennium multi-pay terminal**

Item number	Ordering code	Replacement part description
not shown	A0650199	NT5U01AQ: Rain shield kit (multi-pay). Contains 10 each: escrow, card reader, and rear terminal shields
	P0815233	Or shields can be ordered separately: card reader rain shield
	P0821109	escrow rain shield
	P0833351	rear terminal rain diverter

**Table 9-2: Parts list for the Millennium multi-pay terminal (continued)**

Item number	Ordering code	Replacement part description
not shown	P0705943	Card holder group includes: window number card envelope
1	P0712737  A0639468	VFD assembly includes: 1. VFD 1a. plain grommet 1b. ESD shield 7. M3 tapping screw Japanese display
2		Tapping screw (M5)
3		Hexagon nut (M4)
4		Tapping screw (M3.5)
6 13		Machine screw (M3.5) and washer for validator retaining screw
7		Tapping screw (M3)
8		Tapping screw (M5)
9	P0719168	Security screw (0.312-24 x 0.500 in.) (for back plate)
11 11a		Machine screw (0.250-28 x 0.360 in.) for lock assemblies 11a. washer
14		Machine screw (M6) for hinge assembly (short)
15		Machine screw (M6) for coin return retaining screw (long)
16	A0395259	NT5U4105: Hinge assembly includes: 16a. Left hinge support 16b. Right hinge support 16c. Phantom hinge 16d. M3 machine screw (4) 14. M6 machine screw (4)

**Table 9-2: Parts list for the Millennium multi-pay terminal (continued)**

Item number	Ordering code	Replacement part description
17	A0395258	NT5U4104: Cam assembly includes: 17. cam retainer 17a. cam service 49. M3.5 machine screw
18	P0734692	Coin guide
19	P0715848	Coin slot gasket
20	P0712735	Swivel assembly Includes: 20. swivel 20a. swivel bushing 20b. swivel clamp
20c	P0601105	20c. cotter pin 7. 3M tapping screw
21	P0734573 P0749205 A0631786 A0657732	Card reader bezel with (21a) gasket Bezel for magnetic stripe-only card readers Multi-card Canadian terminals Multi-card American terminals card reader boot gasket (21a) in quantities of 50
22	P0712738 A0631463	Card reader, with two M3.5 tapping screws (#4): magnetic stripe card reader multi-card reader reads smart cards and/or magnetic stripe cards.
See Ch. 2	P0814882	Bent card guide (qty. 50) (no-charge item)
23		Printed ID bezel, customer specific includes: 23a. gasket
24	A0640881 A0372381	NT5U4103 hookswitch/alerter bezel assembly with lineswitch PCP and (24a) gasket NT5U01AN lineswitch PCP (not shown in diagram)
25	P0699989	Clamp plate
26	A0638722 A0657732	Window assembly, includes window and (6a) gasket gasket, sold in groups of 50

Table 9-2: Parts list for the Millennium multi-pay terminal (continued)

Item number	Ordering code	Replacement part description
27	P0729511	Link assembly
28	A0372382	NT5U01AM alerter PCP, comes with: (28a) alerter membrane 4. M3.5 tapping screws (2)
29	A0357452 A0644468 A0398685 A0400380	NT5U01AF handset with 0.7 m cord (Canada) Handset with 0.8 m cord (U.S.) NT5U01BA-03 handset with 1.25 m cord NT5U01BC-03 handset with 1.83 m cord
30	P0847457	PCP frame
31	P0726685	PCP frame guide (two pieces)
32	Call your local sales office for order codes.	Replacement control PCPs should be ordered according to the terminal type. The NT number is written on the board. Terminal Type MTR 1.9: NT5U1BD – English/Spanish MTR 1.9: NT5U430BJ – English/French
33	A0651051	telephony PCP
34	P0749355	Main chassis, includes the back plate and the coin apertures
35		Product identification label (on back housing)
36	A0626472	NT5U01BR rear terminal board assembly includes: 49. M3.5 machine screw
not shown	A0378799	CPD13S04P2 Connector (Rear terminal)
37	P0713024	PCP mount for coin vault security PCP and rear terminal PCP

Table 9-2: Parts list for the Millennium multi-pay terminal (continued)

Item number	Ordering code	Replacement part description
38	A0394610  P0712739  A0363360 A0363361 P0700286	NT5U4102 upper bezel assembly includes an integral keypad which is not separately orderable, and: 38a. gasket.  The upper bezel assembly also requires one of the following: Blank dialer bezel for terminals without quick access keys NT5U01AB ten-button quick access keys NT5U01AA five-button quick access keys Quick access keys dialer window
39		NPS50415-04 upper housing assembly lock and key (not shown on diagrams). This item must be ordered separately.
40	A0366934 A0645314	NT5U01AJ coin validator assembly NT5U01EM coin validator without partition
41	A0366935 A0643395	NT5U01AK escrow assembly NT5U01DP escrow assembly with 10 mm screw
42	A0631784	Vault liner assembly includes: 42. vault liner 42a. spring
43	A0372542	NT5U01AV vault security PCP, includes: 6. M3.5 machine screw 37. Mounting plate
44	A0366928	NT5U40AJ vault door assembly
45	A0366930	NT5U40AL coin return assembly
46	A0378533  A0627880 A0626784 A0600332	NPS50415-06 L0-1 coin box lock, includes: 11. 0.250-28 x 0.360 in. machine screw <b>Special ordering conditions apply.</b> NT5U40BB coin box lock with a security plate NT5U40BA lock security (retrofit) kit NPS50415-06 L02 cash box key

Table 9-2: Parts list for the Millennium multi-pay terminal (continued)

Item number	Ordering code	Replacement part description
47	A0372539	NT5U01AW cash box cover. <b>This item must be ordered separately.</b>
48	A0384023	NPS51258-01 L01 cash box. <b>This item must be ordered separately.</b>
shown in Ch. 7	P0847456 P0855467	Coin box rail, replacement (silver-colored) Coin funnel gasket (install for non-Nortel lids)
49		Machine screw (M3.5)
<b>Optional components (not shown on diagram)</b>		
shown in Ch. 7	A0665665	Smart card alert kit: English/French, sold in sets of 10
shown in Ch. 7	A0659731	Datajack APC module (NT5U01FX)
shown in Ch. 7	P0844857	Datajack connector cable (for use with non-APC datajack units)
shown in Ch. 7	A0651459 A0637022	Inferred answer supervision (IAS) modules High-sensitivity module Low-sensitivity module



Figure 9-2: Exploded view, multi-pay terminal front housing

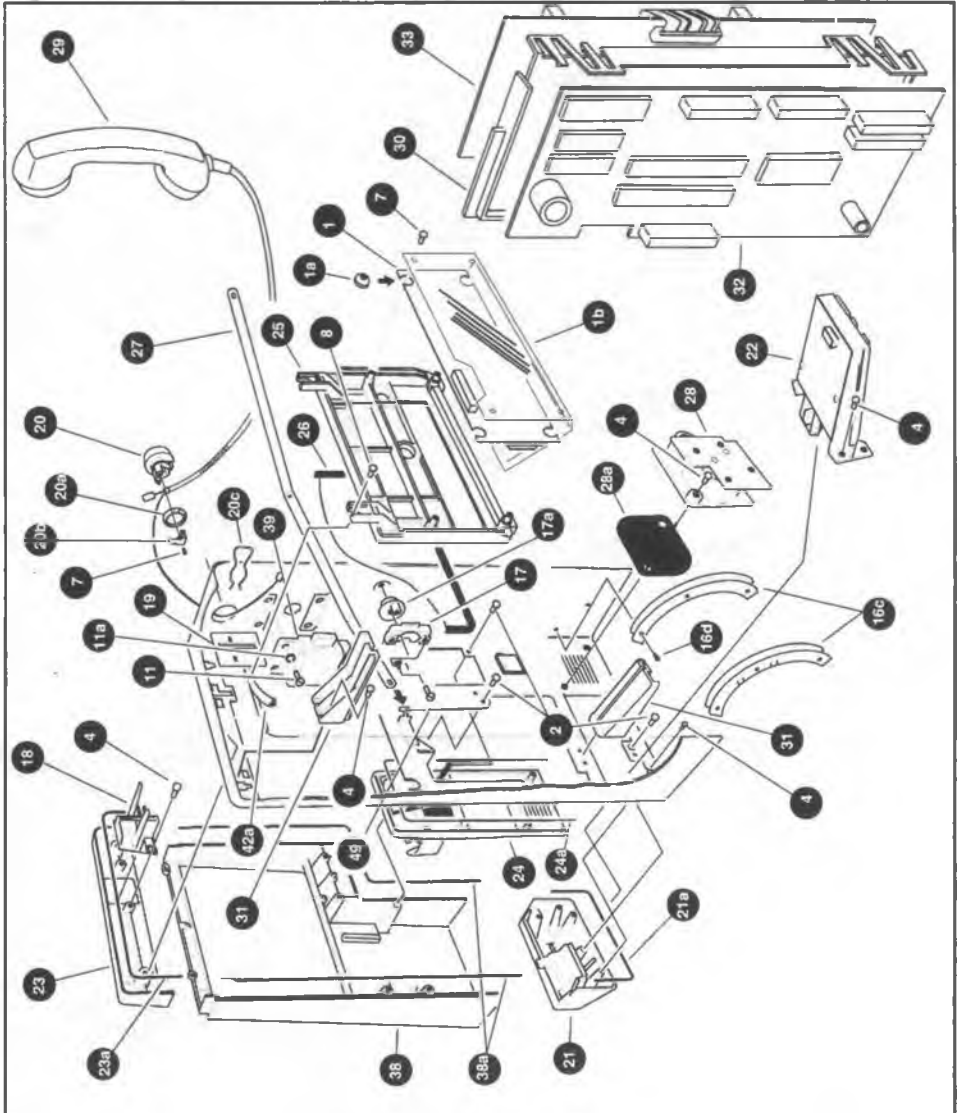


Figure 9-3: Exploded view, multi-pay terminal chassis

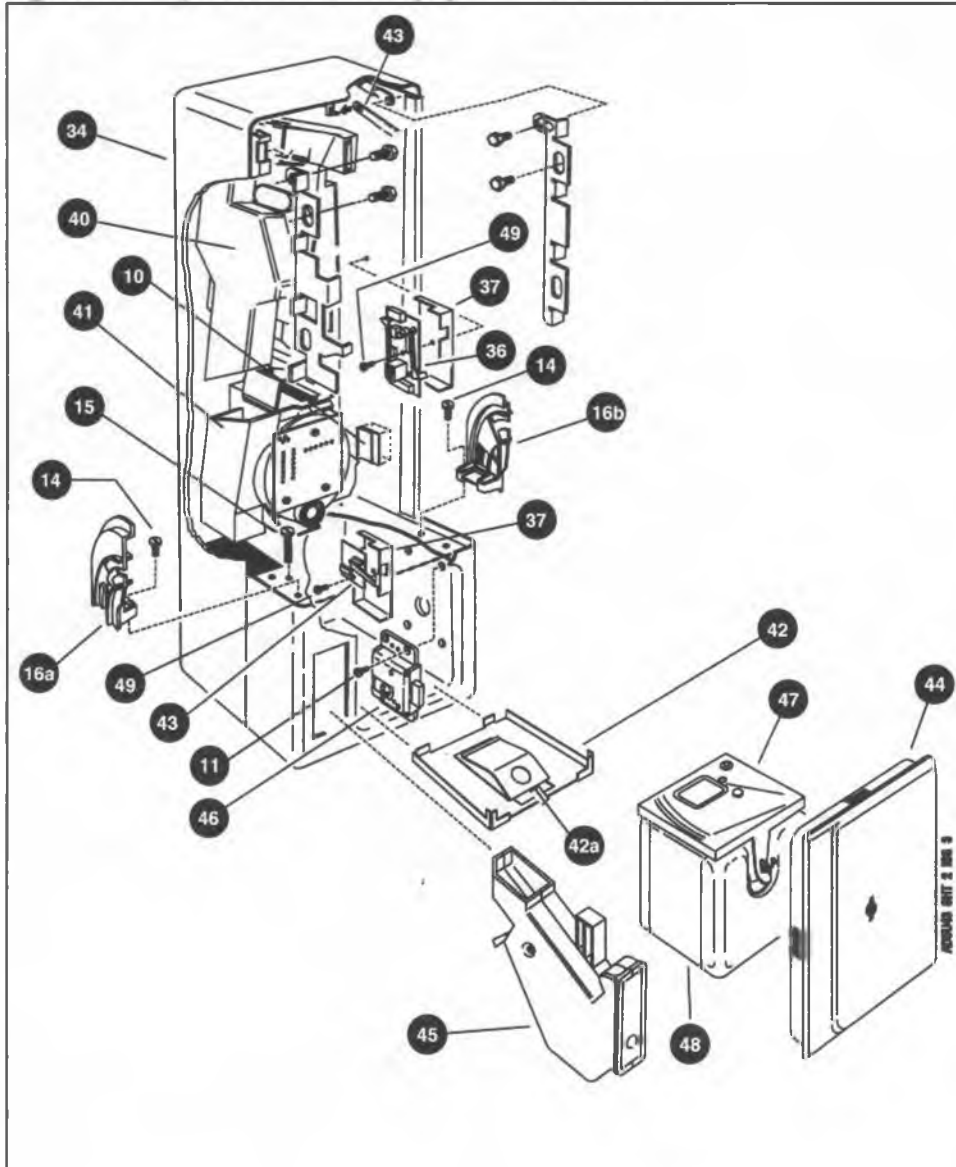
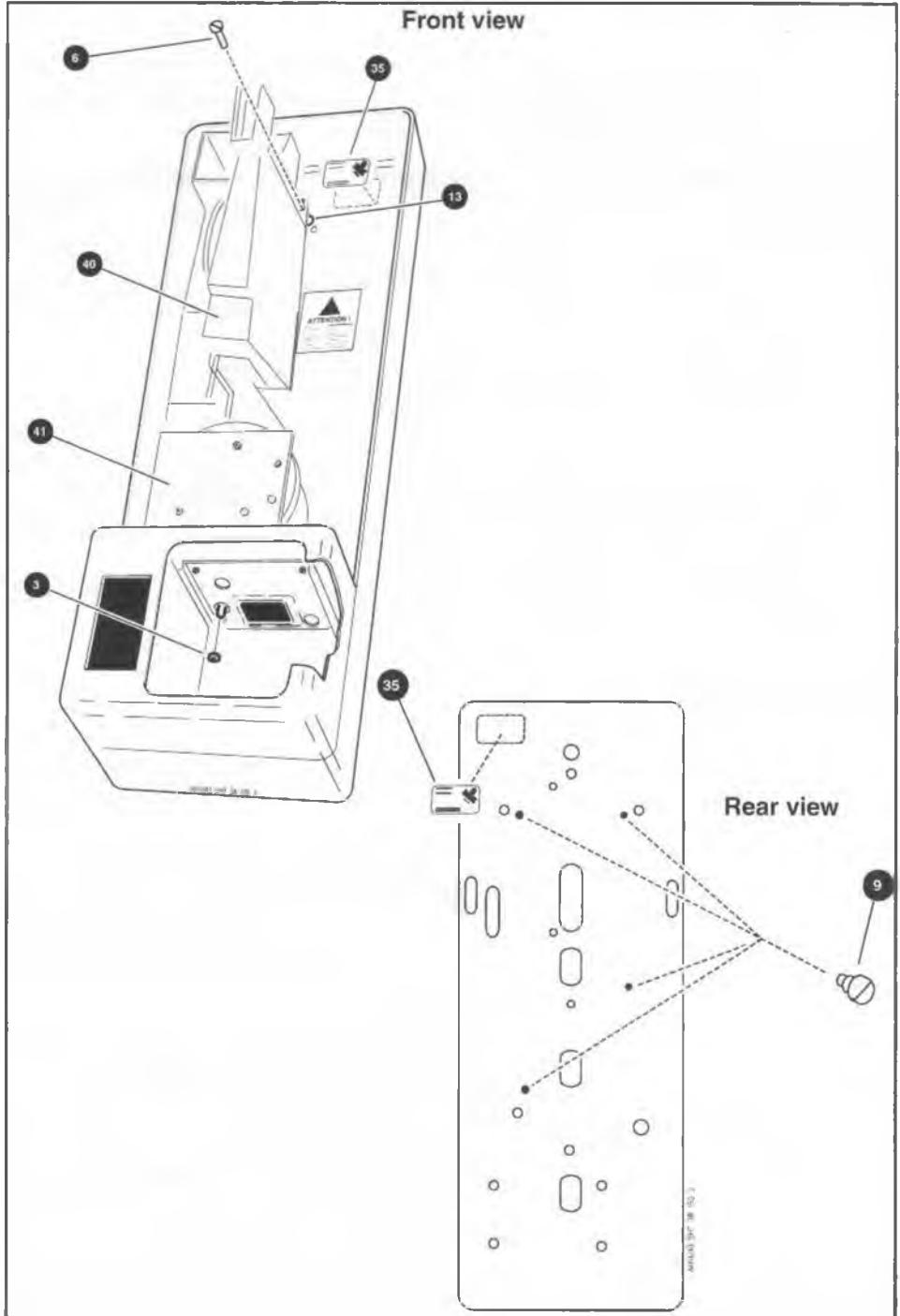


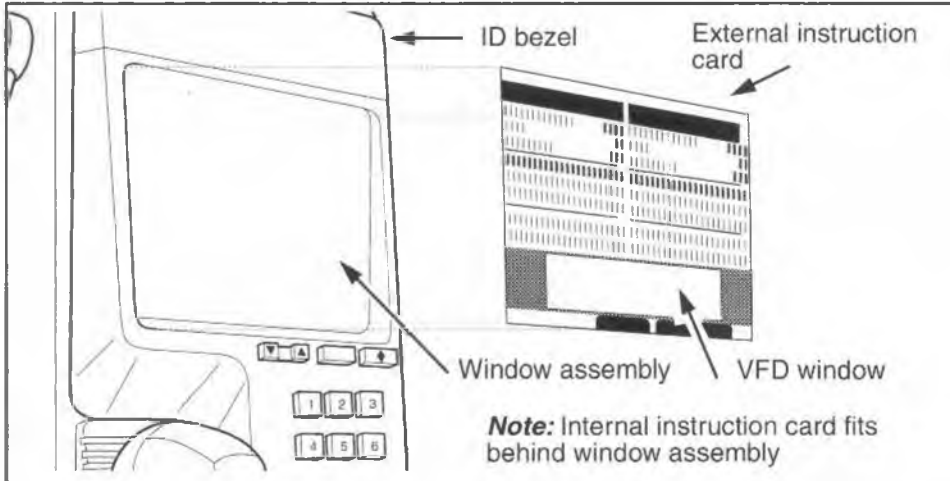
Figure 9-4: Auxiliary view, multi-pay terminal chassis



## Instruction cards

Number cards and internal or external instruction cards are supplied by the operating company. Figure 9-5 shows how the cards are positioned on the terminal.

Figure 9-5: Locating the instruction card in the window assembly



## Printing specifications

These are the recommended printing specifications for the instruction cards:

- **Material:** 0.75 ±0.20 mm thick GE lexan HP92SDB polycarbonate sheet, hardcoat one side, UV stable with a flammability rating of V-2 per UL 94 or approved equivalent.
- **Dimensions** and their tolerances shown about a centre line are symmetrical.
- **Background color:** Pantone 420C (light gray).
- **Print** on the side opposite the hardcoat using a UV stable ink as follows:
  - **Contrast:** P0699990-M1 – 424C (dark gray),
  - **Lines and characters:** P0699990-M2 – 2C (process black).

- **All lettering** must be at least 1 mm from the outer edges.

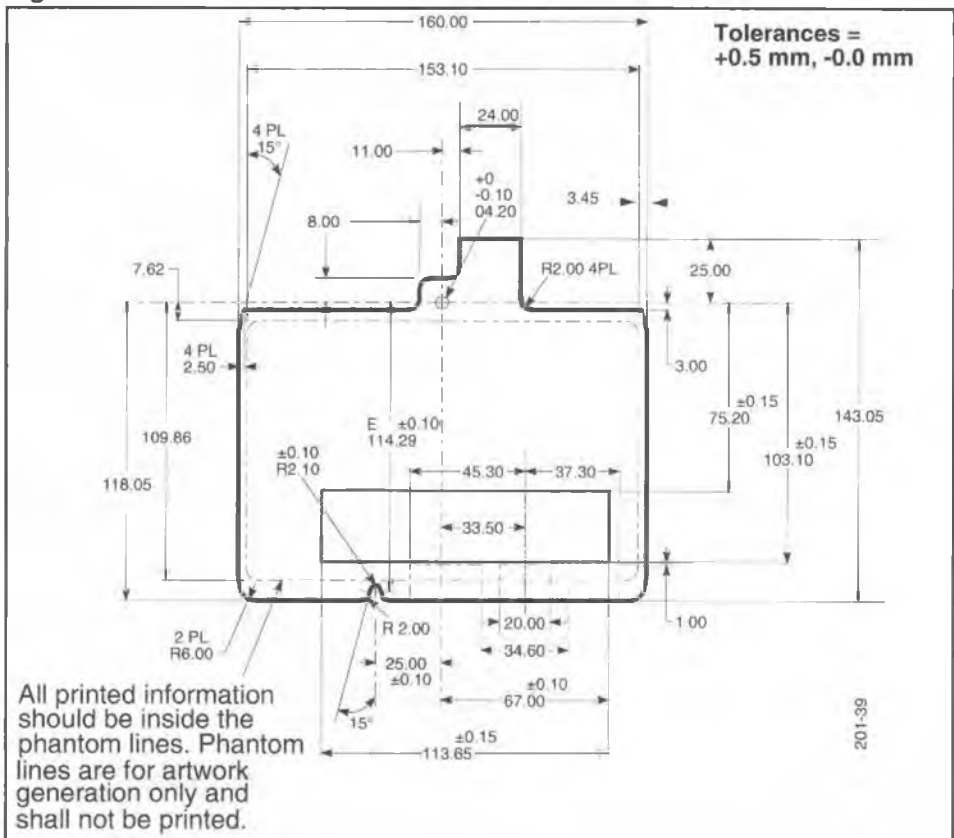
**Note:** The reference pin is for design purposes only.

## Internal instruction card

If internal instruction cards are used, they must have a notch in the lower edge and a hole in the tab at the top, as shown in Figure 9-6. Because of the tight construction of the window and gasket assembly, it is critical that instruction cards be cut to specification. Oversize cards may buckle when installed.

**Note:** Do not use Figure 9-6 as a template; use the measurements to create an original.

Figure 9-6: Dimensions of the internal instruction card



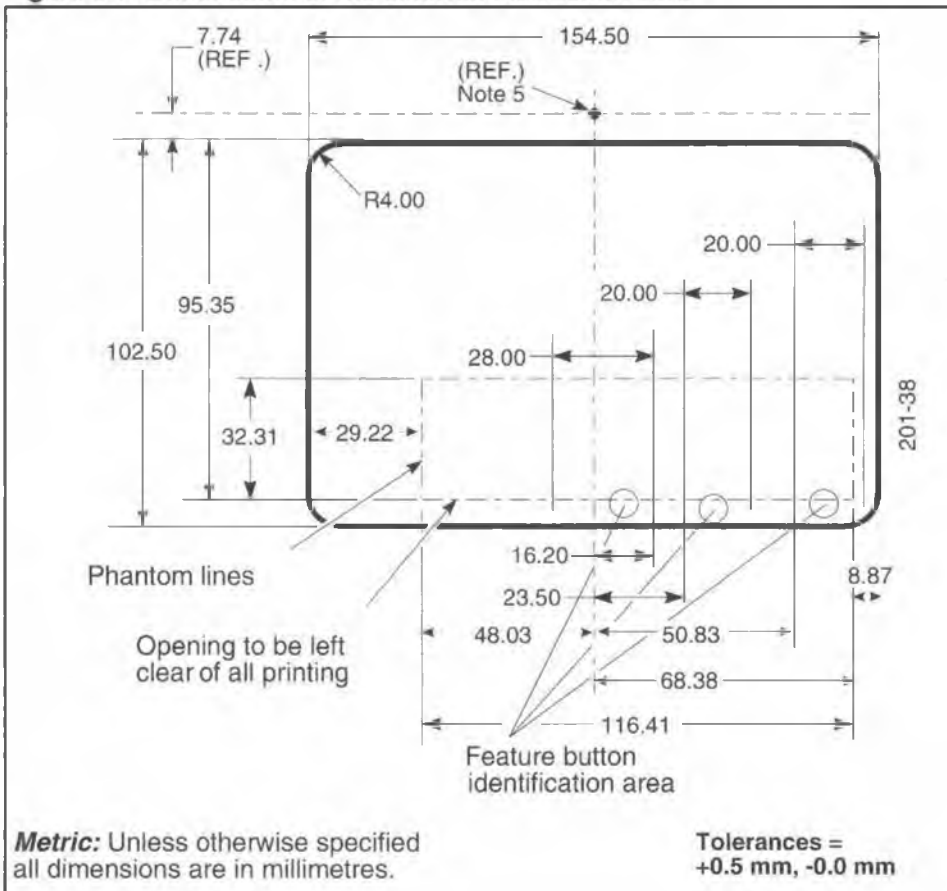
**Note:** Unless otherwise specified, all dimensions are in millimetres. The thickness of the material also should be considered when gauging the fit of the instruction card. The recommended thickness is 0.55 mm.

## External instruction card

Figure 9-7 gives the measurements of the **external instruction card** and shows approximately what it should look like.

**Note:** Do not use Figure 9-7 as a template, use the measurements to create an original.

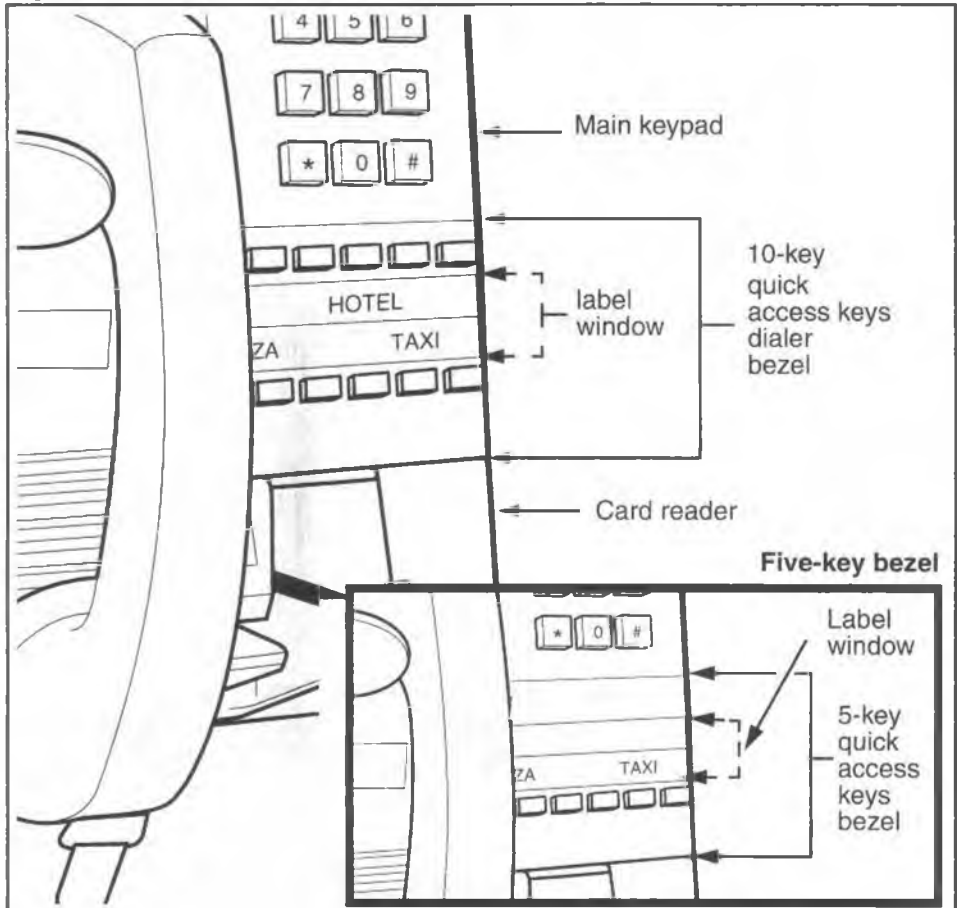
**Figure 9-7: Dimensions of the external instruction card**



## Quick access keys label

The optional quick access keys bezel has a clear plastic window, located between the two rows of keys on a 10-key bezel and above the single row of keys on a five-key bezel. A label card can be inserted behind this window. Refer to Figure 9-8.

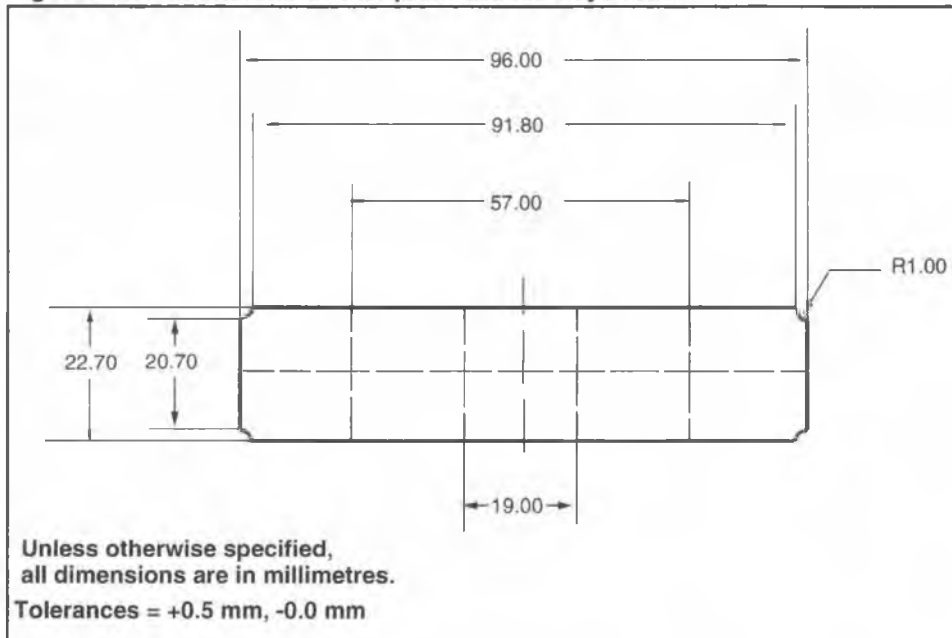
**Figure 9-8: Locating the quick access keys bezel on the terminal**



The label card for the quick access keys is supplied by the customer. The dimensions of the card are indicated in Figure 9-9. Do not use this drawing as a template; it indicates measurements only.

The recommended material for the card is **240M (0.26 mm) Prestige Offset card stock** or the equivalent. Tolerances are indicated on the drawing. The measurements are symmetrical around a center line.

**Figure 9-9: Dimensions of the quick access keys label**



## Tools

Chapter 2 lists the tools and equipment required for installing, maintaining, and testing the multi-pay terminal. Tools are not supplied with the terminal, and must be ordered separately.



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# Appendix A: List of alarms

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Table A-1 lists the alarms issued by the terminal to the Millennium Manager and the appropriate corrective actions.

## Saving CDRs

It is important to upload all CDRs (call detail records) from the terminal before performing maintenance tasks inside the terminal. Although records may not be directly affected by what you are doing, uploading the CDRs assures that the terminal records are up-to-date as of the time of maintenance, should something prevent the terminal from regaining operation.

**Note:** Uploading CDRs also uploads a the cash box status record.

## Before you enter the terminal

To access the inside of the terminal you require maintenance-level privileges, an upper housing key, and a locking tool (T- or L-tool) to access the terminal.

You may need to access the terminal if the terminal is out of service or if you have run the craft interface tests and discovered a faulty component.

- If you know you will be replacing the control PCP or firmware on it, the validator, or the escrow, you will

need to uninstall the terminal before you start replacing parts, then re-INSTALL it when you have completed your tasks.

- If you do not plan to change any of the modules described in the above paragraph, you will not be required to re-INSTALL the terminal when you complete your tasks. However, it is recommended that you still upload the CDRs as a precautionary measure.

**Table A-1: List of alarms**

<b>Alarm code:</b>	The code the Millennium Manager gives to this alarm condition.
<b>Message:</b>	What the code means
<b>Description:</b>	A description of the possible causes of the problem.
<b>Action:</b>	A description of the corrective action to take to return the terminal to service.
<b>0</b>	<b>Message: Handset discontinuity</b>
<b>Description:</b>	<p>Occurs when there is a discontinuity in the handset receive circuit, indicating:</p> <ul style="list-style-type: none"> <li>• a severed handset cord</li> <li>• a handset cord failure</li> <li>• or an unattached connector at the telephony PCP (J15)</li> </ul> <p>Handset continuity is monitored by an electrical continuity check through the receive path while the handset is off-hook. The control PCP checks the telephony PCP status, typically every 60 seconds. If there is a discontinuity, the control PCP notes the failure, but the terminal does not display <b>Out of service</b>. The control PCP monitors the situation for 30 minutes. If 30 consecutive status failures are detected, the terminal displays <b>Out of service</b>, and this alarm goes to the Millennium Manager.</p>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the connector.</li> <li>2. Visually inspect the handset for abuse or vandalism.</li> <li>3. If the problem continues, replace the handset.</li> </ol>

Table A-1: List of alarms (continued)

1	Message: Telephony board not responding
<b>Description:</b>	<p>Occurs when there is a communication problem with the telephony PCP, such as:</p> <ul style="list-style-type: none"> <li>• a control PCP query times out while waiting for a response from the telephony PCP</li> <li>• interprocessor connector, between J2 on the telephony PCP and J17 on the control PCP, is not connected.</li> </ul> <p>When a communication problem is detected, the control PCP attempts to query the telephony PCP four times.</p> <ul style="list-style-type: none"> <li>• If these attempts fail, the alarm is sent immediately to the Millennium Manager and the display indicates <b>Telephony board not responding</b>.</li> <li>• If communication between the control and telephony PCPs resumes, the terminal status returns to normal.</li> </ul> <hr/> <p>When a terminal is first installed, the display may indicate <b>Telephony board not responding</b>.</p> <p>This occurs if the super capacitor on the telephony PCP, which powers the telephony microprocessor, is not charged.</p> <ul style="list-style-type: none"> <li>• The super capacitor is charged from the CO line.</li> <li>• Place the handset on-hook until the capacitor is charged.</li> </ul>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check for sufficient voltage on tip and ring.</li> <li>2. Check the interprocessor connectors.</li> <li>3. Call to verify telephony PCP operation.</li> <li>4. If the problem continues, send the call detail records (CDRs) to the Millennium Manager, replace the telephony PCP, and perform a forced download using menu item 369.</li> </ol>

**Table A-1: List of alarms (continued)**

<b>8</b>	<b>Message: Power fail</b>
<b>Description:</b>	<p>Occurs when the terminal powers up after a power interruption longer than two seconds, with no other errors outstanding.</p> <ul style="list-style-type: none"> <li>• It occurs only when the terminal is fully installed, to prevent false alarms while toggling power during maintenance.</li> <li>• The VFD displays <b>Out of Service</b>, but there is no other visual indication this alarm has been sent.</li> </ul> <p><b>Example:</b> The terminal attempts to contact the Millennium Manager, but gets no response. The terminal continues trying until the retry-attempts threshold is met. The terminal goes out of service. If there is a power interruption during this time, the terminal displays <b>Out of Service</b> and the power fail alarm is sent to the Millennium Manager when communications resumes.</p>
<b>Action:</b>	<p>Check the terminal for abuse or fraud.</p> <p>If the problem continues:</p> <ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Replace the control PCP.</li> <li>3. Perform the INSTALL terminal-configuration routine.</li> </ol>
<b>9</b>	<b>Message: Display not responding</b>
<b>Description:</b>	<p>Occurs when there is a communication problem with the VFD.</p> <ul style="list-style-type: none"> <li>• When the control PCP tries to send characters to the display, the display indicates it is communicating with the control microprocessor.</li> <li>• There is no visual indication on the display that the alarm has been sent. However, this problem may cause the display to freeze and the terminal to go out of service.</li> <li>• Likely causes are a damaged ribbon cable or a defective control PCP.</li> </ul>
<b>Description continues on the next page</b>	

Table A-1: List of alarms (continued)

<b>Alarm 9 (continued)</b>	
<b>Action:</b>	<p>Check the ribbon cable. If it is damaged, replace the display.</p> <p>If the problem continues:</p> <ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Replace the control PCP.</li> <li>3. Perform the INSTALL terminal-configuration routine as described in Chapter 3.</li> </ol>
<b>10 Message: Voice synthesis not responding</b>	
<b>Description:</b>	<p>Occurs when there is a voice prompt problem.</p> <p>This could be caused by the voice chip, U10 on the control PCP, being damaged or not being fully seated in its socket.</p>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check that the voice chip is fully seated.</li> <li>2. Visually inspect the voice chip for damage.</li> </ol> <p>If the problem continues:</p> <ul style="list-style-type: none"> <li>• Send the CDRs to the Millennium Manager.</li> <li>• Replace the control PCP.</li> <li>• Perform the INSTALL terminal-configuration routine.</li> </ul>
<b>12 Message: Card Reader blocked alarm</b>	
<b>Description:</b>	<p>Occurs when one or both of the card reader sensors are activated on-hook or in the off-hook-idle state.</p> <p>If the obstruction is removed, the terminal sends an unalarm to the Millennium Manager.</p>
<b>Action:</b>	<p>If the alarm does not clear itself, check the card reader for a forgotten card or debris.</p>

**Table A-1: List of alarms (continued)**

<b>16, 17, 18, 19</b>	<b>Message: CDR checksum error, statistics checksum error, terminal table checksum error, other data checksum error</b>
<b>Description:</b>	These alarms are caused when data on the control PCP has been damaged.
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Perform a memory check by entering 636 or MEM from the maintenance level menu.</li> <li>2. If the check fails: <ul style="list-style-type: none"> <li>• Send the CDRs to the Millennium Manager.</li> <li>• Replace the control PCP.</li> <li>• Perform the INSTALL terminal-configuration routine, described in Chapter 3.</li> </ul> </li> <li>3. If the check works, the terminal should be monitored for additional alarms.</li> <li>4. If another alarm gets generated, replace the control PCP.</li> </ol>
<b>20</b>	<b>Message: CDR list full</b>
<b>Description:</b>	<p>Occurs when the call detail record (CDR) list is full.</p> <ul style="list-style-type: none"> <li>• The CDR threshold typically is set to 80% to prevent this alarm.</li> <li>• When the threshold is reached, the terminal calls the Millennium Manager to upload the CDRs.</li> <li>• If the terminal is unable to call in, and the CDR list is full, the terminal goes out of service.</li> <li>• The terminal tries to call in periodically. When it succeeds, it sends the alarm and uploads the CDRs.</li> <li>• The terminal remains out of service until the list is uploaded.</li> </ul>
<b>Action:</b>	None

Table A-1: List of alarms (continued)

<b>21</b>	<b>Message: Bad EEPROM</b>
<b>Description:</b>	<p>Occurs when the terminal fails to read and write to the EEPROM on the control PCP.</p> <ul style="list-style-type: none"> <li>• EEPROM is memory that does not require power to maintain data.</li> <li>• Data stored in EEPROM includes the Millennium Manager and terminal telephone numbers.</li> </ul>
<b>Action:</b>	<p>Check the connectors to the control PCP.</p> <p>If the problem continues:</p> <ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Replace the control PCP.</li> <li>3. Perform the INSTALL terminal-configuration routine, as described in Chapter 3.</li> </ol>
<b>22</b>	<b>Message: Control microprocessor RAM contents lost</b>
<b>Description:</b>	<p>Occurs when a terminal memory test, run in the idle state, results in a checksum error, indicating memory corruption by:</p> <ul style="list-style-type: none"> <li>• a loss of supplementary power and super capacitor backup, or</li> <li>• a control PCP firmware chip problem.</li> </ul>
<b>Action:</b>	<p>Perform a memory check by entering 636 or MEM from the maintenance level menu.</p> <p>If the problem continues:</p> <ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Replace the control PCP.</li> <li>3. Perform the INSTALL terminal-configuration routine, as described in Chapter 3.</li> </ol>

**Table A-1: List of alarms (continued)**

<b>23</b>	<b>Message: Control microprocessor RAM defective</b>
<b>Description:</b>	<p>Occurs when the terminal fails a memory test to write data to a block of memory and read it back.</p> <p>The test is done during powerup and idle states.</p>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Replace the control PCP.</li> <li>3. Perform the INSTALL terminal-configuration routine, as described in Chapter 3.</li> </ol>
<b>24</b>	<b>Message: Station access cover open</b>
<b>Description:</b>	<p>Occurs when the front housing is opened without first entering an access code and personal identification number (PIN).</p> <ul style="list-style-type: none"> <li>• The alarm also occurs if a craftsman did not wait for the Mondex records to upload before opening the terminal.</li> <li>• A defective switch or actuator on the rear terminal board, which controls the alarm, can also trigger the alarm.</li> <li>• When this happens the <b>Alarm Sent Cover Open</b> prompt is displayed although the terminal is locked and the switch circuit is closed.</li> </ul> <p><b>Fraud alert:</b> This alarm could also indicate illegal entry of the housing by unauthorized persons.</p>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the terminal for abuse and vandalism.</li> <li>2. Check that the bolts holding the chrome-plated strike plates are fully seated and the plates are engaging the actuator.</li> <li>3. If the problem continues, replace the rear terminal board.</li> </ol>



Table A-1: List of alarms (continued)

<b>25</b>	<b>Message: Stuck button</b>
<b>Description:</b>	<p>Occurs when a terminal in the idle state detects a malfunctioning or stuck button.</p> <ul style="list-style-type: none"> <li>• When this problem is detected, the terminal monitors the situation, typically every minute for 30 minutes.</li> <li>• When the problem is verified, the terminal goes out of service and the alarm is sent to the Millennium Manager.</li> <li>• The situation is checked every minute and the terminal resumes normal operation when the problem is corrected.</li> </ul>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the operation of all buttons to determine if debris or other foreign material is present.</li> <li>2. Clean the buttons by spraying them with a water solution.</li> <li>3. If the problem continues: <ul style="list-style-type: none"> <li>• Check the ribbon cable from the keypad.</li> <li>• If the cable is damaged, replace the keypad.</li> </ul> </li> </ol>
<b>26</b>	<b>Message: Set removal</b>
<b>Description:</b>	<p>Occurs when the terminal is removed without an access code and PIN code being entered first.</p> <p>An unauthorized person may be tampering with the terminal. Not all terminals have this switch, which is located on the rear terminal housing.</p>
<b>Action:</b>	<p>Check the terminal.</p> <ul style="list-style-type: none"> <li>• If the set removal switch is defective, replace the rear terminal board.</li> <li>• If the switch actuator cannot operate due to a recess or cutout, place a clip inside the main housing behind the actuator to bypass the switch.</li> <li>• Contact your technical support person for information on bypassing the set removal switch.</li> </ul>

Table A-1: List of alarms (continued)

<b>27</b>	<b>Message: Cash box threshold met</b>
<b>Description:</b>	<p>Occurs when the volume of the coin box reaches the predetermined threshold.</p> <ul style="list-style-type: none"> <li>• The coin box threshold is downloaded to the terminal and is typically set to 70% to 80% of the coin box capacity.</li> <li>• The terminal maintains normal operation, despite the alarm.</li> </ul>
<b>Action:</b>	<p>Arrange for a coin box collection.</p>
<b>28</b>	<b>Message: Coin box cover opened</b>
<b>Description:</b>	<p>Occurs when the coin compartment lock is unlocked longer than the time-out period.</p> <ul style="list-style-type: none"> <li>• A switch on the vault security PCP controls this alarm.</li> <li>• The time-out period on this alarm ensures it is not generated by a valid coin box collection.</li> <li>• The length of the time-out is downloaded.</li> </ul>
<b>Action:</b>	<p>Check the terminal for abuse and vandalism. If the problem continues, replace the vault security PCP.</p> <p><i>Note:</i> When the vault security P CP is replaced, it may be necessary to adjust the switch actuator so the switch operates properly when the coin box cover is locked and unlocked.</p>
<b>29</b>	<b>Message: Cash box removed</b>
<b>Description:</b>	<p>Occurs when the coin box is removed without unlocking the coin compartment lock.</p> <ul style="list-style-type: none"> <li>• When the coin box is removed without the coin compartment lock being unlocked, the terminal goes out of service and the alarm is generated.</li> <li>• This alarm may be generated accidentally by a collector if the coin vault lock is locked before the coin box is replaced.</li> <li>• The alarm may also occur if the coin box is damaged and does not contact the switch actuator.</li> </ul>
<b>Description continues on the next page</b>	

Table A-1: List of alarms (continued)

<b>Alarm 29 (continued)</b>	
<b>Action:</b>	<ul style="list-style-type: none"> <li>This alarm is triggered by a switch on the vault security board, in the coin vault.</li> </ul> <hr/> <ul style="list-style-type: none"> <li>Check the terminal for abuse and vandalism.</li> <li>Check that the coin box is fully pushed into the vault area and engaging the switch actuator.</li> <li>If the problem continues, replace the vault security board.</li> </ul>
<b>30</b>	<b>Message: Cash box full</b>
<b>Description:</b>	<p>Occurs while the terminal is in the on-hook or idle state.</p> <ul style="list-style-type: none"> <li>It follows a coin box threshold alarm, alarm 27.</li> <li>When this alarm is sent, the terminal goes out of service and displays <b>Coin Service not Available</b>.</li> </ul> <p>This alarm is caused by one of two conditions:</p> <ul style="list-style-type: none"> <li>the coin box volume is greater than 100% full</li> <li>the coin box threshold has been met and a coin jam occurs at the coin sensor or bucket sensors in the escrow assembly.</li> </ul>
<b>Action:</b>	<p>If the terminal displays <b>Coin Service not Available</b>, yet a coin jam cannot be found, nor is the coin box full, contact the Millennium Manager support person to check the volume of the coin box.</p> <ul style="list-style-type: none"> <li>The terminal determines the contents of the coin box by calculating the volume.</li> <li>If the switch which detects the presence of the coin box is defective, the terminal may not have noted the last collection.</li> </ul> <p>The terminal will not return to normal operation until it can detect a valid collection. To do so, replace the coin box vault door as described in Chapter 7.</p>

Table A-1: List of alarms (continued)

<b>31</b>	<b>Message: Validator jam</b>
<b>Description:</b>	<p>Occurs when the validator detects a blockage or coin jam near one of the two sensors or if there is a defective sensor.</p> <ul style="list-style-type: none"> <li>• one sensor is inside the top of the validator</li> <li>• the other is in front of the actuator.</li> </ul> <p>If either sensor is blocked, the terminal monitors it for a short time. If it does not clear, the terminal displays <b>Card Service Available</b> and sends the alarm to the Millennium Manager. If the blockage is subsequently cleared, the terminal returns to normal.</p>
<b>Action:</b>	<p>Check the validator for blockages of debris or jammed coins. If the problem continues:</p> <ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Replace the control PCP.</li> <li>3. Perform the INSTALL routine, as described in Chapter 3.</li> </ol>
<b>32</b>	<b>Message: Escrow jam</b>
<b>Description:</b>	<p>Occurs when the escrow detects a blockage or coin jam near one of five sensors or if there is a defective sensor.</p> <ul style="list-style-type: none"> <li>• One sensor is at the top opening in the escrow.</li> <li>• One is at each exit opening in the bottom of the escrow.</li> <li>• Two sensors are used to detect the position of the escrow bucket.</li> </ul> <p>If the escrow detects a blockage at any sensor, the terminal monitors it for a short time.</p> <ul style="list-style-type: none"> <li>• If the blockage does not clear, the terminal displays <b>Card Service Available</b> and sends the alarm to the Millennium Manager.</li> <li>• When the escrow detects a blockage it will cycle the motor in an attempt to clear the blockage. This continues even after the terminal displays <b>Card Service Available</b>.</li> <li>• If the blockage clears, the terminal returns to normal.</li> </ul>
<b>Action continues on the next page</b>	

Table A-1: List of alarms (continued)

<b>Alarm 32 (continued)</b>	
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the escrow for blockages caused by debris or jammed coins.</li> <li>2. Check the ribbon cable which connects the escrow to the validator for damage.</li> </ol> <p>If the problem continues:</p> <ul style="list-style-type: none"> <li>• Send the CDRs to the Millennium Manager.</li> <li>• Replace the control PCP.</li> <li>• Perform the INSTALL terminal-configuration routine, as described in Chapter 3.</li> </ul>
<b>33</b>	<b>Message: Validator hardware failure</b>
<b>Description:</b>	<p>When the terminal is installed, the light levels inside the coin unit are set and stored as a checksum in the validator.</p> <p>The alarm occurs when the validator detects that this checksum has been corrupted.</p>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Send the CDRs to the Millennium Manager.</li> <li>2. Perform the INSTALL terminal-configuration routine.</li> <li>3. If the problem continues, it indicates there is a memory problem in the validator, which should be replaced.</li> </ol>
<b>34</b>	<b>Message: Central office (CO) line check failure</b>
<b>Description:</b>	<p>Occurs when the terminal fails to detect a dial tone.</p> <ul style="list-style-type: none"> <li>• When the terminal goes off-hook, it performs a dial tone test.</li> <li>• The terminal notes test failures and monitors the situation.</li> <li>• After the allowable number of failures, the alarm is generated and the terminal displays <b>out of service</b> until dial tone is restored.</li> <li>• The allowable number of failures is downloaded from the Millennium Manager.</li> </ul>
<b>Action continues on the next page</b>	

**Table A-1: List of alarms (continued)**

<b>Alarm 34 (continued)</b>	
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the CO line for adequate voltage and dial tone.</li> <li>2. If there is voltage, but no dial tone, check the cables.</li> <li>3. Check the connections to the rear terminal board, the control PCP, and the telephony PCP.</li> <li>4. Check the handset by connecting a test unit to the telephony PCP and performing the CO line test.</li> <li>5. Check the rear terminal board by connecting J28 to the test unit, connecting the test unit to the control PCP and performing a CO line test.</li> </ol> <p>If the problem continues:</p> <ul style="list-style-type: none"> <li>• Send the CDRs to the Millennium Manager.</li> <li>• Replace the telephony PCP.</li> <li>• Perform a forced download (menu item 369).</li> </ul>
<b>35</b>	<b>Message: Dialog failure</b>
<b>Description:</b>	<p>Occurs after the terminal fails to complete a call to the Millennium Manager after the allowable number of failures.</p> <p>Possible problems include:</p> <ul style="list-style-type: none"> <li>• Modems may all be busy.</li> <li>• Millennium Manager may be down,</li> <li>• The terminal may have a control board problem.</li> </ul>
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check that the terminal is dialing the correct Millennium Manager number.</li> <li>2. Wait a few minutes and initiate a data call to determine if the modem answers. The modems may have all been busy.</li> <li>3. If the modem still does not answer, contact the Millennium Manager system clerk to check the status of the system.</li> <li>4. Check the central office line for tip and ring ground, tip/ring cross, and other line faults which can cause data communication problems.</li> </ol>
<b>Action continues on the next page</b>	

Table A-1: List of alarms (continued)


<b>Alarm 35 (continued)</b>	
	<p>5. If none of the above work, try reinstalling the terminal using an alternate Millennium Manager number. However, at this point, any CDRs resident in the memory at the time of the failure will be lost. This event should be reported to the system administrator.</p> <p>6. If the alternate Millennium Manager cannot be contacted, either, it could indicate a faulty modem chip; replace the control PCP.</p>
<b>Message: Un-alarm</b>	
<b>Description:</b>	<p>This un-alarm message is sent automatically to the Millennium Manager when the terminal returns to normal after being <b>Out of Service</b> or <b>Coin Service Available</b>.</p> <ul style="list-style-type: none"> <li>• This alarm will not occur if the terminal is upgraded from <b>Out of Service</b> to <b>Card Service Available</b>.</li> <li>• Information alarms do not cause an un-alarm when cleared.</li> <li>• Informational alarms are those which do not put the terminal out of service.</li> </ul>
<b>Action:</b>	None





## Appendix B: Error codes

Table B-1 lists the error codes found in the craft interface.

<p><b>Electrostatic discharge (ESD)</b></p>  <p>Failure to follow these procedures may damage the electrostatic-sensitive components.</p>	<ul style="list-style-type: none"> <li>• When doing maintenance inside the terminal, prevent damage to the electrostatic-sensitive devices by wearing your ESD wrist strap. Connect it to the ESD connection points shown in Figure 7-2. The strike plates, for instance.</li> <li>• Before removing boards, disconnect the rear terminal board cable (J18) from the control PCP connector (J5). <b>Do not reconnect J18 to J5 until the end of your maintenance session and you are ready to close the terminal.</b></li> <li>• If you put a module down outside the terminal, put it on an anti-static surface or into an anti-static bag. <b>Do not put boards on top of each other.</b></li> </ul>
<p><b>Remember to upload CDRs before you start!</b></p>	<ul style="list-style-type: none"> <li>• If you are going to do any major work on the inside of the terminal, upload the CDRs to the Millennium Manager before you start.</li> <li>• <b>This is imperative if you have to replace the control or telephony PCPs or the firmware chips on the control PCP, the validator or the escrow.</b></li> <li>• To send the CDRs to the Millennium Manager, see <b>Accessing the initial prompt</b> and <b>Sending CDRs to the Millennium Manager</b> in Chapter 7.</li> </ul>

**Note:**When you replace the control PCP or firmware, or the escrow or validator, always run the INSTALL terminal-configuration routine.

**Note:**When you replace the telephony PCP, perform a forced download to repopulate the telephony memory with the power fail telephone numbers.

**Table B-1: Craft interface error code descriptions**

<b>The error code number that displays on the VFD</b>	
<b>Encountered during:</b>	When this error is likely to occur.
<b>Description:</b>	What the error is about
<b>Action:</b>	What you need to do to return the terminal to service.
<b>00</b>	
<b>Encountered during:</b>	All tests.
<b>Description:</b>	Indicates the test passed with no problems.
<b>Action:</b>	None
<b>11</b>	
<b>Encountered during:</b>	Memory check, restricted mode. Usually occurs when there is a software checksum error.
<b>Description:</b>	Indicates a non-fatal board memory error.
<b>Action:</b>	None. The error is self-clearing. If it does not clear, perform a reinstall.
<b>12</b>	
<b>Encountered during:</b>	Memory check, restricted mode.
<b>Description:</b>	Indicates a non-recoverable error in the terminal; for example, physical damage to the RAM.
<b>Action:</b>	Replace the control printed-circuit pack (PCP).

Table B-1: Craft interface error code descriptions (continued)

<b>21</b>	
<b>Encountered during:</b>	Call to the Millennium Manager.
<b>Description:</b>	Indicates no dial tone. Usually occurs during the call setup table download.
<b>Action:</b>	Check for dial tone. Refer to troubleshooting descriptions in Chapter 6.
<b>22</b>	
<b>Encountered during:</b>	Call to the Millennium Manager.
<b>Description:</b>	Indicates the destination Millennium Manager or modem pool is busy. Usually occurs during the call set-up when obtaining a table download.
<b>Action</b>	<ol style="list-style-type: none"> <li>1. Try calling again. If, after several attempts, the problem persists, call the Millennium Manager directly and listen for a modem tone. Once the modem tone is heard, retry the table download.</li> <li>2. If the download is still unsuccessful, replace the control PCP.</li> <li>3. If the modem tone cannot be heard, the problem is not in the terminal. Contact the Millennium Manager system administrator to confirm that the system and modems are operating properly.</li> </ol>
<b>23</b>	
<b>Encountered during:</b>	Call to the Millennium Manager.
<b>Description:</b>	Indicates the carrier was lost. <ul style="list-style-type: none"> <li>• Usually occurs during the call set-up when obtaining a table download.</li> <li>• The terminal was connected to the Millennium Manager, but the Millennium Manager dropped the carrier.</li> </ul>
<b>Action continues on the next page</b>	

**Table B-1: Craft interface error code descriptions (continued)**

<b>Error code 23</b>	
<b>Action</b>	<ol style="list-style-type: none"> <li>1. Try calling again.</li> <li>2. If after several attempts the problem persists, call the Millennium Manager system manager and/or the network personnel to confirm that the Millennium Manager, modems, and CO line are operating.</li> <li>3. If the download is still unsuccessful, replace the control PCP.</li> </ol>
<b>24</b>	
<b>Encountered during:</b>	Call to the Millennium Manager.
<b>Description:</b>	Indicates a data transmission problem with the Millennium Manager.
<b>Action</b>	<ol style="list-style-type: none"> <li>1. Try calling again. Normally, if the data is corrupted, the Millennium Manager/terminal combination retries the data transmission until it receives the correct data.</li> <li>2. If after several attempts the problem persists, contact the Millennium Manager system manager to confirm the system configurations.</li> <li>3. If the download is still unsuccessful, replace the control PCP.</li> </ol>
<b>25</b>	
<b>Encountered during:</b>	<p>Call to the Millennium Manager.</p> <p>Usually occurs during the call set-up when obtaining a table download.</p>
<b>Description:</b>	Indicates that the Millennium Manager failed to answer the call and the terminal wait time has expired.
<b>Action:</b>	Refer to the action for <b>error code 23</b> .

Table B-1: Craft interface error code descriptions (continued)

<b>26</b>	
<b>Encountered during:</b>	Call to Millennium Manager. Usually occurs during the call set-up when obtaining a table download.
<b>Description:</b>	Indicates there is no ring-back signal.
<b>Action:</b>	Refer to the action for <b>error code 23</b> .
<b>31</b>	
<b>Encountered during:</b>	Millennium Manager download.
<b>Description:</b>	The terminal requested an abort command.
<b>Action:</b>	Refer to the action for <b>error code 23</b> .
<b>32</b>	
<b>Encountered during:</b>	Millennium Manager download, installation mode only.
<b>Description:</b>	Indicates an incorrect terminal download was received from the Millennium Manager. For example, a download for a card terminal was received for a multi-pay terminal.
<b>Action:</b>	Contact the Millennium Manager system manager and confirm the telephone number of the terminal and the Millennium Manager setup.
<b>33</b>	
<b>Encountered during:</b>	Millennium Manager download.
<b>Description:</b>	Indicates an attention call-back was received during the download process.
<b>Action:</b>	None. The terminal will call in when returned to service.

**Table B-1: Craft interface error code descriptions (continued)**

<b>34</b>	
<b>Encountered during:</b>	Millennium Manager download, installation mode. Occurs when a table the terminal requires is not downloaded from the Millennium Manager.
<b>Description:</b>	Indicates a terminal will not go into service unless its tables are downloaded.
<b>Action:</b>	Contact the Millennium Manager system manager to confirm that the Millennium Manager is configured properly for the terminal.
<b>35</b>	
<b>Encountered during:</b>	Millennium Manager download, installation mode.
<b>Description:</b>	Indicates the CDRs are still present after the download was completed.
<b>Action:</b>	Retry the download.
<b>36</b>	
<b>Encountered during:</b>	Millennium Manager download.
<b>Description:</b>	Indicates a program logic error occurred.
<b>Action:</b>	Retry the download.
<b>41</b>	
<b>Encountered during:</b>	Central-office (CO) line check.
<b>Description:</b>	Indicates no voltage is present.
<b>Action</b>	<ol style="list-style-type: none"> <li>1. Check the CO line for voltage.</li> <li>2. If the line is okay, check that the handset plug is fully seated in the jack on the telephony PCP, and the tip/ring connections are secure.</li> <li>3. If the line voltage has been lost, see the section on CO troubleshooting in Chapter 6.</li> </ol>

Table B-1: Craft interface error code descriptions (continued)

<b>42</b>	
<b>Encountered during:</b>	Central office line check.
<b>Description:</b>	Indicates the CO line test failed because there is no dial tone.
<b>Action:</b>	<p>Check the CO line coming into the terminal for dial tone.</p> <p>If the line is okay, check that the handset plug is fully seated in the jack on the telephony PCP, and that the tip/ring connections are secure on the rear terminal PCP.</p> <p>If the dial tone has been lost see the section on CO troubleshooting in Chapter 6.</p>
<b>51</b>	
<b>Encountered during:</b>	Answer supervision test, installation or restricted mode – code 267.
<b>Description:</b>	Indicates the answer supervision test failed.
<b>Action</b>	<ol style="list-style-type: none"> <li>1. Retry the answer supervision test.</li> <li>2. If after several attempts the problem still persists, contact the Millennium Manager system manager to confirm that the system is operating.</li> <li>3. If this is not the problem, contact the network manager to confirm that answer supervision options are selected on the switch (RMR, RMT).</li> <li>4. If this does not correct the problem, replace the handset and, if necessary, the telephony or control PCP.</li> </ol>

**Table B-1: Craft interface error code descriptions (continued)**

<b>61</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	A coin validator error has occurred.
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the cable connections to the escrow unit and control PCP.</li> <li>2. Retry the test.</li> <li>3. If the problem persists, replace the coin validator and, if necessary, the escrow unit.</li> </ol>
<b>62</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	Valid but incorrect coin type.
<b>Action:</b>	<p>Retry using several different coins.</p> <p>If the problem persists, replace the coin validator.</p>
<b>63</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	Invalid coin.
<b>Action:</b>	<p>Retry using several different coins.</p> <p>If the problem persists, replace the coin validator and if necessary the escrow unit.</p>
<b>64</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	Unknown code from coin validator.
<b>Action:</b>	<ol style="list-style-type: none"> <li>1. Check the cable connections to the escrow unit and control PCP.</li> <li>2. Retry the test.</li> <li>3. If the problem persists, replace the coin validator and if necessary the escrow unit.</li> </ol>



Table B-1: Craft interface error code descriptions (continued)

<b>65</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	Time-out while waiting for a coin.
<b>Action:</b>	Retry test inserting coins more quickly.
<b>66</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	EEPROM (Electrically Erasable Programmable Read-Only Memory) checksum error.
<b>Action:</b>	Reinstall the terminal. If the problem persists, replace the coin validator and if necessary the escrow unit.
<b>67</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	Validator jam error.
<b>Action:</b>	Check for blockages in the coin validator and escrow unit. If the problem persists, replace the coin validator and, if necessary, the escrow unit.
<b>68</b>	
<b>Encountered during:</b>	Coin unit test, installation or maintenance mode.
<b>Description:</b>	Escrow jam error.
<b>Action:</b>	Check for blockages in the escrow unit. If the problem persists, replace the escrow unit.

**Table B-1: Craft interface error code descriptions (continued)**

71	
<b>Encountered during:</b>	Memory check. This problem usually occurs during the download procedure.
<b>Description:</b>	Indicates possible read or write problem with the EEPROM (Electrically Erasable Programmable Read-only Memory).
<b>Action:</b>	Replace the control PCP.

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# Appendix C: Regulatory notices

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This appendix includes various regulatory messages and safety instructions from the Canadian and American governments and from Underwriters Laboratories.

## Industry Canada notice

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

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The method of connection approved for this equipment as designated by D.O.C. Standard CS-03 is a CA11A/CA14A or CA11W/CA14W connection arrangement. The A or W suffix indicates that either desk or wall mounting is approved.

In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified jack-plug-cord ensemble (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Existing telecommunications company requirements do not permit their equipment to be connected to customer-provided jacks except where specified by individual telecommunications company tariffs.

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

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected.

This precaution may be particularly important in rural areas.

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

**Notice:** The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination of a loop may consist of any combination of devices subject only to the requirement that the sum of the LNs of all the devices does not exceed 100.

This telephone has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in CSA 108.8.

**Caution:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone, do not use sharp instruments during the assembly procedures.

**Warning:** Do not insert the plug at the free end of the receiver cord directly into a wall or baseboard jack. Such misuse can result in unsafe sound levels.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

This symbol on the product is used to identify the following important information:

Certified Class 2 Level C power source (16 VAC/250 mA max./50 or 60 Hz).

## Shock hazard warning

To avoid potential electrical shock hazard to personnel or damage to the telephone, use only the manufacturer supplied equipment and installation procedures. Specifically, use only 4 conductor modular teladapt plug/cords with this product, and the AC transformer must be CSA/UL or CSA-NRTL/C approved Class 2, level C.

## Address for warranty and repairs in Canada

Nortel  
30 - Norelco Drive  
Weston, Ontario  
M9L 2X6

## U.S. regulations

This section consists of U.S. federal rules and cautions.

### Radio/TV interference

Terminals equipped with electronic push-key dials generate and use radio frequency energy, and if not installed and used properly and in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. These terminals have been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of the FCC rules. While these rules are designed to provide reasonable protection, there is no guarantee that interference will not occur in a particular installation. You can determine whether interference occurs by monitoring your radio or television reception while placing a call.

If your terminal causes interference, one of the following measures may correct the problem:

Reorient or relocate the receiving TV or radio antenna, where this may be done safely.

To the extent possible, move the telephone and the radio or television farther away from each other, or connect the telephone and the radio or television to outlets on separate circuits.

Consult the dealer or an experienced radio/television technician for additional suggestions.

**Note:** FCC registration does not constitute an expressed or implied guarantee of performance.

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## Federal Communications Commission (FCC) notice

**FCC registration number:** This telephone equipment complies with Part 68, Rules and Regulations, of the FCC for direct connection to the Public Switched Telephone Network. (The FCC registration number appears on a sticker affixed to the bottom of the telephone.)

Your connection to the telephone line must comply with these FCC rules:

Use only an FCC standard RJ11W/RJ14W or RJ11C/RJ14C network interface jack and FCC-compliant line cord and plug to connect this telephone to the telephone line. (To connect the telephone, press the small plastic tab on the plug at the end of the telephone's line cord. Insert into a wall or baseboard jack until it clicks. To disconnect, press the tab and pull out.)

If a network interface jack is not already installed in your location, you can order one from your telephone company. Order RJ11W/RJ14W for wall-mounted telephones or RJ11C/RJ14C for desk/table use. In some states, customers are permitted to install their own jacks.

Your telephone may not be connected to a party line or coin telephone line. Connection to Party Line Service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)

It is no longer necessary to notify the telephone company of your phone's registration and REN numbers. However, you must provide this information to the telephone company if it requests it.

If this terminal equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modification to maintain uninterrupted service.

Do not attempt to repair this equipment yourself. If trouble is experienced with this equipment, for repair or warranty information please contact 1-800-4NORTEL or write to Nortel, 640 Massman Drive, Nashville, TN 37210. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

**Signaling method:** The unit's push-key dial allows it to signal in tones (DTMF). It can complete calls to local and long distance lines and can also complete long distance calls via computer-phone systems such as MCI or SPRINT.

**Ringer Equivalence Number:** The FCC registration label (on the bottom of the phone), includes a Ringer Equivalence Number (REN), which is used to determine the number of devices you may connect to your phone line. A high total REN may prevent phones from ringing in response to an incoming call and may make placing calls difficult. In most areas, a total REN of 5 should permit normal phone operation. To determine the total REN allowed on your telephone line, consult your local telephone company.

**Hearing aids:** The telephone is compatible with hearing aids equipped with an appropriate telecoil option and is compliant with the requirements of the Americans with Disabilities Act (ADA).

**Programming emergency numbers:** When programming emergency numbers and/or making test calls to emergency numbers:

1. Remain on the line and briefly explain to the dispatcher the reason for calling before hanging up.
2. Perform such activities in the off-peak hours, such as early mornings or late evenings.



## CSA/NRTL/UL installation instructions

**Warranty:** Avoid electrical shock hazard to personnel or equipment damage. Observe the following precautions when installing telephone equipment:

Never install telephone wiring during a lightning storm.

3. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
4. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
5. Use caution when installing or modifying telephone lines.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

This symbol on the product is used to identify the following important information:

CLASS 2 power source (20-30 VAC/500 mA max/50 or 60 Hz).

## Important safety instructions

When using your telephone equipment, basic safety precautions should always be followed to reduce risk of fire, electric shock, and injury to persons. Follow these precautions:

1. Read and understand all instructions.
2. Follow the warnings and instructions marked on the product.
3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
4. Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.
5. Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
6. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
7. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
8. Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
9. Never spill liquid of any kind on the product.
10. To reduce the risk of electric shock, do not disassemble this product, but have it sent to a qualified service person when some service or repair work is required.
11. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - When the power supply cord or plug is damaged or frayed.

- If the product has been exposed to rain or water, or if liquid has been spilled on the product, disconnect and allow the product to dry out to see if it still operates, but do not open up the product.
  - If the product housing has been damaged.
  - If the product exhibits a distinct change in performance.
12. Avoid using a telephone during an electrical storm. There may be a remote risk of electric shock from lightning.
  13. Do not use the telephone to report a gas leak in the vicinity of the leak.
  14. **Caution:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone, do not use sharp instruments during the assembly procedures.
  15. **Warning:** Do not insert the plug at the free end of the handset cord directly into a wall or baseboard jack. Such misuse can result in unsafe sound levels or possible damage to the handset.
  16. Save these instructions.

## Shock hazard warning

To avoid potential electrical shock hazard to personnel or damage to the telephone, use only the manufacturer-supplied equipment and installation procedures. Specifically, use only four-conductor modular teladapt plug/cords with this product. The AC transformer must be CSA/UL or CSA-NRTL/C approved Class 2, level C.



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# Glossary

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The following terms and abbreviations may appear in this document:

**AABS**

*See Automated Alternate Billing Service*

**ACCS**

*See Automated Calling Card Service.*

**alarms**

Messages generated by terminals to alert the Network Control Center of terminal failure conditions.

**answer detection**

*See supervision.*

**Automated Alternate Billing Service (AABS)**

A feature that allows automated calling card, collect, and third-number billed calls using voice and visual prompts to communicate with the calling and billed parties.

**Automated Calling Card Service (ACCS)**

A feature that allows the customer to dial a 0+ call and bill it to a calling card number provided by the telco or a commercial credit card company.

**call-detail record (CDR)**

A record of data on calls processed by the Network Control Center. These records are stored on the recording device and used for billing data and to compile studies on traffic and equipment service, division of revenue, engineering and fraud.

**CDR**

*See call-detail record*

**central office**

Part of the telecommunications network which provides telecommunication services to subscribers within a given area. It consists of switching equipment and trunks for establishing connections to other central offices.

**checksum**

A data integrity test that is typically used to ensure that memory and transmitted messages have not been corrupted.

**CO**

*See central office*

**craft interface**

Part of the maintenance level of the Millennium terminals. Used by the craftspersons to maintain, install, and operate the Millennium terminals.

**CRTC**

Canadian Radio and Telecommunications Commission, the federal regulator of the telecommunication industry in Canada.

**dc**

*See direct current.*

**dialpad**

*See keypad.*

**dial tone**

A continuous audible tone sent to a subscriber to signify readiness to start dialing.

**digital**

Signals in the form of discrete on/off pulses, represented by the digits 0 and 1, where "1" signifies on and "0" signifies off.

**direct current (dc)**

An almost nonpulsating unidirectional electrical current with minimal value changes.

**download**

A term applied to the transfer of data from a primary source device, such as a mainframe computer, to a subsidiary destination device, such as a terminal.

**DTMF**

*See* dual tone multifrequency.

**dual tone multifrequency (DTMF)**

A signaling method that uses set combinations of two voice band frequencies. One frequency is selected from a set of low frequencies, and the other from a set of relatively high frequencies. This produces the various tones heard when the user pushes the buttons on the keypad.

**EEPROM**

*See* electrically erasable programmable read-only memory.

**electrically erasable programmable read-only memory (EEPROM)**

A type of memory from which data can be erased and electronically changed. It does not require power to maintain data. Data stored in the EEPROM of the control PCP in the terminal includes the Millennium Manager and terminal telephone numbers.

**electrostatic discharge (ESD)**

A transfer of electrostatic charge either caused by direct contact between two bodies that have a different electrostatic potential, or induced by an electrostatic field. It is important to protect against ESD as sensitive components in the terminal can be damaged.

**ESD**

*See* electrostatic discharge.

**FCA**

*See* forgotten card alarm.

**FCC**

Federal Communications Commission. The US government body which regulates the American telecommunications industry.

**Fail to POTS Mode**

A telephone that has lost its supplementary power reverts to Plain Ordinary Telephone Service (POTS) and is no longer able to provide credit, calling and pre-paid integrated circuit card services.

**forgotten card alarm**

This is an optional feature created by rerouting the alerter connection and the keypad alerter connection to a daughter board on the control PCP. The alarm occurs when a card is left in the card reader after a caller has replaced the handset on-hook.

**Global Technical Service (GTS)**

Provides technical assistance to the Millennium installation, operation, maintenance and administration personnel. Formerly known as MTAS.

**hotlist**

A data table containing invalid credit, calling and pre-paid integrated circuit card numbers.

**IAS**

*See* inferred answer supervision.

**Industry Canada label**

This is a certification process that ensures that equipment meets certain telecommunications network protective, operational, and safety requirements. This certification does not guarantee the equipment will operate to the satisfaction of the user.

**inferred answer supervision**

The process of determining when a call has been connected by mechanical means when answer supervision is not available on the telephone line.

**interface**

The device, method or condition of communicating with separate entities, such as software and hardware components.

**ISO**

International Standards Organization



**ISW**

The inside service wire provides power to the components of the terminal.

**keypad**

An alphanumeric keypad on the terminal used to enter alphanumeric information.

**line**

A transmission medium for connecting the equipment of a customer to a central office or other switch.

**load number (LN)**

Denotes the percentage of the total load to be connected to a telephone loop used by a device.

**Millennium Manager (NCC)**

The central computer network, which is the control centre of the Millennium system. Formerly known as the Network Control Centre (NCC).

**modem**

A hardware device which converts data to voice frequency tones and vice versa to transmit data.

**MSR**

Millennium System Release. These releases are upgrades of the system.

**MTR**

Millennium Terminal Release. These releases are firmware upgrades to the terminals.

**NCC (Millennium Manager)**

Network control centre, which is the control centre of the Millennium system. Now known as Millennium Manager.

**next-call**

The ability of the terminal to make another call without requiring more coins or another validation of a card, providing the handset has not been replaced on-hook after the previous call.

**NTP**

Northern Telecom publication or practice.

**opcode**

An abbreviation for operation code. *See* operation codes.

**operation codes**

These are messages craftspeople send to the Millennium Manager from the terminal to inform the telephone company of the status of the terminal and the activities they have done. Each code is up to three digits long. The operating company specifies the meanings of most operation codes.

**out of service**

A state in which equipment is removed from service, either automatically by the system or manually by personnel

**packet-switched network (PSN)**

A specialized communication system designed to carry digital data. Streams of data are divided into packets or units of standard size and sent along the network. Each packet has an address and system for checking the accuracy of the original data.

**PCP**

*See* printed-circuit pack.

**PIN**

Personal Identification Number, used by craftspeople to install and repair Millennium terminals.

**POTS**

Plain Ordinary Telephone Service or Plain Old Telephone Service. In reference to Millennium terminals, this level occurs when the supplementary power is lost, either from outside the terminal or because of a problem with the rear terminal PCP or the control PCP.

**PICC**

*See* pre-paid integrated circuit card.

**pre-paid integrated circuit card (PICC)**

Also known as a smart card, telecard, or chip card. Users buy the cards and use them to pay for telephone calls by inserting them into the card reader. They contain an Electrically Erasable Programmable Read-Only Memory chip that records the value of the card. This value decreases as the card is used.

**printed-circuit pack (PCP)**

These are boards which contain the firmware chips, electronic circuitry, modem chips, memory, etc. which activate the various modules in the terminal. The two main PCPs are the control and telephony PCPs, which are the central functioning control center of the terminal.

**PSN**

*See* packet-switched network.

**PSTN**

*See* public switched telephone network.

**RAM**

*See* random access memory

**random access memory (RAM)**

Random access memory is memory used for temporary storage of information while a process occurs, such as during card validation.

**receive**

One of two subfunctions of the speech function of the telephone set. The telephone receives a message by converting electrical signals into sound waves.

**REN**

*See* Ringer Equivalence Number.

**Ringer Equivalence Number**

The number found on an FCC registration label which is used to determine the maximum number of devices that can be handled by a phone line.

**smart card**

*See* pre-paid integrated circuit card (PICC).

**supervision**

One of the functions of switching equipment by which subscriber use is monitored.

**switch**

A device which connects terminals to the network and routes calls to terminals.

**TAM**

*See* Technical Assistance Manager.

**Technical Assistance Manager**

This is the Nortel representative who helps telcos with technical problems in setting up and running Millennium terminals.

**telco**

A telephone or telecommunications company

**terminal**

A telephone or other electronic device used at the location of a subscriber to send and receive messages over a communication channel.

**UL**

Underwriters Laboratories Inc.

**vacuum fluorescent display**

The dot matrix display on which the visual prompts appear on a Millennium terminal. As well, advertising and craft interface prompts are displayed.

**VFD**

*See* vacuum fluorescent display.

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Millennium multi-pay terminal (M1211, M1221, M1231)

## **Installation, operation, and maintenance guide, MTR 1.9**

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