

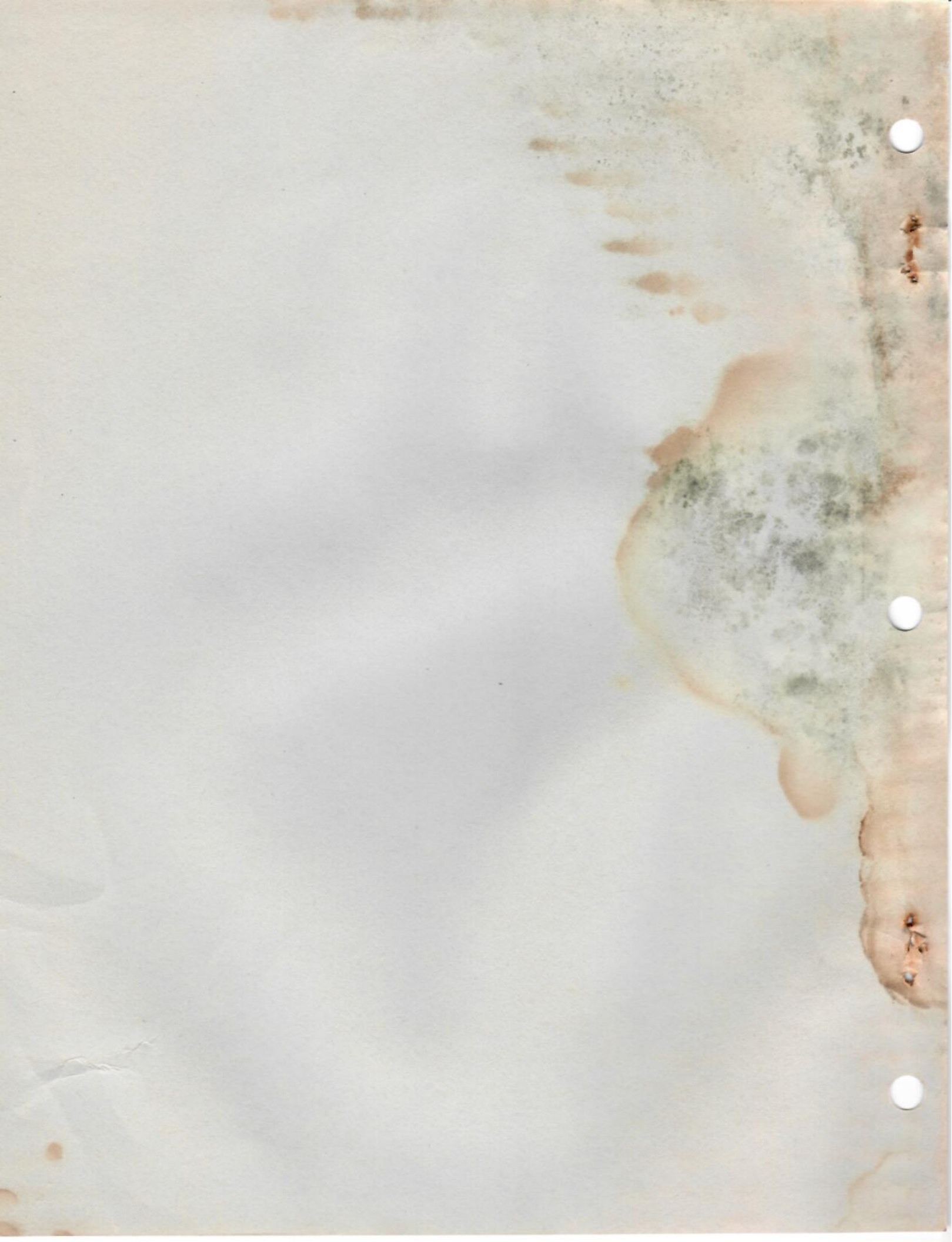
Burroughs

**RT 650
Automatic
Teller
Machine**

OPERATORS MANUAL

This Manual Replaces All Previous Editions of Form 2015541

PRICED ITEM



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Automatic
Teller
Machine**

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INTRODUCTION

This manual provides a description of the Burroughs RT 650 Automatic Teller Machine (ATM). It presents the RT 650 in terms of its external appearance, system components and facilities available for operator control.

The manual is organized into four sections.

1. A general introduction to the RT 650 showing it in operation and briefly describing the various system components.
2. A description of system operation by the customer.
3. A description of system operation by the Attendant, including how to access, service and use system components that are available to the Attendant.
4. Information regarding system configuration that is relevant to the Attendant, at an introductory level.

More detailed information concerning the RT 650 system is contained in the BMT RT SERIES Systems Reference Manual (form No. 2014502).

There are substantial modifications in this edition.

INTRODUCTION

This manual provides a description of the features of the RT 650 Automatic Teller Machine (ATM). It presents the RT 650 in terms of its various components, system components and facilities available for operator control.

The manual is organized into four sections:

1. A general introduction to the RT 650 showing its operation and briefly describing the various system components.
2. A description of system operation by the customer.
3. A description of system operation by the Attendant, including how to access the system and use system components that are available to the Attendant.
4. Information regarding system configuration that is relevant to the Attendant at an installation level.

More detailed information concerning the RT 650 system is contained in the RT 650 SERIES System Operator Manual (form No. 2014102).

Additional information is in the edition.

GENERAL DESCRIPTION

1

SYSTEM OPERATION BY A CUSTOMER

2

SYSTEM OPERATION BY ATTENDANT

3

SYSTEM CONFIGURATION

4

1 GENERAL DESCRIPTION

2 SYSTEM OPERATION BY A CUSTOMER

3 SYSTEM OPERATION BY A TENDANT

4 SYSTEM CONFIGURATION

SECTION 1

GENERAL DESCRIPTION

INTRODUCING THE RT 650

The RT 650 is a full service Automatic Teller Machine (ATM) designed for through the wall operation. Refer to figures 1-1 and 1-2. It provides a 24-hour service to customers of financial Institutions and is capable of supplying a full range of bank services. These include :

- withdrawals of currency
- deposits of currency or checks
- bill payments from accounts
- bill payments by cash or check
- transfer of funds between accounts
- account balance enquiries
- service requests, such as "mail statement" or "mail checkbook"
- service requests with deposits
- cash check transactions
- card balance enquiries
- selected amount cash check transactions
- quick cash transactions

The RT 650 is controlled by Application software, which is produced by Burroughs. A feature of the software is that its operating characteristics can be tailored by each Institution to its own requirements. This is achieved by using a program, known as the Customizer, which runs in an RT 650. For example, this program enables the Institution to specify how the system must react under certain circumstances and to determine the control messages displayed to customers, without altering the Application program code itself.

The concept of the Customizer means that great flexibility can be offered in the Application software, without loss of integrity.

Another feature of the flexibility of the RT 650 is its capability of operating in three different modes.

1. Online Only Mode.

An RT 650 operating in online only mode requires a data communication link to a Host computer system in order to perform transactions.

During a business session, the Host can be referred to a number of times. A business session starts when a customer's presence is detected, either by the insertion of a magnetic stripe card or by the entry of an account number on the keyboard (a choice made through the use of the Customizer program), and ends when the customer leaves the machine. Refer to figure 1-3.

The system can be configured to send a message to the Host in order to identify the customer in terms of the customer's account number and Personal Identification Number (PIN), and also to wait until it receives permission from the Host to proceed. This

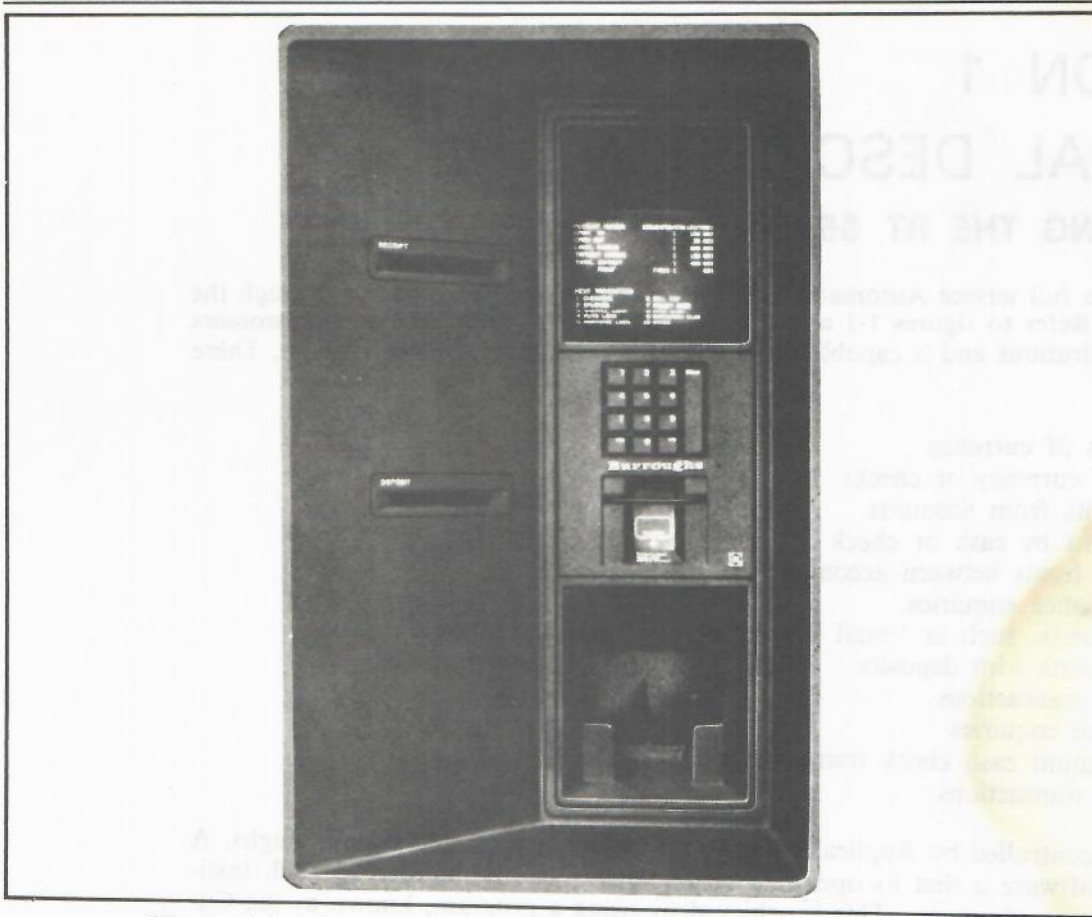


Figure 1-1. Customer's View of the RT 650 Full Service ATM

process is known as "customer validation", and can be carried out locally by the RT, if required.

When the customer has been validated, the RT offers the (customizable) transactions which are available. Each time the customer selects a transaction and enters any additional data required (for example, an amount), the RT sends a message to the Host requesting authorization. It then waits for permission to execute the transaction.

If communication with the Host is lost, the RT cannot continue processing the customer's transactions and reverts to a condition known as Out of Service State, until the link is re-established.

2. Offline Only Mode.

RT 650 systems with back-up storage can operate entirely independently of a Host system. All software loading and transaction processing is carried out locally without reference to a Host. Transaction details are recorded on the back-up media.

3. Offline Capable Systems.

Offline capable RT systems with a data communications link to the Host can operate online in one of two ways. They can operate online; that is, exactly as described previously, with the extra facilities offered by the Offline capable program. Alternately they can operate offline; that is, without reference to the Host, either because the link has

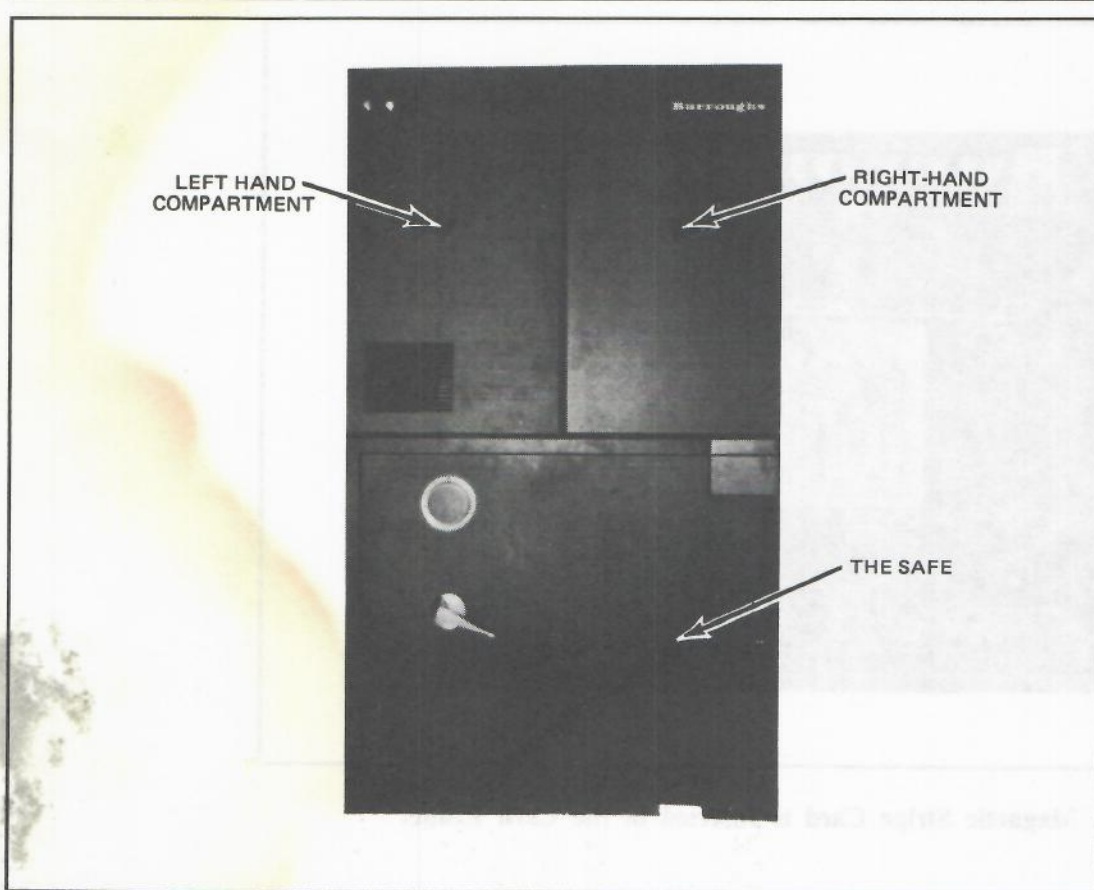


Figure 1-2. RT 650 as Seen from Inside the Institution

failed or the Host has directed the RT to do so. In general terms, an RT is said to be operating offline if it carries out transaction processing without reference to the Host. However, the data communication link can still be operable and the RT can still inform the Host of its condition and status at appropriate times.

A TYPICAL TRANSACTION

The following sequence of figures shows the steps involved when a customer uses the RT 650 to make a withdrawal of currency. The messages displayed on the screen are examples only, as the wording of all displayed messages is specified by the Institution, using the Customizer program.

RT 650 SYSTEM COMPONENTS

The following description of the hardware and software components available with an RT 650 system introduces the reader to the appearance, use, and basic operation of each component. The hardware components are described first, followed by the software components that make up an RT 650 Automatic Teller Machine.

BASIC HARDWARE COMPONENTS

RT 650 systems are equipped with a Display Screen, a Keyboard, a choice of one or two Feeders (for dispensing currency) and a Depository. A number of other options are available.

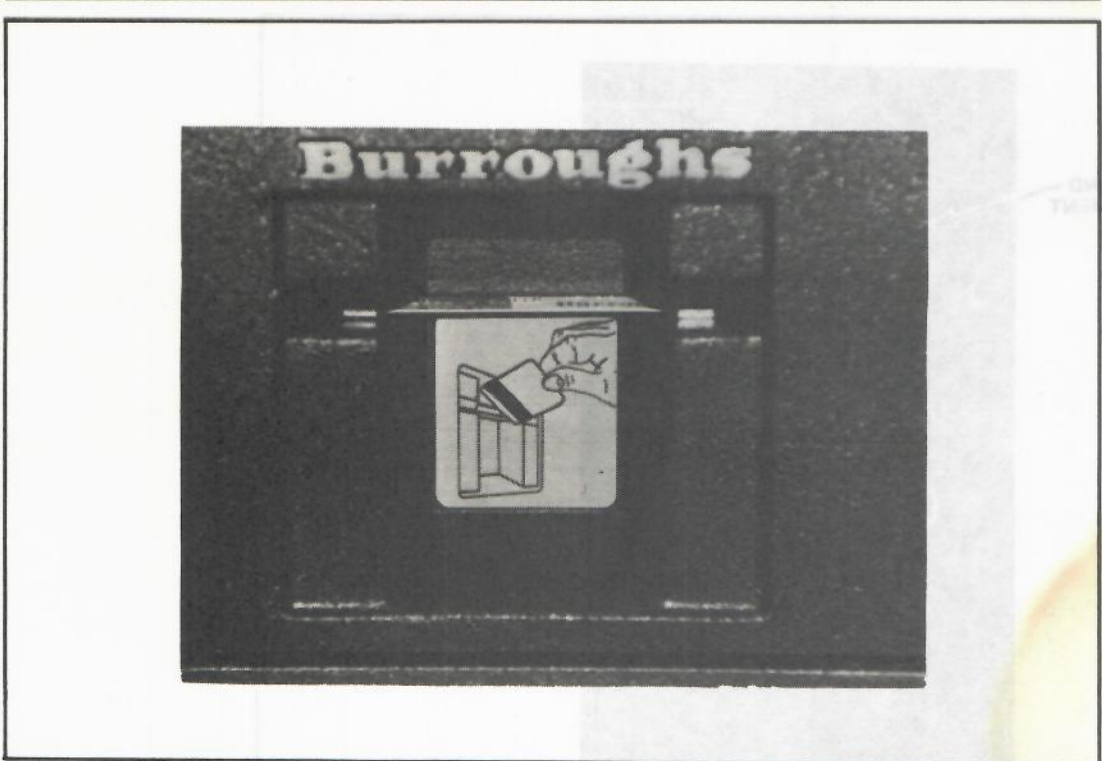


Figure 1-3. Magnetic Stripe Card is Inserted in the Card Reader

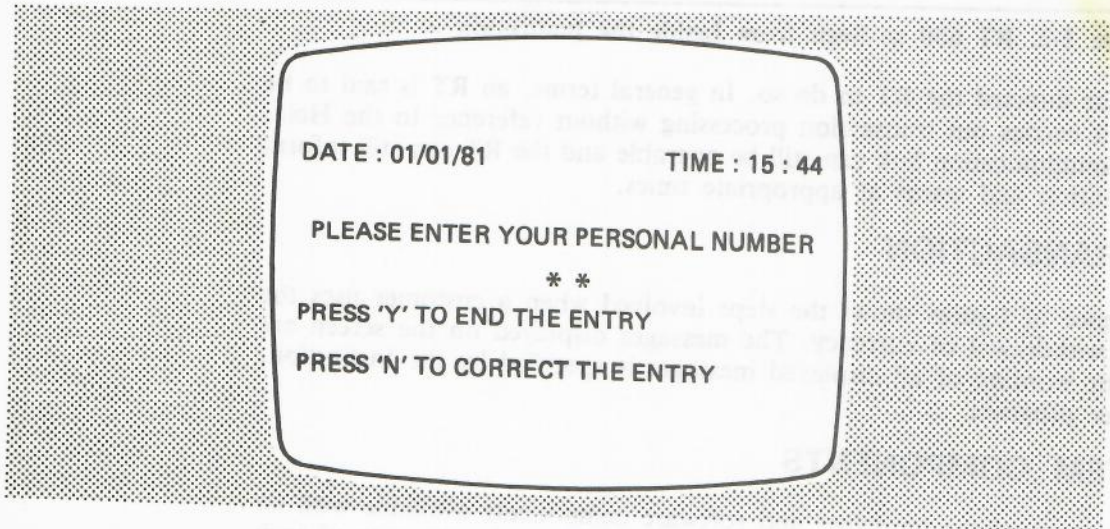


Figure 1-4. The PIN is Indexed on the Keyboard

Display Screen

The display screen is used primarily to guide customers, step by step, through the required transactions, and to display the procedures available during Attendant service. Refer to figure 1-9. It is a Cathode Ray Tube (CRT) television monitor capable of dis-

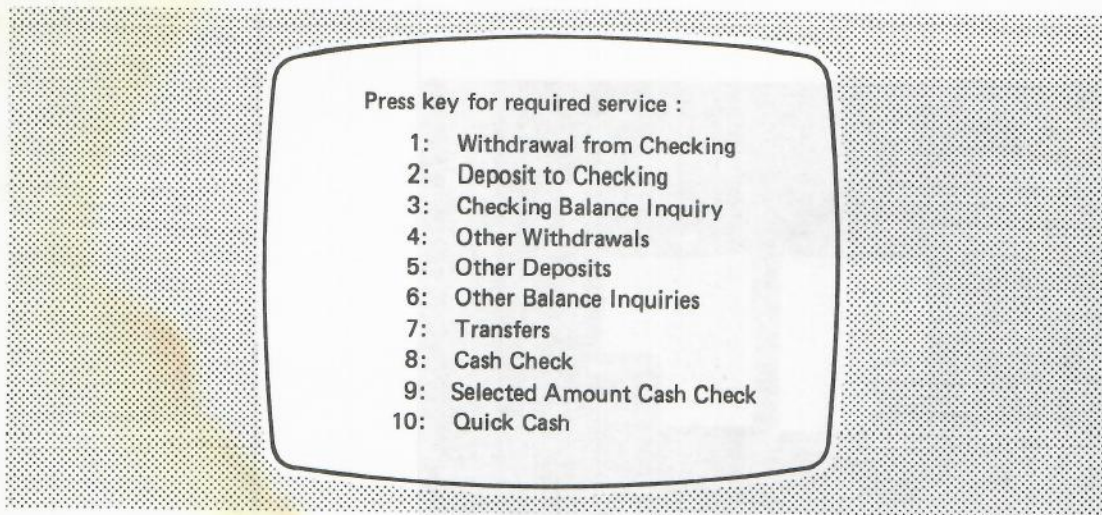


Figure 1-5. A Menu of Transactions is Offered

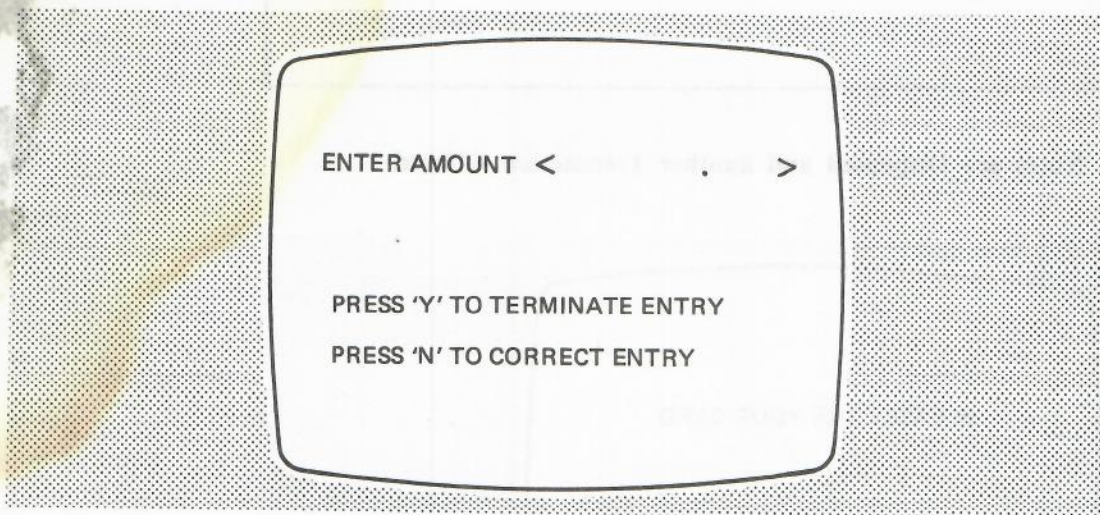


Figure 1-6. Amount to be Withdrawn is Indexed on the Keyboard

playing a maximum of 600 characters, formatted in 15 lines of 40 characters each. The high-persistence green phosphor display provides a restful and flicker-free image which is easily read in all light conditions. The wording of all messages displayed on the screen is specified by the Institution, using the Customizer program.

Keyboard

The keyboard is used primarily by the customer for identification, transaction selection and amount entries. The keyboard has 13 keys; numeric keys 0-9, "yes" and "no" keys (marked Y and N), and a cancel key (marked C). The keys have a light but positive action. Refer to figure 1-10.

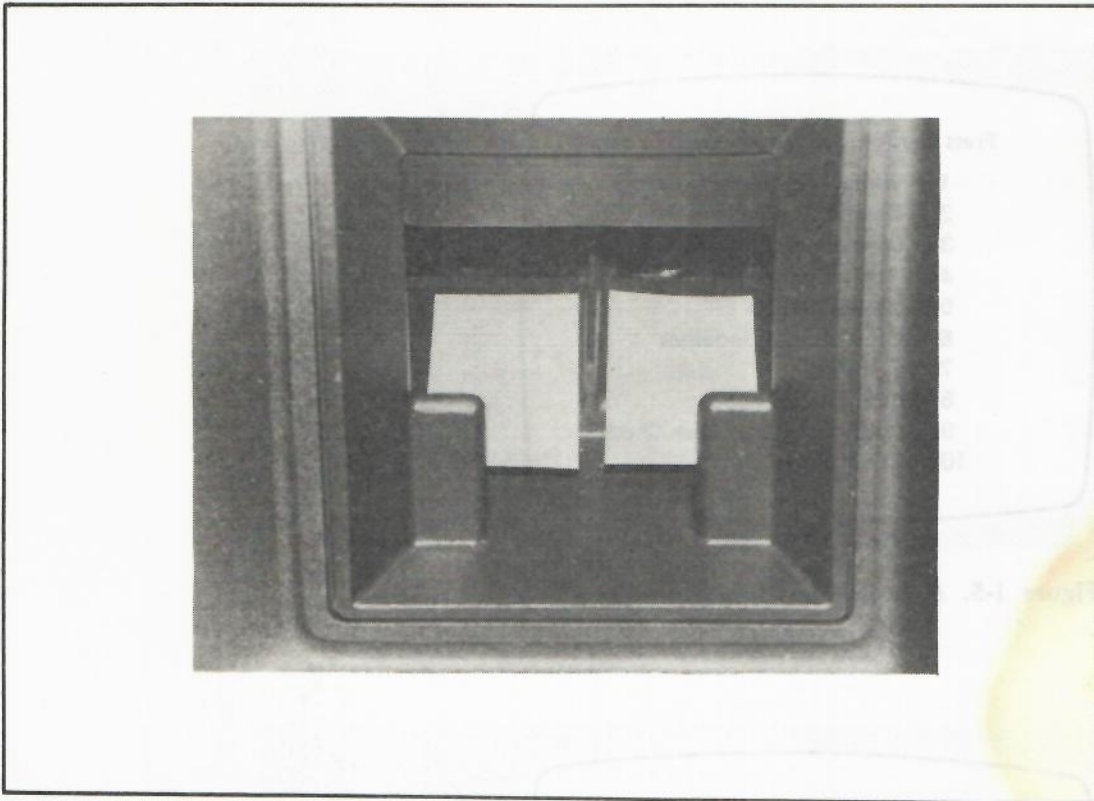


Figure 1-7. Notes are Dispensed and another Transaction Offered

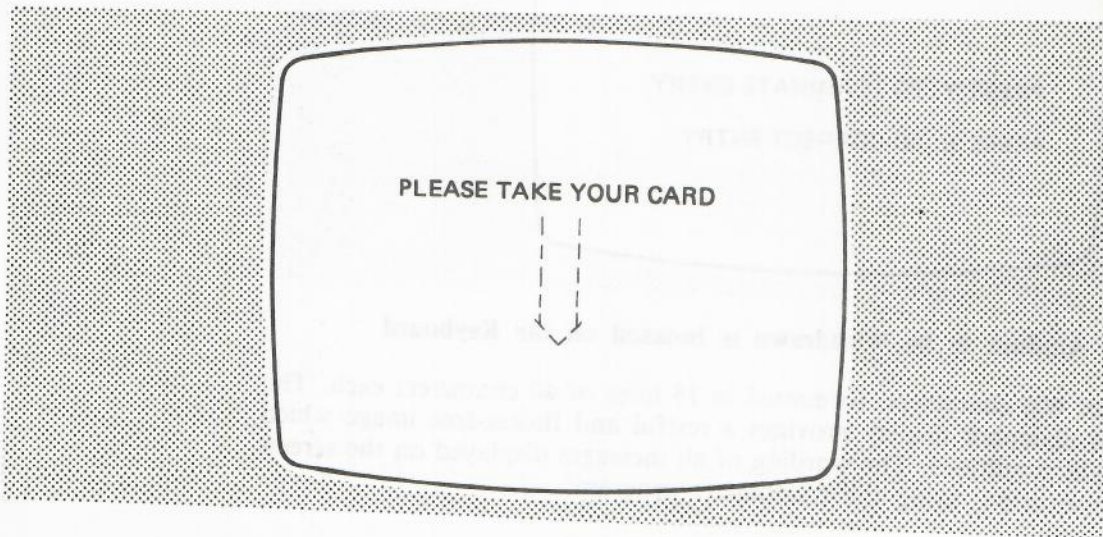


Figure 1-8. Card is Returned and the Customer instructed to Remove the Printed Receipt

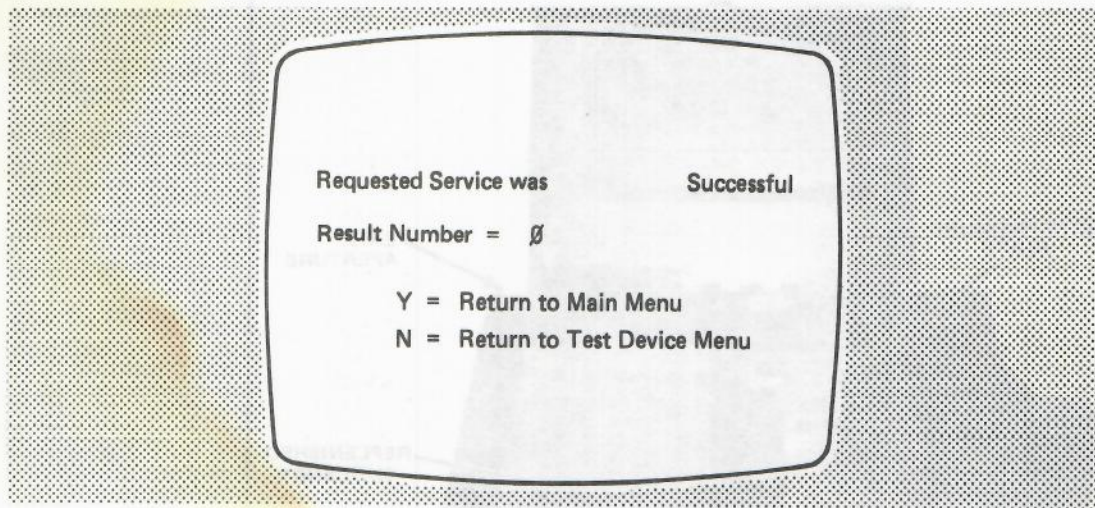


Figure 1-9. The Display Screen

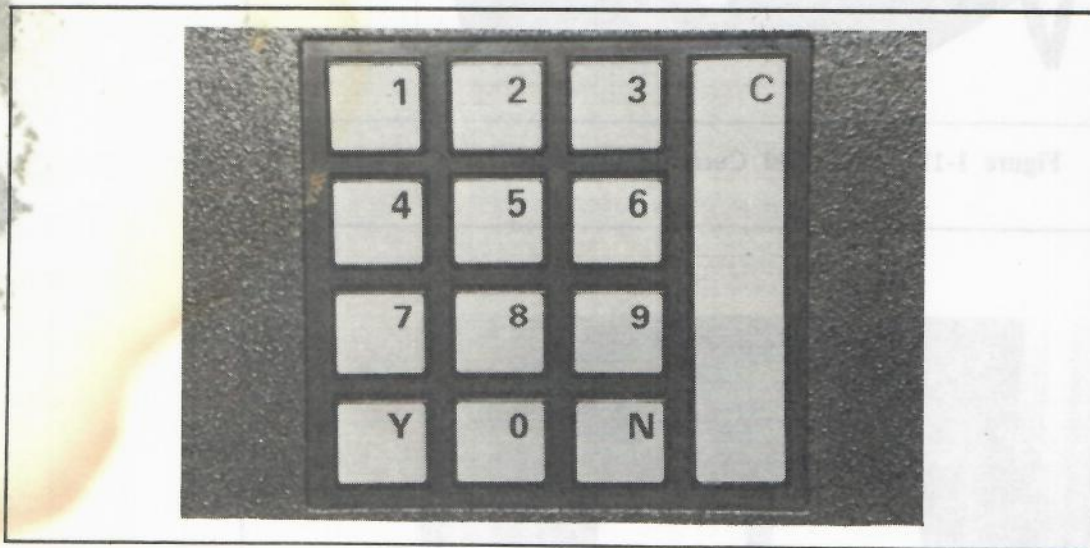


Figure 1-10. The Keyboard

Burroughs Currency Feeder

Each feeder has a capacity of 2400 banknotes, which are loaded using a currency cassette. Spare cassettes can be pre-loaded for fast replenishment of currency (Refer to figure 1-11). The feeder dispenses both new notes and average-condition used notes (of the correct size). It delivers them into the currency tray at an approximate rate of 2 notes per second. Refer to figure 1-12. The system is capable of dispensing notes of two different denominations, provided one is a multiple of the other. When two denominations are dispensed, they lie side by side in the currency tray.

Any notes that are rejected due to misfeeds or damage are diverted to a reject area within the currency cassette.

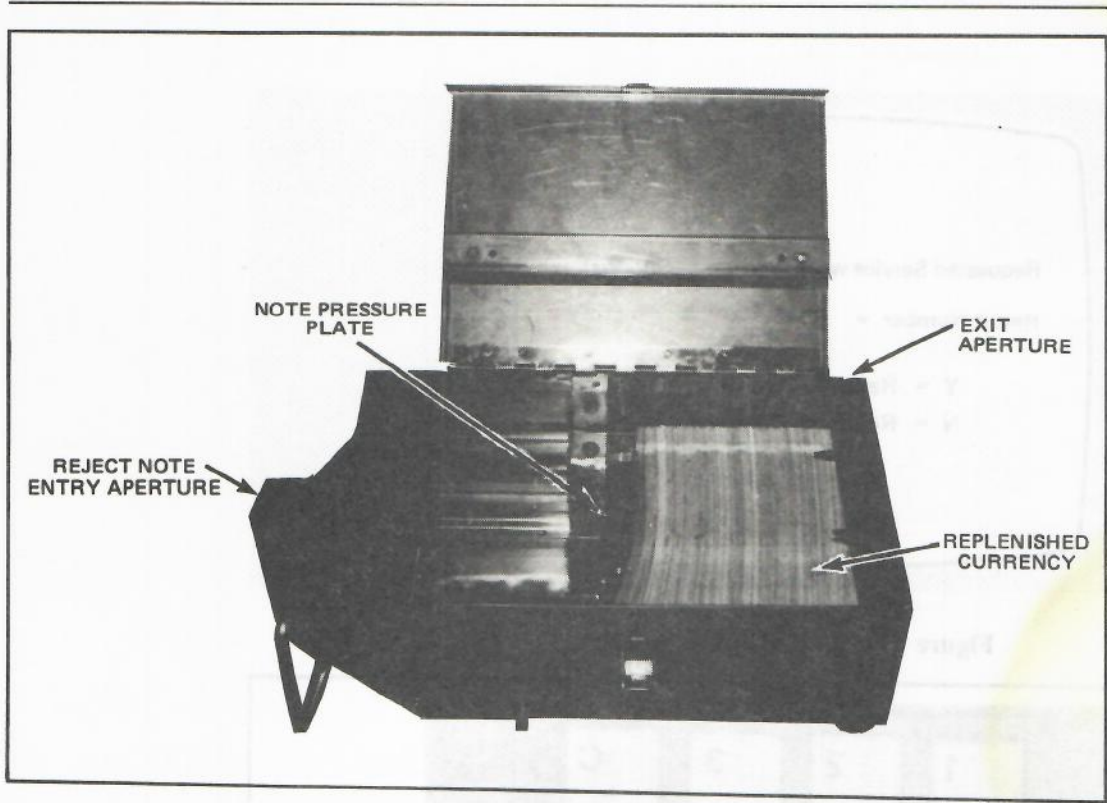


Figure 1-11. Pre-loaded Currency Cassette

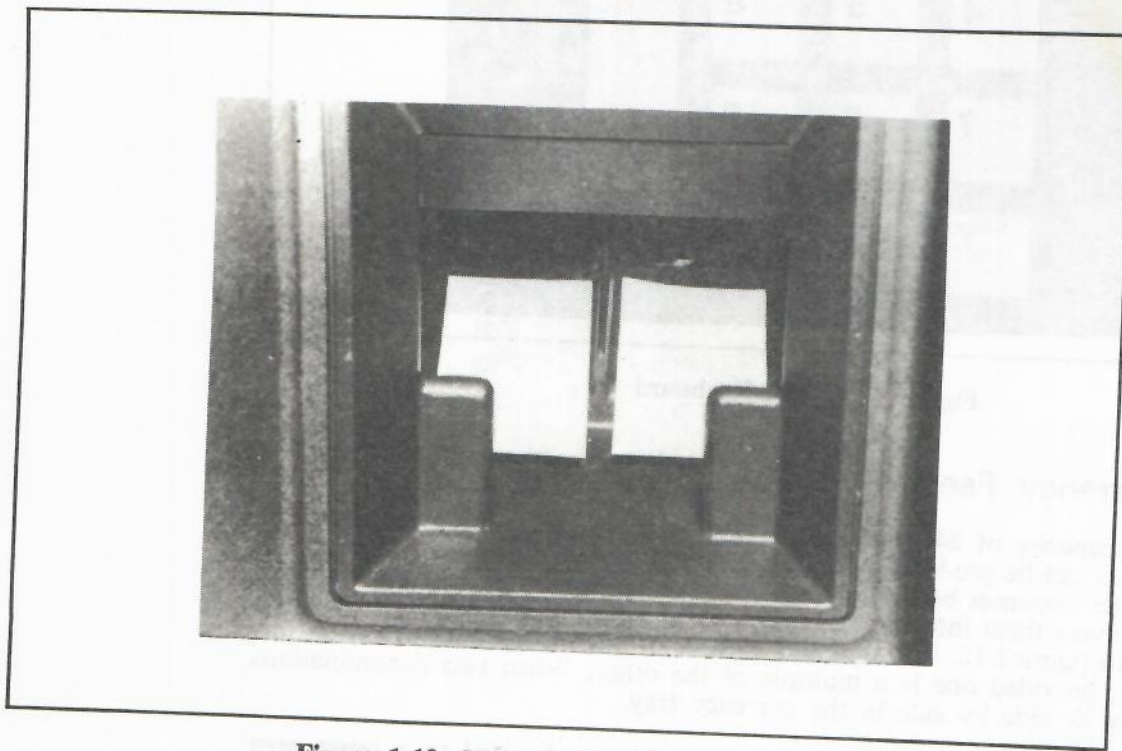


Figure 1-12. Notes in the Currency Tray

Depository

The depository (figure 1-13) consists of an aperture in the fascia of the RT, protected by an automatic deposit gate which can only be operated by legitimate bank customers or the Attendant. An "anti-fish" device ensures that access to the deposit area in the machine can only be gained by opening the safe door.

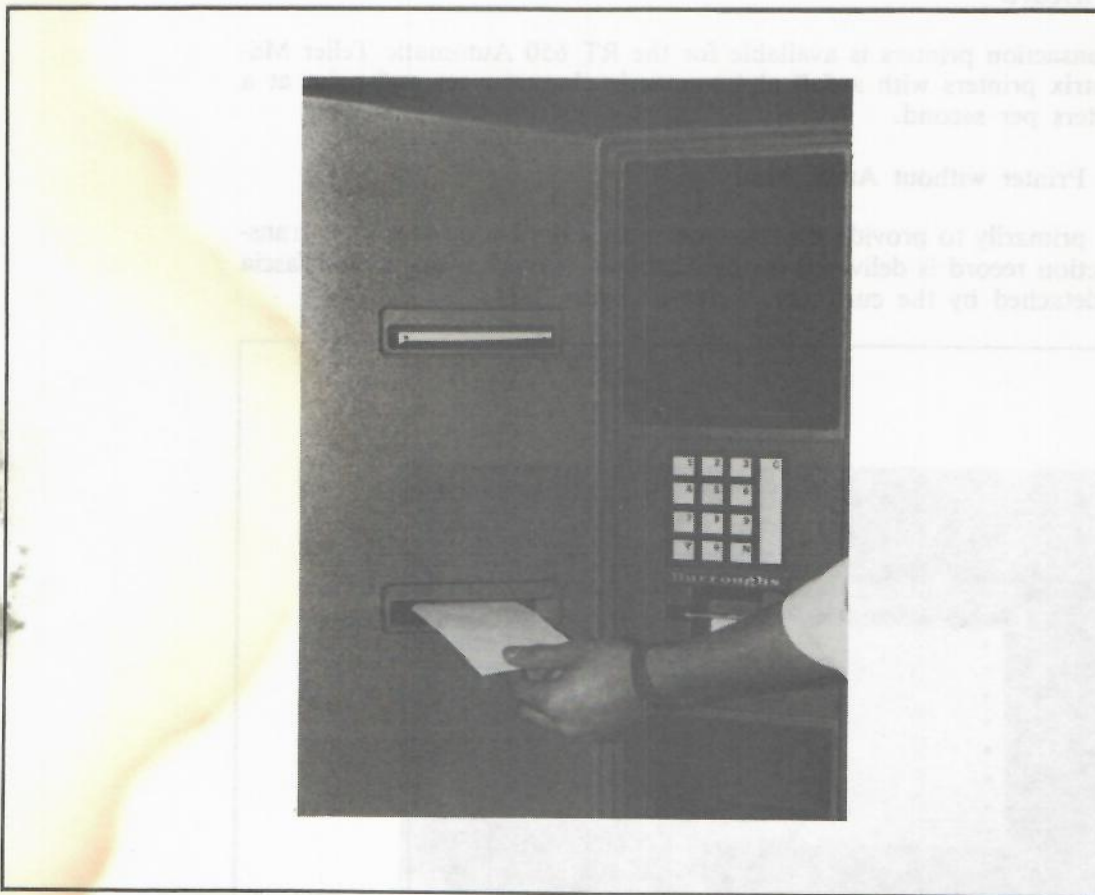


Figure 1-13. The Depository

The depository is used within a selected deposit-type transaction, providing a secure place in which currency and checks can be deposited. A deposit must be contained in a sealed envelope which satisfies the following specifications:

- length – minimum 6 inch (15.24 cm), maximum 9 inch (22.86 cm)
- width – minimum 3 inch (7.62 cm), maximum 4.5 inch (11.43 cm)
- paper weight – 63 G.S.M. for paper contents only
- envelope seal – side or end flap, self adhesive or gummed only
- maximum acceptable envelope paper content – any thickness up to a maximum envelope thickness of 0.5 inches (1.27cm) when manually compressed, but not exceeding 1 inch naturally.

The depository is also used to provide a secure area into which retained Magnetic Stripe Cards (MSCs) can be delivered.

OPTIONAL HARDWARE COMPONENTS

The following hardware system components are treated as optional. However, depending on the type of system required, some of these options become essential (for example, an offline system requires back-up storage and a Time-of-Day Clock).

Transaction Printers

A choice of two transaction printers is available for the RT 650 Automatic Teller Machine. Both are matrix printers with a full alpha-numeric character set and print at a speed of 90 characters per second.

1. Transaction Printer without Audit Trail

This printer is used primarily to provide the customer with a hard-copy record of transactions. The transaction record is delivered to the customer through a slot in the fascia of the RT and is detached by the customer. Refer to figure 1-14.

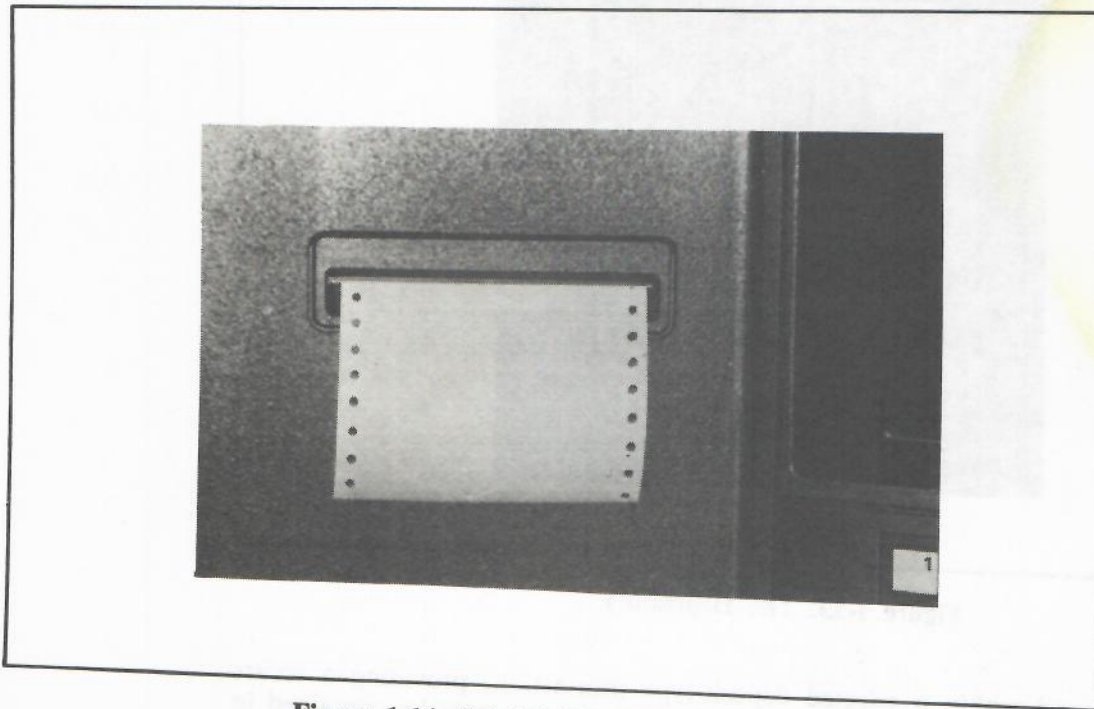


Figure 1-14. Printed Transaction Receipt

The content and wording of all printed records are specified by the Institution, using the Customizer program.

2. Transaction Printer with Audit Trail

The printer is similar in operation to that previously described, but it provides the Institution with a hard copy record of all transactions. While the top of the customer copy is delivered to the customer through a slot in the fascia of the RT, the Institution's audit copy is rolled on a spool by the printer and is maintained within the body of the RT. This enables the Attendant to access it easily. Refer to figure 1-15.

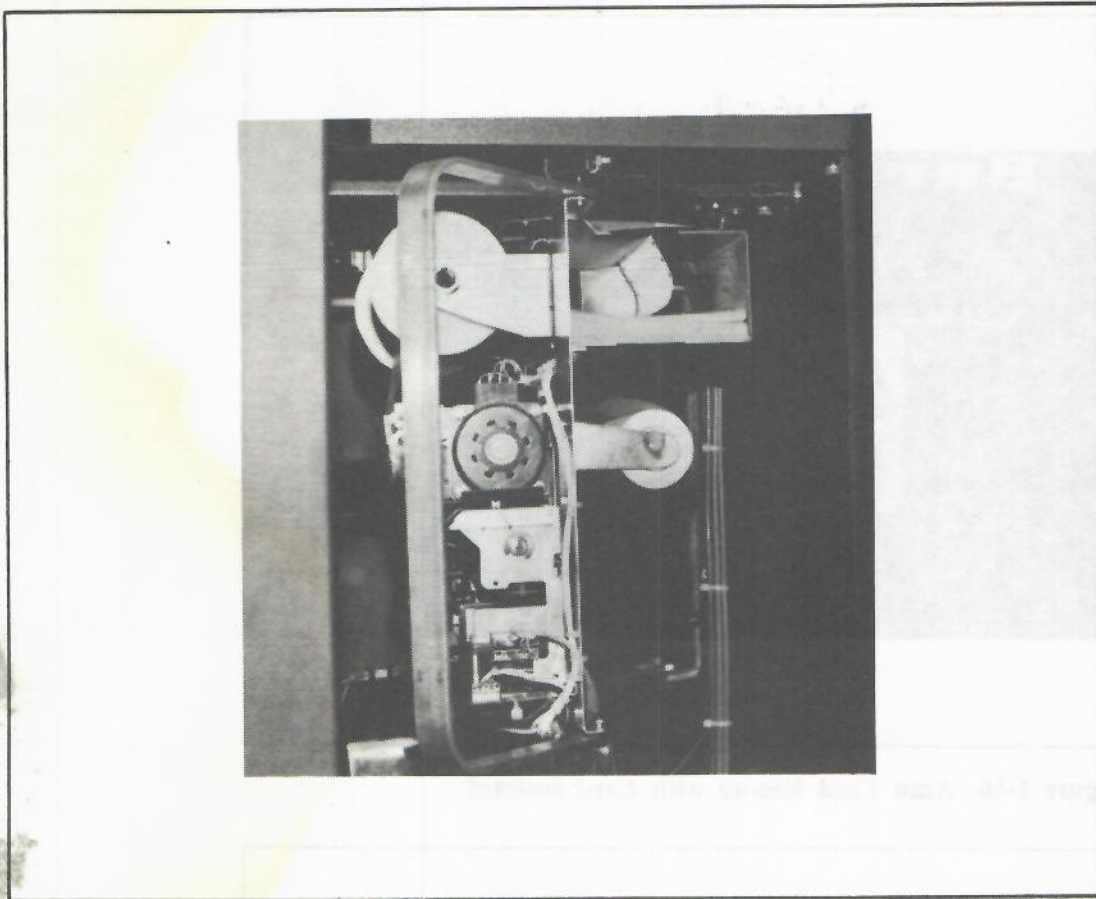


Figure 1-15. Transaction Printer with Audit Trail

Auto Card Reader

The Auto Card Reader (figure 1-16) is a power-driven device which is capable of reading data on both Track 2 and Track 3 of a Magnetic Stripe Card (MSC) and of writing on Track 3. The reader maintains possession of a customer's card for the duration of a business session, so the PIN need only be entered once. Track 3 cards can be rewritten at the end of a business session, enabling data fields relevant to card usage to be updated by the system.

In addition, a card retention mechanism option is available. This provides for card capture under software control. Therefore, if the RT is customized to retain MSCs (for example, on Host directive or customer timeout), the cards are directed to the deposit chute, into the deposit safe where they can be accessed easily by the Attendant.

TP 420 Micro-Disks

Micro-floppy diskettes can be used as the back-up storage media for the RT 650 if they are required. Each micro-disk has a capacity of 85K bytes, and the diskette itself is 5.25 inches (13.3 cm) in diameter. The disk drive unit is configured with two micro-floppy disk devices and provides a compact peripheral file storage device. Refer to figure 1-17.

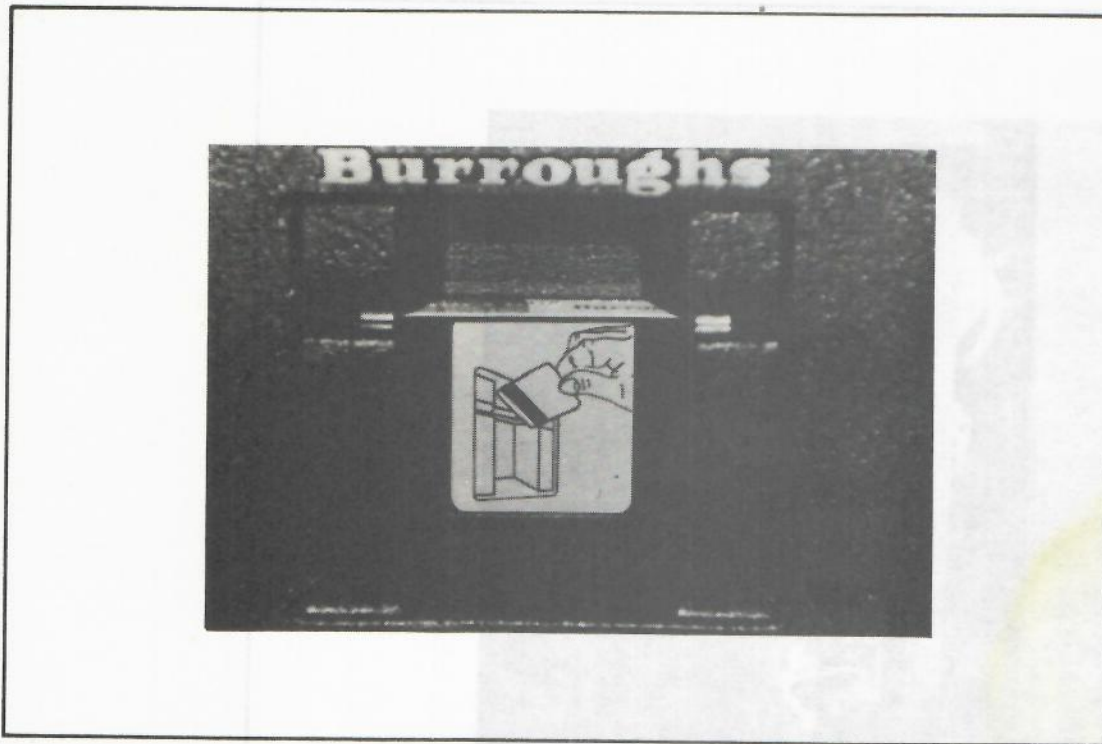


Figure 1-16. Auto Card Reader with Card Inserted

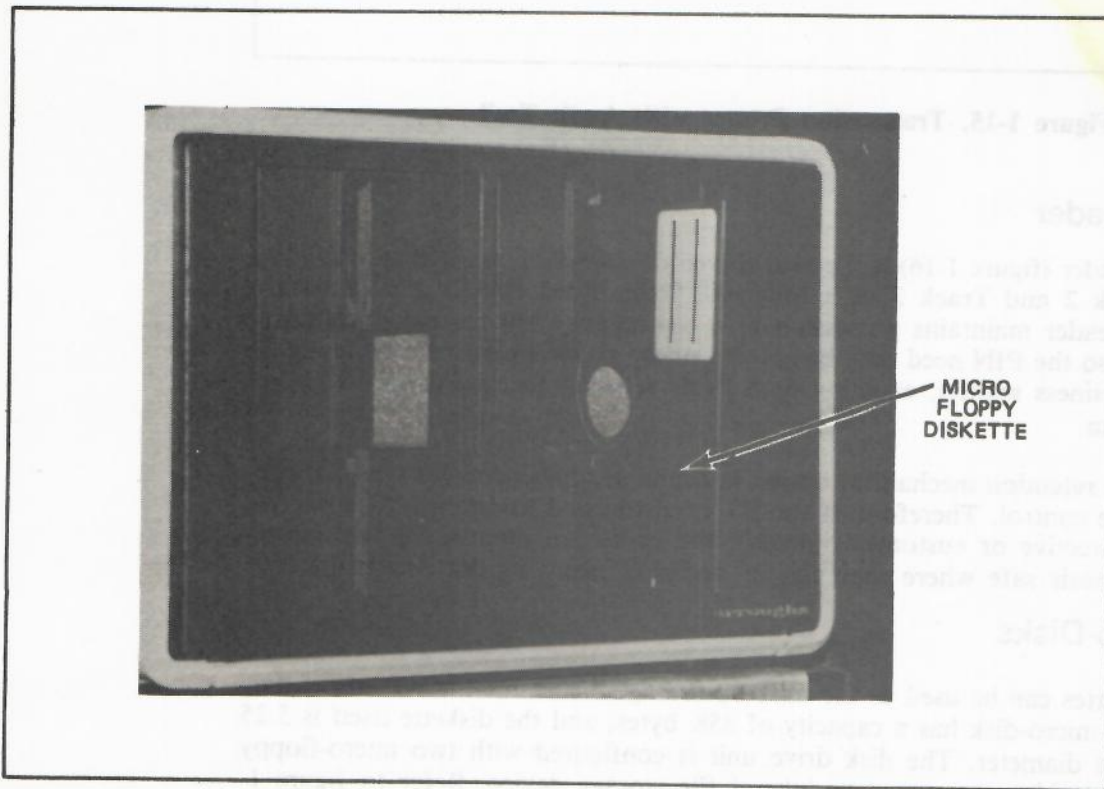


Figure 1-17. TP 420 Micro-floppy Disk Drive and Disk

TP 461 Burroughs Super Mini Disk

A Burroughs Super Mini Disk may be used as the back-up storage media for the RT 650 if it is required. The Burroughs Super Mini Disk is a flexible mini-disk which has a capacity of 1M byte and a disk diameter of 8 inches (20.3 cm). The disk drive unit provides a compact, high capacity peripheral file storage device. Refer to figures 1-18A and 1-18B.

Time of Day Clock

The Time of Day Clock is a free running, battery supported device that can be reset under Attendant control. For correct operation the mains power supply to the RT must not be turned off for more than 6 hours in any 24 hour period. The Time of Day Clock is a vital device for the offline capable Application software, as it is used to record the date and actual time that a transaction sequence started. If required, this data can be recorded on the transaction printer, in transaction records on disk, and can be included in datacomm messages. The date is automatically advanced by the clock.

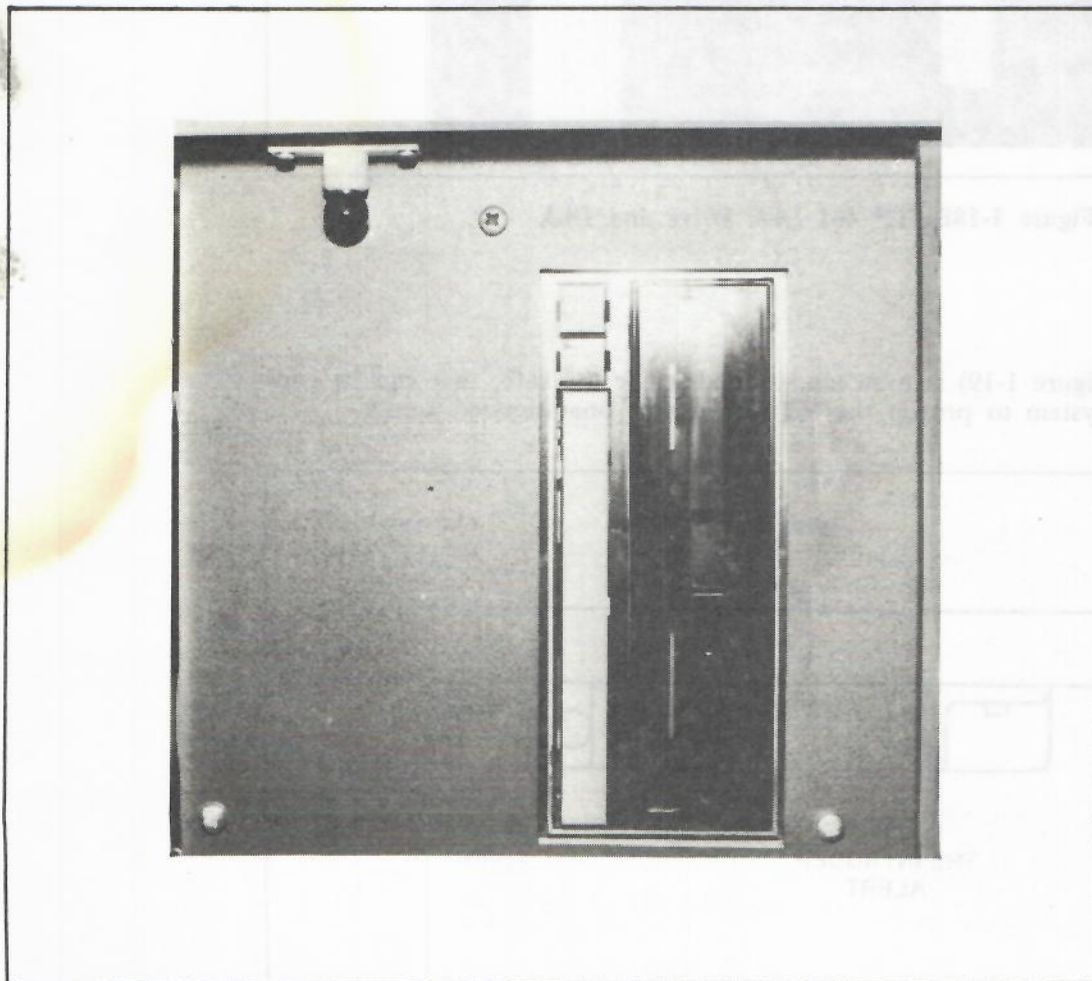


Figure 1-18A. TP 461 Disk Unit

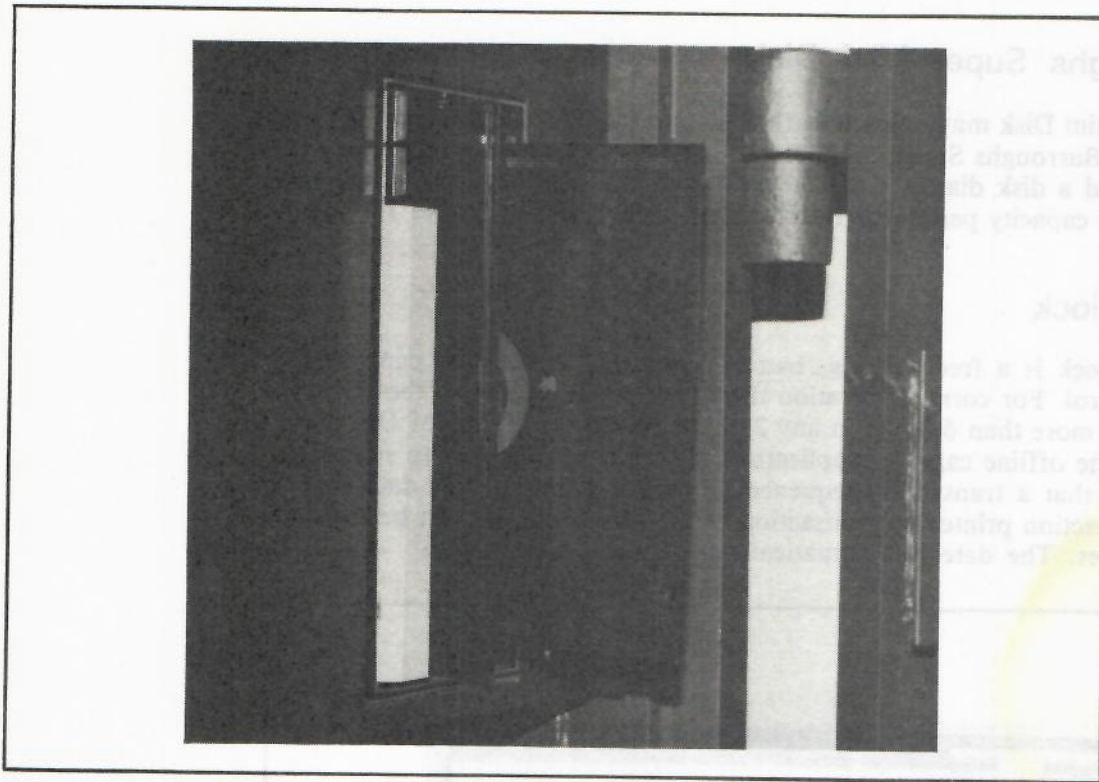


Figure 1-18B. TP 461 Disk Drive and Disk

Intruder Alert

The Intruder Alert (figure 1-19) is a switch, located inside the safe, that can be connected to an alarm system to protect the RT 650 against unauthorized access.

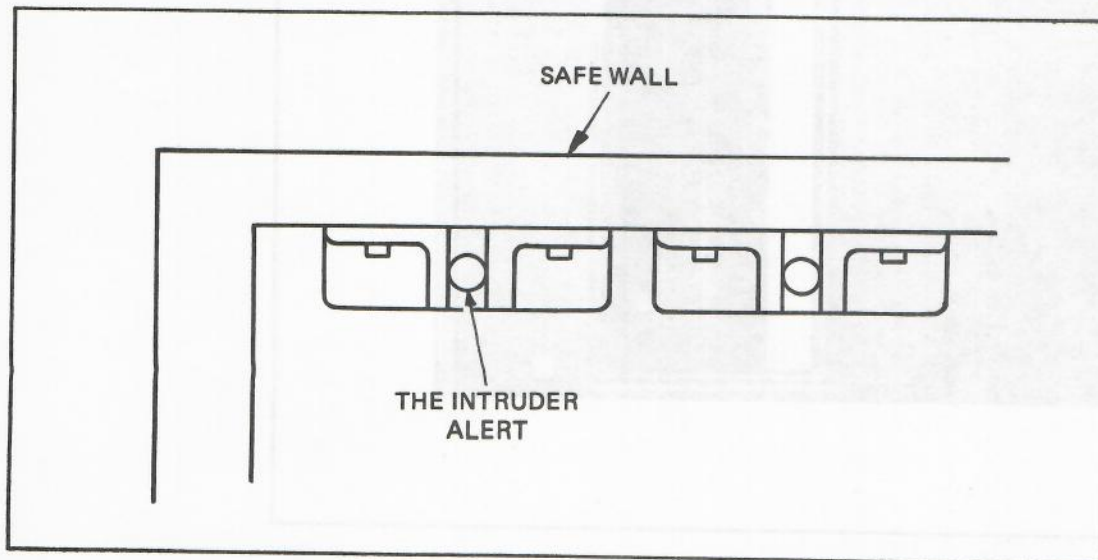


Figure 1-19. The Intruder Alert

Customization Equipment

In order to customize an RT 650 the following equipment is necessary:

1. TP 290 Video Monitor. This is a 9" video monitor that is used in place of the display screen during customization.
2. TP 110 alpha-numeric keyboard. This contains the full set of symbols that are necessary in order to use the Customizer program. Refer to figure 1-20.

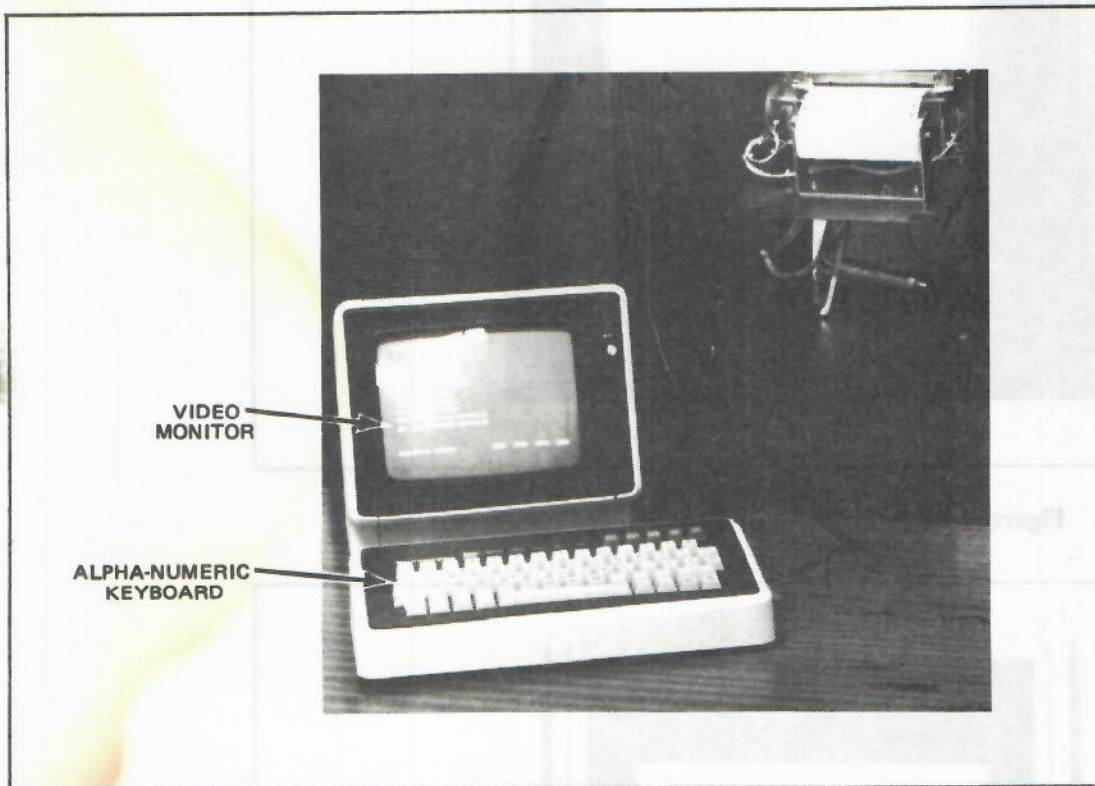


Figure 1-20. Customization Equipment

Cash Tray Door

A cash tray door (figures 1-21A and 1-21B) can be fitted onto the currency tray as an optional feature. The cash tray door denies access to the currency tray by casual passers-by. This enhances the physical security of the street side of the RT 650.

The locking catch on the door is released by the Application program at the end of the transaction or the business session (customizable option) if a dispense transaction has occurred. The customer is requested to lift the door to the open position, remove the dispensed notes and close the door. If the door is left open, the Application program closes it either when a new customer is detected, or after the customizable timeout has elapsed.

RT 650 SOFTWARE COMPONENTS

The RT 650 is controlled by software which is produced by Burroughs. This software comprises two types of program: the Application program and the Customizer program.

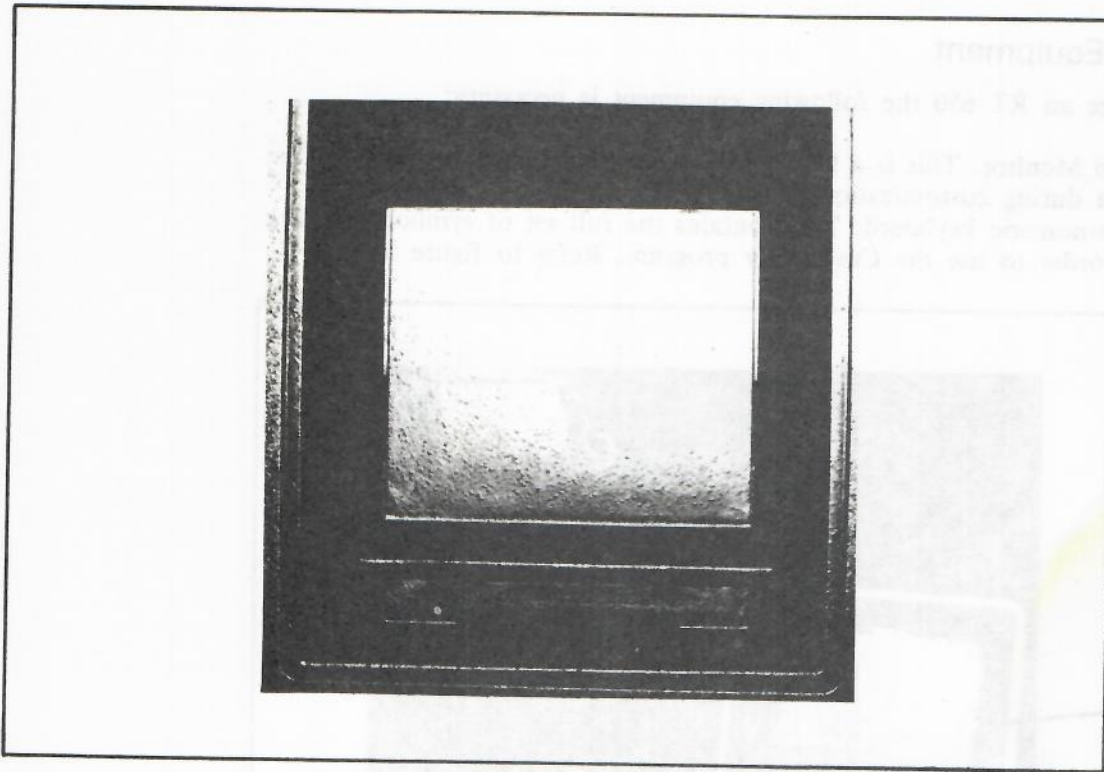


Figure 1-21A. Cash Tray Door Closed

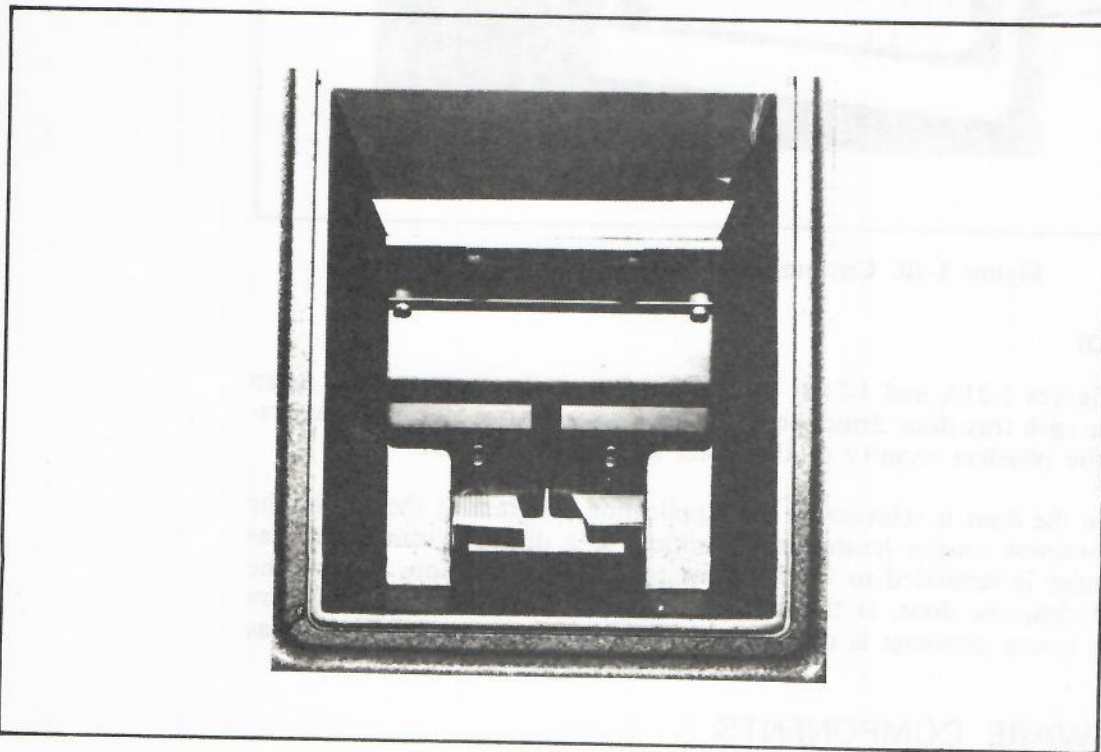


Figure 1-21B. Cash Tray Door Open

The Application programs provide all the necessary routines for the system to function as a full service Automatic Teller Machine. The operating characteristics of the Application programs are controlled by a data file called the Custom File, which can be tailored by each Institution to satisfy its own requirements. The Institution sets the values in the Custom File using the Customizer program. This allows a variety of requirements to be met by the same basic software, and provides financial Institutions with an easily modified and flexible product.

The Customizer Program

The Customizer is an interactive editor which allows the data values and format descriptions of a Custom File to be altered by the Institution. The Customizer cannot create a Custom File; it can only be used to edit an existing one. A "standard" Custom File is provided with each release of software. This "standard" Custom File can then be edited to represent the requirements of a live installation.

For detailed information concerning the Customizer program, refer to the BMT RT Series Systems Reference Manual, form number 2014502.

The Custom File

The Institution can influence the behaviour of an Application program by editing the Custom File. A Custom File is loaded into the system memory as the first step in Application program execution. The information in the Custom File is used to initialize variables in the Application program. As the Application program code itself is not altered, flexibility is provided without loss of integrity.

The information stored by the Customizer in the Custom File can be classified into five categories, as follows:

1. The hardware configuration of the RT 650 which the Application program is to support.
2. Details of the transactions to be offered, the associated account types and the identifying codes to be used.
3. Parameters governing the general behaviour of the RT 650; for example, timeouts, retry limits, and the action to be taken when an expired card is presented to the system.
4. The sizes, and in some cases the formats, of the data fields to be manipulated by the RT 650.
5. The content and format of all messages to and from the system. These include the data communication messages used in the interface to the Host.

The Application Programs

There are two versions of the Application program, corresponding to the two basic hardware configurations: an online only version for systems without back-up storage; an offline capable program, which supports back-up storage media.

It is important to realize that the structure of the two versions of the Application program are very similar. The extra facilities provided in the offline capable program represent extensions to the online only program, not deviations from it.

By selecting the appropriate hardware configuration, Application program and customized choices, an Institution can operate the RT 650 system in one of three ways: online only; offline only; online with offline back-up.

The online only Application operates in online only mode. The offline capable Application can operate in any one of the three modes, with the provision of additional facilities such as local transaction authorization. Therefore, the offline capable Application provides a flexible service to the Institution that can also contend with Host/datacomm failure in a secure manner.

GENERAL DESCRIPTION 1

SYSTEM OPERATION BY A CUSTOMER 2

SYSTEM OPERATION BY ATTENDANT 3

SYSTEM CONFIGURATION 4



SECTION 2

SYSTEM OPERATION BY A CUSTOMER

INTRODUCTION

This section describes the operation of an RT 650 by a customer of an Institution. It describes the business session in terms of three phases and uses illustrations for clarity. The wording of all messages displayed on the screen is customizable, and so all the illustrations show example wording.

Before the business session starts, one of a number of messages is displayed on the screen. The message indicates whether or not the RT is ready to start serving a customer. For example "OUT OF SERVICE" message means that the customer cannot use the RT.

The RT 650 is ready for use if a "welcoming message" is displayed, asking for card and/or account number entry. Customers are guided through each step of a business session by clear instructions displayed on the screen. A business session can be considered as having three distinct phases: customer validation, (determining whether or not a customer is entitled to use the system), transaction selection and execution; and business termination.

CUSTOMER VALIDATION

The steps involved in customer validation vary, depending on the requirements of the Institution, and on how the system is configured. The software provides for two different methods.

ACCOUNT NUMBER ENTRY

With this method, the customer is requested to enter an account number, followed by a Personal Identification number (PIN). Refer to figures 2-1 and 2-2.

To prevent unauthorized access to a customer's account (in the event of a business session not being correctly terminated) the customer is required to enter the PIN for each transaction selected.

CARD ENTRY

RT 650 systems which are equipped with an Auto Card Reader request the customer to insert a Magnetic Stripe Card in the card entry station. Refer to figure 2-3. It is then clamped in position and read.

When the card has been read successfully, the customer is requested to enter the PIN in the same way as previously described. The system maintains possession of the card during the business session, so the customer is only required to enter the PIN once. The card is then returned to the customer unless the system is customized to retain cards under certain conditions. If the card is encoded with data on track 3, the system can validate the PIN locally and securely. In this case a choice is offered in the Customizer program, between PIN validation locally or by the Host system.

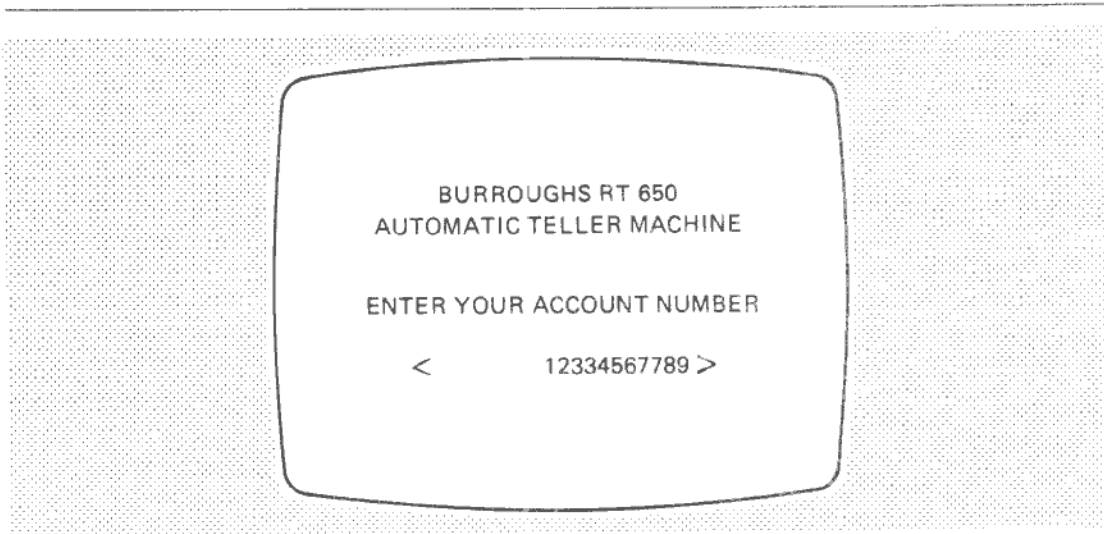


Figure 2-1. Digits Displayed as Entered by the Customer

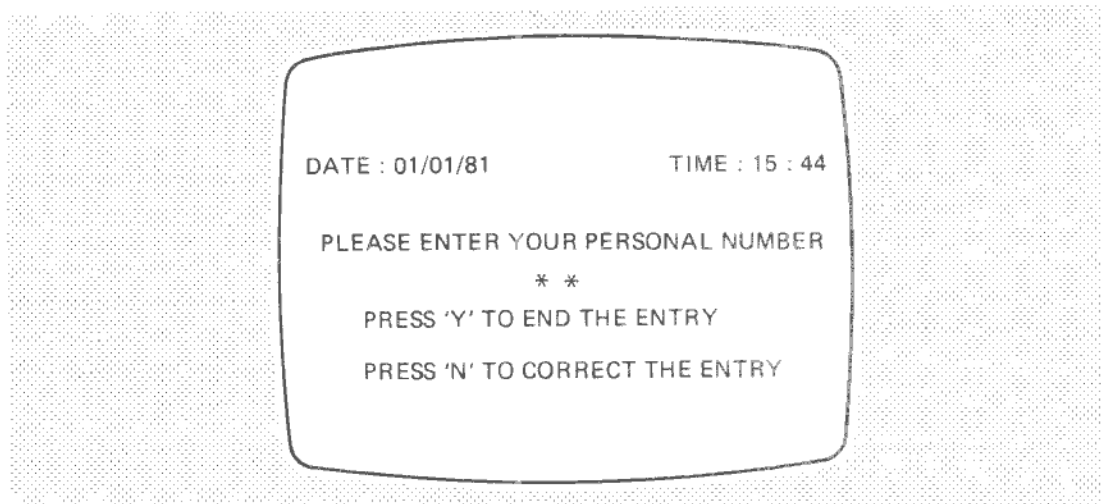


Figure 2-2. PIN Digits Displayed as Security Characters

Customer validation based on card entry can be offered in combination with account number entry. In this case the software monitors for whichever comes first; key depression or card insertion. Refer to figure 2-4.

If the cancel key is pressed at any time during customer validation, the RT terminates the business session.

TRANSACTION SELECTION AND EXECUTION

When the customer validation phase of a business session has been successfully completed, a number of transactions/services are presented to the customer. The customer selects the required transaction, and enters any necessary parameters (normally an amount) when instructed. A message is then sent to the Host system describing the requested transaction. When the Host responds with a message to authorize the transaction, the RT executes and records it on the Transaction Printer. This printed record is the customer's receipt of the executed transaction. If the cancel key is pressed at any time during transaction selection, the machine terminates business.

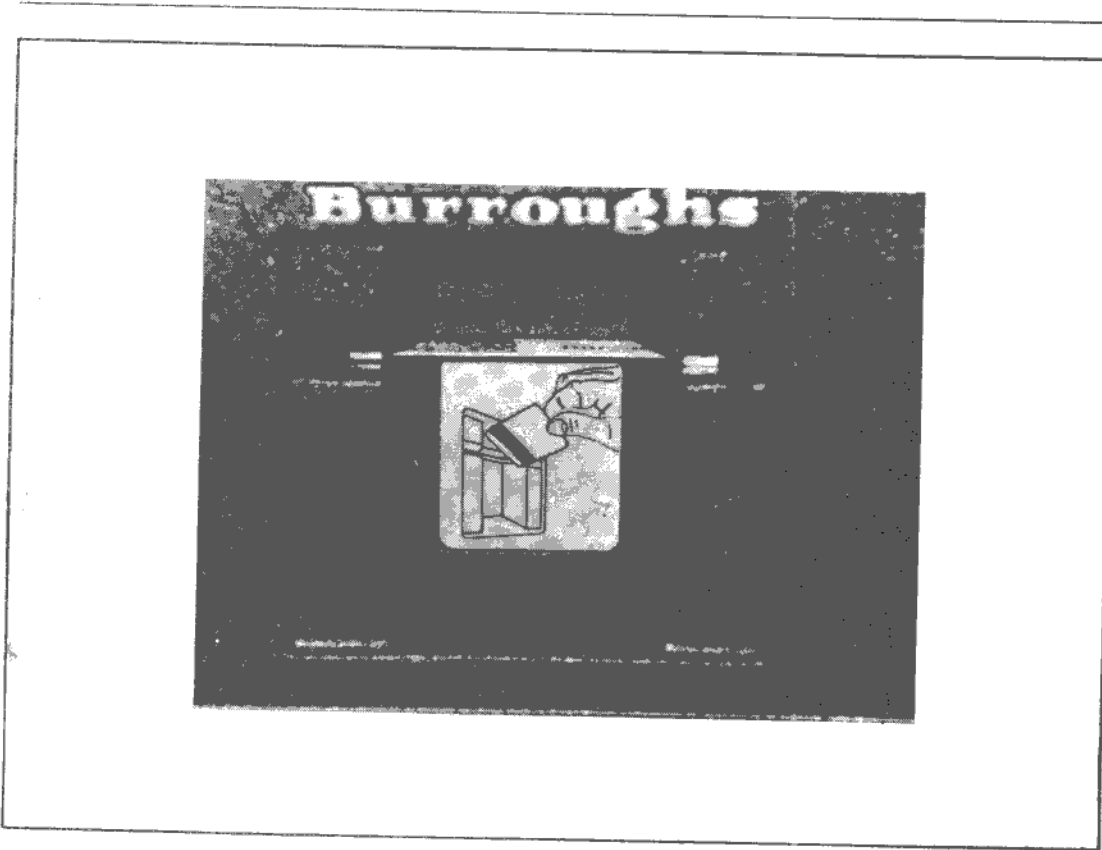


Figure 2-3. A Card is Inserted in the Card Reader

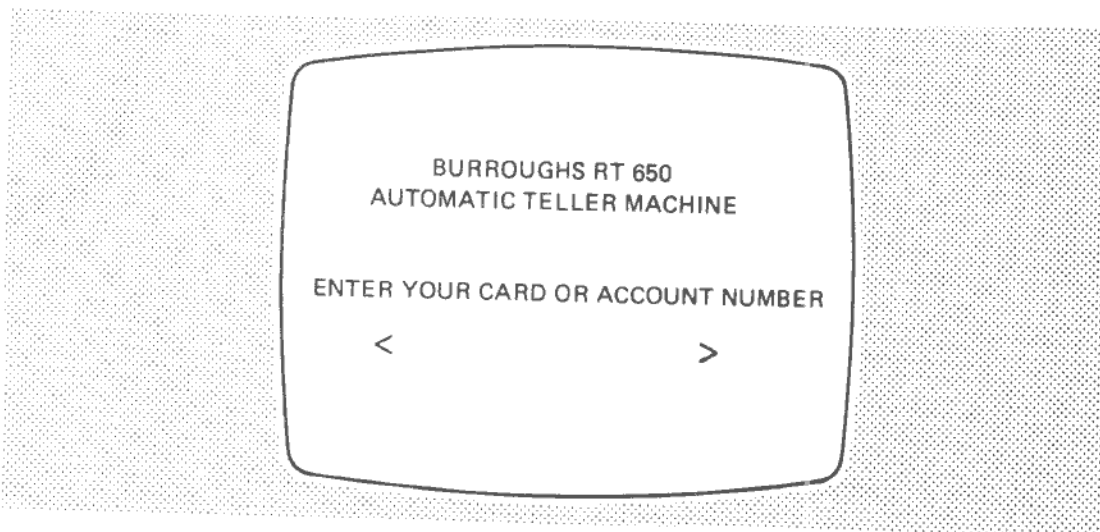


Figure 2-4. Welcome Card or Account Display

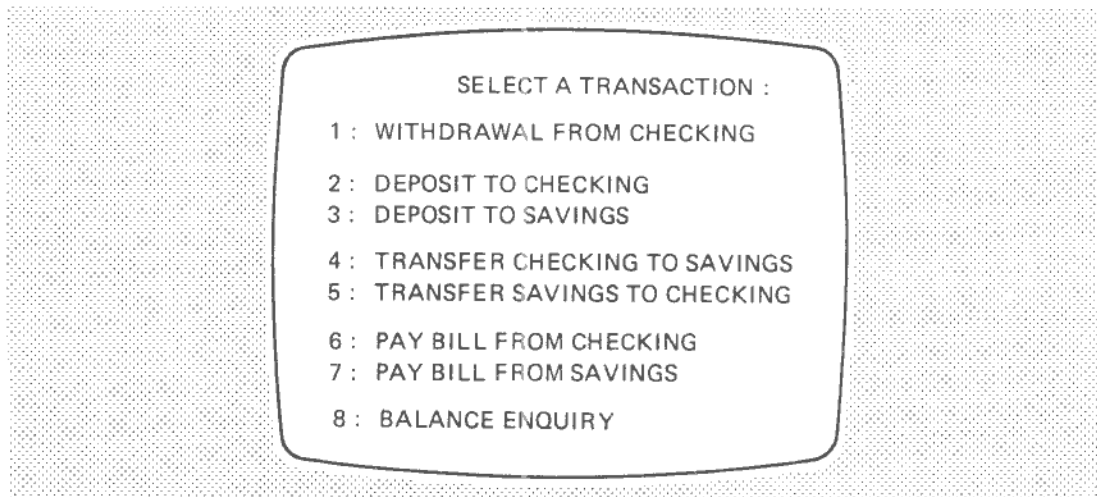
Full details of message sequencing between the RT and the Host are given in the BMT RT Series Systems Reference Manual (form number 2014502).

TRANSACTION SELECTION

Depending on how the Custom File has been customized (using the Customizer program), the available transactions and services can be presented to the customer in a number of ways.

In the Page System method, the available transactions are displayed on the screen as a list of discrete functions; that is, a list of specific transactions such as "CASH WITHDRAWAL FROM CHECKING ACCOUNT" or "TRANSFER FROM SAVINGS TO CHECKING". If the screen is not large enough to display all the discrete choices at once, the customer (by depressing the appropriate key) can continue requesting the next "page" of the transactions list. This is displayed on the screen until the required transaction is found and selected.

In the Structured method, the first list presented to the customer contains general transaction types, such as "WITHDRAWAL", "TRANSFERS", and subsequent choices are made to define the exact transaction required. For example, the selection of a transfer function might be followed either by one display listing all the available transfers and inviting a choice between them, or by two displays, one defining the type of account to be debited, and the other defining the type of account to be credited. (Refer to examples 2-1 thru 2-3).



Ex. 2.1 Transaction Menu using the Page System Method

SELECT A CLASS OF TRANSACTIONS :

- 1 : WITHDRAWALS
- 2 : DEPOSITS
- 3 : TRANSFERS
- 4 : PAYMENT OF BILLS
- 5 : BALANCE ENQUIRY

Ex. 2.2 a) Transaction Menu using the Structured Method

SELECT TYPE OF TRANSFER REQUIRED :

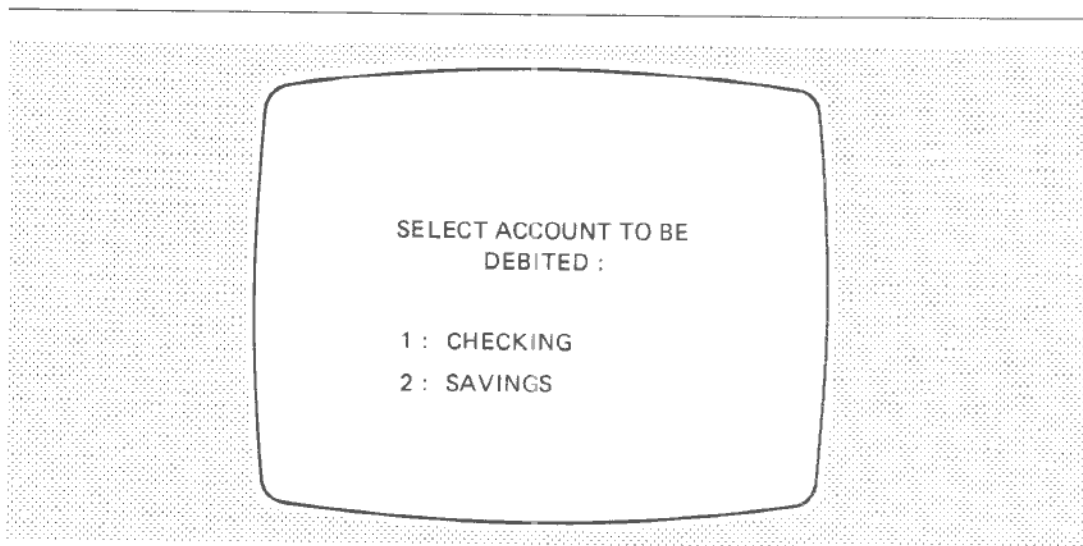
- 1 : FROM SAVINGS TO CHECKING
- 2 : FROM CHECKING TO SAVINGS
- Y : RETURN TO MAIN MENU

Ex. 2.2 b) After Selecting "TRANSFERS", a Second Menu is Displayed

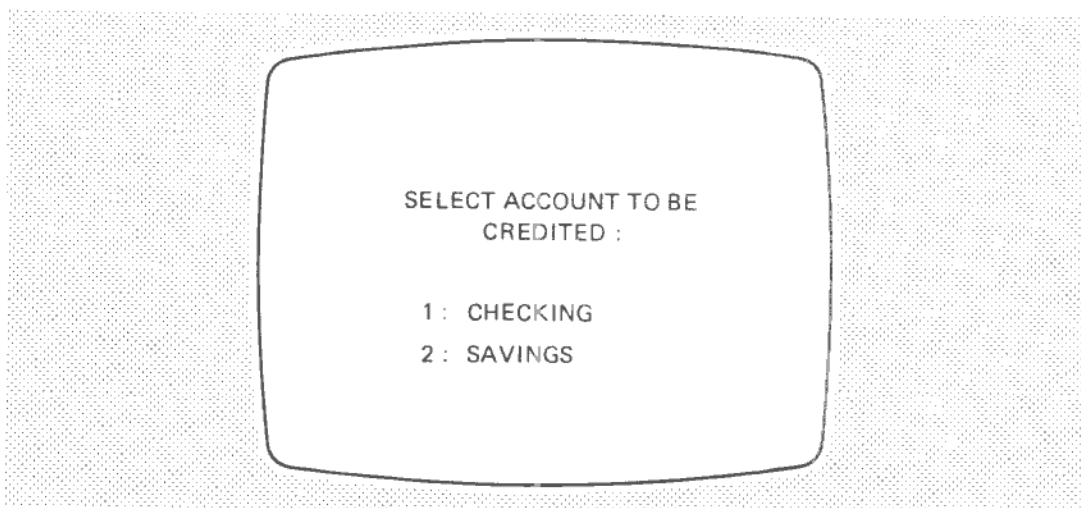
SELECT A CLASS OF TRANSACTIONS :

- 1 : WITHDRAWAL
- 2 : DEPOSITS
- 3 : TRANSFERS
- 4 : PAYMENT OF BILLS
- 5 : BALANCE ENQUIRY

Ex. 2.3 a) Transaction Menu using the Structured Method



Ex. 2.3 b) A Second Menu determines Account to be Debited

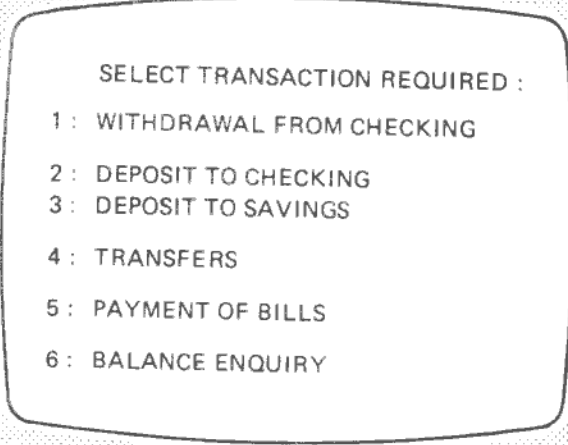


Ex. 2.3 c) A Third Menu determines Account to be Credited

When deciding how to present transactions to customers, consideration must be given to two main areas; clarity of description, and ease of customer operation. The transactions offered must be clearly and accurately described, and it must be ensured that any transaction can be selected with the minimum number of key entries by a customer.

The method chosen by any individual Institution largely depends on how many transactions are to be offered. A maximum of twelve choices are available on one "page", so if twelve or less transactions are to be offered the best method is probably the page system. However, if a large number of transactions are offered using the page system, a customer would need to keep pressing a key to display the next "page". The greater the number of transactions offered using the page system, the more time-consuming, confusing and frustrating it becomes for the customer to locate those transactions which are among the last offered. If many more than twelve transactions are to be offered, then the structured method is better.

A combination of the Page and the Structured methods can be constructed. This means that the most frequently used transactions are displayed as a page of discrete functions, and the remaining transactions are presented structurally. Refer to example 2.4.



SELECT TRANSACTION REQUIRED :

- 1 : WITHDRAWAL FROM CHECKING
- 2 : DEPOSIT TO CHECKING
- 3 : DEPOSIT TO SAVINGS
- 4 : TRANSFERS
- 5 : PAYMENT OF BILLS
- 6 : BALANCE ENQUIRY

Ex. 2.4 Combination of the Page and Structured Methods

The basic types of transactions and services made available by the RT 650 are:

- withdrawal
- deposit
- pay bill from account
- pay bill with cash/check
- transfers
- balance inquiry
- card balance
- service request
- service request with deposit
- cash check
- quick cash
- selected amount cash check

The Institution can present any number of these services to its customer by appropriate use of the Customizer program.

TRANSACTION EXECUTION

When a transaction has been selected, any further parameters that are necessary (for example an amount entry) are requested from the customer. A message describing the transaction is sent to the Host system (if operating online). It then responds with a message authorizing or cancelling the transaction. If the RT is operating offline, then local transaction authorization takes place.

If the selected transaction is authorized, it is executed by the RT and recorded on the Transaction Printer. The exact sequence of events depends on the type of transaction selected.

BUSINESS TERMINATION

At the end of each transaction, the customer is offered the choice of selecting further transactions or terminating business. Business can also be terminated at any time during the business session by pressing the cancel key (marked "C"), by Host command or Attendant intervention. When business termination is requested, the customer is informed that business has been concluded, and messages are displayed requesting the customer to remove his card (if the business session was begun by a Magnetic Stripe Card in an Auto Card Reader) and to detach the printed receipt. The final display is a customizable courtesy "farewell" message. Refer to figure 2-5.



Figure 2-5. Courtesy Farewell Message

GENERAL DESCRIPTION

1

SYSTEM OPERATION BY A CUSTOMER

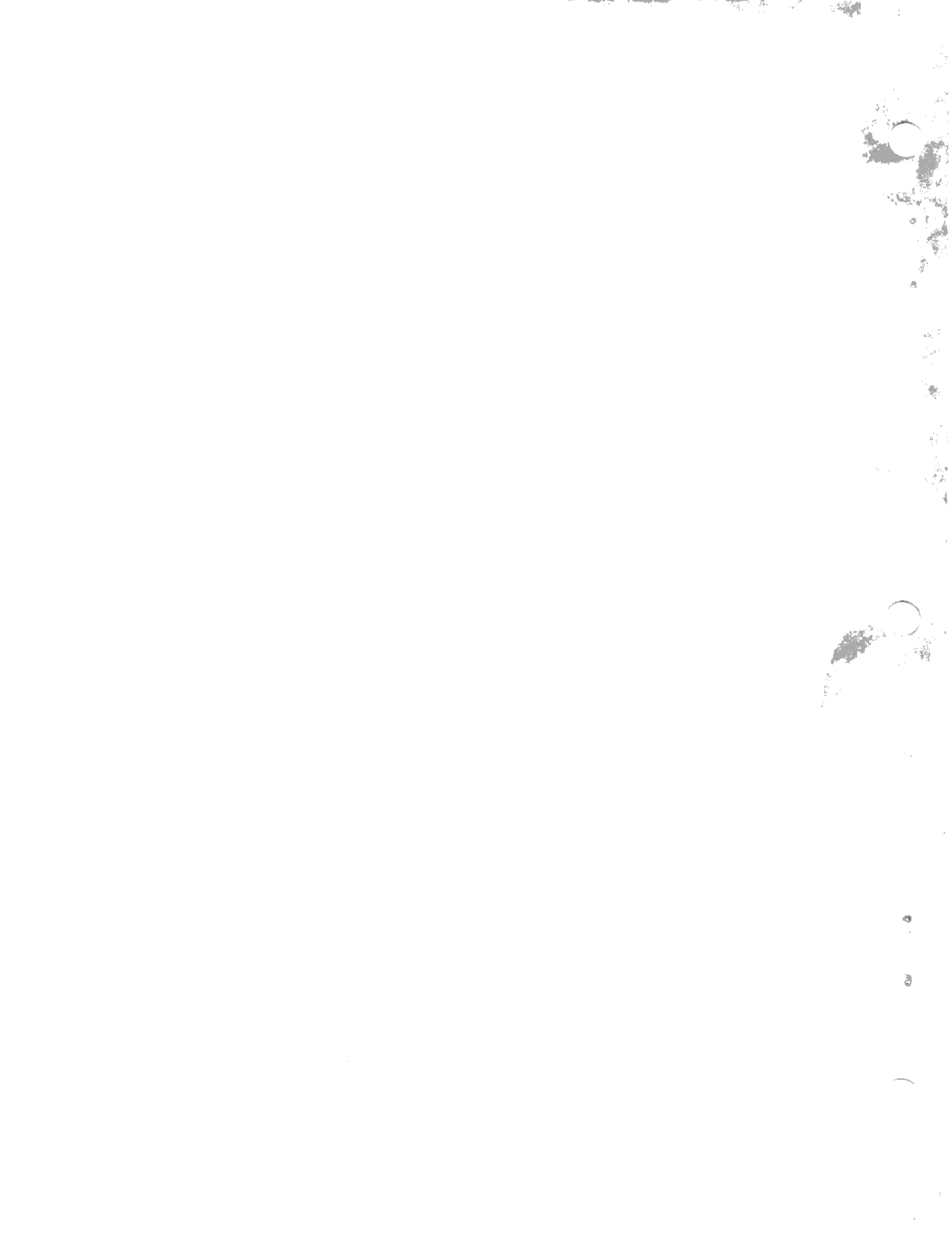
2

SYSTEM OPERATION BY ATTENDANT

3

SYSTEM CONFIGURATION

4



SECTION 3

SYSTEM OPERATION BY ATTENDANT

INTRODUCTION

This section describes the operation of an RT 650 Automatic Teller Machine by an Attendant of the Institution. It describes the features of the RT 650 that are relevant to an Attendant, together with procedures illustrating how to access and service a number of system components. There is a discussion of the software servicing procedures that are available to an Attendant, followed by any error conditions that may arise.

RT 650 STATES OVERVIEW

The RT 650 Application programs for online only and offline capable systems are structured around functionally distinct modes of operation, known as States (refer to figure 3-1).

INITIALIZATION STATE

Initialization state is entered as soon as the Application program has been loaded. The Application program is initialized with the values contained in the Custom File, and the hardware modules connected to the system are verified. On completion of Initialization the system enters Out of Service State. During Initialization a (customizable) message is displayed on the screen.

OUT OF SERVICE STATE

Out of Service State is entered:

- on completion of Initialization State
- on Attendant or Host directive
- if a critical hardware or media error is encountered.

If operating online, the system waits for either Attendant or Host intervention. If operating offline, the system enters In Service State, provided that Out of Service was not encountered due to a critical error or Host directive. In Out of Service State a customizable "out-of-service" message is displayed on the screen.

IN SERVICE STATE

In Service State is entered on Host directive (online operation), or automatically from Out of Service State (offline operation) - refer to Out of Service State. When in In Service State the system waits either for customer presence to be detected through the keyboard or card reader, or for Attendant or Host intervention.

CUSTOMER SERVICE STATE

Customer Service State is entered when the presence of a customer is detected. In this State the system validates customers, and processes transactions, guiding the customer

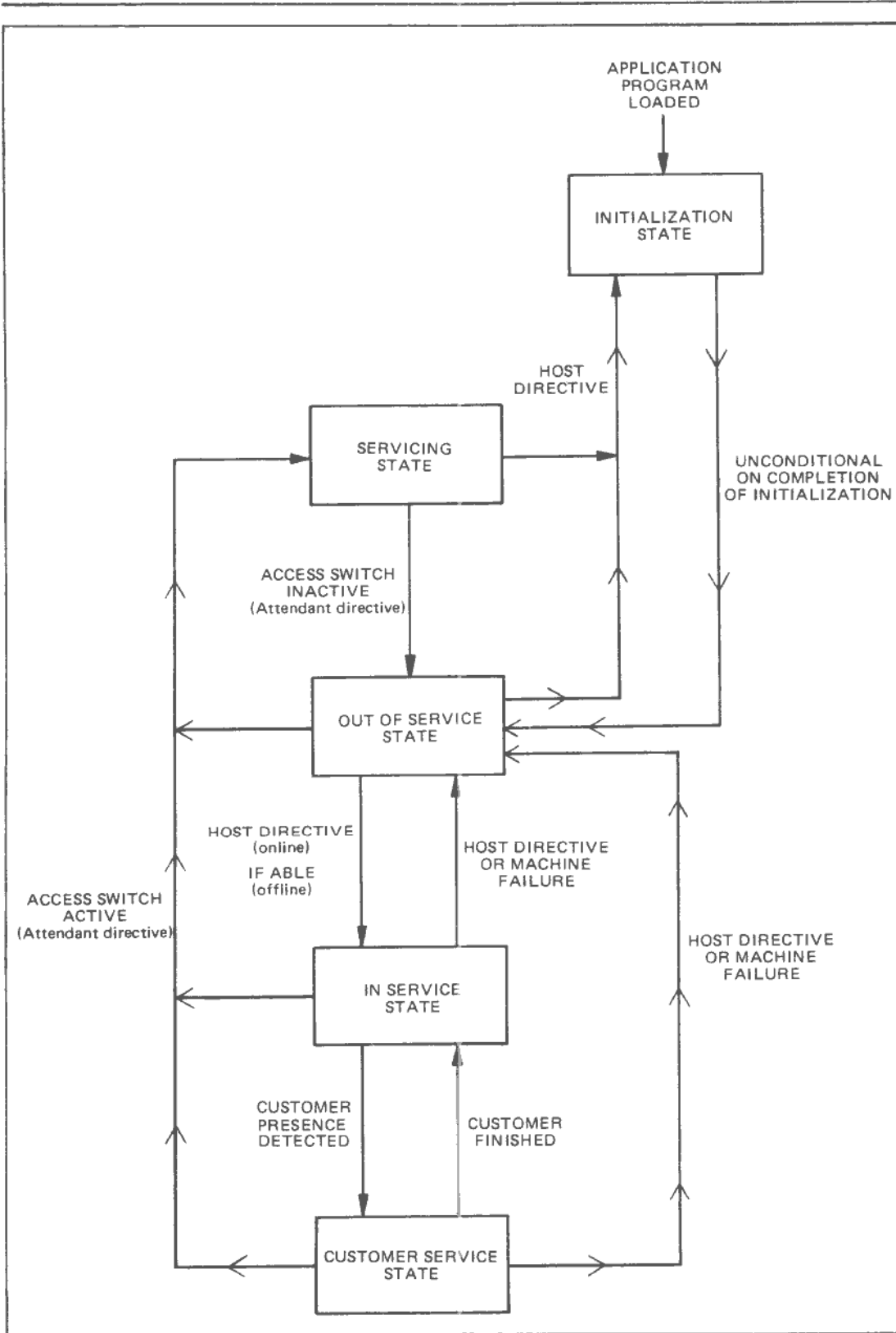


Figure 3-1. States Overview

using informational displays on the screen and requests for keyboard entries. Exit from Customer Service State is made when the customer completes a business session, if a critical malfunction occurs, or on Attendant or Host directive.

The main difference between systems transacting to customers in online mode and systems operating offline, is that balance enquiry transactions are not permitted offline, and different customizable limits apply to withdrawal transactions.

SERVICING STATE

ONLINE ONLY SYSTEMS

Servicing State is entered when Attendant presence (Access switch is in the active position) is detected by the system. In this State the Host can exercise any peripherals connected to the RT, and can communicate with the Attendant using the display screen and keyboard. Alternatively, the Attendant can access a set of local program routines by keying in a customizable secret code. The functions available are then presented in the form of menus of various options. They consist of updating audit totals and machine resources, resetting the printer status and testing the operational status of the devices. Exit is made to Out of Service State when the Attendant indicates completion of servicing by pressing the Cancel key (marked C) and returning the Access switch to the not active position.

OFFLINE CAPABLE SYSTEMS

Offline capable systems provide local program routines that enable the Attendant to check and test the devices attached to the system, audit the machine totals, and carry out maintenance of locally stored files (derogatory files, transaction files). In order to enter these local servicing routines, the Attendant activates the Access switch. The RT then enters Servicing State and the Attendant keys in a customizable secret code. The functions available are then presented in the form of menus of various options. Exit from the local servicing routines is made by pressing the cancel key. Exit from Servicing State is made by returning the Access switch to the not-active position.

In Servicing State a customizable servicing-state-display message is displayed on the screen.

THE ATTENDANT ACCESS AND POWER SWITCHES

The following is a description of the Access and Power Switches, as used by the Attendant.

THE ATTENDANT ACCESS SWITCH

The state of the Attendant Access switch (figure 3-2) determines the actions that the RT takes when it is powered on, as well as directing the RT into and out of Servicing State. The Attendant Access switch is a rocker switch positioned horizontally in a recess at the top left side of the RT 650. The switch is active when the side nearest the fascia of the machine is depressed, (refer to figure 3-2) and not active when the side nearest the indicator lights is depressed.

THE POWER SWITCH

The Power On/Off switch (figure 3-3) is located in the top right compartment of the RT 650. With the compartment door open, the Power switch is at the top left of the

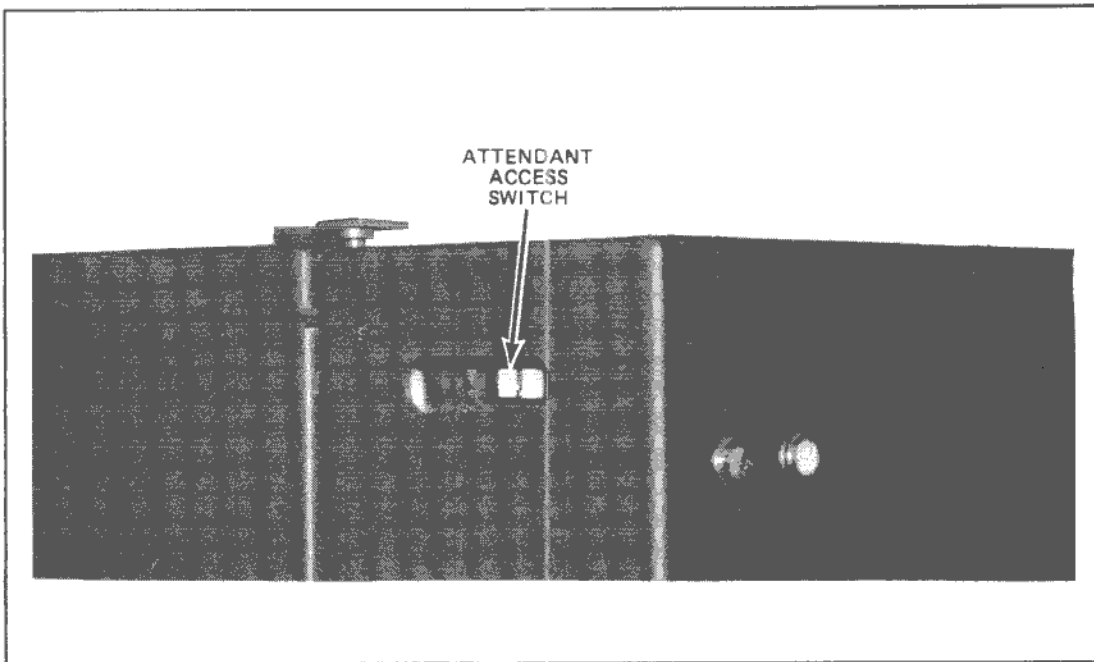


Figure 3-2. The Attendant Access Switch

compartment. There is a label showing the ON and OFF positions of the Power switch on the roof of the compartment above the switch.

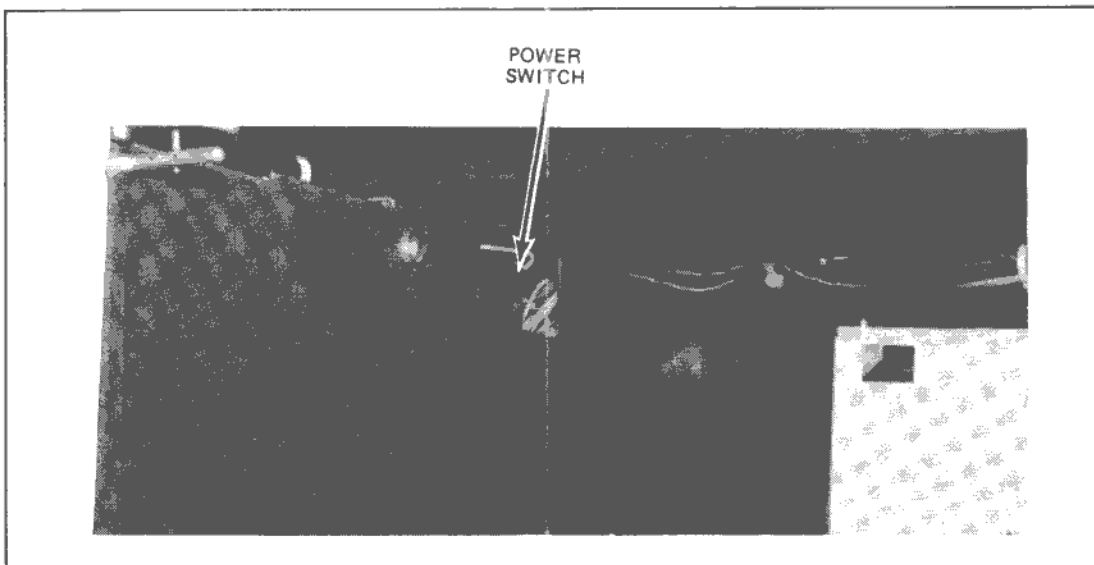


Figure 3-3. The RT 650 Power Switch

USE OF THE ATTENDANT ACCESS AND POWER SWITCHES

The Attendant Access switch is used to signal the presence of an Attendant. The state of the Access switch determines the actions taken by the RT during the power on phase and during Application program execution.

During Power On Phase

When power is applied to the RT 650, the buzzer sounds and basic processor and peripheral confidence tests are performed. Subsequent action depends on the state of the Attendant Access switch – whether it is active or not (Refer to figure 3-4).

1. Attendant Access Switch Not Active.

Control is passed to the built-in loader and an attempt is made to load an Application program. The loader examines the Electrically Alterable Read-Only Memory (EAROM) to retrieve the Application identifier used in the loading process.

2. Attendant Access Switch Active.

The legend “MTR MODE?” (Maintenance Test Routines) is displayed on the screen. If the “Y” key is pressed the MTR routines are entered. MTR routines are mainly used by Burroughs Field Engineering personnel. If no keys are pressed, or any other key is pressed, the loader attempts to load the Customizer program.

Programs are loaded either from backup storage or from the Host, depending on the value of the primary program load source indicator in EAROM. The facility to default from the primary load source is provided by using a secondary program load source indicator, also in EAROM.

During Application Program Execution

When the Attendant Access switch is activated at any time during Application program execution, this results in the RT entering Servicing State. The facilities available in Servicing State depend on whether the RT is using the Online only Application or the Offline capable Application program. They are described in detail at the end of this section.

GAINING ACCESS TO THE INTERIOR OF THE MACHINE

Figure 3-5 shows the external appearance of the safe and compartments of the RT 650. The safe and the right hand compartment allow the Attendant to access the interior of the machine in order to service machine resources. The left hand compartment contains system components that must only be serviced by Burroughs Field Engineering personnel.

SAFE AND COMPARTMENT CONTENTS

THE SAFE

The safe controls access to all other compartments of the machine, and ensures that only legitimate personnel have access to the interior of the machine. The safe contains the following components.

1. Currency Cassettes and Feeders.

The location of these is shown in figure 3-6. The feeders are mounted on sliding rails which allow the entire mechanism to be withdrawn and serviced.

2. Intruder Alert.

The Intruder Alert is a device that may be connected to the alarm system used by the Institution in order to indicate if the safe has been opened. It is situated inside the safe near the top left corner.

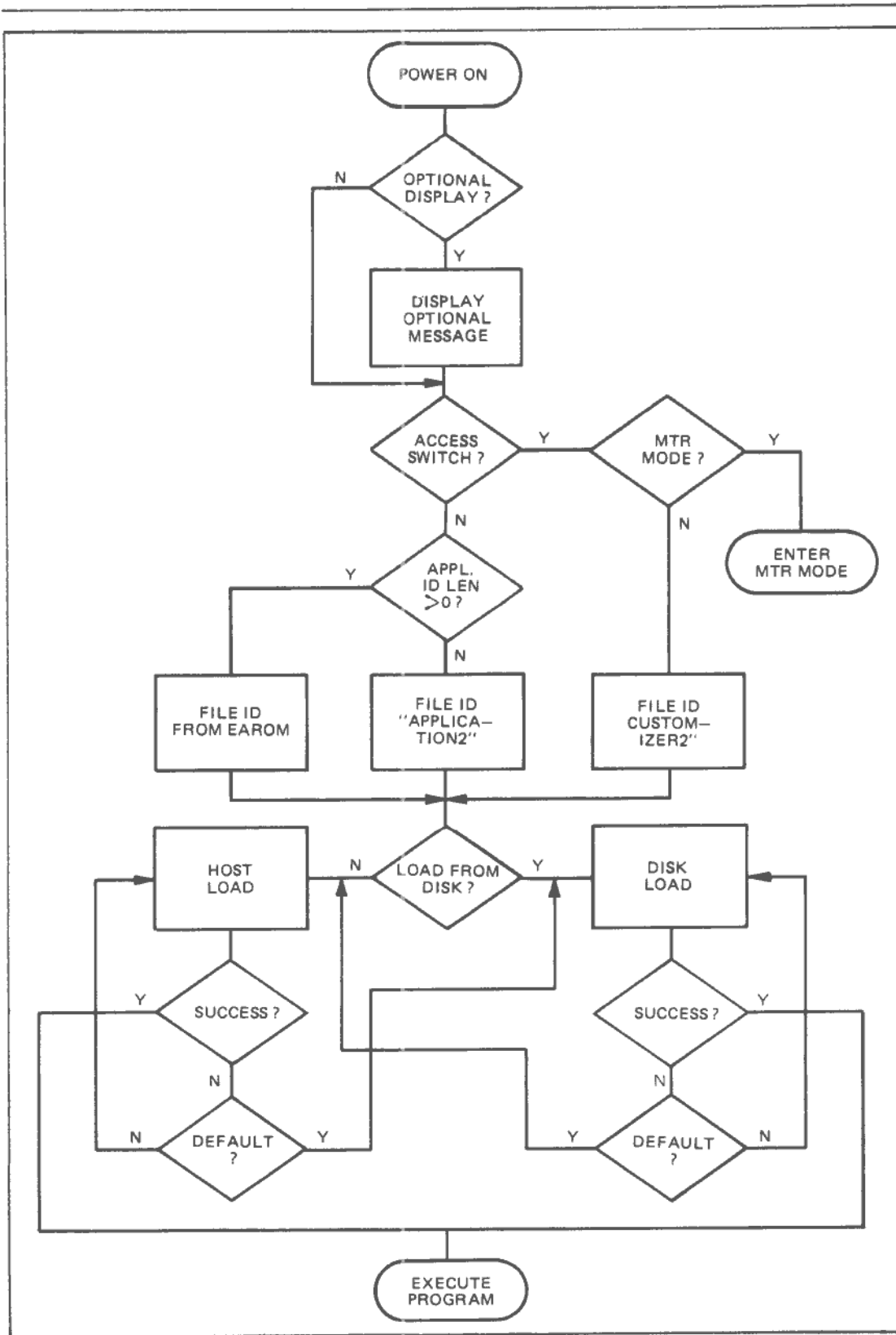


Figure 3-4. Options Available at Power On

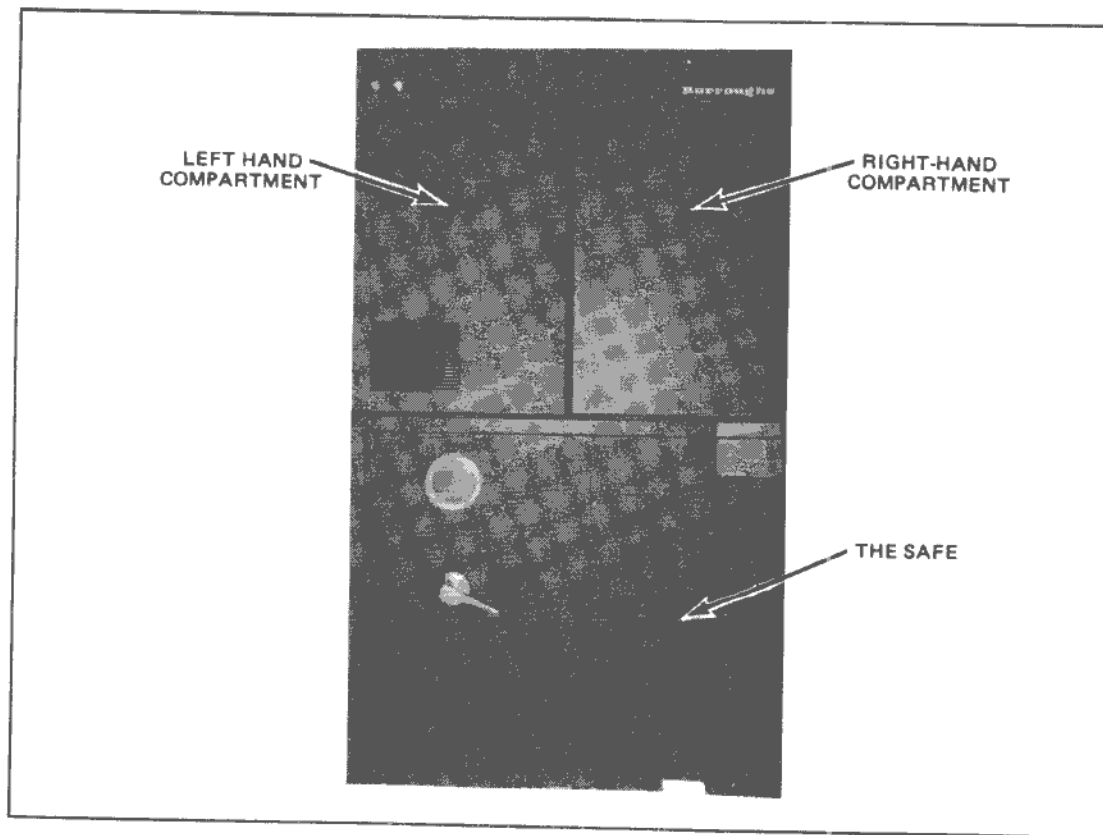


Figure 3-5. The RT 650 Safe and Compartments

3. Safe Interlock.

The Safe Interlock controls power to all the peripheral devices, except the Display Screen. When the safe door is open, the interlock is "dropped" and power to these devices is removed. With the safe door closed, the interlock is "normal" and power is supplied to all the peripheral devices.

4. Cover Access Latch.

This is a spring-loaded latch that releases the top right hand cover so that it may be opened, allowing access to the contents inside.

5. Backup Storage Area.

This area in the safe is used to contain the backup storage for offline capable RT 650 systems. The backup storage is provided in the form of either micro-disk or Burroughs Super Mini Disk.

6. Deposit Area.

The Deposit Area is below the Backup Storage Area. It is used to store envelopes that have been deposited by customers during deposit-type transactions and cards that have been retained by the system.

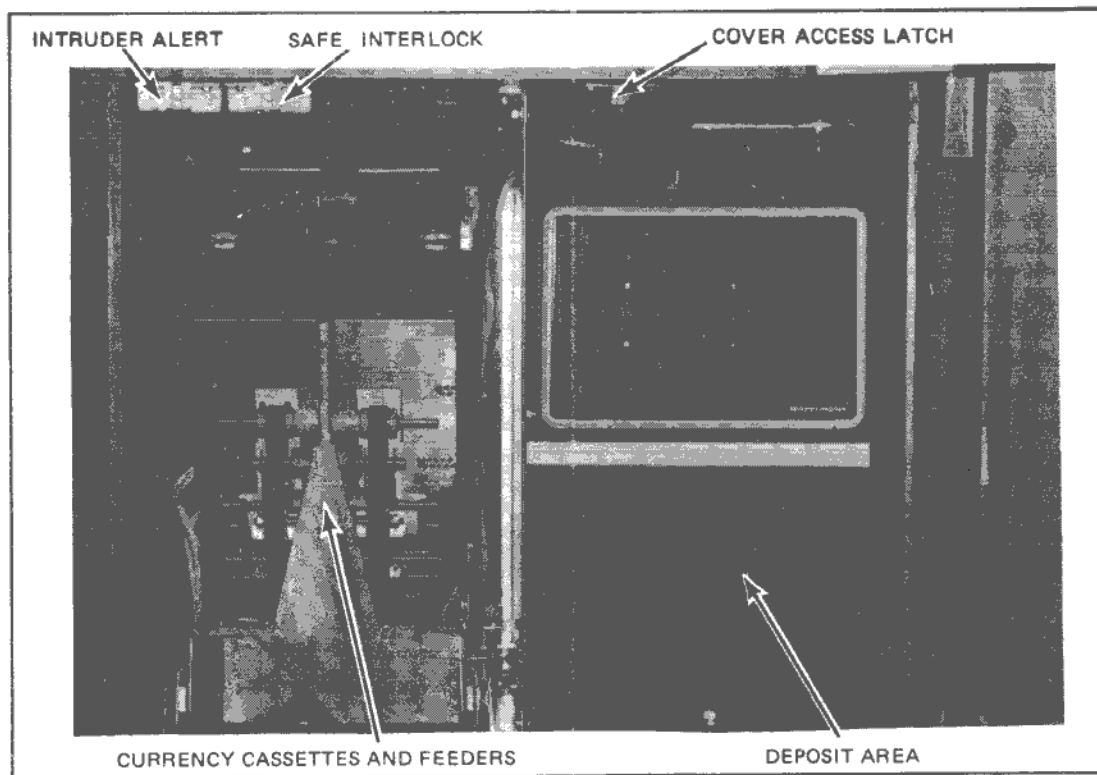


Figure 3-6. The Safe

THE RIGHT HAND COMPARTMENT

The Right Hand Compartment (figures 3-7A and 3-7B) are accessed through the safe. It contains the following system components:

1. The Power Switch.

The Power Switch controls power to the RT 650. It is situated in the left hand wall, at the top of the compartment.

2. The Transaction Printer Mechanism.

This is located at the far end of the compartment, near the fascia of the machine. The printer mechanism is mounted on a metal plate that is hinged about its base, and rests in a vertical position during normal operation. To access the printer mechanism without audit trail, pull the handle that is attached to the plate, and rest it on the base of the compartment.

If the printer with audit trail is being used, pull the handle that is attached to the mechanism and allow the printer to slide along its predefined track until it reaches a halt. The components of the printer are now fully exposed to facilitate servicing.

3. The Customizer Keyboard Socket.

The connection socket for the customizer keyboard is located in a recess in the left hand door of the RT 650. The exact position of this P/J connection is shown in figure 3-

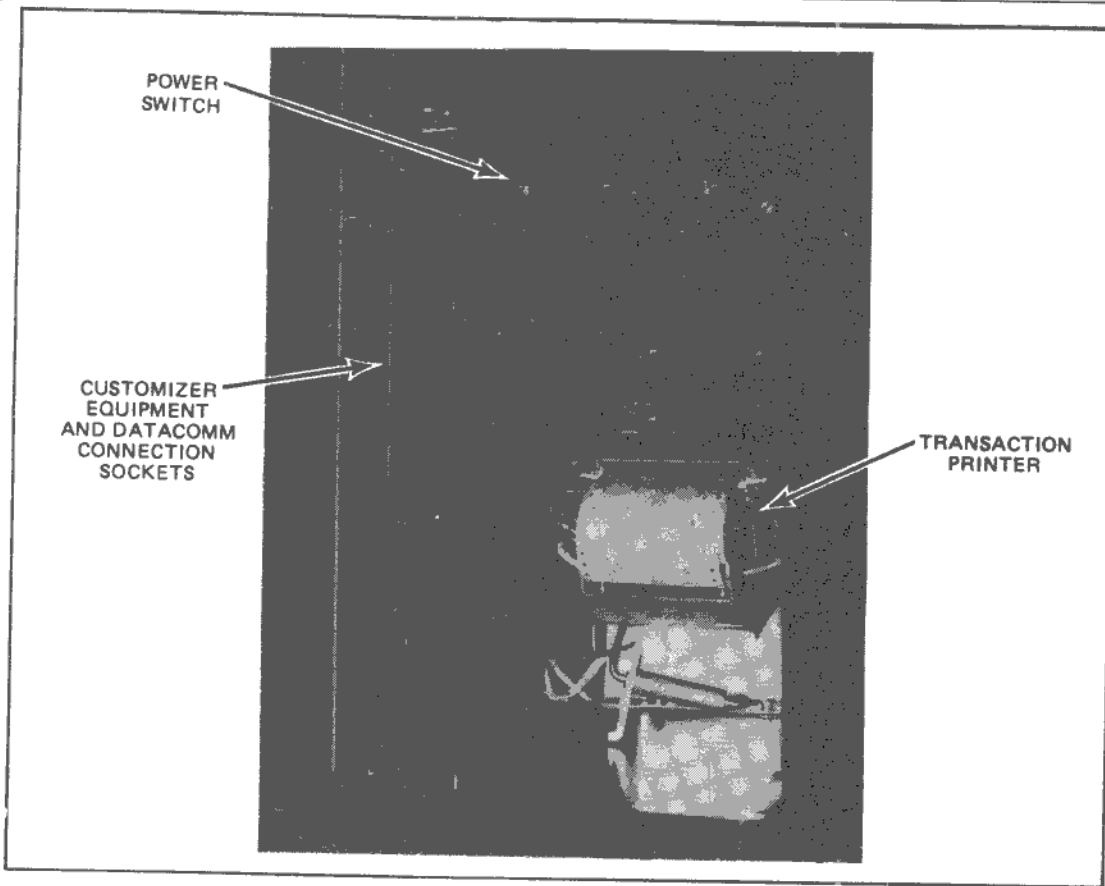


Figure 3-7A. The Right Hand Compartment

8. Access to the customizer equipment connections and the data communications connections is controlled by the right hand door. The Customizer Keyboard Socket is marked "SI/O" and must not be confused with a similarly marked socket at the bottom of the connection panel.

4. The Customizer Video Socket.

The Customizer Video Socket controls power to the RT 650 display screen and the customizer video monitor. It is situated at the top of the left hand door connection panel, above the Customizer Keyboard Socket and is unmarked.

5. Data Communication Sockets.

These consist of two P/J sockets in the left hand door connection panel. The upstream datacomm connection is marked "DATA COMM U" and the downstream connection is marked "DATA COMM D".

THE LEFT HAND COMPARTMENT

The contents of this compartment must only be accessed by Burroughs Field Engineering personnel.

The door of the compartment contains two indicator lights that operate under software control (refer to figure 3-9).

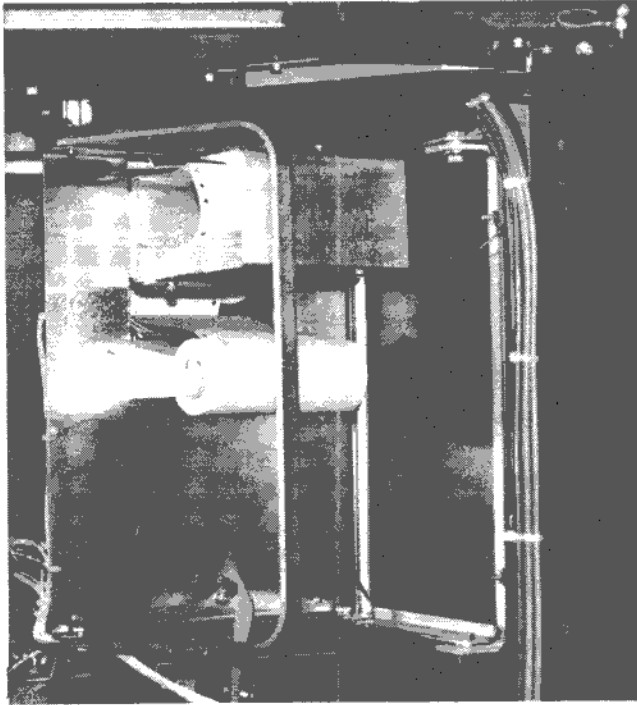


Figure 3-7B. The Right Hand Compartment with Audit Trail

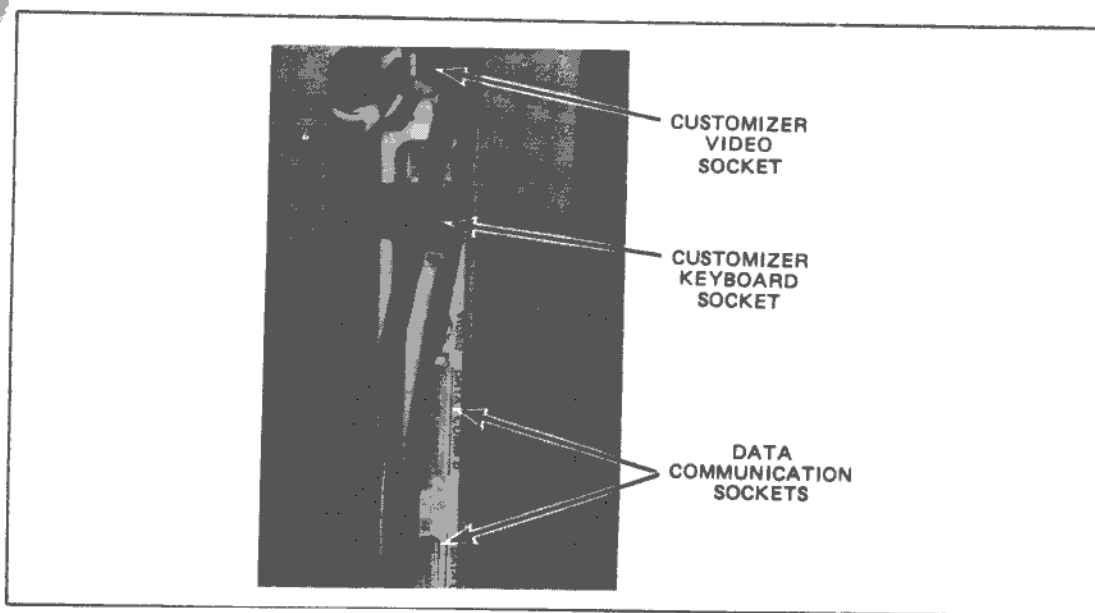


Figure 3-8. Data Comm and SIO Connection Panel

The left hand (red) indicator is used to inform the Attendant when authorized entry to the machine is permitted (RT is in Servicing State). If the indicator is lit, access to the interior of the RT is not permitted.

The right hand (amber) indicator is used to signal that the RT requires Attendant intervention; for example, currency cassettes almost empty, transaction printer requires servicing, a vital device failure has occurred. An Early Warning System for system resources is available on the RT 650. The resources involved are feeder note contents, the amount of printer paper and the disk space available for recording transactions. For each resource, there is a customizable value/limit which, when reached, results in an Early Warning (EW) to the Host system and/or Institution staff.

The Attendant Access switch is set in a recess in the left hand side of the door. The use of this switch is described in detail at the beginning of Section 3.

ACCESSING THE SAFE AND COMPARTMENTS

When the left hand (red) indicator light is turned off, the Attendant can access the contents of the RT in order to service the machine resources. The Attendant Access switch must have been activated before the RT can be serviced.

THE SAFE

The safe forms the main structure of the RT 650 Automatic Teller Machine. It consists of 1 inch thick walls (2.54 cm) of welded construction. The door of the safe is secured by bolts which are operated by the safe handle and a three number combination lock. The combination lock is protected by a drill-proof plate and is fitted with a relocking device.

The combination lock has two index marks outside the combination dial (refer to figure 3-10).

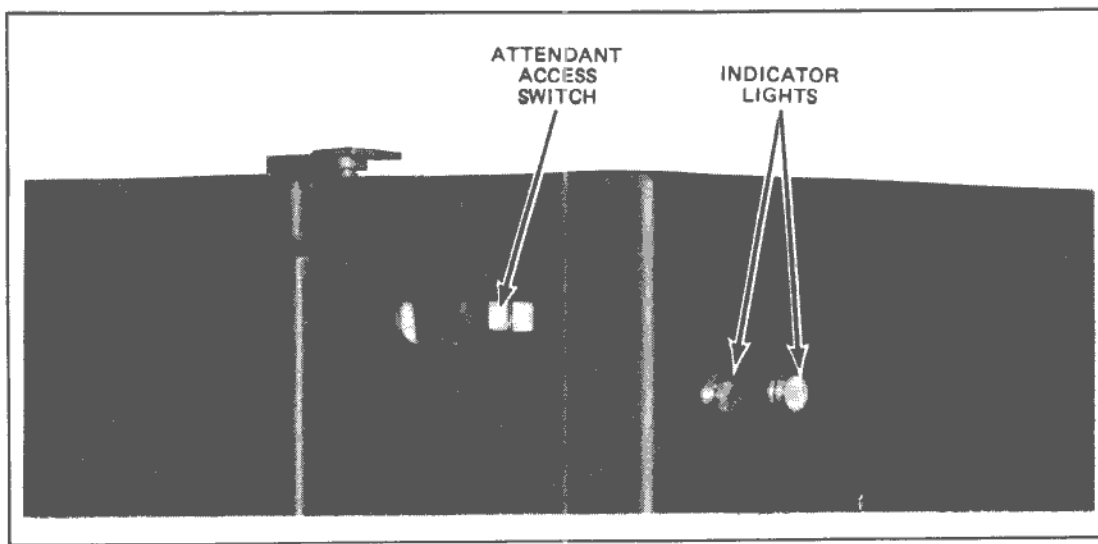


Figure 3-9. The Left Hand Compartment

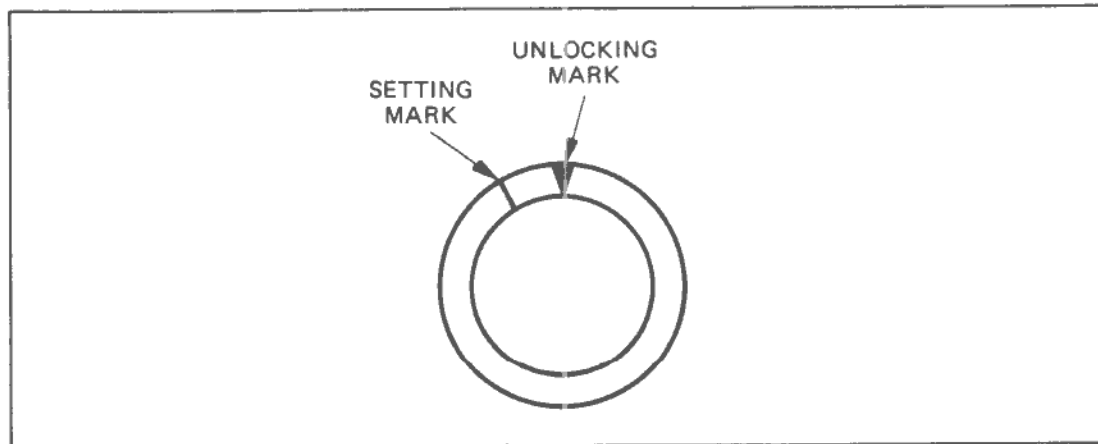


Figure 3-10. Combination Lock Marks

The unlocking mark is "V" shaped and positioned at the top of the dial. This mark is used when locking and unlocking the safe. The setting mark is a thin straight line on the left of the unlocking mark and is used to change the lock combination.

Opening the Safe

The following steps must be taken in order to open the safe door. An example combination of 10-20-30 has been used. Refer to figure 3-10A.

1. Turn the dial anti-clockwise until the first of the three numbers comes to the unlocking mark for the fourth time.
2. Turn the dial clockwise until the second number comes to the unlocking mark for the third time.
3. Turn the dial anti-clockwise until the third number comes to the unlocking mark for the second time.

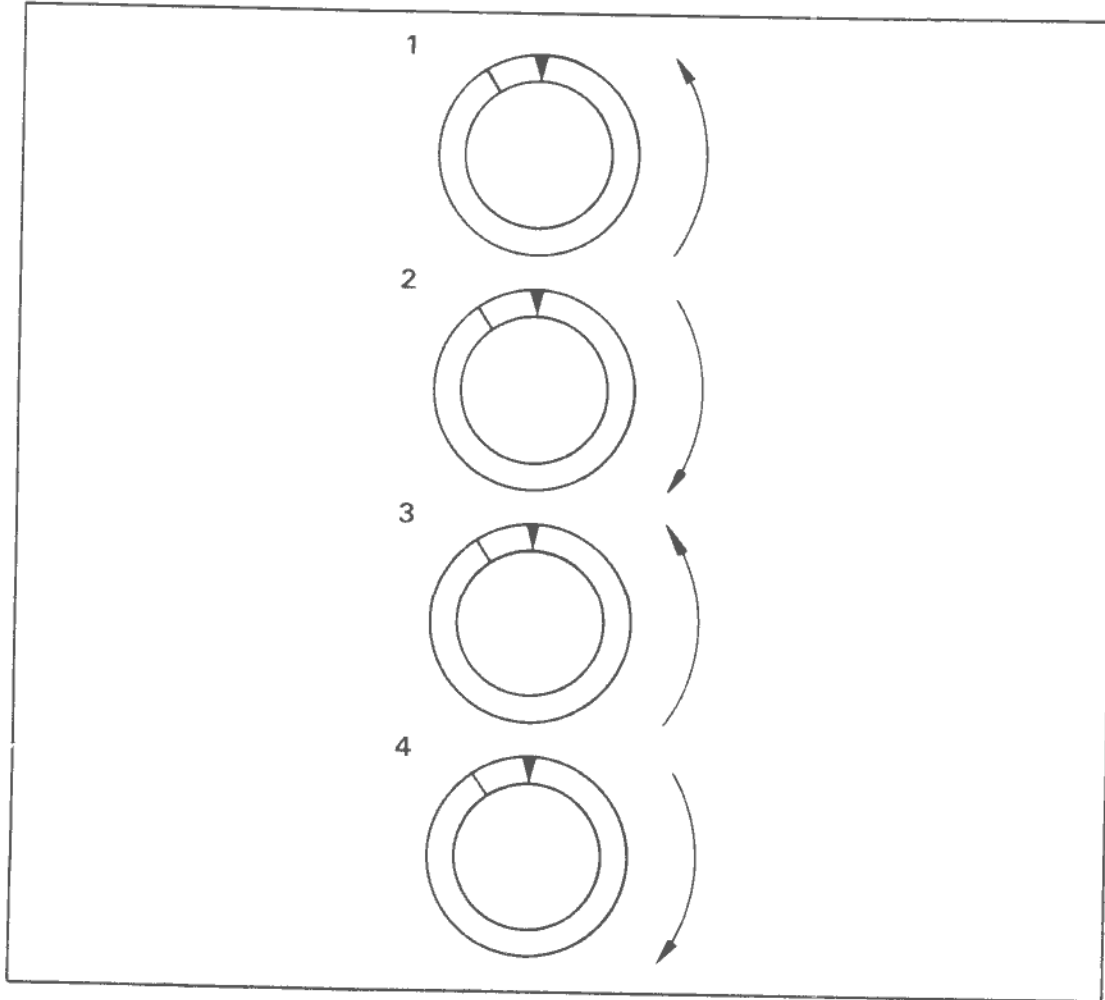


Figure 3-10A. Opening the Safe

4. Turn the dial slowly clockwise until it stops.
5. Open the safe door by turning the door handle clockwise until the bolts are released. With the safe door open, power to all peripheral devices (except the Display Screen) is removed.

Locking the Safe

When the safe door has been opened the following steps must be taken to lock the safe securely.

1. Close the safe door and secure the bolts by turning the door handle firmly anti-clockwise.
2. Turn the combination lock dial anti-clockwise for at least four full revolutions.

Setting a New Combination

Example: change 10-20-30 to 44-55-66.

1. Unlock and open the safe door.

2. Secure the bolts by turning the door handle firmly anti-clockwise.
3. Lock the combination lock by turning the dial anti-clockwise four full revolutions.
4. If the keyhole on the back of the safe door is not visible, open the lock case by removing the ten retaining screws.
5. Dial the existing combination numbers using the SETTING MARK instead of the unlocking mark, and stop on the last number:
 1. Turn dial four times.
 2. three times.
 3. twice
6. Insert the change key into the keyhole in the cover plate on the back of the lock (refer to figure 3-11). Ensure that the wing on the key is completely in the hole, then turn the key a quarter turn anti-clockwise.

Do not remove the change key at this stage.

7. Still dialing to the setting mark, but using the new combination, repeat the procedure given in step 5. Stop on the last number. Dial the number:
 1. four times.
 2. three times.
 3. twice
8. Turn the change key a quarter turn clockwise. Remove the key.
9. Check the new combination several times before closing the door. The new combination can be checked by repeating the procedures for opening and locking the safe, but **WITHOUT CLOSING THE SAFE DOOR**.

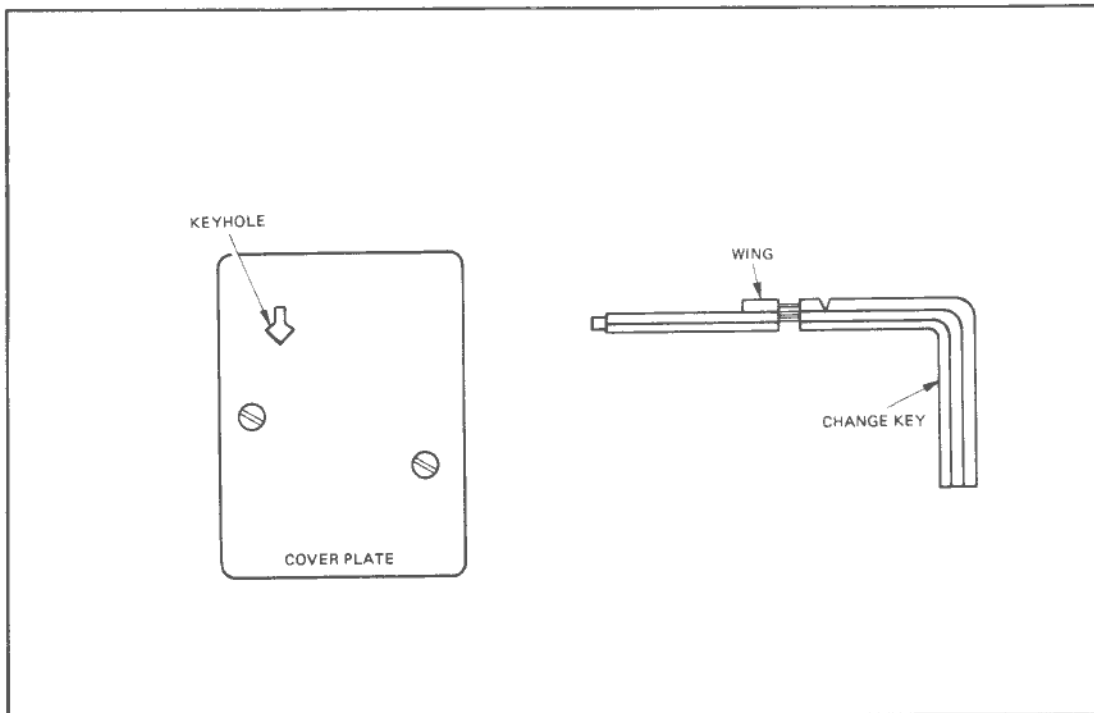


Figure 3-11. Cover Plate Keyhole and Change Key

Correcting Mistakes when Setting a New Combination

When checking a new combination, and the lock cannot be opened due to a mistake, the following procedure must be followed in order to reset the combination.

1. Remove the cover plate on the back of the lock (refer to figure 3-12).
2. Turn each wheel until the square hole in each wheel is over the keyhole in the cover plate. A piece of wire inserted in the slot of each wheel will easily move the wheels.
3. Replace the cover plate.
4. In order to set the new combination, insert the change key and repeat the procedure outlined in steps 6 through 9 in "Setting a New Combination".

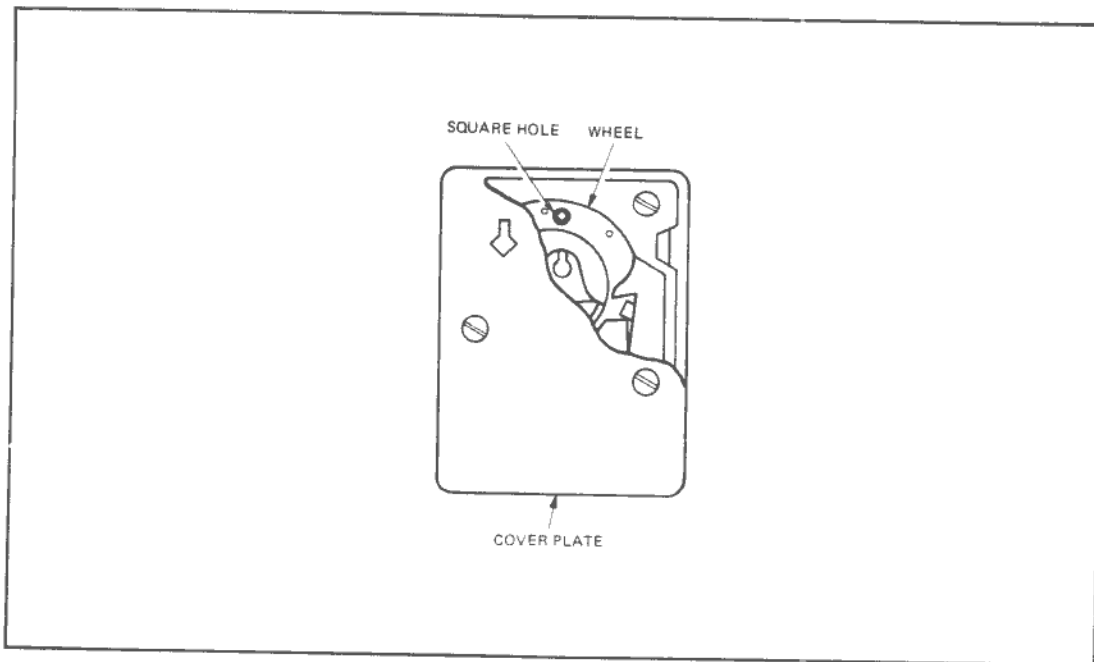


Figure 3-12. Lock Mechanism

THE RIGHT HAND COMPARTMENT

Opening the Right Hand Compartment

The right hand compartment cannot be opened without first opening the safe door. The following procedure must then be followed:

1. With the safe door open, release the Cover Access Latch by pulling it vertically down (refer to figure 3-13).
2. Swing open the right hand compartment door and release the Cover Access Latch.

Closing the Right Hand Compartment

The right hand compartment can be swung firmly shut. This automatically engages the Cover Access Latch. After closing the compartment door, ensure that the safe is securely locked before leaving the RT unattended.

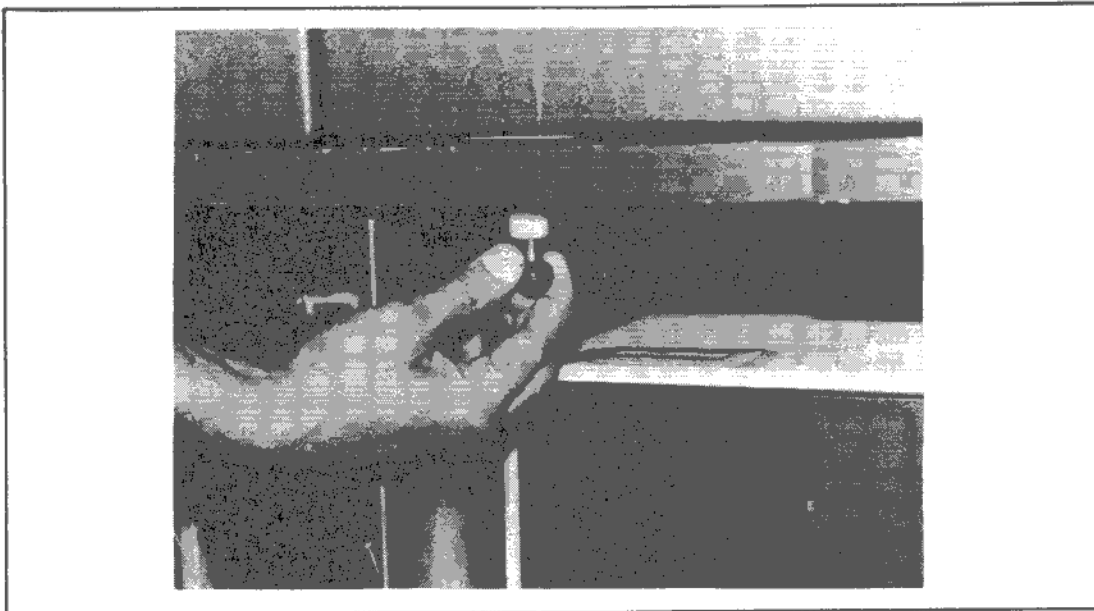


Figure 3-13. Release Cover Access Latch

THE LEFT HAND COMPARTMENT

The left hand compartment contains components that must only be serviced by Burroughs Field Engineering personnel. Consequently, the method of access to this compartment is not described here.

SYSTEM INITIATION

System memory in the RT 650 comprises two main components:

1. Read-only Memory (ROM) which contains the basic firmware of the machine, the program loader, and the procedures which make up the Maintenance Test Routines (MTR).
2. Random Access Memory (RAM) which contains the program being executed.

In addition, the RT maintains permanent configuration data in EAROM. This data defines the configuration of the RT 650 system in which it is stored, and determines the action taken by the RT when power is applied.

The data in EAROM is accessible to programs and is entered using procedures available in MTR mode (these procedures are described under "MTR MODE"). Data in EAROM is accessed in the form of the address of the data, followed by the value contained in that address.

When power is applied to the RT 650, basic processor and peripheral confidence tests are performed. The system then examines the optional display message flag in EAROM, and if this flag is zero (00), the optional display message contained in EAROM is displayed on the screen. This display replaces all other displays, including error display messages, and persists until a program has been loaded and begins execution. If the confidence tests are successfully completed, control is passed to the built-in loader program. If they are not successfully completed, an error is indicated on the display screen.

The loader uses information in EAROM to load a program from the backing store or from the Host. The messages displayed during program loading depend on the value of the optional display message flag in EAROM and the state of the Attendant Access Switch.

OPTIONAL DISPLAY MESSAGE NOT SELECTED

(Optional display message flag not equal to zero).

The loader displays the legend

“WAITING”

on the screen status line and

“ADDRESSES NOT READY ARE.....”

if any devices are not ready. Provided the customer keyboard is active, the loader continues operation. Otherwise, the error message

“KBD ERR”

flashes onto the screen status line.

When the customer keyboard is active, subsequent action depends on the state of the Attendant Access Switch:

1. Access Switch Not Active. The loader attempts to load the Application program either from backup storage or from the Host. The load source and file name are derived from values in EAROM (see Section 4). The messages displayed while loading a program are described under the heading: “File Loading”.
2. Access Switch Active. The legend “MTR MODE?” is displayed on the screen. If the “Y” key is depressed, the built-in MTR routines are entered. If any other key is depressed, or no keys are depressed, the loader attempts to load the Customizer program.

File Loading

Programs can be loaded either from backup storage (disk) or from the Host. The primary source of program loading (both Application and Customizer) is given by EAROM location 24 (hexadecimal). In addition, location 25 (hexadecimal) is used to indicate that if the requested program is not found from the primary source, the system attempts to find it elsewhere. This means that if the primary source is the Host, then when the request for the file has been refused 10 times, the system will attempt to load from disk. If the default load also fails, the loader reverts to the original source.

File Names

If the Application program is to be loaded, EAROM location 1B (hexadecimal) is interrogated. If this has the value zero, then the file name “APPLICATION2” is used. If not, the loader uses this value to retrieve the file name to be used from the following locations. If the Customizer program is to be loaded, the file name “CUSTOMISER2” is used.

Loading Files from the Host

The display goes blank except for the screen status line which changes from:

“WAITING” (in the case of Application load)

or

“MTR MODE?” (in the case of Customizer load)

to

“TRYING TO SEND”.

If the datacomm is active and connected then the screen status line will change to

“WAITING”

followed by

“LOOKING FOR MSG”

The number of bytes loaded is displayed under this message.

Loading Files from Backup Storage

During local storage program loading the display goes blank, and the screen status line changes from:

“WAITING”

to

“BACKING STORE”.

When the load starts, the number of bytes loaded is displayed. If any errors occur at this point, the flashing screen status line message:

“DEVICE ERROR”

will appear.

OPTIONAL DISPLAY MESSAGE SELECTED

(Optional display message flag equal to zero).

With this configuration none of the diagnostic messages described above are displayed. Instead, a single line of text (the optional display message from EAROM) is displayed on line 8 of the display screen. This occurs either until the program has been loaded and execution begins, or until MTR mode is entered. With this configuration the legend:

“MTR MODE?”

is not displayed. If the Maintenance Test Routines are required, the Attendant must press the “Y” key as soon as possible after power has been applied to the machine.

Only two types of error can be detected with this configuration:

1. If the customer keyboard is not active, two flashing asterisks appear in the bottom left hand corner of the screen.
2. If EAROM is incorrectly set (for example with conflicting information such as load from Host although datacomm is set as not present), two flashing asterisks appear intermittently. If the Attendant Access Switch is activated, MTR Mode is entered.

ERRORS AND ERROR RECOVERY

Confidence Test Error Messages

During system initiation a number of confidence tests are performed on system components. In the event of an error, a suitable error message is displayed on the display screen. If a confidence error message appears, Burroughs Field Engineering personnel must be contacted immediately.

Error Message	Meaning
SIO ERROR	SIO loopback test failed.
UNUSUAL RAM ERROR	Inconsistent results in RAM test.
RAM SEGMENT 0 ERROR	RAM test found that first segment of RAM was in error.
SINGLE BIT ERROR AT LOCATION NNNNN BIT MMMMM	One bit in error.
MULTIPLE BIT ERROR AT LOCATION NNNNN BIT MMMMM	More than one bit in error; the first is reported.
INTERRUPT MASK ERROR	Interrupt mask failure.
TIMER INTERRUPT ERROR	No interrupt received after timer started.
UNEXPECTED INTERRUPT ERROR	Interrupt received which should not occur at this time.
VIDEO ERROR	No interrupt received from the video.
DATACOMM ERROR	Datacomm loopback test failed.
SIO TIMEOUT ERROR	No response received from the SIO when expected.
DATACOMM TIMEOUT ERROR	No response was received from SIO when expected
NOT ENOUGH RAM ERROR	Less RAM found than specified in the Application signature.

Loader Error Messages

After successfully completing the initial confidence tests, if MTR mode is not selected the loader is invoked and a program is loaded. The loader performs a number of peripheral device tests and provides error messages on the display screen.

A description of error messages that may be encountered follows, together with instructions on how to recover, if this is possible.

1. ADDRESSES NOT READY ARE

KBD AA
FDR AA
CDR AA
PRT AA
KB2 AA
TOD AA
DSK AA

This display shows the peripheral devices that are not ready. A three-character string denotes the peripheral device. It is followed by the address of the device in the form of a two-character hexadecimal number (AA).

The mnemonics used are:

KBD – customer keyboard
FDR – currency feeder
CDR – card reader
PRT – transaction printer
KB2 – customizer keyboard
TOD – time of day clock
DSK – backup storage

Diagnosis

When all the device errors are displayed, an interlock problem has occurred. Check that the safe door is firmly closed. If not, close the door; the RT will load but the display will remain.

The individual error messages indicate that the loader has detected a particular device error. For example:

ADDRESSES NOT READY ARE
PRT AA

indicates that the transaction printer is not fully operational.

2. DEVICE ERROR

The appearance of this (flashing) error message on the status line of the display screen indicates a device error.

Diagnosis

The most likely device error causing this message is a backing store device error. Ensure that the disk drive doors are closed, the drives are operable and contain undamaged disks.

3. KBD ERROR

The appearance of this (flashing) error message on the status line of the display screen indicates that a customer keyboard device error has occurred.

Diagnosis

Interlock problem. Ensure that the safe door is firmly closed.

4. EAROM UNSET

The appearance of this (flashing) error message on the status line of the display screen indicates an EAROM setting conflict.

Diagnosis

Locations in EAROM contain conflicting values. The EAROM locations that cause this loader error message are:

1. Address 26: Character used in File Transfer Protocol messages set to 0.

2. Address 24: Primary load source indicator set to a value other than 01, 02 or 03.
3. Address 25: Secondary load source indicator set to a value other than 05 or 06.
4. Addresses 1A and 24 are not compatible; for example, EAROM set to load from datacomm but datacomm set as not present.

Check EAROM settings by entering MTR mode.

5. TRYING TO SEND

The appearance of this error message on the status line of the display screen indicates that a file transfer error has occurred.

Diagnosis

A number of possible reasons for this error exist:

- Datacomm not connected.
- Check the datacomm connections.
- Datacomm not active.
- Investigate datacomm line operation.
- RT is requesting data from the Host, but the Host is not replying.

6. <OPTIONAL DISPLAY MESSAGE>

**

The appearance of two continually flashing asterisks under an optional display message indicates that a customer keyboard device error has occurred.

Diagnosis

Customer keyboard not active – possibly an interlock problem. Ensure that the safe door is firmly closed.

7. <OPTIONAL DISPLAY MESSAGE>

**

The appearance of two intermittently flashing asterisks under an optional display message indicates conflicting EAROM settings.

Diagnosis

Locations in EAROM contain conflicting values. Activate the Attendant Access switch, press the “Y” key, and use MTR mode to check and reconfigure EAROM settings.

Other Error Indications

Blank Display Screen

A totally blank display screen even after power has been applied to the RT indicates display screen error.

Diagnosis

No power is being supplied to the display screen – possibly an interlock problem. Ensure that the left hand compartment door is firmly closed.

<OPTIONAL DISPLAY MESSAGE> PERSISTS

With the Attendant Access switch active and “Y” key depressed, only the <Optional Display Message> persists on the screen, and MTR mode is not entered.

Diagnosis

The timeout has expired before the “Y” key is pressed, and therefore the RT attempts to load the Customizer. Power the RT off and on again with the Attendant Access switch active. Depress the “Y” key as soon as possible after power on.

Number of Bytes Loaded Not Shown

The number of bytes loaded is not shown beneath the status line display.

Diagnosis

RT is not loading a program. Host is not sending the program file, or no program file is found on the backing store.

If any of the errors described above occur, and it is not possible to recover, given the information above, Burroughs Service Engineering personnel must be contacted.

MTR MODE AND CUSTOMIZATION

When the RT 650 is powered on with the Attendant Access switch active, the Attendant is given the option of entering Maintenance Test Routine (MTR) mode or defaulting to load the Customizer program. A description of MTR mode follows, together with instructions concerning Customizer equipment connection and use.

MAINTENANCE TEST ROUTINES (MTR)

Normally MTR is the concern only of Burroughs Field Engineering personnel. The exception to this rule is that EAROM configuration is performed in MTR Mode. Certain system constants are stored in EAROM, including datacomm constants, and a distinguishing character which is used to identify datacomm messages as belonging to the File Transfer Protocol. It may be necessary to change values in the EAROM for these items.

On entry to MTR mode, a menu of options is displayed on the screen (refer to figure 3-14). While the menu is being displayed, the Attendant Access switch must be restored to the not active position. If the Attendant Access switch is still active when the menu has been displayed, the legend “INVALID KEY” flashes on the screen. Before any menu option can be selected, the Attendant Access switch must be in the not active position, with the legend “ENTER KEY” displayed on the screen.

The options available are :

- EAROM configurator
- Manual SIO control
- MTR program loader
- Video display test

1. Video monitor TP 290
2. Alpha-numeric keyboard TP 110.

In order to customize the RT 650, the following equipment is necessary:

CUSTOMIZATION PROCEDURE

When this option is selected, the display is filled with the character "E". When the "Y" key is pressed, the display is filled with the character "H". Pressing the "Y" key again results in a blank screen with reverse video. In addition to the "Y" key, which steps sequentially through the three tests, the "N" and "C" keys are also active. The "N" key executes the previous test; the "C" key returns to the MTR options menu.

Video Display Test

This option enables the Field Engineer to load one of the MTR programs.

MTR Loader

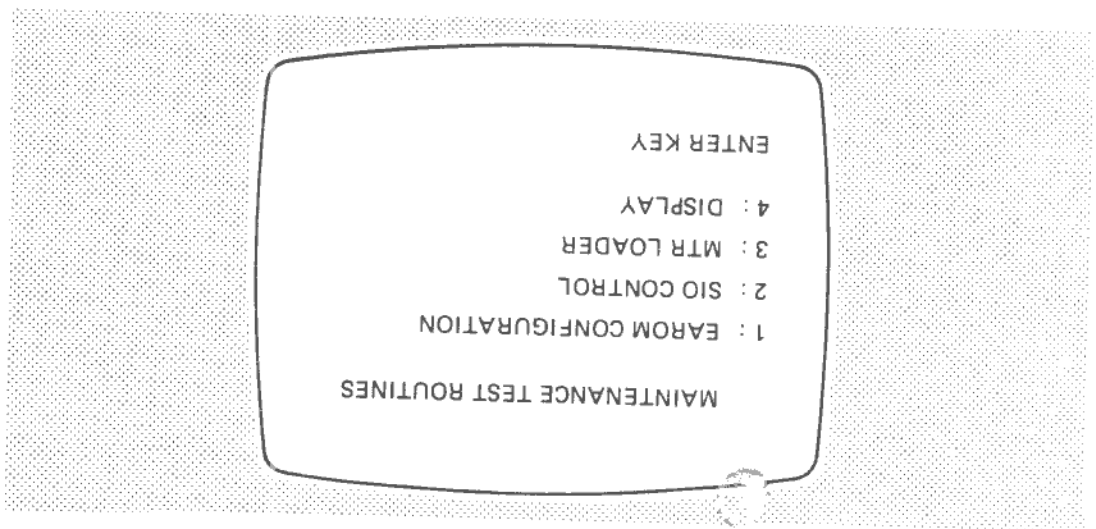
This option enables the Field Engineer to exercise peripherals by keying instructions directly onto the serial I/O lines.

SIO Control

When this option is selected, the current contents of EAROM are copied into a scratch pad area of memory, and the address and value of the first EAROM location are displayed on the screen. The process of changing EAROM values involves selecting a location and entering the required value. This process is repeated until all the required values have been entered. When configuration is complete, the scratch pad area of memory in which all the editing takes place, is burnt into the EAROM. For complete instructions on EAROM configuration, refer to Section 4.

EAROM Configurator

Figure 3-14. MTR Options Menu



In addition, a suitable desk or table positioned at the rear of the RT 650 is required.

Customization Equipment Connection

1. With the safe door open, release the right hand compartment door. This allows the customization equipment to be connected to the RT 650 connection panel.
2. Remove the retaining screws that secure the Display Screen Connector and disconnect the connector from the Customizer Video Socket. A circular aperture is provided to assist removal of the top retaining screw (refer to figure 3-15).

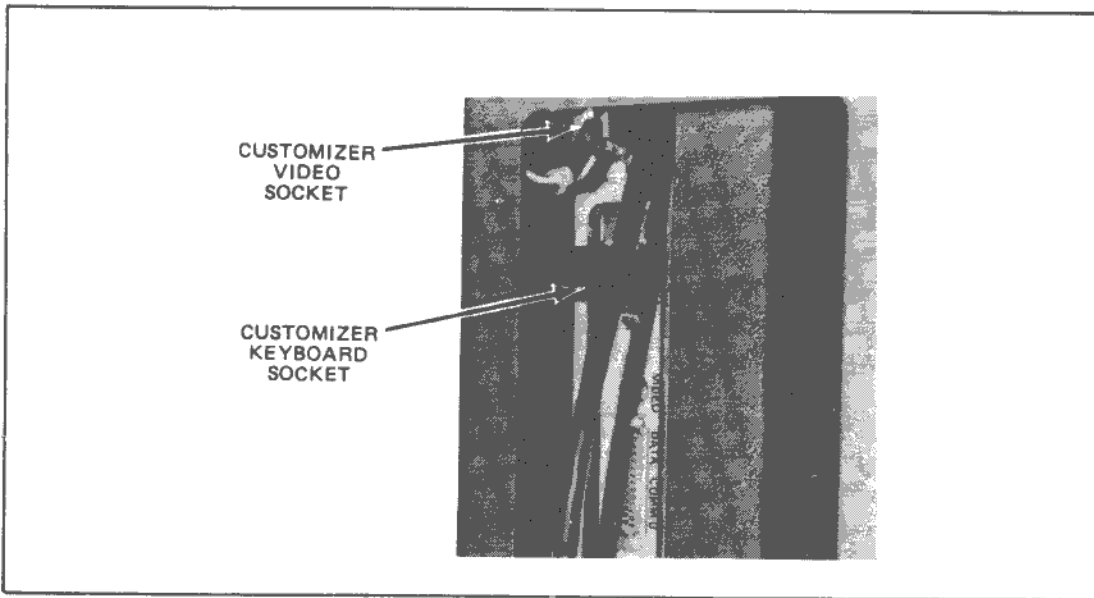


Figure 3-15. Customizer Video and Keyboard Connections

3. Connect the video monitor to the Customizer Video Socket.
4. Remove the terminator retaining screws and release the terminator from the Customizer Keyboard Socket. (Refer to figure 3-15).
5. Connect the customizer keyboard to the Customizer Keyboard Socket.
6. Pull the handle of the printer mechanism so that the printer is moved to its servicing position.

The RT 650 is now suitably configured for customizing. The Customizer and Custom File can now be loaded.

Customization Equipment Removal

After completing customization, the RT 650 must be restored to its normal configuration in order to function as an Automatic Teller Machine.

1. Disconnect the video monitor and customizer keyboard.
2. Replace the Display Screen Connector in the Customizer Video Socket.
3. Return the Customizer Keyboard Socket terminator to its original position.
4. Return the printer to its normal position by swinging it upright if it is a printer without Audit trail and by sliding it back if it is a printer with Audit trail.
5. Close the right hand compartment door.
6. Ensure that the safe is securely locked before leaving the RT unattended.

RT 650 SERVICING

RT 650 servicing can be divided into two categories:

1. Servicing of machine resources; for example, replenishing currency, printer paper.
2. Software servicing procedures; for example, updating audit totals, testing devices.

Both types of servicing can only be initiated by activating the Attendant Access switch. Servicing of machine resources is permitted when the red indicator light has been turned off. In order to use the software servicing procedures, a password must be entered before the system allows the Attendant to use the functions available to complete machine servicing.

SERVICING MACHINE RESOURCES

Servicing of the following machine components is described:

- currency dispenser system
- transaction printer
- deposit safe
- TP 420 Micro disks
- TP 461 Burroughs Super Mini Disk

Currency Dispenser System

The currency dispenser system is a variable amount note dispenser capable of handling two customizable denominations of currency. The currency is held in two currency cassettes which are mounted on the feeder mechanisms. Each cassette holds up to 2400 mint notes or 1800 suitable used notes.

Each feeder mechanism separates notes from the currency cassette and feeds them to a controlled accept/reject device. The accept/reject device either directs the notes into the currency tray or into a reject compartment inside the currency cassette (if the note sensing device detects any fault). Each cassette has a reject potential of 10% of its storage capacity.

The feeder mechanism and currency cassettes are mounted on telescopic sliding rails in the safe.

Removal and Installation of the Currency Cassettes

The removal and installation procedures for the front and rear currency cassettes are identical. Each cassette must be clearly marked "Front" or "Rear", and must also be identified with the currency denomination that it contains. If notes of incorrect denomination are placed in the cassettes, incorrect dispensing operations will result.

Removal Procedures

1. With the safe door open, lift the Feeder Release Latch (refer to figure 3-16) and pull the feeder mechanism out from the safe along its support rails. The Feeder Release Latch must be raised for at least the first 1 cm of travel.

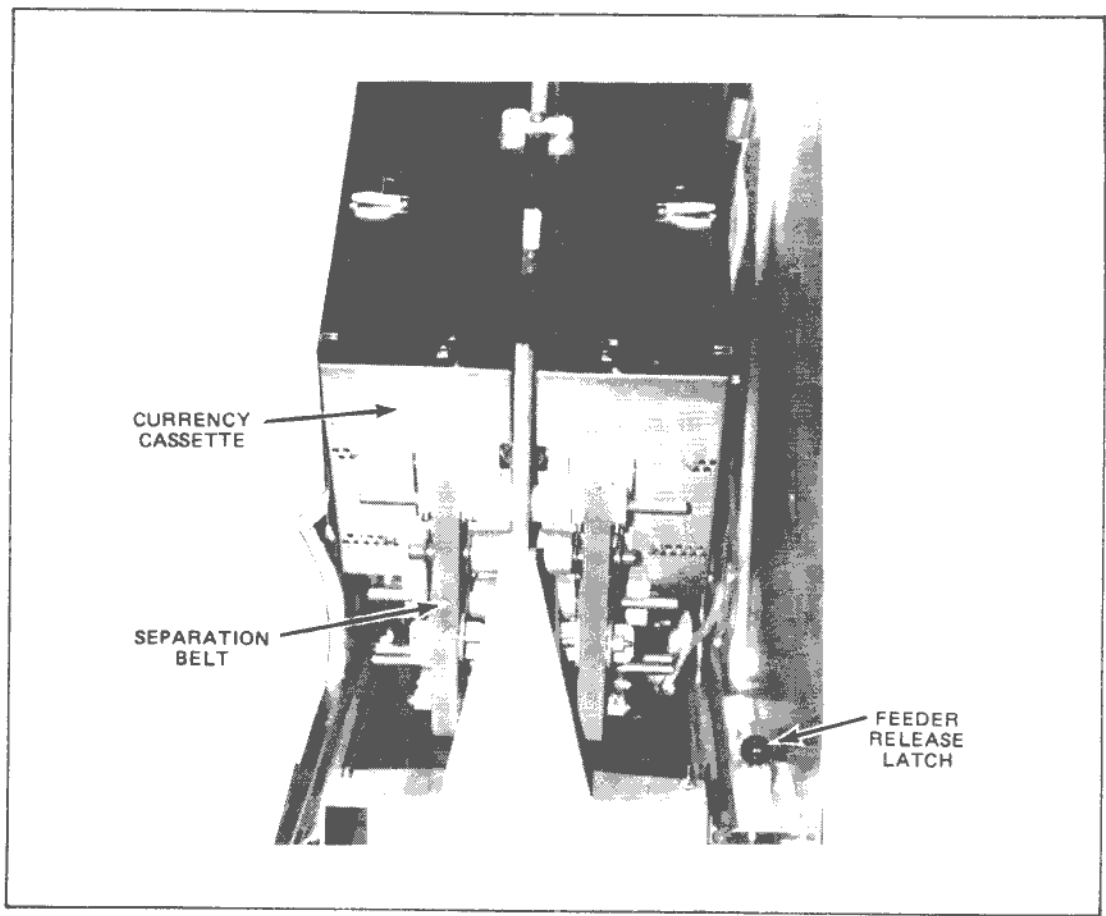


Figure 3-16. The Currency Dispenser System

2. Turn the Cassette Retention Latch (refer to figure 3-17) clockwise until it lies in a vertical position.
3. Using the cassette handle (refer to figure 3-18), lift the currency cassette from the feeder. Care must be taken to ensure that no currency escapes from the cassette at this stage.
4. Note that one note is retained in the feeder when the cassette has been removed. This note must be removed before the cassette can be replaced.

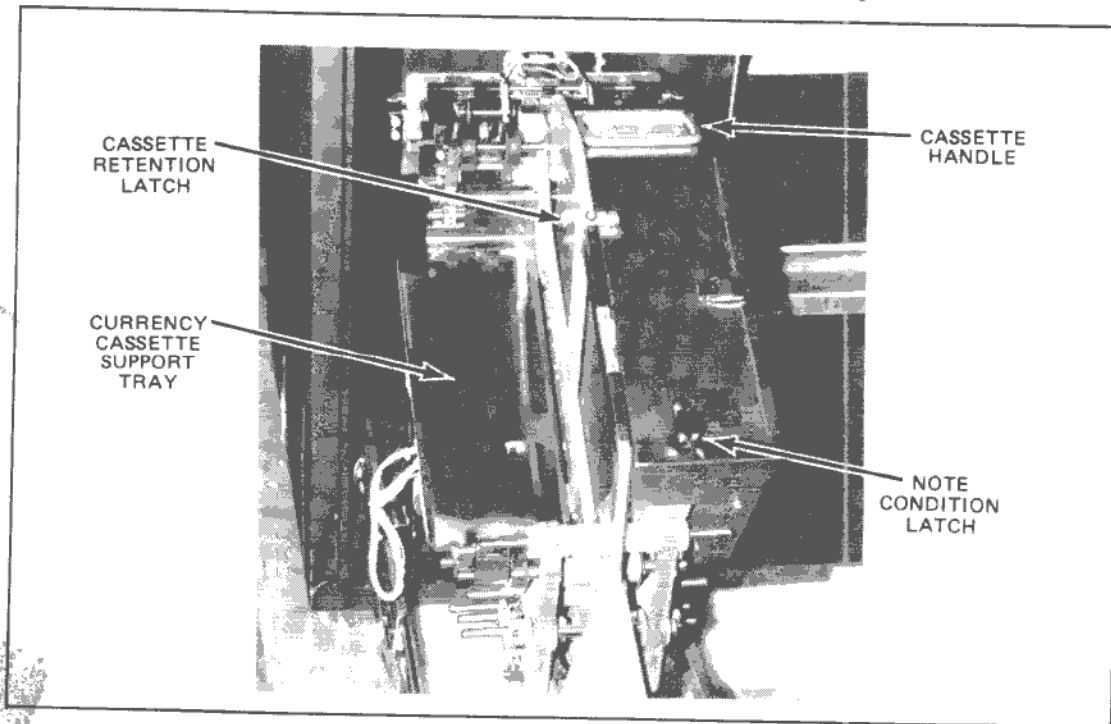


Figure 3-17. Currency Dispenser System Withdrawn

Installation Procedures

1. Holding the cassette handle, insert the rear of the cassette into the currency cassette support tray (refer to figure 3-17) and ease the front of the cassette gently into place.
2. Secure the Cassette Retention Latch by turning it anti-clockwise until it fully engages both cassettes.
3. Push the feeder mechanism back into the safe. Ensure that the Feeder Release Latch is engaged in the support rail.

Loading the Currency Cassette

The cassette is divided internally into two compartments; one for notes to be dispensed, and one for notes which have been rejected. The compartments are separated by a sliding note pressure plate. Its main purpose is to hold the notes to be dispensed correctly stacked, and to force them towards the exit aperture (refer to figure 3-20). The pressure plate assembly contains a magnet which is used to indicate to the controller when the cassette contents run low. A note condition latch (refer to figures 3-17 and 3-18) can be set to either "mint notes", or "used notes". This increases the note contact with the separation belt when mint currency is used, and improves note separation. The cas-

ettes accept currency notes which are between 4.72 inch (12.0 cm) and 6.81 inch (17.3 cm) long, and between 2.4 inch (6.1 cm) and 3.74 inch (9.5 cm) wide.

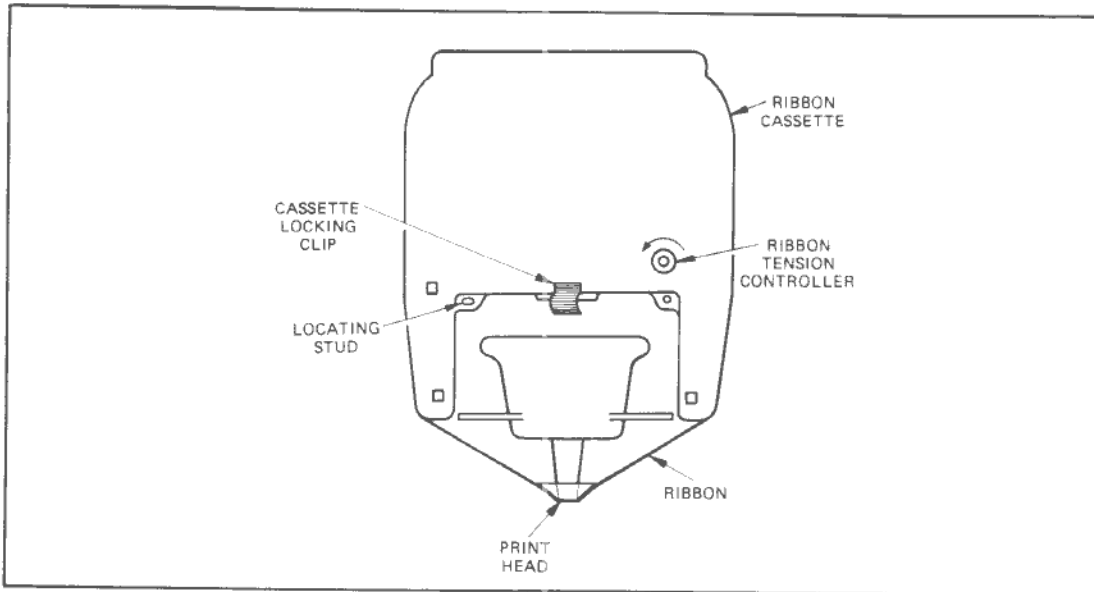


Figure 3-18. Currency Cassette

Currency Selection

Used currency that is to be used in the RT 650 must be inspected for the following defects:

1. Sticky adhesive substances on the surface of the note.
2. Tears extending more than 0.5 inch (1.2 cm) from the edge of the note.
3. Holes or missing sections in the body of the note.
4. Tape on the surface of the note used for repairing, patching or any other purpose.
5. Staples, pins or any other foreign body attached to the note.
6. Bent corners that are larger than 0.5 inch (1.2 cm) and folds across the width of the note, which in effect reduce the length of the note.
7. Notes which have lost their rigidity.
8. Two or more notes which are joined together by any means.

Defective notes must not be loaded into the Currency Cassette.

New or uncirculated currency must be inspected for the following:

1. All the defects listed for used currency.
2. New currency which has been creased.
3. Currency which has become bent due to packing and storage. Currency which curves more than 0.15 inch (0.38 cm) from flat must not be used until the condition has been corrected.

Loading Currency

After inspecting all the notes, the currency cassette can be loaded using the following procedures.

1. If new currency is being loaded, each note must be separated from the next. This is done by bending each pack of notes backwards and forwards, across its length and width (refer to figure 3-19).
2. Stacks of 50 to 100 notes must be prepared, ensuring that notes are not out of alignment by more than 0.12 inch (0.3 cm) in relation to the stack.
3. With the note pressure plate moved away from the exit aperture, the notes are loaded into the cassette, and the pressure plate is moved to its operational position against the stack (refer to figure 3-20).
4. Check the stack of notes in the cassette for folded edges which could cause dispenser jams. These notes must be re-aligned or removed.
5. Close the cassette door and secure the door latch.

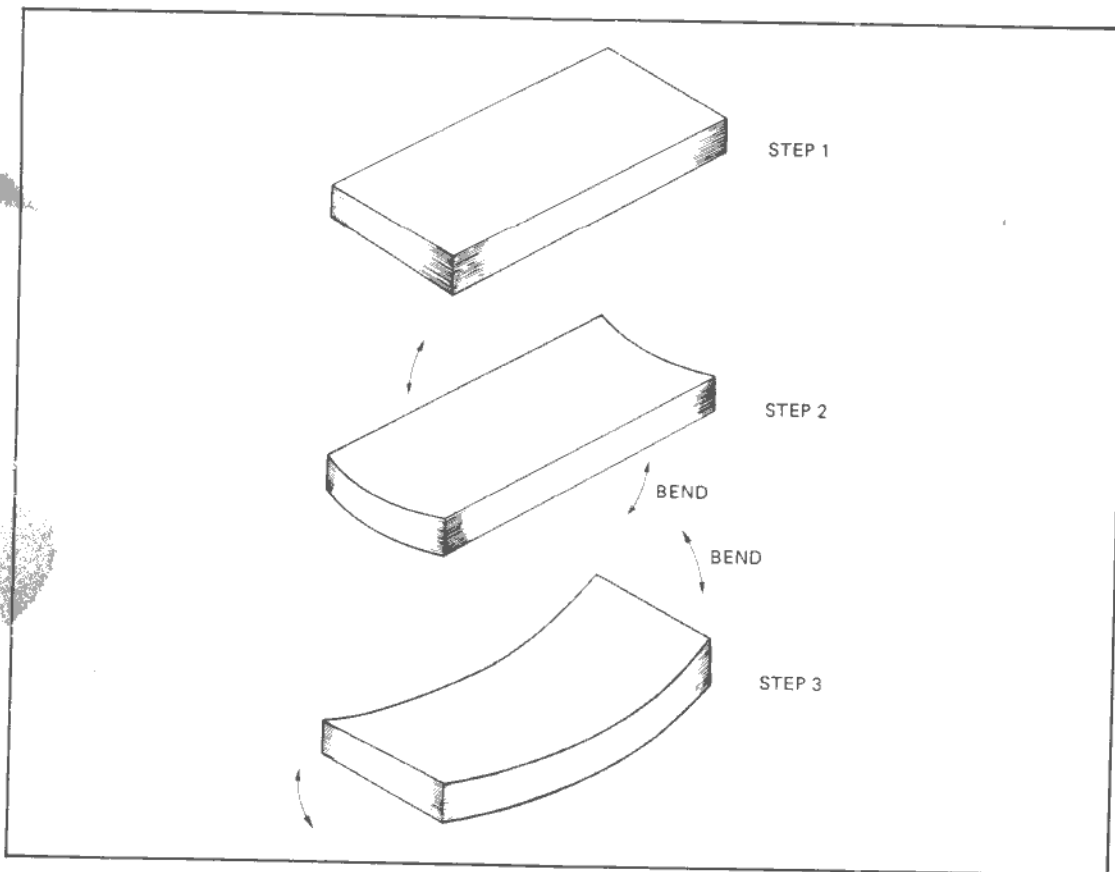


Figure 3-19. Currency Note Separation

Clearing Currency Jams

With the feeder mechanism in its extended position, a visual check should be sufficient to locate a currency jam.

Cleaning the Feeder Sensors

It is recommended that the feeder sensors are cleaned with a puffer brush (as supplied by Customer Service Engineering (CSE) Sales Supply) whenever currency is replenished in the machine.

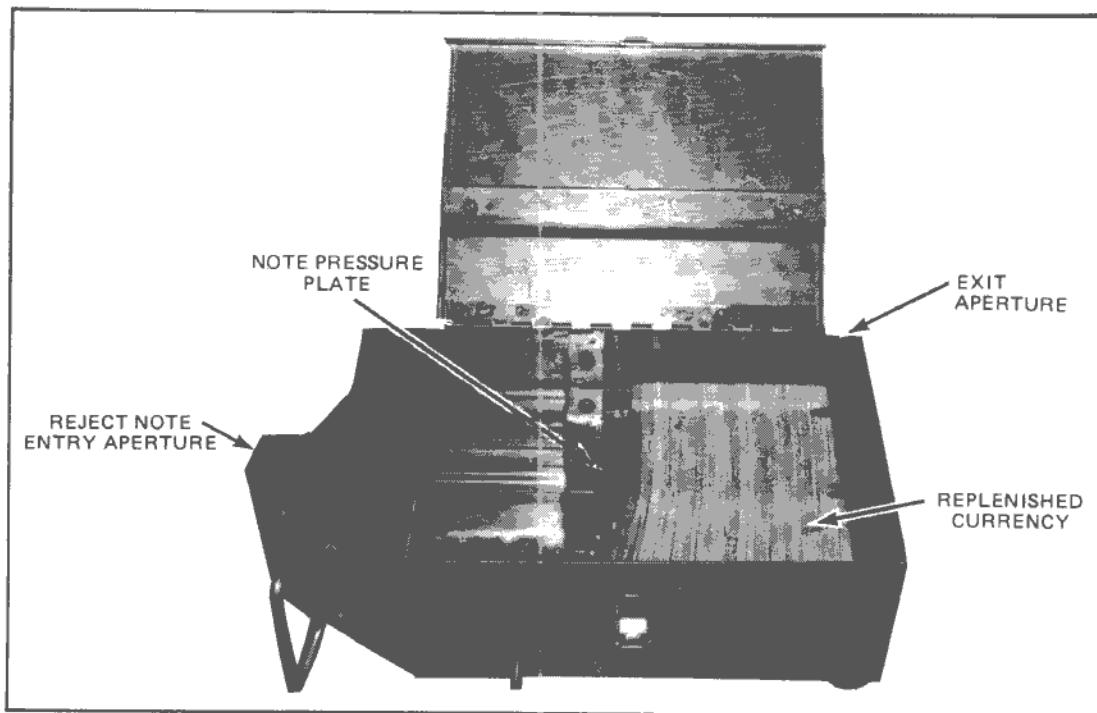


Figure 3-20. Loaded Currency Cassette

1. Remove the currency cassettes. Release the two Diverter Assembly Latches and lift the Diverter Assembly so that it rests in an upright position (refer to figure 3-21).
2. The exit sensors and reflectors are now accessible and can be cleaned with a puffer brush.
3. After removing any dust, replace the Diverter Assembly by swinging it back into its original position engaging both Diverter Assembly Latches.
4. The currency cassettes can now be re-installed and the feeder mechanism pushed back into the safe.

The Deposit Safe

The deposit safe is a deposit area inside the RT 650 safe. It can contain up to 100 deposit envelopes (conforming to the specifications given in Section 1) and any cards that have been retained by the system. In order to access the deposit safe, the safe door must first be opened using the procedures already described. The deposit safe is in the bottom right hand corner of the safe.

The Transaction Printers

1. The Transaction Printer without Audit Trail

The transaction printer uses a continuous roll of 5.5 inch (13.9 cm) wide single ply paper to record business transactions and optional information during bank service. The printer is fitted with a sensor which indicates to the processor when a renewal of printer paper is required. The Customizable Early Warning system can be used to indicate to the Attendant that the printer paper needs to be renewed. The Attendant is responsible for renewing the paper supply and changing the ribbon cassette.

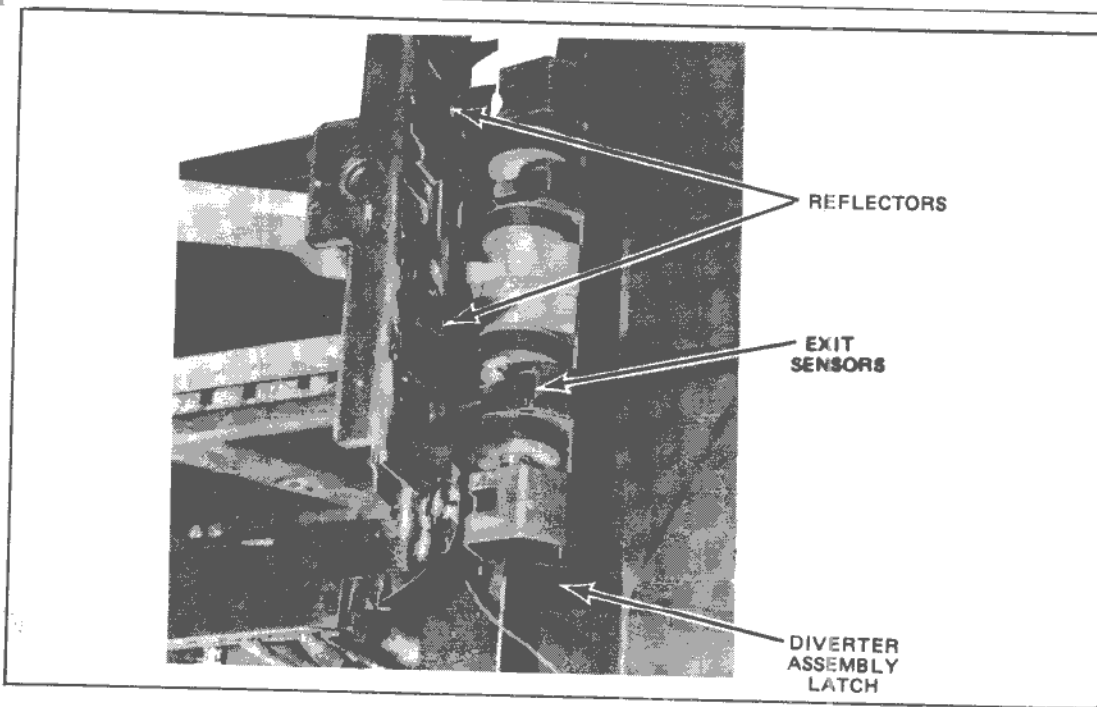


Figure 3-21. Diverter Assembly

Access to the Transaction Printer

1. Release the Cover Access Latch and open the right hand compartment.
2. Pull the handle attached to the printer mechanism base plate and rest it on the base of the compartment. (Refer to figure 3-22.)

The transaction printer is now in servicing position.

Renewal of Printer Paper Supply

Refer to figure 3-23 in the following procedures.

1. With the transaction printer in servicing position, lift the tear-off blade and release the paper from the pin feed roller.
2. Remove the paper spool from its holder.
3. Replace the finished spool by pulling out the center core and sliding it into a new spool (Refer to figure 3-24).
4. Replace the paper spool in its holder, ensuring that the paper feeds through the printer from the top of the spool.
5. Feed the paper through the paper entry guide until enough paper appears from behind the pin feed roller to pass through the tear-off blade.
6. Ensure that the paper is correctly positioned so that the pins in the pin feed roller are located in the pin holes in the paper.
7. Lower the tear-off blade and tear off any surplus paper.

2. Transaction Printer with Audit Trail

The transaction printer uses two different types of paper to record business transactions and optional information obtained during Local Servicing.

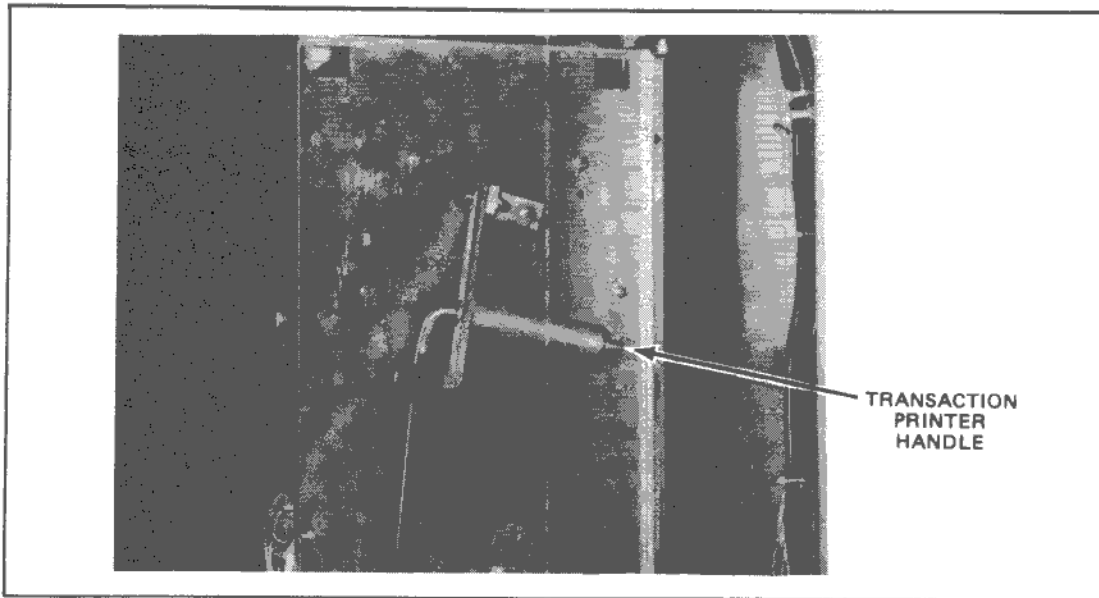


Figure 3-22. Accessing the Transaction Printer

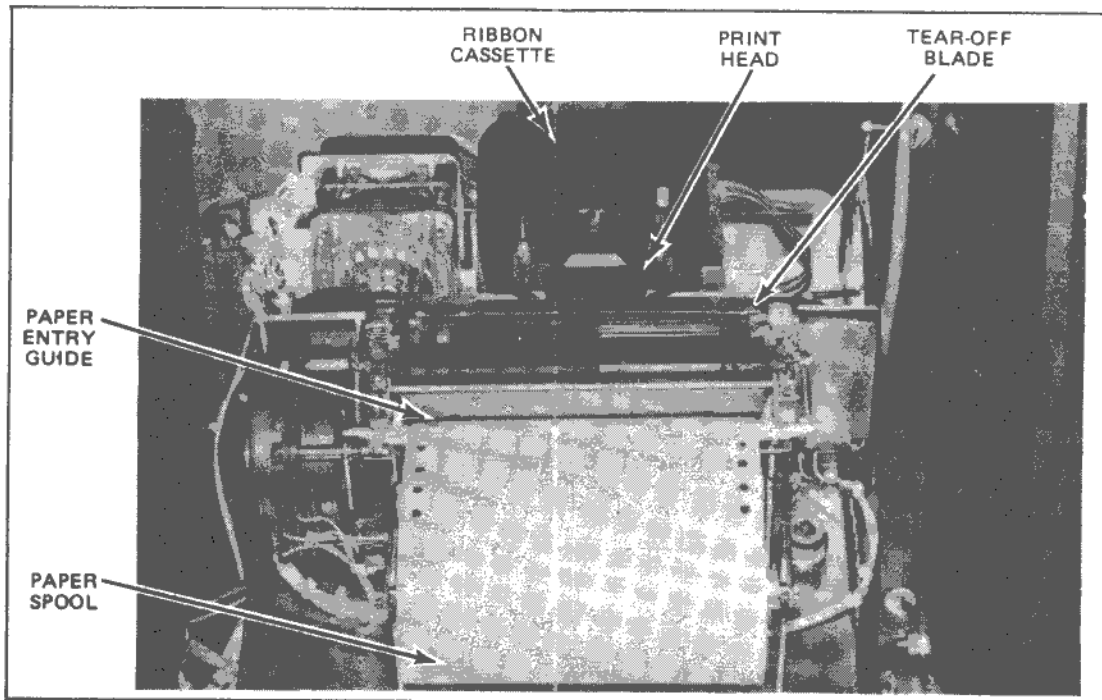


Figure 3-23. Transaction Printer Mechanism

- a. The customer copy is fed from a continuous roll of 5.5 inch (13.9 cm) wide single ply paper. A full roll should last for 1000 'typical' transactions, assuming that a typical receipt has an average length of four lines of transaction data.
- b. The audit copy used for audit trail purposes is pressure sensitive paper, fan folded to 750 sheets, which is wound onto a take up spool as printing progresses.

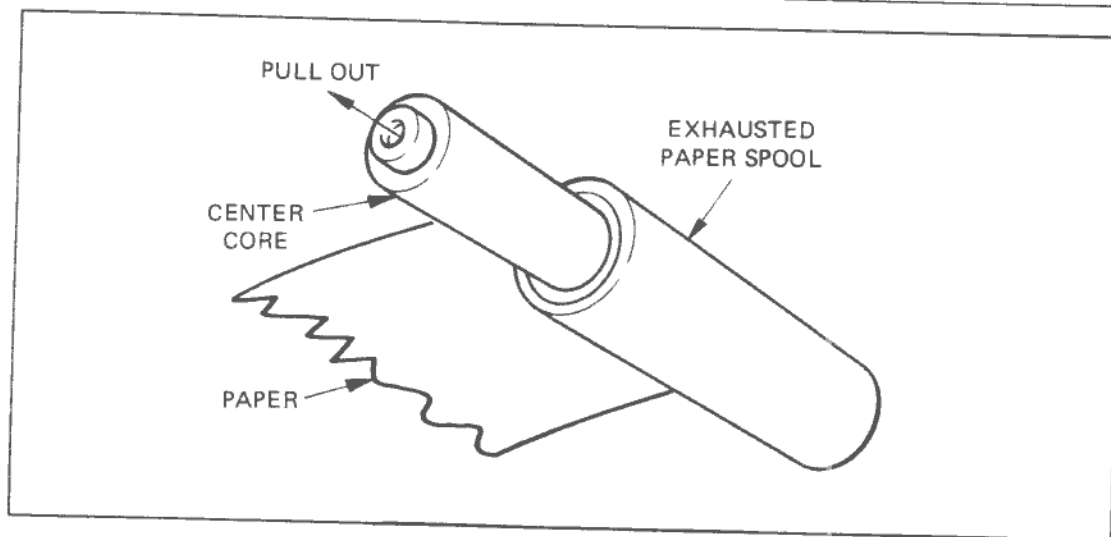


Figure 3-24. The Paper Spool

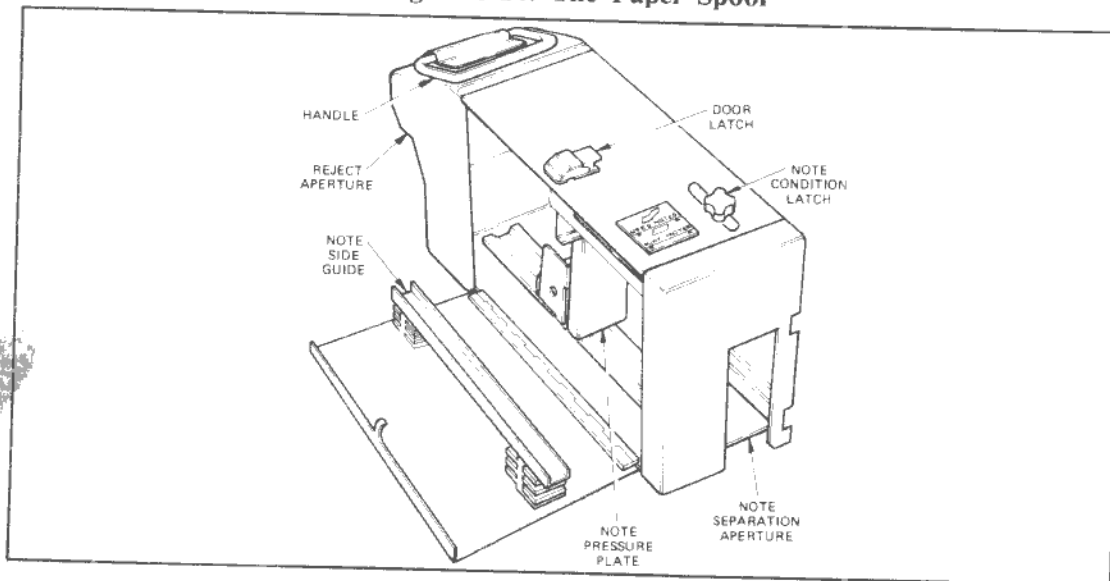


Figure 3-25. Printer Ribbon Cassette

The printer is fitted with a sensor which indicates to the processor when renewal of printer paper is required. In addition, the Customizable Early Warning System can be used to indicate to the Attendant that the printer paper (audit or customer rolls) needs renewal, when the software count of lines printed reaches the customized limit.

The Attendant is also responsible for changing the ribbon cassette.

Access to the Transaction Printer

1. Release the cover access latch and open the right hand compartment.
2. Pull the handle attached to the printer mechanism and allow the printer to slide along its predefined track until it reaches a halt, with the back of the printer mechanism facing the open end of the compartment. The transaction printer is now in the servicing position (refer to figure 3-26).

Renewal of Printer Paper Supply

1. Lift the tear-off blade and release both papers from the pin-feed roller located at the lower end of the printer mechanism.
2. Remove the customer paper spool from its holder.
3. Replace the exhausted customer paper spool by pulling the center core out and inserting it into a new spool (refer to figure 3-24).
4. Replace the customer paper spool in its holder, ensuring that the paper feeds into the printer from the top of the spool.
5. Feed the customer paper through the paper entry guide until enough paper appears from behind the pin-feed roller to pass through the tear-off blade (refer to figure 3-27).
6. Place the audit trail paper in the audit trail box situated at the upper side of the back of the printer mechanism.
7. Feed the paper into the slot located on the panel of the printer mechanism, ensuring that the pressure-sensitive side of the audit trail paper faces the lower edge of the slot as the paper passes through (refer to figure 3-28). Note that the pressure-sensitive side of the audit trail paper can be identified as the side which can be marked by the scratch of a finger-nail.
8. Feed the paper from the audit trail through the paper entry guide, just in front of the customer paper (refer to figure 3-29). When the audit trail appears from behind the pin-feed roller, pass it through the slit between the pin-feed roller and the tear-off blade mechanism. Ensure that the audit trail paper fed through the printer mechanism is long enough to reach the audit trail spool and to roll around the spool approximately four times.
9. Lower the tear-off blade and ensure that both papers are correctly positioned so that the sprocket holes of both papers are in line. Tear off the surplus paper from the customer copy against the tear-off blade.
10. Pull the spool release latch out of position and remove the audit trail spool. Pull out the removable right-hand disk (note that the fixed left-hand disk has a metal flange over it to prevent its removal) and slip the audit trail roll off the spool (refer to figure 3-30).
11. Slip the left-hand disk back onto the spool and insert the spool back into its mounted position by pulling the spool release latch, adjusting the spool into position and then securing it by releasing the latch.
12. Insert the audit trail paper one turn inside the spool and then wind the spool three turns clockwise. Refer to figure 3-31.

The printer can now be returned to its operating position.

Renewal of Ribbon Cassette

This servicing procedure is common to both printers.

The ribbon cassette contains a black ribbon which is driven in front of the nose of the print head. The life of the ribbon depends on the use of the head. On average it is between 1.2 to 2 million characters. The following procedures must be followed in order to change the ribbon cassette (refer to figure 3-25).

1. With the transaction printer in the servicing position, release the cassette locking clip. Remove the cassette by pulling it out of the cassette locating studs.
2. Position the ribbon of the new cassette in front of the print head, below the lip of the head.

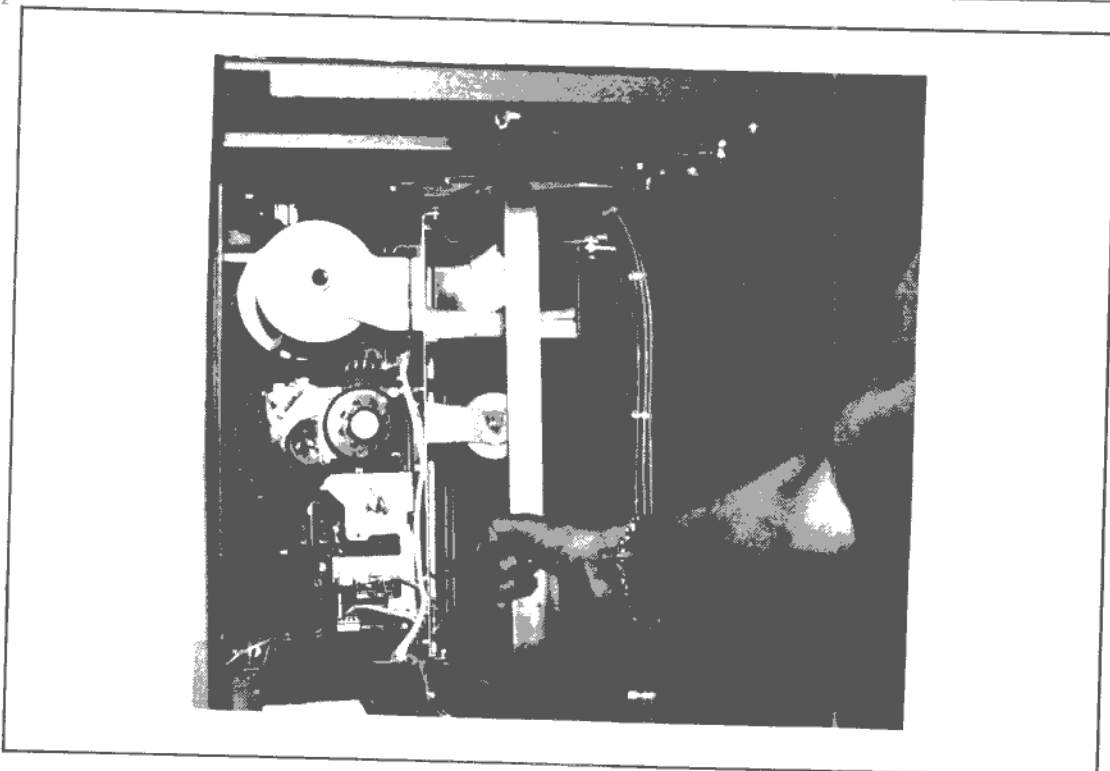


Figure 3-26. Accessing the Transaction Printer with Audit Trail

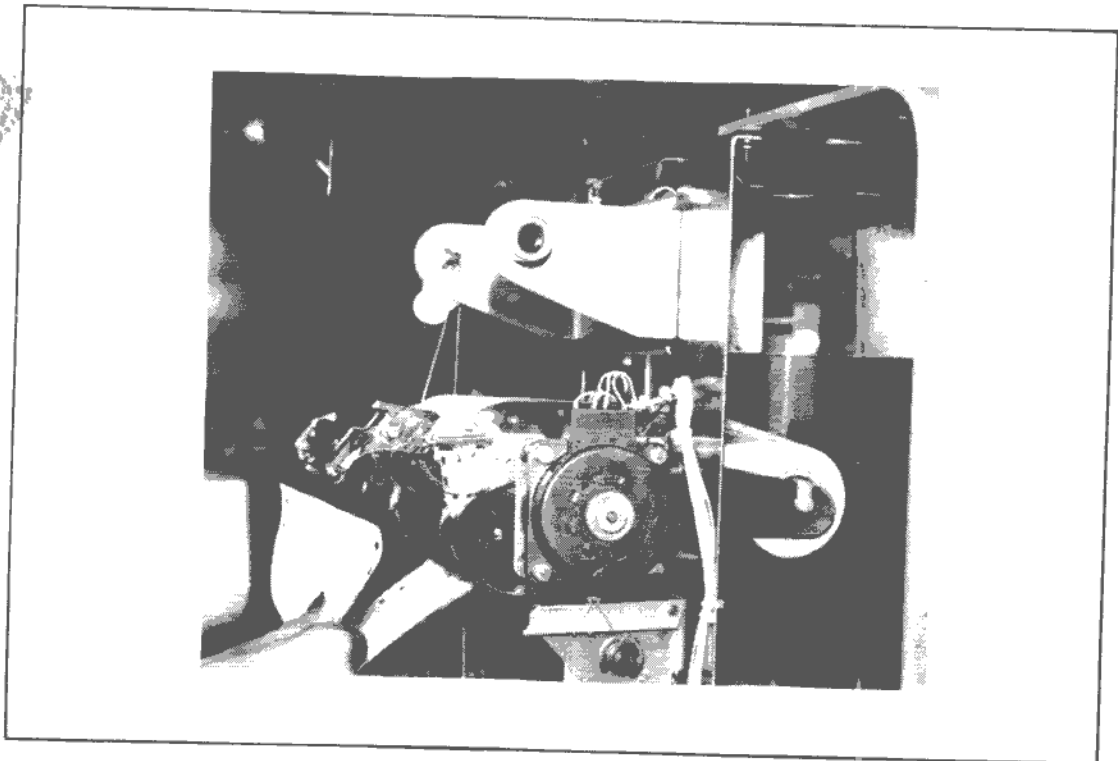


Figure 3-27. Renewal of Customer Paper

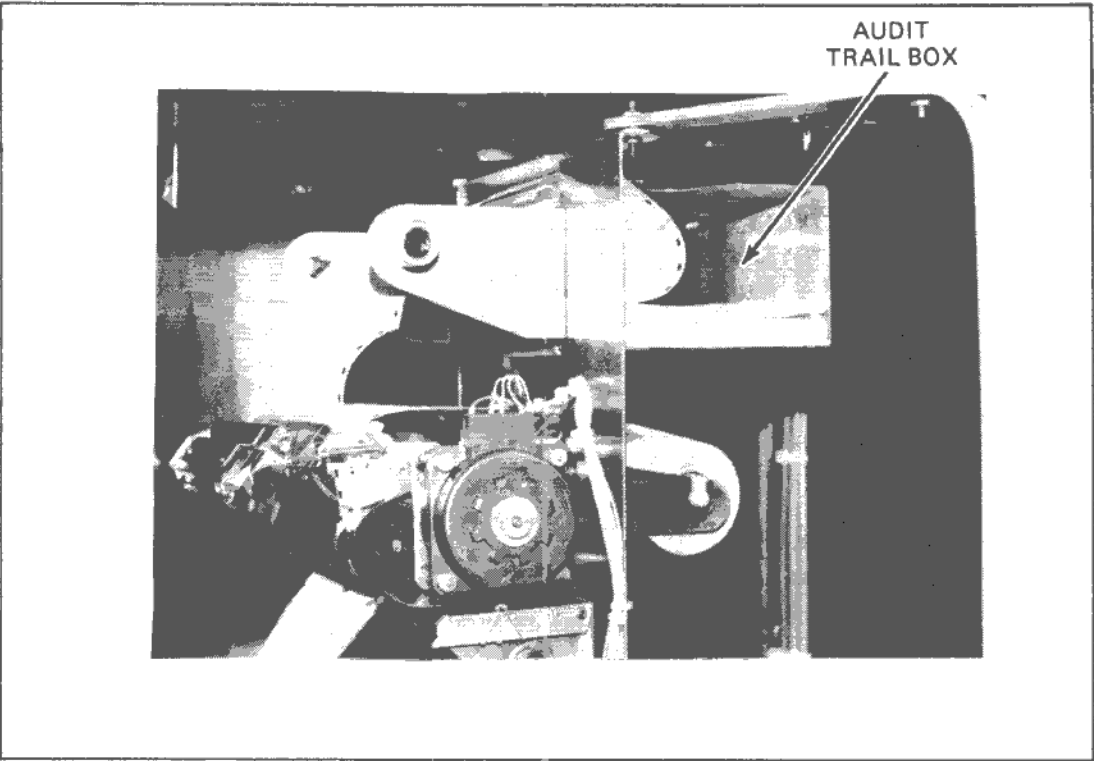


Figure 3-28. Audit Trail Box

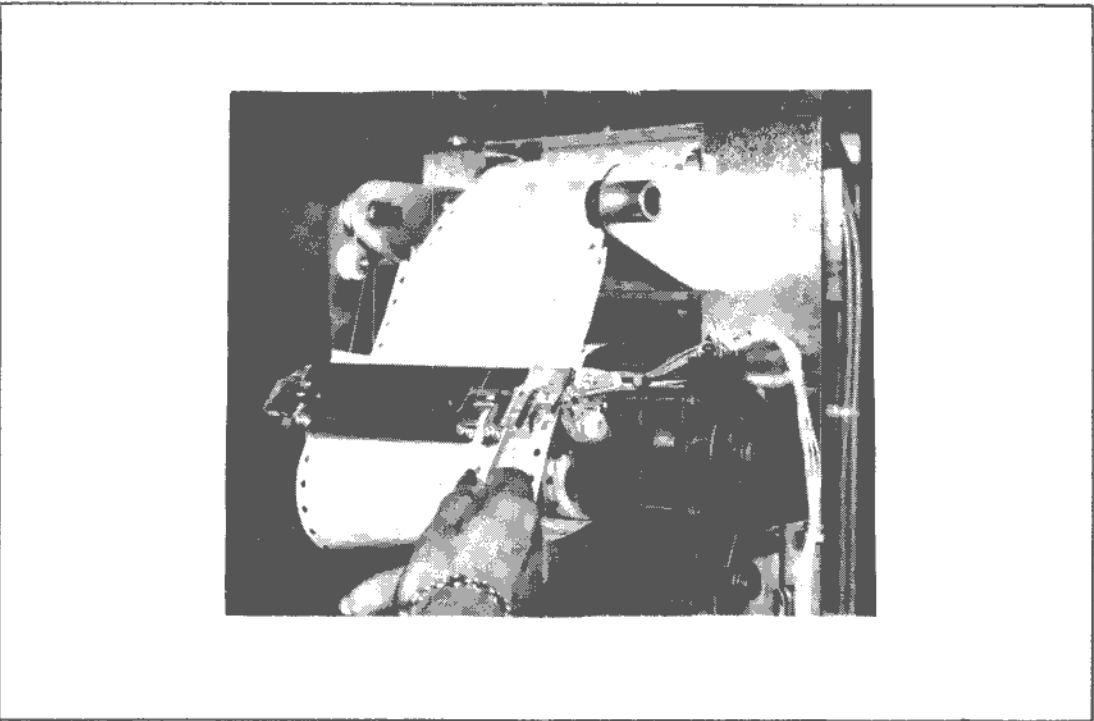


Figure 3-29. Renewal of Audit Paper

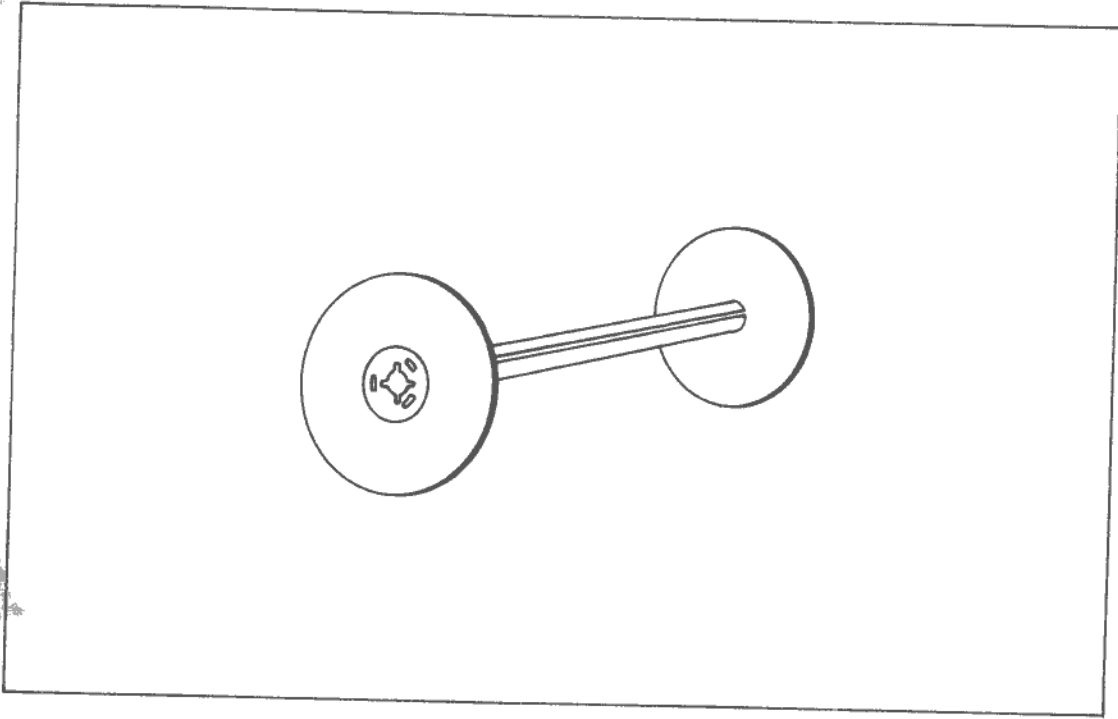


Figure 3-30. Audit Trail Spool

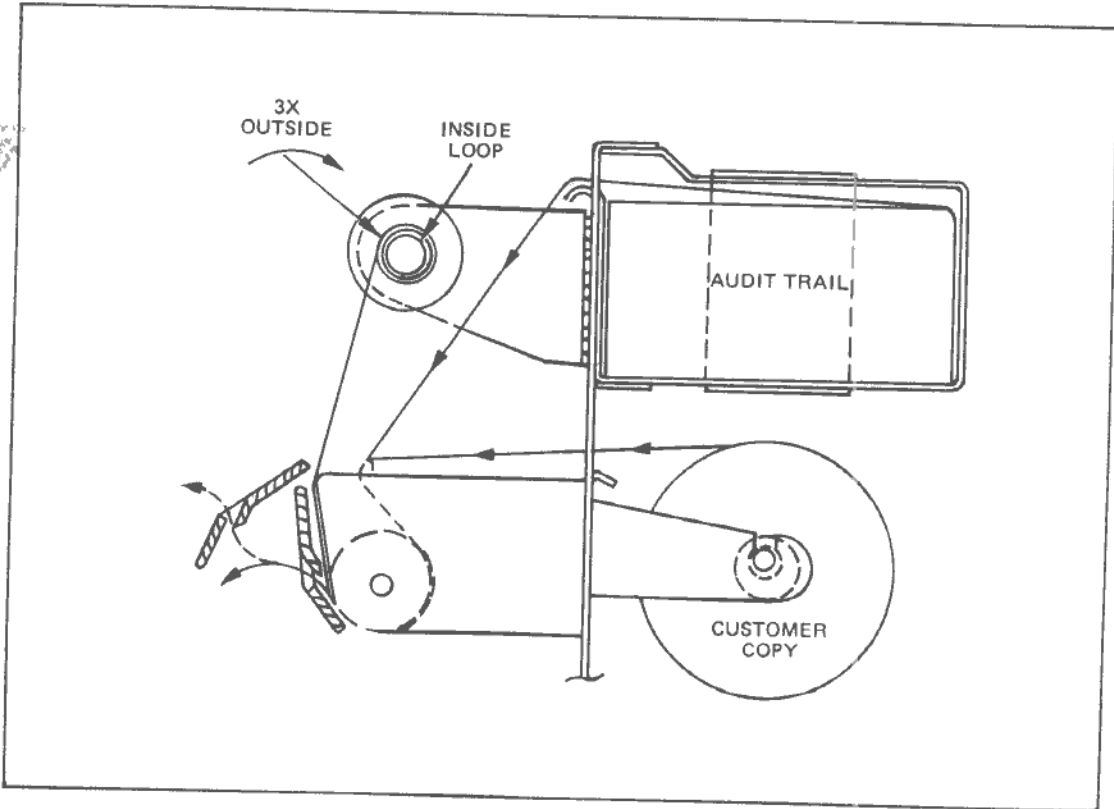


Figure 3-31. Transaction Printer Mechanism

3. Insert the cassette into the locating studs and secure it by engaging the locking clip.
4. Remove any slack in the ribbon by turning the cassette tension controller anti-clockwise.

Servicing of the transaction printer is now complete and the printer can be returned to its normal position.

TP 420 Micro Disks

A dual configuration TP 420 Micro Disk unit (figure 3-32) can be fitted as the backing store for an offline capable RT 650. The disk unit is fitted in the safe, and can therefore only be accessed by authorized personnel. The on/off rocker switch that controls power to the disk unit is located at the back of the unit.

Care must be taken when handling the micro disks to ensure that the disk surface does not come into direct contact with any object. By placing a piece of tape over the write protect notch, data stored on the disk is protected by inhibiting a write operation.

RT 650 System and data disks must not be write inhibited.

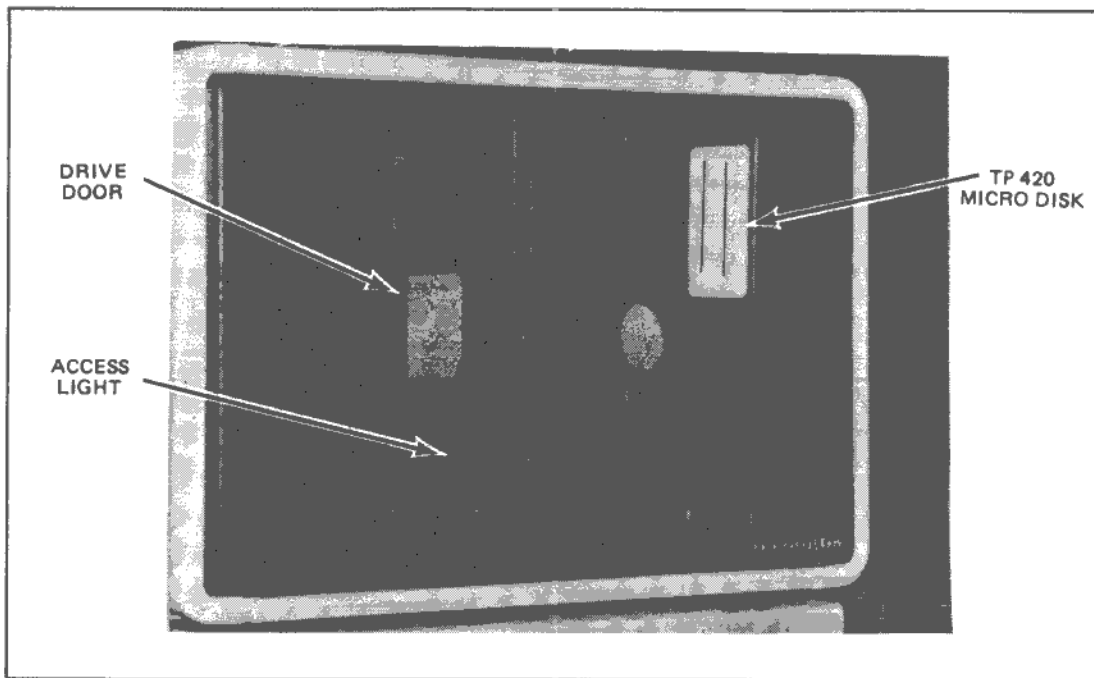


Figure 3-32. TP 420 Micro Disk Unit

Disk Insertion Procedures

1. Open the safe.
2. Open the drive door.
3. Insert the TP 420 micro disk with the disk label on the left hand side, and the disk write protect notch at the bottom, facing downwards. (Refer to figure 3-33)
4. Close the drive door.

Disk Removal Procedures

1. Open the safe.
2. Ensure that the disk access light is turned off. Open the drive door.
3. Remove the micro disk.
4. Replace the disk in its protective envelope.

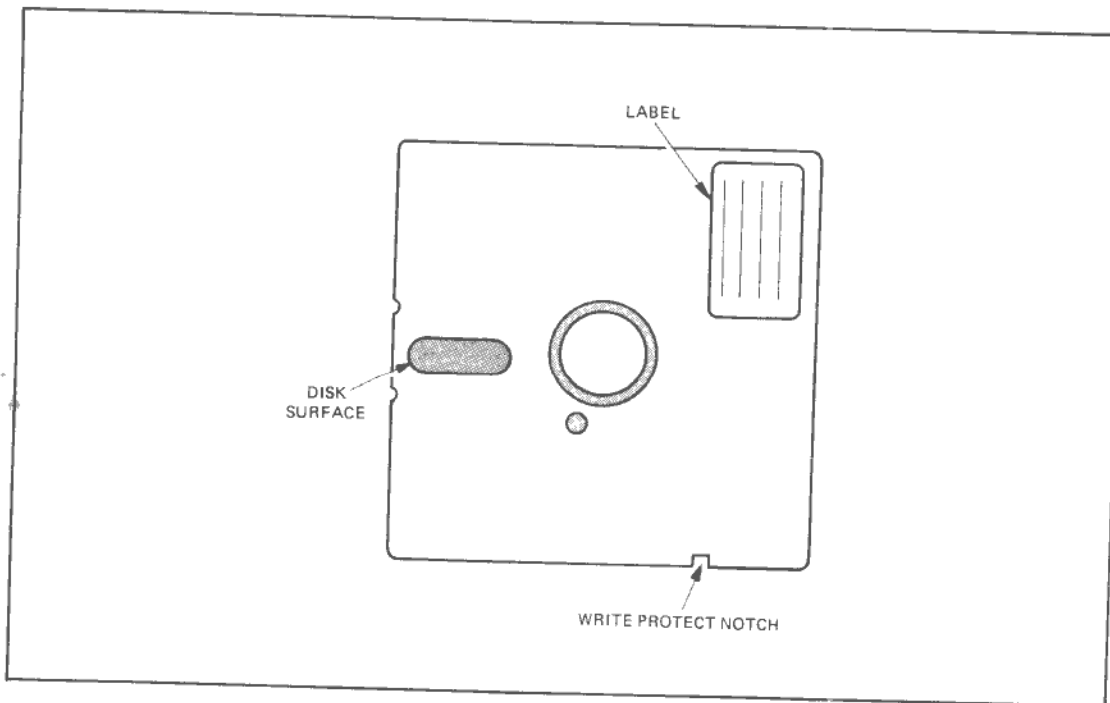


Figure 3-33. TP 420 Micro Disk

TP 461 Burroughs Super Mini Disk

A single drive model TP 461 Burroughs Super Mini Disk (BSMD) unit can be fitted as the backing store for an offline capable RT 650. The Burroughs Super Mini Disk is a flexible mini-disk which has a capacity of 1M byte and a disk diameter of 8 inches (20.3 cm). The disk unit is fitted in the safe, and can therefore only be accessed by authorized personnel.

The indicator lights that are used to display the operating status of the TP 461 are the Ready and Write Enable indicators on the drive unit. The Ready indicator (blue) is lit when the disk is correctly inserted and at operating speed. The Write Enable indicator (red) is lit when data can be written to and erased from the disk.

To write disable a BSMD, remove the tape covering the Write Lockout Hole (see figure 3-34). In order to write enable a BSMD that has been inhibited in this manner, cover the Write Lockout Hole with a label or tape that does not allow light to pass through the hole.

Disk Insertion Procedures

To insert a BSMD in a Drive Unit, perform the following procedure.

-
1. Open the safe.
 2. Open the drive door by pressing the Door Release Bar.
 3. Insert the disk as shown in figure 3-34.
 4. Close the drive door. The Ready indicator (blue) should be lit almost immediately; it does not light if the disk has been inserted incorrectly.

Disk Removal Procedures

1. Open the safe.
2. Ensure that the currently selected operation, if any, in Local Service is terminated before opening the drive door; that is, wait until OBS-STOP-OR-CONTINUE-SCREEN is displayed.
3. Remove the disk.
4. Place the disk in its protective envelope.

SOFTWARE SERVICING PROCEDURES

On entry to Servicing State the Attendant is required to identify himself, by indexing a customized password, preceded and terminated with the 'Y' key. There are a number of software procedures which allow an Institution to implement its own structured servicing routines. The procedures can be divided into two categories:

1. Host Servicing is available if the data communication link is operational. After the Attendant is identified, the Host is informed that it can now service the RT.
2. Local Service is available after the Attendant is identified, either directly or on the direction from the Host. On entry to Local Service, the Attendant is presented with a menu of facilities; the facilities available depend on how the system has been customized.

Host Servicing Capabilities

If the data communication link is operational, the Host can perform a number of servicing functions. These include:

requesting information from the RT; for example, the values of certain data items communication with the Attendant using the display screen and keyboard manipulation of any of the RT 650 hardware devices for verification, testing and operation.

These functions can be used by the Host to provide an automated servicing routine for RT 650 Automatic Teller Machines.

Local Servicing Capabilities

Local Service consists of a number of functions which can carry out various servicing routines. Each of the functions is self-contained, so that a Local Service structure can be developed which allows an Institution to implement its own structured servicing procedures. Therefore, the order of presentation to the Attendant and the contents of the messages displayed are totally customizable.

Entry to Local Servicing

Servicing State is entered when Attendant presence (Access switch in active position) is detected by the system. When the Servicing State message is displayed, enter the cu-

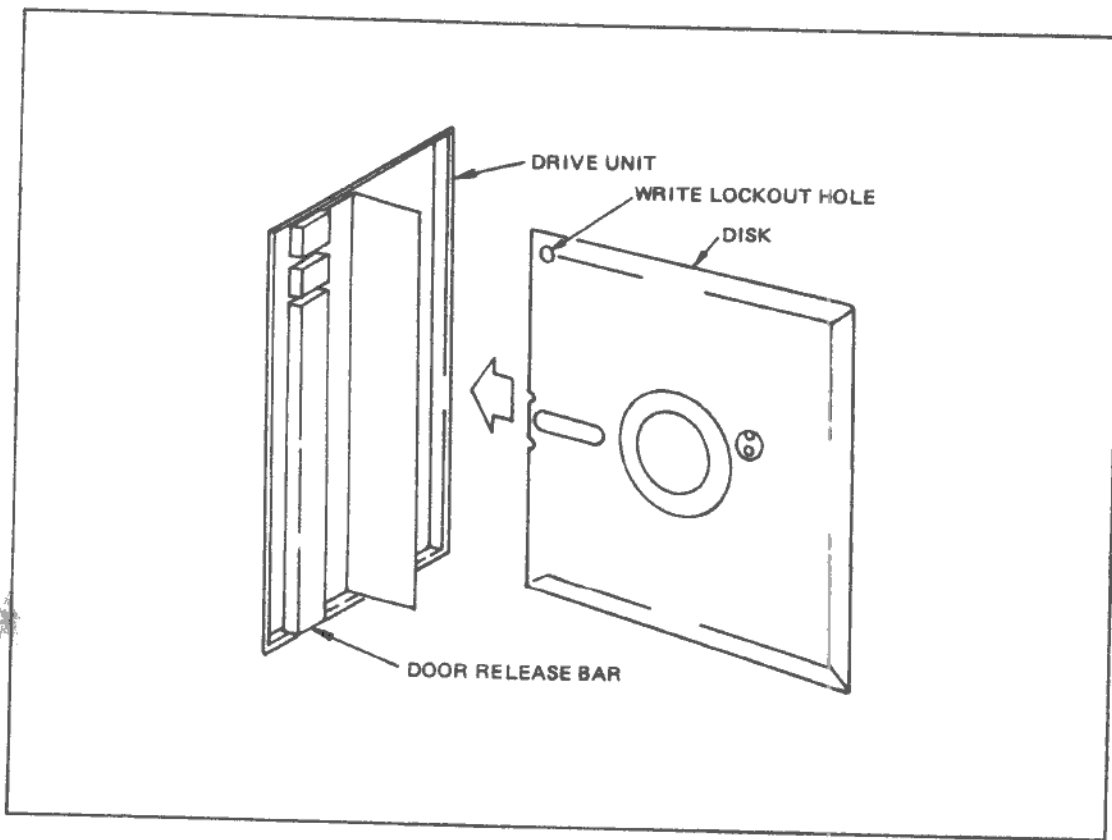


Figure 3-34. TP 461 Disk Insertion

stomizable password in order to be identified by the system. This is done by first pressing the 'Y' key, indexing the password and pressing the 'Y' key again; for security reasons anything entered is not displayed and all entries except the correct password are ignored. Local Service is entered immediately after the password, or on direction from the Host; this may involve a short delay.

Function Selection

The available services can be presented in a number of ways, depending on how Local Servicing has been customized (using the Customizer Program). On entry to Local Service, a menu is presented which usually consists of a choice of functions. The selection process is achieved by pressing the key which is associated with the required function. When a function has been selected, any further parameters that are necessary (for example, an amount entry during a Feeder test) are requested. When a specified function is completed, three choices are offered: selecting further services; returning to the function which invoked the current one; or terminating Servicing by pressing the Cancel key.

NOTE

If the Cancel key is pressed at any time during Local Service, (except during the Keyboard test when the Cancel key is disabled) the machine reverts to Servicing state; that is, pre-password level. Subsequent entry to Local Service must be made by re-entering the password.

Most functions, when completed, return a result specifying whether the operation was successful or unsuccessful. If a function is unsuccessful, a code number is displayed which can be looked up in Table 3-1. This table describes the cause of the failure and the action to be taken. If the error persists and no obvious solution is found, Burroughs Customer Service Engineering Personnel must be contacted.

When Local Servicing is entered, it is recommended to select the Device Test function (if customized) which provides a number of tests associated with each device. A summary of the operational status of the RT is displayed on the screen if the key associated with the 'Display Machine Status' option is pressed. This test enables quick identification of any device failures or warnings, so that the appropriate action can be taken. For example, when the 'Display Machine Status' function is invoked, if the status of the backup storage (for example, Drive 1) reveals that the device is inoperable, the Disk test option must be selected and the drive number (1) entered when the RT requests the drive number entry. That drive will be verified and the result of the operation displayed on the screen. The code number returned with the result can be looked up in Table 3-1 which describes the cause of failure and the possible recovery actions.

It must also be noted that if the RT is an offline capable machine, then the Time of Day Clock must be set on power up if the RT is to go into offline operation, as the Clock is vital for offline operation. If the Clock is not set, the RT cannot go into offline In Service State.

Facilities Available in Local Servicing

Local Servicing offers a wide range of routines which allow the Institution to meet their specific requirements.

For clarity and consistency, the servicing routines are divided below into six groups of logically similar functions:

1. Device Test Functions
2. Audit Related Functions
3. Derogatory File Functions
4. File Maintenance Functions
5. Clock Maintenance Functions
6. Host Servicing

Note that RTs using the Online Only systems program have access to a restricted set of servicing routines in Local Service. They consist of:

- Displaying and updating audit totals and machine resources
- Resetting the printer status after a printer failure occurs
- Checking the operational status of the devices and testing them individually.

1. Device Test Functions

Local Service provides the Institution with a series of tests that can be carried out to check the operational status of the devices. Refer to figure 3-35. Associated with each test is a value (which appears on completion of the test) indicating the result of the operation. The Test Device Results table (Table 3-1) can then be referred to in order to determine the appropriate action to be taken.

Any of the following tests can be included:

1. Display Machine Status

This function interrogates all the devices, updates their status identifiers if necessary, translates the device status to their text equivalents and displays them on the screen. Four possible values can be associated with each device: Not Present, Operable, Not Operable and Alert. Note that the text contained in these fields is totally customizable.

- NOT PRESENT:** A device is not fitted, for example a Time of Day Clock (TOD) on an online only RT 650
- NOT OPERABLE:** A device failure has occurred, for example, no more currency in the feeder or the reject compartment is full. The device in question must be tested using the Local Servicing facilities to determine the cause of this device status.
- OPERABLE:** The device is fully operational
- ALERT:** A warning condition has arisen. If the device is customized as being vital for operation, the RT will not go into service. The devices that can assume this value are:
- Backing Store: A software error has occurred. If Disk-Soft-Status is also included in this menu, it will usually have a non-zero value, indicating the reason for the alert condition.
 - Card Reader : The Card Reader is active; that is, a card has been prematurely inserted.
 - Clock : The Clock requires setting, there is a century overflow, or the alarm has been activated.

Note that backup storage (TP 420 or TP 461) and the Time of Day Clock are essential for offline operation of the RT.

2. Card Reader Test

This test offers a choice of functions. It requires a pre-encoded test card to be inserted. The card can then either be retained, or undergo the test which consists of a read operation and (if the system is customized for Track 3) write and read after write operations.

If the Card Retention option is selected, the system attempts to retain the test card. If the card is jammed during any of the card reader tests, a function is provided to clear the Card Reader.

Success or failure of any of these operations is reported by a result being displayed on the screen.

A sample card reader test menu is shown in figure 3-36.

Card Reader Test Results:

- 0 - Successful
- 2 - Card Reader active
- 3 - Card Reader failure
- 34 - Read failure
- 36 - Card removed while reading
- 37 - Card not present
- 38 - Read not complete
- 39 - Write failure
- 41 - Card removed while writing
- 43 - Card Reader or card retention mechanism not fitted
- 70 - Failed to retain card

Refer to Table LS-1 for a full specification of the results.

3. Currency Feeders Test

This function allows the feeders to be initialized (that is; two notes from each feeder are fed into the currency reject compartment of that feeder), and individually tested by dispensing a specified number of notes from either feeder. Both feeders can also be tested together by requesting the dispense of an amount.

An individual feeder can be selected by entering 1 (front or left feeder) or 2 (right or rear feeder); both feeders can be selected by entering 3 . If both feeders are selected, the RT requests entry of the amount to be dispensed, and when entered, dispenses the requested amount and signals the result of the operation. If an individual feeder is selected, the number of notes to be dispensed is requested. Note that an entry of zero causes both feeders to initialize.

When the dispense operation is performed, the Cash Tray Door, if fitted, is unlatched by the RT, and can then be lifted to retrieve the cash dispensed.

Currency Feeder Test Results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device failure
- 25 - Dispense off target

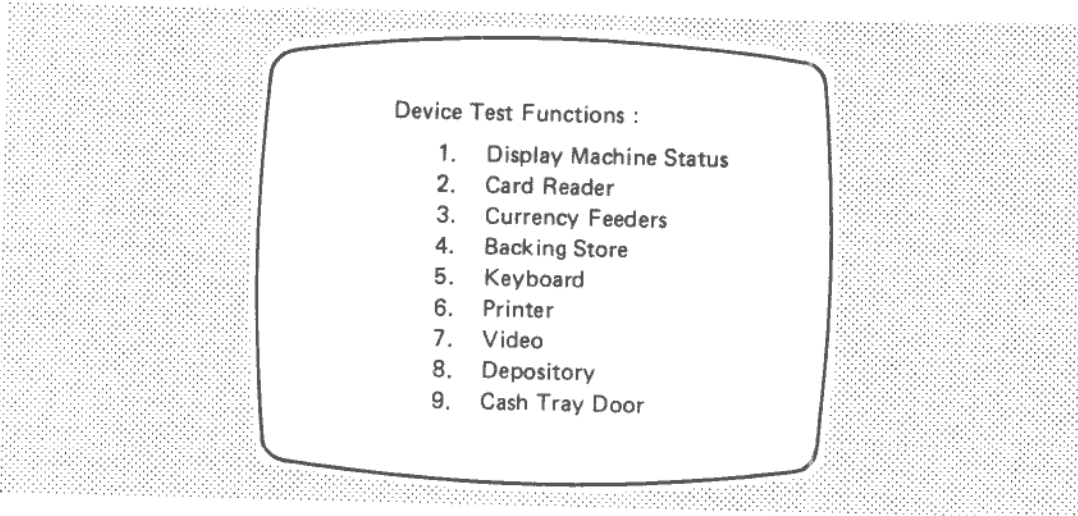


Figure 3-35. Device Test Functions

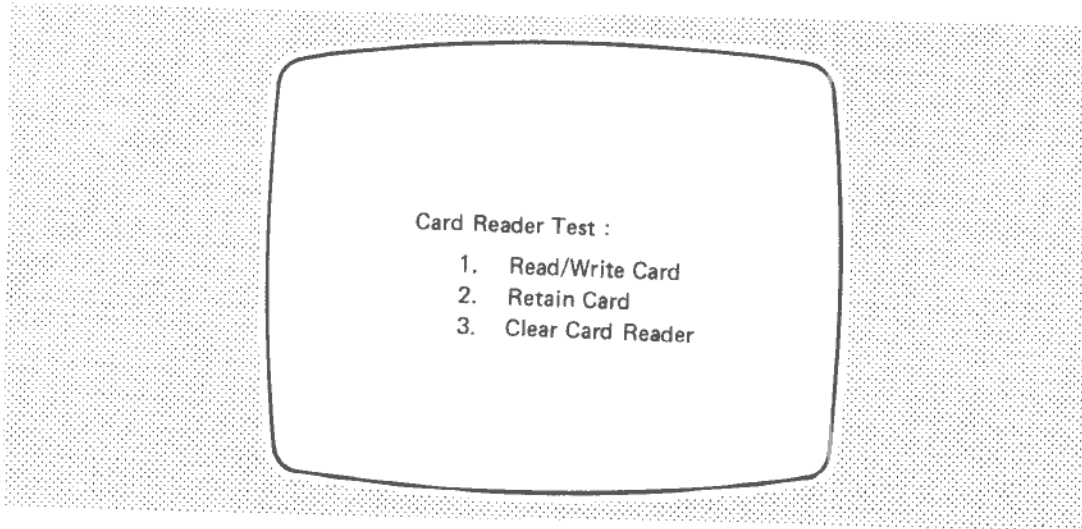


Figure 3-36. Card Reader Test Functions

43 - Device not present (refers to the Cash Tray Door, since the Feeders form an integral part of the RT)

94 - Feeders sensor detected empty feeders

Refer to Table 3-1 for a full specification of the results.

4. Backing Store Test

If a TP 461 is fitted, a verification of the 1 megabyte disk is carried out as soon as this option is selected. If a TP 420 is fitted, the RT will first request entry of the number of the drive to be tested (1 or 2).

Backup Device Test Results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device not present
- 23 - Disk full
- 43 - Device failure
- 49 - No media
- 50 - Read/Write error
- 51 - Duplicate name
- 52 - File name not found
- 53 - Write protect
- 61 - Verify fail
- 62 - Storage handler error
- 67 - Duplicate volume identifiers

Refer to Table 3-1 for a full specification of the results.

5. Keyboard test

When this option is selected, an instructional (non-customizable) display is shown on the top status line of the screen. It consists of all the keys 0-9, Y,N and C. All the keys on the keyboard must be pressed in the order shown. If the wrong key is pressed or Attendant timeout occurs, the test fails.

Note that this test becomes redundant if the keyboard and video are not functional. Ensure that the connections of these devices to the SIO connection panel are firmly in place.

Keyboard Test results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device failure

Refer to Table 3-1 for a full specification of the results.

6. Printer test

This test results in the complete printer character set being printed on the transaction printer. When the printer has failed, whether it is vital for service or not, the printer status must be reset explicitly.

Printer test results:

- 0 – Successful
- 3 – Device failure
- 31 – No more paper
- 43 – Device not present

Refer to Table 3-1 for a full specification of the results.

7. Video test

This option causes the display screen to be filled with asterisks in normal video for two seconds, followed by asterisks in reverse video for another two seconds.

Video test results:

- 0 – Successful
- 3 – Device failure

Refer to Table 3-1 for a full specification of the results.

8. Deposit Gate test

This test results in the deposit gate's opening for one second.

Deposit Gate results:

- 0 – Successful
- 3 – Device failure (Keyboard)

9. Cash Tray Door test

Two functions are available for testing the operation of the Cash Tray Door, Open Cash Tray Door and Close Cash Tray Door.

When the Open Cash Tray Door Test is selected (returning result 69 from the menu), the locking catch on the door is released by the Application. On completion of the operation a code number is displayed, indicating the result of the test.

When the Close Cash Tray Door Test is selected (returning result 70 from the menu), the door is closed by the Application. On completion of the operation a code number is displayed indicating the result of the test.

Cash Tray Door Test Results:

- 0 – Successful
- 3 – Device failure (Cash Tray Door)

Refer to Table 3-1 for a full specification of the results.

2. Audit and Resources Maintenance

The functions in this category allow manipulation and interrogation of the audit medium.

A list and description of each of these functions is given in figures 3-37A, 3-37B and 3-37C.

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Audit and Resources Maintenance:

1. Audit Maintenance
2. Resource Maintenance
3. Print Offline Transactions file
4. Purge Offline Transactions file
5. Initialize Audit Media
6. Reset Disk Status

Figure 3-37A. Audit and Resource Functions

Audit Maintenance:

1. Display Audit Totals
2. Update number of withdrawals
3. Update number of deposits
4. Update number of transfers
5. Update number of service requests
6. Update total amount withdrawn
7. Update total amount deposited
8. Update total amount paybill with deposit
9. Update total amount paybill from account
- O. Update total amount transferred
- N. Set all above fields to zero

Figure 3-37B. Audit Functions

Resource Maintenance:

1. Display machine resources
2. Update number of notes in front feeder
3. Update number of notes in rear feeder
4. Update number of front feeder rejects
5. Update number of rear feeder rejects
6. Update amount of paper remaining
7. Update amount of backup storage remaining

Figure 3-37C. Resource Functions

Using the functions mentioned above, the current Audit totals and resources can be displayed, and any of the fields amended to reflect audit changes during machine servicing. Note that the RT can be customized to print the contents of any screen on the CTR printer.

The number of cards retained can be updated/reset if the appropriate steps have been customized.

All changes to the Audit occur in memory. If changes are made to the Audit using the functions listed above, an Audit record must be written to backup storage. This is automatically detected by the Application program and achieved, provided return is made to the main menu; that is, the first menu displayed on entry to Local Service. Ensure, therefore, that the 'Cancel' key is not pressed before returning to the main menu after amending the Audit, as this terminates Local Servicing.

3. Print Offline Transactions File

When this function is selected, the entire contents of the Transactions File are printed on the CTR printer. While this operation is being performed, the display consists of a PLEASE WAIT message and an instructional message in the status line; for example, PRINTING IN PROGRESS. On completion, success or failure of the operation is reported by a result displayed on the screen.

Results:

- 0 - Successful
- 3 - Device failure
- 31 - No more paper
- 43 - Device not present
- Any of the disk access errors

Refer to Table 3-1 for a full specification of the results.

4. Purge Offline Transactions File

When this option is selected, the entire contents of the Offline Transactions File are removed and the file is re-created on exit from Local Service. A PLEASE WAIT message and a PURGING message displayed on the screen reflect the status of the operation.

Results:

- 0 - Successful
- 3 - Device failure
- 43 - Device not present
- Any of the disk access errors

Refer to Table 3-1 for a full specification of the results.

5. Initialize new Audit media

If a TP 420 is fitted, the Attendant is requested to specify the drive number holding the Data Disk that contains the Audits. If a TP 461 is fitted, the media is automatically initialized. Ensure, therefore, that the correct disk is present, otherwise it will be overwritten.

Results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device failure
- 43 - Device not present
- 49 - No media
- 50 - Read write error
- 53 - Write protect
- 62 - Storage Handler error

Refer to Table 3-1 for a full specification of the results.

6. Reset Disk Status

When this option is selected, the software status of the backing store device is reset to zero. This function must be explicitly invoked after rectifying the condition which caused the disk failure/error.

3. Derogatory File Functions

The Main Derogatory file is provided to contain a list of cards which have been lost or stolen or which for other reasons are not to be transacted to. The Mini Derogatory file is also made up of entries which contain sufficient information to identify a Magnetic Stripe Card uniquely. Entries into the Mini Derogatory file are automatically made by the Application when a customer exceeds the allowed number of PIN retries.

When this option is selected, the contents of the Main and Mini Derogatory files can be manipulated using the range of functions available. Local Service offers the functions shown in figure 3-38.

1. Display Derogatory File Contents

Derogatory files are held in memory in ascending order and consist of one continuous string of characters made up of:

- Interchange code (if an interchange system)
- Primary Account Number
- Card Member Number

If the Display Derogatory file function is selected, the RT requests a Derogatory file entry. This entry is only used to position the display 'window' within the file (held in ascending order). If the entry is non-existent, the window is positioned at the point in the file where it would have been. However, if an invalid entry is made (wrong interchange code or null entry) the window is positioned at the beginning of the file. This last step only applies to the Main Derogatory file because the Mini Derogatory file is cyclic.

2. Search for a specified entry

When this function is selected, the RT requests a Derogatory file entry, and when entered, checks for the presence or absence of that entry in the currently selected file. If the entry is found, it is displayed (along with its action code); if it is not present, the display indicates an error condition.

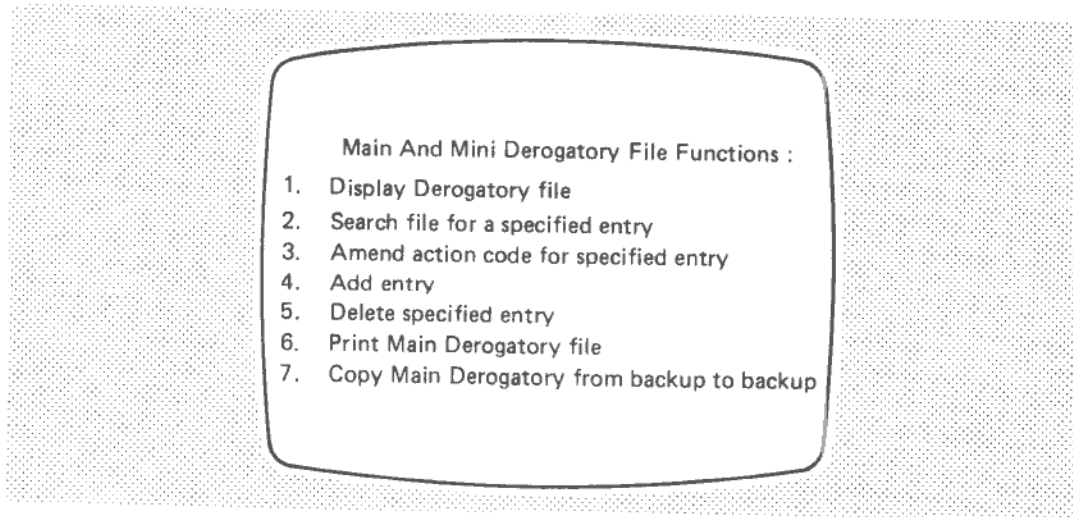


Figure 3-38. Derogatory Files Functions

Results:

- 0 - Successful
- 20 - Entry not found

3. Amend, Add or Delete derogatory file entries

The Amend function enables the action code of an existing entry to be changed. The Add function enables a new entry to be entered. The Delete function enables an existing entry to be removed.

All three functions require entry of the account number (and Interchange Code, if used). In addition, the add and amend functions request the specification of an action code. As soon as the necessary information is provided, the function is attempted and, on completion, a result is shown. If an invalid action code is given, an error message appears on the status line and the screen that was displayed prior to the one requesting the action code entry is re-displayed.

Results:

- 0 - Successful
- 20 - Record not found
- 21 - Record already exists

Refer to Table 3-1 for a full specification of the results.

6. Print Main Derogatory File

Invocation of these functions causes the entire contents of the Main Derogatory file to be printed from backup or memory.

Results:

- 0 - Successful
- 3 - Device failure
- 31 - No more paper
- 43 - Device not present
- Any of the disk access errors

7. Copy Main Derogatory from Backup to Backup

This function enables the contents of the Derogatory file to be copied from one micro-disk to another, if a TP 420 is fitted. The process used is similar to that used in File Transfer Functions.

Results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device failure
- Any of the disk access errors

4. File Maintenance Functions

The functions grouped under this category allow transfer of files from memory to back-up and/or backup to backup. In addition, entire disk contents can be duplicated. Note that duplication of media can only be carried out if the RT is equipped with a TP 420 unit.

The functions available are listed in figure 3-39 and described collectively according to how they use common procedures.

On selection of any of these functions, the RT requests the entry of a drive number (if TP 420 is used). The operation is then attempted, while a PLEASE WAIT message is displayed along with a message in the status line. On completion of the transfer, the result is displayed.

Results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device failure
- Any of the disk access errors

5. Clock Maintenance Functions

If the system is suitably customized, Local Servicing can contain four functions associated with the Time of Day Clock. These are shown in figure 3-40.

1. Read time and date

This function causes the date and time to be updated from the Time of Day (TOD) Clock and then displayed on the screen. If the clock cannot be read, a result is displayed on the screen.

Possible results:

- 0 - Successful
- 3 - Device failure
- 43 - Device not present
- 44 - Clock requires setting
- 47 - Century overflow

2. Set time and date

When this function is selected, the RT requests entry of the current date and time in the form of one continuous string of characters in the following format: CCYYMMDDHHMM, where CC is the century, YY is the year, MM is the month, DD is the day, HH is the hour and MM is the minutes. The time must be entered in 24 hour clock format (2400 = 12 midnight, 1200 = 12 midday). The date and time entry must be terminated by pressing the Y key. The Clock is then updated. If the operation fails, a result is displayed on the screen.

Results:

- 0 - Successful
- 1 - Invalid input
- 3 - Device failure

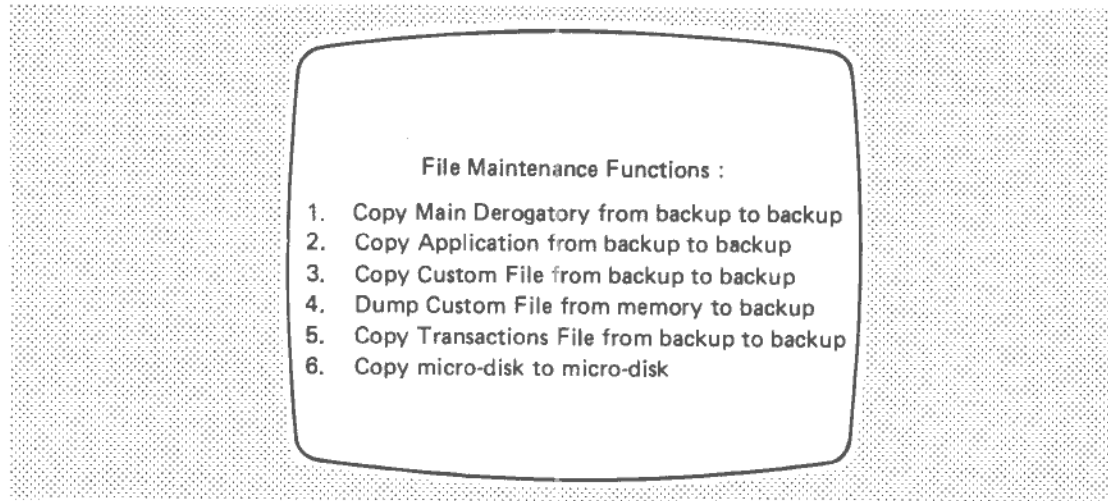


Figure 3-39. File Maintenance Functions

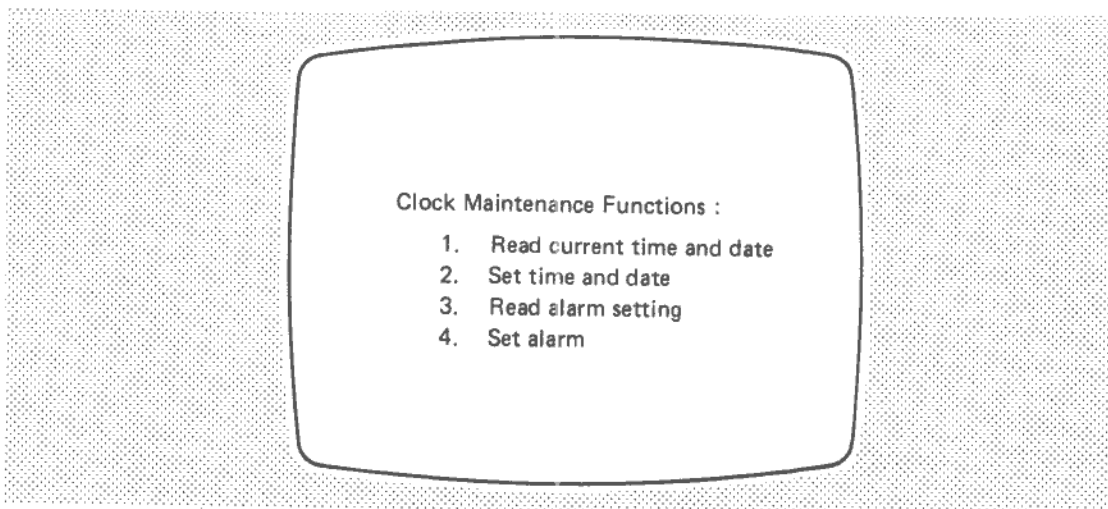


Figure 3-40. Clock Maintenance Functions

43 – Device not present

3. Read Alarm Setting

This function is similar to the Read Clock function in that it causes the alarm data items to be read.

Results:

- 0 – Successful
- 3 – Device failure
- 43 – Device not present
- 46 – Alarm Call
- 48 – Alarm requires setting

4. Set Alarm

If this function is selected, the RT requests entry of the using the Set Clock Screen and then sets the Alarm on the Time of Day Clock. The numbers entered must be in the order specified in Set Time And Date above.

Results:

- 0 – Successful
- 1 – Invalid input
- 3 – Device failure
- 43 – Device not present

Refer to Table 3-1 for a full specification of the results.

6. Host Servicing

When this option is selected, control is handed over to the Host which can operate any of the devices and communicate with the Attendant.

Test Devices Results: Description and Recovery

After completing one of the functions that are available in Local Service, a value is displayed on the Display Screen indicating the result of the requested operation. Refer to figure 3-41.

Possible errors that may be encountered in Local Servicing while Servicing the RT are described in table 3-1, together with recovery procedures where appropriate. If an error result occurs which is not listed, Burroughs Customer Service Engineering Personnel must be contacted.

Table 3-1. Test Devices Results

Result	Meaning	Description	Recovery
0	Successful (Default Value)	selected function successfully completed	N/A
1	Invalid input	Invalid input is entered in: – feeder test	Input correct values

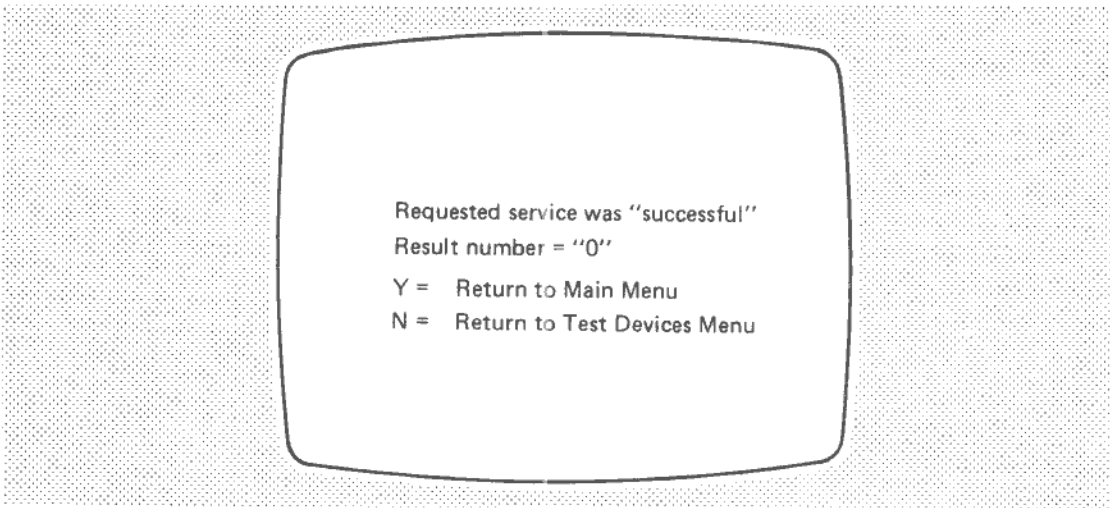


Figure 3-41. Result of a Local Service Operation

(continued)

Table 3-1. Test Devices Results

Result	Meaning	Description	Recovery
		<ul style="list-style-type: none"> - keyboard test - disk test - clock setting - alarm setting - derogatory handling - audit functions - file functions 	
2	Device ready	Device status is interrogated and the device is already active: a card has been prematurely inserted	Insert MSC when the Card Reader is ready
3	Device failure	Device being accessed is inoperable	Determine which device is inoperable (using the Display Status Function in Local Service) and carry out relevant recovery procedures.
20	Record not found	Derogatory file functions have been selected and an attempt to delete, amend or search for a non-existent record has been made	Ensure correct records are present using the Display Entries facility in Derogatory file testing
21	Record already exists	Derogatory file functions have been selected and an attempt to add an existing record has been made	Display contents of Derogatory file and check that the specified entry is already present. Duplicate entries are rejected automatically
22	Audit not found	DISK-SOFT-STATUS value	Ensure base file exists
23	Disk full	DISK-SOFT-STATUS value	Delete transactions from the Transactions File (data disk) or delete derogatory entries from the Derogatory File (system disk)
24	File handling Transfer fail	In File Maintenance Functions, transfer of Application, Custom file or Transactions file or duplication of files has failed	Ensure correct disks are present. Retry the operation
25	Dispense off target	<ol style="list-style-type: none"> 1. Specified amount to be dispensed in feeder test is greater than physical capacity of feeder. No dispense takes place. 2. Amount specified does not correspond with feeder denominations 	Enter dispensable amount

(continued)

Table 3-1. Test Devices Results

Result	Meaning	Description	Recovery
29	File Handler Save Fail	1. Dump Custom File to backup Bad length, input file open incorrectly, output file closed incorrectly, disk access errors	Ensure file exists. Retry operation. Try saving the file onto another disk
31	No more paper	Roll of printer paper is exhausted when an attempt is made to: 1. Print a menu in Local Service 2. Print transactions file 3. Print contents of Derogatory file 4. Perform printer test	Replenish printer paper
34	Read failure	Card Test function is selected and test card has not been read successfully	1. Retry operation 2. Check for bad test card 3. Contact Burroughs
36	Card removed while reading		Do not remove the card while the Card reader is active. Retry operation
37	Card not present	Test card has been removed during the pause between read and write operations	Retry test
38	Read not complete	In Card Test function test card is inserted in Card Reader and Cancel Key is pressed during the read operation	Wait for the Card Reader to perform the test before retrieving the card or pressing the Cancel key
39	Write failure	Card test function is selected and test card has not been re-written successfully	1. Retry test 2. Ensure test cards are properly encoded 3. Contact Burroughs
41	Card removed while writing		Do not remove card while the Card Reader is active. Retry operation
43	Device not present	An attempt is made to access a device which is not fitted	
44	Clock requires setting	On power up, Local Service is entered and an attempt is made to read the clock	Set the clock using the facilities in Local Service

(continued)

Result	Meaning	Table 3-1. Test Devices Results Description	Recovery
46	Alarm Call	The alarm has been set and activated and an attempt is made to read the Clock in Local Service	This result is only a warning condition to indicate that the Alarm has been activated
47	Century overflow	Indicates a toggle of centuries when an attempt is made to read the clock	This result is only a warning condition. No recovery is needed.
48	Alarm requires setting	On power up, Local Service is entered and an attempt is made to read the Alarm	Set the Alarm using the facilities in Local Service
49	Storage – no media	Occurs in any of the following functions: – Initialize audit media – Backup storage test – File Maintenance functions – Copying in Derogatory File Maintenance No storage media is detected when an 'Open File' operation is performed: 1. Media is not present 2. Drive door is open 3. Disk is inserted incorrectly	1. Ensure that the correct media is present 2. Ensure that the drive doors are closed 3. Ensure disks are correctly inserted in the drives
50	Storage – Read Write error	1. In the File Maintenance functions an attempt is made to copy a non-initialized disk 2. In Audit maintenance functions, an attempt is made to initialize a bad disk	1. Ensure that disks are not damaged 2. Ensure that files are copied onto initialized disks 3. Otherwise, contact Burroughs
51	Storage – Duplicate name	In File Maintenance functions, an attempt is made to copy a file which exists already on the output drive	Ensure correct disks are present. If a copy of the specified file is required, perform the copy operation onto a new disk. Alternatively, use the Copy file from Backup to Backup facility in Local Service
52	Storage – No name	1. An attempt is made to print a Transactions File which is not found	1. Ensure that the Transactions File is present

(continued)

Table 3-1. Test Devices Results

Result	Meaning	Description	Recovery
		2. An attempt is made to copy the Transactions File from Backup to Backup, where the file is not found 3. A hardware error has occurred	2. Otherwise, a hardware error has occurred. Contact Burroughs
53	Storage – Write Protect	Specified disk is read only	To write onto the TP 420, remove the write protect label. To write onto the TP 461, cover the Write Lockout Hole with a label.
61	Storage – Verify failed	An attempt has been made to initialize a faulty disk Retry operation. Ensure disks are not damaged	
62	Storage Handler error	An exceptional error has occurred. This usually occurs after an accumulation of storage handler errors	Power off the disk unit and retry operation. Otherwise, contact Burroughs
64	Wrong Data Disk	RESTART-RESULT value TP 461: Disk is not DATA disk TP 420: Both disks are either SYSTEM or DATA disks	Ensure correct disks are present
65	No Transactions File	RESTART-RESULT value failed to open TRANSACTIONS or TRANFUL files	Ensure Transactions file is present
67	Duplicate Volume Identifiers	In File Maintenance functions, an attempt is made to copy the Custom File from system memory onto Backup where the Custom File is already stored	Ensure that files to be dumped are not already present on Backup. It is advisable to copy onto new disks
94	Feeders Empty	Feeder sensor has detected empty feeder. Note that if feeders are physically empty, a device failure would occur (result 3)	Replenish feeders

Backup Storage Device Errors

A number of backup storage device errors can occur when performing operations involving backup storage. Often, the values of DISK-SOFT-STATUS and RESTART-RESULT can be interrogated in Local Service to provide an indication of the cause of the error. If the cause of the error is not apparent after inspecting these items, the following recovery procedures must be followed.

1. Ensure correct disks are present.
2. Ensure disks are not damaged.
3. Ensure disks are correctly inserted in the drives.
4. Close drive doors.
5. Ensure power is supplied to the disk drive device.
6. Reset DISK-SOFT-STATUS using the facility in Local Service.
7. Ensure both drives are fully operational.
8. Switch disk unit off and back on again after a few seconds
9. If successful, recovery is complete.

Disk-Soft-Status

Definition – This variable data item contains the result value of any operations carried out on the backing store medium which are not successful. The value is set by the RT each time a disk handling error occurs and can be displayed and reset using the Local Servicing procedures. The default value is zero if successful.

Value	Meaning
0	Successful
3	Device Failure
23	Disk full
49	Drives are empty – No media is present
50	Read/Write error has occurred
51	Duplicate name
52	File name not found
53	Disk is write protected
61	Verify disk device has failed
62	Exceptional error hs occurred
67	Duplicate volume identifiers

Restart-Result

Definition – During initialization and on exit from Servicing, the RT performs checks on its operational status. The item, RESTART-RESULT, contains the result of these checks, which can be interrogated in Local Servicing.

Value	Meaning
0	Successful
3	Device failure
22	Audit not found
23	Disk full
64	Wrong Data Disk
65	No Transactions File

3, 23, 64 and 65 prevent the RT going into service. 22 also prevents the RT going into service if AUDIT is set vital for operation.

Exit from Local Servicing

Exit is made to Servicing State (that is, pre-password level) when the Cancel key is pressed or the RT requests an entry and does not receive it within the customizable time-out. Out of Service State is entered when completion of servicing is indicated, by returning the Access Switch to the not active position.

EXCEPTIONS TO NORMAL OPERATION

While the RT is operating as an Automatic Teller Machine (that is, during Application Program execution), possible error conditions may be encountered which affects the operation of the RT. These are described below together with recovery procedures where appropriate. If these conditions cannot be overcome, or other abnormal symptoms occur on the RT 650 system, a call must be placed with Burroughs Customer Service Engineering Personnel.

Errors that can occur during RT power up and program loading have been discussed already under 'SYSTEM INITIATION'.

1. 'Needs Attention' light is on

At any time during program execution the 'Needs Attention' light, which is the right-hand amber indicator on the left-hand side of the RT, is used to signal that the RT requires Attendant intervention. This light is used in conjunction with the Early Warning (EW) System for system resources. This facility, which has been introduced to improve the general efficiency and service of the RT, involves feeder note contents, the amount of printer paper and the disk space available for recording transactions. For each resource there is a defined (customizable) value/limit, which, when reached, results in an EW to the Host and/or Institution staff.

In addition to the 'Needs Attention' light being set, a status message indicating the reason for servicing is sent to the Host. If the data communications link is not operable, or the Host is not present, the status message is recorded on disk and when communication is restored, it is transmitted to the Host.

The appropriate action is to go into Servicing State, to display machine resources in order that the reason for the EW can be determined, to rectify the condition and then update the appropriate machine resource total.

Note that if an EW is ignored and the resource is vital for operation, the RT will go out of service as soon as the device is physically empty (or full, in the case of the Offline Transactions File and the Feeders Reject Compartment).

2. Out of Service State is entered 'abnormally'

Out of Service State is always entered on exit from Initialization State and Servicing State. The RT then remains in Out of Service State until the Host directs it to another state, or the Access Switch is activated directing it to Servicing State. If the RT is customized as an Offline Capable system, it reverts automatically to offline customer service operation.

However, Out of Service State is also entered from the other states when any of the following conditions arises:

1. Failure of a vital device

The Customizer Program allows the Institution to specify which devices are vital to the operation of the RT. Failure of a vital device can sometimes be detected by directing the RT into Servicing State and using the Display Machine Status function in Local Service. However, it can always be detected by the Host system because the RT sends

a status message on entry to Out of Service state. This message is recorded on disk if the data communications link is not used .

Some device failures can be overcome in Local Servicing (for, example; replenishing currency when dispenser cassettes are empty, clearing feeder path if the feeder jams or replenishing paper supply in the printer.) Other device errors may occur which require a call to be placed with Burroughs Customer Service Engineering Personnel.

2. Host sends a 'Go-to-out-of-service' directive

The Attendant cannot determine if the Host has directed the RT into Out of Service unless Host servicing is established and a 'Host-to-person' message is displayed on the screen stating this. Alternatively, the Host system support center can be contacted. The Attendant must follow the procedures laid down by the Institution when this condition occurs.

Note that even if the RT is customized as an offline capable system, the RT will remain in Out of Service State until the Host issues another directive.

3. Host communication failure

Communication with the Host is lost if a data communications error occurs, or if the system goes down. The data communications connection to the RT (refer to figure 3-8) must be checked to ensure that the plug is firmly in place.

If communication cannot be re-established, the Host system support center must be contacted for information concerning the status of the Host in relation to the RT. The procedures laid down by the Institution for Host communication failure must be followed.

Note that if the RT is customized as an offline capable system and communication with the Host is lost, the RT reverts to offline operation.

4. Loss of Audit information

The Audit file is provided to maintain audit totals in the event of a power failure. Each audit record has a tag value 'pending' until the authorized transaction has been executed. This 'pending/complete' tag enables the system to know if audit totals are accurate or possibly inaccurate, and when they are recovered from disk after a power failure. If the tag value of the last audit record is 'pending' then there is doubt whether the authorized transaction was executed. In this event the RT remains in Out of Service and a message is sent to the Host (if online) or written to disk (if offline) stating that audit totals are suspect due to a power failure.

The lost audit information can be recovered by manually auditing the RT. Facilities are available in Local Servicing and to the Host which enable individual audit totals to be amended at will. These totals are amended in memory and the next audit record written to disk reflects the changes.

3. Safe Interlock

The safe interlock controls power to all the peripheral devices except the Display screen. If the safe door is opened during Servicing (to access the devices) and then not closed properly, the devices will not initialize since no power is applied to them. Therefore, ensure that the interlock is 'normal' (that is, safe door closed) when Servicing state is exited.

4. System Halts

If the RT encounters a run time error, it will system halt, and display the contents of various system registers on the screen.

The procedures for recovery are:

1. Note the values of the registers displayed on the screen. Figure 3-42 shows a suggested format for recording these values.
2. Note the sequence of events that led to the system halt; for example, transaction being performed, RT waiting for a customer, RT out of service.
3. Power off the RT 650.
4. Power it back on after about 10 seconds and reload the software.
5. If irrecoverable errors occur or the system halts again contact Burroughs Customer Service Engineering Personnel.

E-REG (P)	
P-ORG:	P-REG:
P-OFF:	TOTAL:
B-REG:	C-POOL:
L-REG:	INITF:
T-REG:	STACK:
S-REG:	S-ORG:

Figure 3-42. Reporting System Halts

GENERAL DESCRIPTION

1

SYSTEM OPERATION BY A CUSTOMER

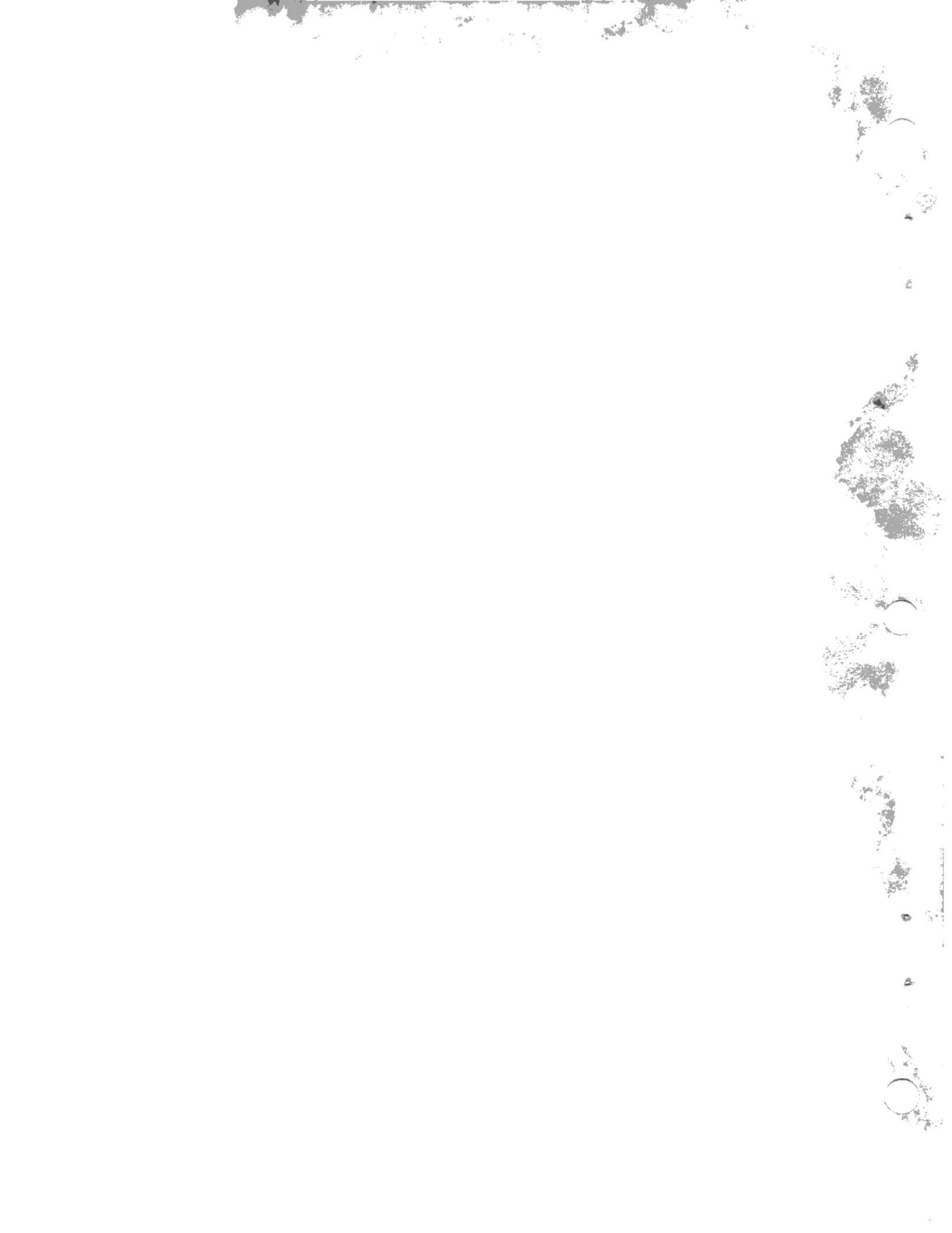
2

SYSTEM OPERATION BY ATTENDANT

3

SYSTEM CONFIGURATION

4



SECTION 4

SYSTEM CONFIGURATION

INTRODUCTION

The versatile nature of the RT 650 system allows an Institution to configure a basic system to meet specific requirements. This flexibility is provided by a number of features:

- choice of Application programs
- customization of "standard" Custom File
- EAROM configuration
- Host control using data communications link
- Stand-alone capability

This section describes the features that determine the configuration of an RT 650 system. The Application programs and customization have already been covered in previous sections, and are only included briefly here.

THE APPLICATION PROGRAMS

A choice of two Application programs is available for an RT 650 system: an Online Only Application and an Offline Capable Application. Using these Application programs, an RT 650 ATM can run in one of three modes of operation : online only, offline only or online with offline backup.

CUSTOMIZATION OF THE CUSTOM FILE

The Customizer program and Custom File allow an Institution to tailor the operating characteristics of an Application program to suit specific requirements. The "standard" Custom File is edited interactively using the Customizer program.

EAROM CONFIGURATION

Electrically Alterable Read-Only Memory (EAROM) contains certain system constants that determine the behaviour of an RT 650 during initialization and define the hardware characteristics of the system.

The memory locations in EAROM have an address range of 000 to 200 (hexadecimal). The contents of EAROM locations are displayed in the form

(AAA) VV

where the value in brackets represents the address of the current EAROM location as three hexadecimal digits, and VV represents the value of the current location as two hexadecimal digits. After entering MTR mode and selecting "EAROM CONFIGURATION", the address and contents of location 001 are displayed on the screen and EAROM configuration can proceed.

KEY FUNCTIONS

During configuration of EAROM, the keys on the customer keyboard perform specific functions when pressed.

“Y” Key

When the cursor is positioned on the address field, the next (incrementing) location of EAROM is selected and displayed on the screen, with the cursor positioned on the value field.

When the cursor is positioned on the value field, it moves back to the address field of that same EAROM location. Any partially completed value entry is discarded.

“N” Key

When the cursor is positioned on the address field, the preceding location of EAROM is selected and displayed on the screen, with the cursor positioned on the value field.

When the cursor is positioned on the value field, it moves back to the address field of that same EAROM location. Any partially completed value entry is discarded.

Numeric Keys

When the cursor is on the address field, numeric keys enable an address to be indexed. When the entry is complete, the current value of that location replaces VV.

Numeric Key Entry

Each of the characters displayed on the screen represents a hexadecimal value (0 to F). As there are only ten numeric keys on the PIN Keyboard, two entries must be made for each character. The table below shows what must be keyed in to represent each of the hexadecimal values from 0 to F.

Hexadecimal character	Keyed-in value	Hexadecimal character	Keyed-in value
0	00	8	08
1	01	9	09
2	02	A	10
3	03	B	11
4	04	C	12
5	05	D	13
6	06	E	14
7	07	F	15

Example:

to key in the address 200 requires the entry of 020000.

Cancel Key

When the cursor is positioned on the value field, it moves back to the address field. Any partially completed value entry is discarded.

When the cursor is positioned on the address field, the EAROM checksum is computed, and the values currently stored in the scratch pad area of memory are burnt into the EAROM.

Example:

To change the file transfer protocol distinguishing character from * (asterisk) to / (slash) (assuming that the cursor is positioned on the value field).

1. Press either the "Y" or "N" key to position the cursor on address field.
2. Enter numeric digits 000206 (the distinguishing character is stored at hexadecimal address 26). The display will be (26) 2A (* character is ASCII 2A). The cursor will be positioned on the value field.
3. Enter numeric digits 0215. The display will be (26) 2F (/ character is ASCII 2F). The cursor will be positioned on the address field.
4. Assuming that this is the only (or last) required change, press the "C" key. The new values are burnt into EAROM from the scratch pad area of memory, and the system returns to the basic MTR menu of options.

EAROM LOCATIONS

The EAROM address allocations in hexadecimal are shown below. Note that only significant digits are given.

Address (Hex)	Content
01 - 1A	Datacomm constants
1B - 26	Program loading specifications
27 - 2F	SIO Peripheral addresses
30 - 32	EAROM checksum
33 - 35	Application files information
1D6 - 200	Default display message

Datacomm Constants

Certain datacomm constants can be considered as a group of eight bits, numbered 0 to 7, where the value of each bit (one or zero) has a particular meaning. The required hexadecimal digits are derived from the bit pattern as shown in the example below:

1. Bit number	7 6 5 4 3 2 1 0
2. Bit value required	0 1 1 0 1 1 0 0
3. Bit weighting	8 4 2 1 8 4 2 1
4. Value	4+2 8+4
5. Hexadecimal digits	6 C

1. The bits are numbered 0 - 7.
2. Bits 2, 3, 5 and 6 have the value 1.
3. Consider the number as two groups, each containing four consecutive bits. This provides the weighting for each bit.
4. Add the relevant bits in each group. This yields two decimal numbers.
5. Interpret the decimal numbers as hexadecimal digits that are entered in the value field of EAROM.

Other EAROM locations contain datacomm control characters. The usual hexadecimal ASCII character value for these is given in the form VV (EAROM value).

Address 01 Bit Pattern

Bit 7 :	Address 01 (Hex)
Bit 6 :	Unused set to 0

Bit 5 :	Unused
Bit 4 :	0 = Enable propagation of RTS & CTS signals on power up 1 = Block propagating RTS & CTS signals on power up
Bit 3:	0 = Disable speed circuit 116 modem control 1 = Enable speed circuit 116.
Bit 2:	0 = Disable speed circuit 111/126 modem control. 1 = Enable speed circuit 111/126.
Bit 1:	Unused
Bit 0 :	Unused

Address 02 Bit Pattern

Bit 7 :	0 = Asynchronous protocol. 1 = Synchronous protocol.
Bit 6:	Unused set to 0
Bit 5 :	Unused set to 0
Bit 4:	0 = Single stop bit on datacomm character (typical) 1 = Two stop bits on datacomm character
Bit 3:	0 = Odd parity. 1 = Even parity.
Bit 2:	0 = Include parity bit on datacomm character (not used in MTS 2). 1 = Inhibit parity bit on datacomm character.
Bit 1:	0 = Datacomm character size (less parity) 5 or 7 bit. 1 = Datacomm character size (less parity) 6 or 8 bit.
Bit 0:	0 = Datacomm character size (less parity) 5 or 6 bit. 1 = Datacomm character size (less parity) 7 or 8 bit.

Typical Values for Address 02

Bit value by number	Hex Digits	Interpretation
7 6 5 4 3 2 1 0		
0 0 0 0 1 0 0 1	09	Asynch, even parity, 7 bit char.
0 0 0 0 0 1 1 1	07	Asynch, no parity, 8 bit char.
1 0 0 0 0 0 0 1	81	Synch, odd parity, 7 bit char.
1 0 0 0 0 1 1 1	87	Synch, no parity, 8 bit char.

Address 03 Character

SYN character for transmission. Typically ASCII 16.

Address 04 Character

SYN character for receive. Typically ASCII 16.

Address 05 – Unused

Address 06 – Baud Rate Factor

Baud Rate	Hex Value
00045.5	00
00050	01
00075	02
00110	03
00134.5	04
00150	05
00300	06
00600	07
01200	08
01800	09
02000	0A
02400	0B
04800	0C
09600	0D
19200	0E
38400	0F

Address 07 – Character

AD1 ; first terminal identification address character.

Address 08 – Character

AD2 ; second terminal identification address character.

Address 09 – Character

GAD1 ; first group terminal identification address character (used in group procedures to identify the concatenated terminals in a group).

Address 0A – Character

GAD2 ; second group terminal identification address character. The group address supplied by EAROM locations 09 and 0A are not the same as the normal address of any of the terminals in the group. In an environment not using group procedures, these characters must be set to 7F (ASCII DEL) or 04 (ASCII EOT).

Address 0B – Character

GSL ; Group Select character (used in group select procedures to identify the terminals belonging to a group). In an environment not using group select procedures, this character must be set to 7F (ASCII DEL) or 04 (ASCII EOT).

Address 0C – Character

POL character – normally 70 (ASCII p) for Burroughs.

Address 0D – Character

SEL character – normally 71 (ASCII q) for Burroughs.

Address 0E – Value

(See also address 0F)

Datacomm buffer length – interpreted as the upper 8 bits of an unsigned 16 bit integer. The value of this location should be 04.

Address 0F – Value

(See also address 0E)

Datacomm buffer length – interpreted as the lower 8 bits of an unsigned 16 bit integer. The value of this location is 00, specifying (with address 0E) a datacomm buffer length of 1024 bytes.

Address 10 Character

Transmission number

- 0 – disabled
- 1 – enabled and is the base

Address 11 – Value

Clear to send delay (in millisecond units). Permissible hex values 00 – FF (0 – 255 milliseconds).

Address 12 – Value

Receive delay (in millisecond units). Permissible hex values 00 – F (0 – 255 milliseconds).

Address 13 – Value

Unused set to zero.

Address 14 – Value

Unused set to zero.

Bit 0: 0 – disable ODT

1 – enable ODT

Address 15 – Unused

Address 16 – Value

Code size (most significant byte)

B3 for 96K

77 for 64K

Address 17 Value

Code size (least significant byte)

FF for 96K or 64K

Address 18 – Unused

Address 19 – Unused

Address 1A – Character

Datacomm present flag – set to 30 if datacomm hardware is not present, 31 if present.

Program Loading Specifications**Address 1B – Value**

Application identifier length. This is used to specify the number of significant characters in locations 1C to 23 which make up the program identifier (see location 1C). Permissible values are in the range 00 to 08.

Address 1C – 23 – Characters

Application identifier. The number of locations starting at 1C, given by location 1B, are used as the file identifier when requesting Application program loading (either from the Host or backup storage).

Each location must be set to the ASCII value of the character required; for example, the identifier "APPLIC" would require 1B to be set to "06", and locations 1C to 21 to be set to "41 50 58 4C 49 43". If location 1B is zero, then the default identifier "APPLICATION2" is used.

Address 24 – Value

Primary program load source indicator. This defines the media from which the loader first attempts to load a program. Permissible values are: 01 = Disk; 03 = Datacomm. See also location 25.

Address 25 – Value

Secondary program load source indicator. If this location is set to value 05 and the requested program is not found on the media specified by the primary indicator (location 24) the loader attempts to find it elsewhere. This means that if the primary indicator is set to load from backup media, the loader reverts to datacomm, and if the primary source is datacomm the loader reverts to backup media. If this location is set to value 06, the loader does not attempt to find a secondary load program.

Address 26 – Character

Character used in File Transfer Protocol messages to distinguish those messages from other RT Series datacomm messages. Initially set to 2A (ASCII *).

SIO Peripheral Constants

For each peripheral in the system an EAROM location is required to contain the peripheral address. With the exception of the customizer keyboard, peripherals which do not form a physical part of the system must have an address of 00.

Address 27 – PIN Keyboard Address

Value = EO

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Address 28 – Feeder Address

Value = 80

Address 29 – Card Reader Address

Value 70

Address 2A – Storage Device Address

Value = 01

Address 2B – Printer Address

Value = 0F

Address 2C – Customizer Keyboard Address

Value = 03

Address 2D – Time of Day Clock Address

Value = 50

Address 2E – 30 – Uncommitted

Value = 00

Application Files Information

Address 33 – Value

Custom file load source indicator. This location specifies the primary and secondary sources for Custom file loading. The permissible values are :

- 01 – load from datacomm only (see address 34);
- 02 – load from backup media only;
- 04 – load from backup if available; if not, from datacomm;
- 05 – load from datacomm if available; if not, from backup.

Address 34 – Value

Derogatory file source load indicator. This location specifies the primary and secondary sources for the Derogatory file. It has the same values and meanings as location 33.

Address 35 – Value

Backup device type. This location must be set to indicate the type of backup storage device fitted. Values are:

- 00 – no backup device fitted;
- 01 – TP 420 fitted;
- 03 – TP 461 fitted;

Address 36 – Value

Specifies the length of time in seconds that programs wait for a Host response after requesting Custom File load.

Address 37 – Value

This is the number of attempts to be made at waiting for a Host reply to Custom File load request, before Host failure is assumed and load source switched to default.

Optional Display Message

Address 1D6 – 1FB Characters

Optional Display Message. If the optional display message flag (address 200) is set to zero, the 40 characters in this area are displayed on line 8 of the customer display screen, at any time the loader is active; that is, from power on until a program has been loaded and commences execution. Any other display text that is normally displayed is suppressed. The characters of the message must be entered as their equivalent ASCII values with trailing and leading spaces as required.

Address 1FC – 1FF Not Used

Address 200 – Value

Optional display message flag. If this location has the value 00, then the optional display message is used. Any other value causes the optional display message not to be used.

Summary of EAROM Locations

ADDRESS		EXAMPLE	COMMENT
HEX	DEC	VALUE	
01	1	00	DATACOMM SPECIFICATION
02	2	09	DATACOMM SPECIFICATION
03	3	16	SYN CHARACTER FOR TRANSMISSION
04	4	16	SYN CHARACTER FOR RECEIVE
05	5	00	UNUSED
06	6	00	BAUD RATE FACTOR
07	7	41	AD1
08	8	30	AD2
09	9	7F	GAD1
0A	10	7F	GAD2
0B	11	7F	GSL
0C	12	70	POL
0D	13	71	SEL
0E	14	04	= >
0F	15	00	= > DATACOMM BUFFER SIZE
10	16	00	TRANSMISSION NUMBER
11	17	0A	CLEAR TO SEND DELAY
12	18	01	RECEIVE DELAY
13	19	01	BAUD DELAY
14	20	00	ODT SPEC
15	21		RESERVED
16	22	B3	CODE SIZE
17	23	FF	CODE SIZE
18	24		RESERVED
19	25		RESERVED
1A	26	30 OR 31	DATACOMM PRESENT FLAG (30 = NOT, 31 = PRESENT)

(continued)

ADDRESS		EXAMPLE	COMMENT
HEX	DEC	VALUE	
1B	27		FILE NAME LENGTH (IF > 0, NAME USED)
1C	28		FILE NAME CHARACTER 1
1D	29		FILE NAME CHARACTER 2
1E	30		FILE NAME CHARACTER 3
1F	31		FILE NAME CHARACTER 4
20	32		FILE NAME CHARACTER 5
21	33		FILE NAME CHARACTER 6
22	34		FILE NAME CHARACTER 7
23	35		FILE NAME CHARACTER 8
24	36	01,03	PRIMARY PROGRAM LOAD SOURCE (1 = DISK, 3 = DATACOMM)
25	37	05 or 06	SECONDARY PROGRAM LOAD SOURCE (5 = YES, 6 = NO)
26	38	2A	FILE MESSAGE TAG (HEX 2A = "**")
27	39	EO	KEYBOARD ADDRESS
28	40	80	FEEDER ADDRESS
29	41	70	CARD READER ADDRESS
2A	42	01	BACKUP DEVICE ADDRESS
2B	43	0F	PRINTER ADDRESS
2C	44	03	CUSTOMIZER KEYBOARD ADDRESS
2D	45	50	TIME OF DAY CLOCK ADDRESS
2E	46	00	RESERVED
2F	47		RESERVED
30	48		RESERVED
31	49		RESERVED
33	51	01,02,04,05	CUSTOM FILE SOURCE (1 = DATACOMM, 2 = BACKUP, 4 = BACKUP + DEFAULT, 5 = DATACOMM+DEFAULT).
34	52	01,02,04,05	DEROG. FILE SOURCE (SEE 33)
35	53	00, 01	BACKUP DEVICE TYPE (0 = NONE, 1 = DISK)
36	54	01	AWAIT HOST RESPONSE DELAY
37	55	0A	AWAIT HOST RESPONSE RETRY LIMIT LOCATIONS 38 TO 1D5 ARE NOT USED
1D6	470		START OF OPTIONAL DISPLAY MESSAGE
1FB	507		END OF OPTIONAL DISPLAY MESSAGE
1FC	508		RESERVED
1FD	509		RESERVED
1FE	510		RESERVED
1FF	511		RESERVED
200	512	00 OR >0	OPTIONAL DISPLAY MESSAGE FLAG (OPTIONAL MESSAGE USED IF = 0).

HOST CONTROL OF THE RT 650

The Host can exercise control over an online capable RT 650 that is connected to it over a data communications link. Communication between the Host and RT is in the form of customizable messages which can be directives, requests for data, or responses to previous messages. The Host can use this message mechanism to perform a number of control functions at the discretion of the Institution.

These functions include :

- File transmission and storage
- Event sequencing
- Transaction data collection
- Audit data maintenance
- RT machine status monitoring
- Intermediate communication with customers
- Control of the State in which the RT operates.
- Manipulation of the RT hardware devices.

STAND-ALONE CAPABILITY

An RT 650 using the Offline Capable Application program can operate entirely independently, without reference to a Host system. This system requires no data communications links, and all the Host control functions described above are performed locally by the RT.

This stand-alone capability can be used to configure an RT 650 to operate online with offline backup. With this system, if either the Host or datacomm fail at any time, the RT 650 can continue operating entirely independently of the disabled Host system.



APPENDIX A

GLOSSARY OF TERMS

Application Software

Computer program that contains all the routines that enable an RT 650 to function as an Automatic Teller Machine.

ATM

Automatic Teller Machine.

Attendant

Person nominated by an Institution to attend and service the RT 650.

Backing/Backup Storage

Additional optional storage provided in the form of magnetic disks.

Bit

Representation of a binary digit as a basic element of storage.

Business Session

Period of time that elapses between detection of the presence of a customer and the time when the customer leaves the RT 650.

Byte

Set of binary digits that are considered as a single unit.

Card Reader

Optional peripheral device that reads data encoded on a Magnetic Stripe Card.

Currency Cassette

An easily transportable container used for loading currency notes into the safe.

Customer

A member of the public who is authorized by the Institution to use the RT 650.

Custom File

Data file containing information that defines the configuration and operation of the RT system.

Customizer

A computer program that is used to edit the contents of the Custom File.

Depository

Mechanism that provides a secure place in which deposits can be retained.

Dispenser System

Mechanism that holds and delivers currency notes to the customer.

Display Screen

Visual Display Unit that is visible through the fascia of the RT 650.

EAROM

Electrically Alterable Read-Only Memory

Fascia

The face of the RT 650 that is visible to a customer during normal operation.

Feeder

Component of the dispenser system that delivers currency notes from the currency cassette into the currency tray.

GAD

Group address.

Host

Computer system which communicates with the RT and transfers information. The Host system can control and monitor the operation of the RT 650.

Institution

The company or organization that has purchased or leased the RT 650.

Keyboard/customer Keyboard

Peripheral device in the machine fascia used to communicate data from a customer to the Application under normal operation.

Loader

Computer Program resident in Read Only Memory that controls loading of code files into Random Access Memory.

Main Derogatory File

Data file containing information that identifies invalid Magnetic Stripe Cards. The file is used when operating offline and its contents are maintained on backup storage.

Menu

Term given to a list of options that are available and displayed on the display screen.

Message

A logical collection of data used to communicate information between system components or transfer information between computer systems.

Mini-Derogatory File

Dynamic data file containing information that identifies invalid Magnetic Stripe Cards.

MSC

Magnetic Stripe Card.

MTR

Maintenance Test Routine.

OBS

Offline Bank Service.

Offline

Not under direct Host control; operating in an independent mode.

Offline Capable System

An RT system that is capable of operating in Online mode or Offline mode.

Online

Under direct Host control; the Host is responsible for event sequencing.

Online Only System

An RT system that can only operate in Online mode.

Operator

Individual using the RT 650.

PIN

Personal Identification Number.

RAM

Random Access Memory.

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ROM

Read Only Memory.

RT

Remote Teller.

SIO

Serial Input/Output.

Software Servicing Procedures

The Application program routines that are available to perform machine servicing.

SYN Character

Synchronization character used in the data communications protocol.

System

Collection of integrated components that perform a logical function.

Track 2

Track 2 of a Magnetic Stripe Card containing data which can be read by an RT 650 ATM.

Track 3

Track 3 of a Magnetic Stripe Card used for encoding data according to Burroughs Track 3 Format B specifications. Data can be read from or written to Track 3.

Transaction

An element of the set of bank services that are available to a customer.

Transaction File

Data file containing details of all transactions that have been executed while the RT is operating offline.

Transaction Printer without Audit Trail

Peripheral device used primarily to provide the customer with a receipt and to record the transactions that have taken place during a business session.

Transaction Printer with Audit Trail

Peripheral device used to provide the customer with a receipt and the Institution with a hard copy of the transactions that have taken place during a business session.