

ALL PURPOSE
TERMINAL

APT USER'S MANUAL



RCA

The RCA APT All-Purpose Terminal



USER'S MANUAL

Trademark(s) * Registered Marca(s) Registrada(s) Information furnished by RCA is believed to be accurate and reliable. However, no responsibility is assumed by RCA for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of RCA.

Printed in U.S.A./12-83

APT-302 9220 001
Optional User Price \$10.00

An Important Note About Product Safety

This terminal is to be connected only as described herein. Use only the Power Converter supplied with this unit. When the unit is installed with an antenna, use only the supplied Antenna Isolation Switch. The Power Converter and Antenna Isolation Switch are designed with important safety features that may not be designed into similar devices from other manufacturers.

Do not expose the Power Converter to moisture or excessive heat.

Repairs, Adjustments and Alterations

Do not attempt to repair, adjust or alter this product in any way. All repairs must be made by RCA or its authorized agents. Repairs, adjustments or alterations will invalidate the FCC Registration on this device for FCC Rules, Part 68, and may cause excessive radio interference or higher than acceptable RF output levels in violation of FCC Rules, Part 15.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart H and J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the equipment with respect to the receiver
- Move the equipment away from the receiver
- Plug the equipment into a different outlet.

(So that computer and receiver are on different branch circuits).

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No.004-000-00345-4.

CONGRATULATIONS for selecting RCA's APT for your data communications needs.

This professional terminal is designed to service a wide variety of data communications applications in business, industry and education. It is suitable for personal use in the office and home as well.

The APT is easy to operate for casual data base use, yet it is powerful enough to serve the needs of the computer professional. Comparing features to price, the APT is an exceptional value.

APT USER'S MANUAL — TABLE OF CONTENTS

The APT User's Manual — Contents And Use	v
Some Useful Information For Data Base Beginners	ix
CHAPTER 1 — INTRODUCTION TO THE APT	1
Features and Uses	1
CHAPTER 2 — INSTALLATION	5
The APT Terminal - Parts List	6
Knowing The APT - Physical Features	7
Connection To A Monitor	8
Connection To A TV Set	9
Connection To The Telephone Line	13
CHAPTER 3 — THE MODEM MODE - A TUTORIAL	17
CHAPTER 4 — MENU SELECTIONS	33
Using the Menus	33
MAIN MENU	35
1 EDIT DIRECTORY INFORMATION	36
2 SYSTEM CONFIGURATION	44
3 TERMINAL COMMUNICATIONS	69
4 KEYBOARD DIAL	72
CHAPTER 5 — SPECIAL FEATURES	75
Memory Backup	75
Terminal Security	76
Special Key Sequences	77
Acoustic Coupler Interface	78
CHAPTER 6 — USING THE APT WITH A PRINTER	79
Using The APT As An Electronic Typewriter	80
The Printer Port	81
CHAPTER 7 — THE DIRECT MODE	87
CHAPTER 8 — APT CONTROL COMMANDS	97

APPENDICIES

A. Specifications	113
B. Control Command Format - Summary	117
C. APT Keypress/ASCII Character Output	121
D. ASCII Code Table	125
E. Character Bit Maps	127
F. Graphics Characters	131
G. ASCII Character Equivalent Count, Row & Column	137
H. Data Word Format	141

GLOSSARY

143

INDEX

149

THE APT USER'S MANUAL — CONTENTS AND USE

This manual will help you derive maximum benefit from your APT. It is both a reference source and a tutorial.

If data base access, time sharing and computers are new to you, the hints presented on the last page of this introduction and the glossary in the back of this manual may be particularly useful.

Install your APT as described in Chapter 2.

A non-technical tutorial in Chapter 3 helps you get the APT "on-line" quickly. In doing so, you will utilize some of the APT's user friendly menus. Chapter 4 provides details on these and all other APT menu selections.

Chapters 6, 7 and 8 provide technical information you will find valuable for enhanced use of the APT, and, depending on your application, can be covered as needed. These chapters and the appendices provide a reference resource for system designers and programmers, but are written to be understood by those with minimal computer expertise.

The chapters in this manual and their contents are:

Chapter 1 — Introduction to the APT

Brief descriptions of the many APT features are presented in this chapter to familiarize you with the capabilities of the APT.

Chapter 2 — Installation

The installation of your APT for use in the telephone-connected, MODEM mode with a standard monitor or TV set as a display is covered.

Chapter 3 — The MODEM Mode

This chapter is a step by step tutorial showing you how to get started using the APT for data base access and timesharing.

Chapter 4 — Menu Selections

A comprehensive discussion of each menu selection is presented. A menu numbering convention helps locate menu selections quickly and easily. This chapter is a reference source but should be read completely. Many useful, subtle features of the APT are presented in this chapter.

Chapter 5 — Special Features

APT features that are not discussed as part of Menu Selections, Chapter 4, are presented here — such as special key sequences, memory back-up, terminal security and the acoustic coupler interface.

Chapter 6 — Using the APT with a Printer

The use of a printer with the APT is discussed in this chapter.

Chapter 7 — The DIRECT Mode

Connecting directly to a computer or other equipment through the APT RS-232C interface connector is discussed.

Chapter 8 — APT Control Commands

A discussion of each of the 39 definable APT control commands appears in this chapter.

Appendices

The appendices include additional reference information — ASCII codes, specifications, graphics tables, etc.

Glossary

Definitions of the terms used in this manual and other terms frequently used in telecommunications are included.

Index

The index is an alphabetical list of the terms and “How-To” phrases and where they can be found in this manual.

Menu Tree

A Menu Tree showing the interrelationship of the APT menus is provided with the APT on a separate sheet.

SOME USEFUL INFORMATION FOR DATA BASE BEGINNERS

If you are new to the computing and timesharing world, read the following hints. They may prove helpful and avoid some confusion while you are trying to become familiar with computer jargon.

** **ESCAPE** , **BREAK** , **CONTROL** , **SHIFT** and **RETURN** are keyboard keys with special functions. You will see them referred to in this manual and in the manual for your data base. Use the appropriate key when instructed to do so — typing in the word will not work. In text, **ESCAPE** can be abbreviated EC or ESC.

** **SHIFT** and **CONTROL** are always used with another key. If you see **CONTROL F1** , as you will in this manual, it means —press and hold **CONTROL** and then press key **F1** . This instruction is commonly written CTRL/F1. **SHIFT** is used in the same manner.

** A control command, **CONTROL C** for example, is usually displayed ^C.

** When using a data base or timesharing network, most of your data inputs are followed by **RETURN** .

** Many programs and data bases prompt the user to press ENTER, others RETURN, and some CARRIAGE RETURN. Use the **RETURN** key for all three.

** The letter O and the number 0 (zero) can be easily confused. The number zero is frequently written with a slash through it, Ø. Some data displays and texts use shape to distinguish between the O and the 0 (zero), as in this text.

** Lower case l (el) cannot be used for the number 1 in computing as it can be in typing.

** Some data bases allow **DELETE** or **BACKSPACE** to correct an entry error.

** Frequent errors in your data may be caused by poor telephone line transmission. Terminate the session and try again.

** Read the information provided with your data base service if you have problems using the data base. Don't be timid most systems are friendly and forgiving.

CHAPTER 1 — INTRODUCTION TO THE RCA APT

Features And Uses

The APT is designed for multi-data base timesharing and dedicated, direct computer connected applications. With a simple connection to your existing telephone line, the APT can give you immediate access to information sources like CompuServe, Dow Jones News/Retrieval Service and countless other public and private data bases. With the APT, you don't have to be a computer whiz to get information from them. It's as easy as using an autodialer. A single keypress can dial a stored number, adjust the terminal's "personality" to match the data base host computer, send the logon sequence to the host computer, and return terminal control to the user.

To give you some ideas as to the many possible uses of the APT, the following is a list of features.

**** Menu-Controlled Operation**

For easy selection of the many functions available with the APT including telephone directory maintenance and terminal setup.

**** Programmable "Personality"**

A terminal "personality" that you preprogram into the APT matches specific communications requirements automatically when a Data Base is dialed or when directly connected to a computer. Up to 9 personalities programmable. A commonly used "default" personality is built-in.

**** Built-In Direct Connect Modem**

A built-in, direct-connect 300-baud modem with originate and answer modes plus auto-answer.

**** Auto Dial**

The auto dial feature gives you tone or pulse dialing of up to 26 stored telephone numbers for voice or data base calls.

**** Manual Dial**

Enter numbers from the keyboard. Convenient for dialing numbers not programmed into the directory. Terminal remembers the last number you dialed.

**** Memory Backup**

This feature allows you to carry the APT anywhere without losing directory information, log-on sequences and terminal parameters. It has a minimum 48 hours backup without plug-in power — No batteries required!

**** Auto Logon**

The APT can be programmed to enter logon sequences automatically after auto dialing.

**** RS-232C Port**

Allows APT to be used as a primary or remote terminal for your personal and business computer. The APT can also provide communications from your computer to timesharing data bases. High speed modems and other devices may also be connected to the RS-232C port.

**** Printer Port**

Centronics-type parallel output for hard copy. Allows the APT to be used as a printing terminal. Includes a display page dump feature.

**** Smooth Scroll Display**

Optimum readability at 110 and 300-baud data rates. Easy on the eyes. Allows you to read text as it is transmitted without interruption.

**** Function Keys**

One keypress can send a multiple character sequence to the host computer. User programmable or downloadable from host.

**** Two User Keys**

For controlling printer or other terminal operating modes.

**** Auto Repeat**

A key pressed and held for more than 1 second will automatically repeat at the rate of approximately 15 characters per second.

**** Numeric Keypad**

For easy entry of numeric data.

**** 80 and 40 Character Display Formats**

The APT can display 80 characters per line on any standard monitor making the display compatible with most business applications, or 40 characters per line on any standard TV set or monitor.

**** Graphics Mode**

The APT has a 2x3 block character graphics mode for creating forms and other display graphics.

**** Built-In Speaker**

Provides aural keypress feedback and allows monitoring of telephone line audio. Fingertip adjustable volume control.

**** Password Protection**

Can prevent unauthorized access to designated directory entries. In addition, a system password can be assigned to prevent unauthorized viewing of directory entry information.

**** Status Line**

24th line can be selected as a non-scrolling terminal status line. Displays telephone status, printer status, on-line status and current user key function.

**** Display Screen Protection**

Display output automatically blanks off after ten minutes of inactivity to reduce possibility of screen burn. A key touch instantly restores the display unchanged. This feature can be disabled if a continuous display is desirable.

**** LED Indicator**

Signals "carrier detect" when making a data call, or "clear to send" when terminal is connected directly to a computer.

**** Low Profile Case**

Small, rugged and portable but with a full size keyboard. Suitable for a wide range of applications.

**** Channel 3/Channel 4, VHF Output**

Built-in RF modulator connects to a standard TV set. Your APT can be carried with you and used anywhere a TV set is available. Cable and antenna switch supplied. Channel selection by menu choice.

**** Video Output**

Connects to any standard monitor, such as RCA VP-3012D Data Display Monitor. Cable and connector adaptor supplied.

**** Single Line/Multi-Line Switch**

Allow the APT to be used on multi-line pushbutton phones commonly found in offices as well as using the APT on normal single line phones.

**** Acoustic Coupler Input**

The APT can be acoustically coupled to a time sharing data base where direct connection to a telephone line is impractical such as older installations, public telephones, hotels and certain business phones.

**** Versatile Communications Support**

The APT supports full and half duplex, handshaking, selectable parity, stop and data bits, and selectable baud rates — 110 and 300 in the MODEM mode and 110 through 9600 in the DIRECT computer connected mode through the RS-232C port.

CHAPTER 2 — INSTALLATION

The RCA APT uses ordinary telephone lines for data communications with a host computer and a standard video monitor or an ordinary TV set for information display. Either an 80 or a 40 character per line display can be selected when used with a monitor. A 40 character per line display is used with a TV set. The APT includes an RF modulator and an antenna isolation switch to enable connection to the antenna terminals of an ordinary TV.

The Federal Communications Commission (FCC) regulates certain aspects of television and telephone interfacing devices under FCC Rules Part 15 and Part 68. It is therefore important that these instructions for installation be strictly followed.

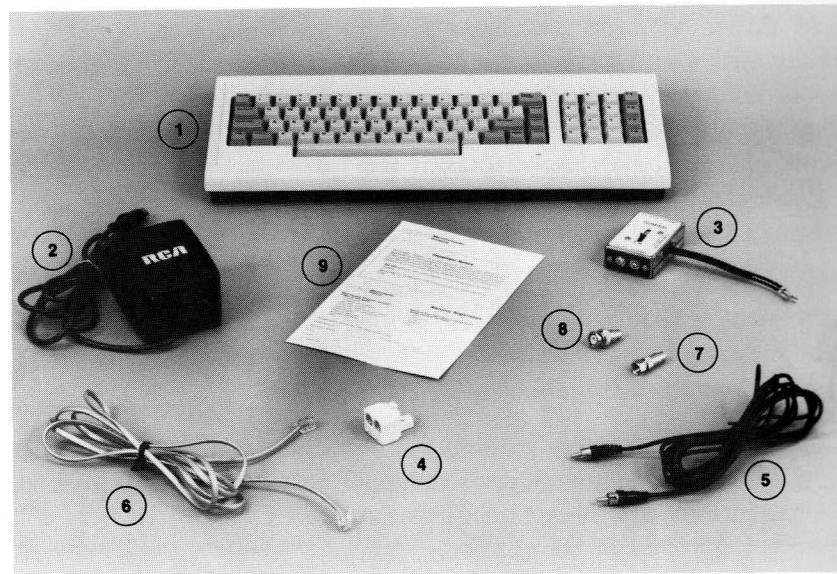
CAUTION: Connection of the APT other than described herein may violate certain FCC regulations.

During installation, utilize the parts list and pictures of the APT on the following pages. Once you have identified all the parts, proceed to Connection To A Monitor, Page 8 or Connection To A TV Set, Page 9. Connection to a monitor requires no tools. A small screw driver is the only tool necessary for connection of the APT and Antenna Isolation Switch to the antenna leads of a TV. Only after you are certain that the connections are made correctly and that the monitor or TV is operating properly should you proceed to Connection To The Telephone.

For direct connection to a computer or other equipment through the RS-232C interface, see Chapter 7, The DIRECT Mode.

For connections to a printer, see Chapter 6, Using The APT With A Printer.

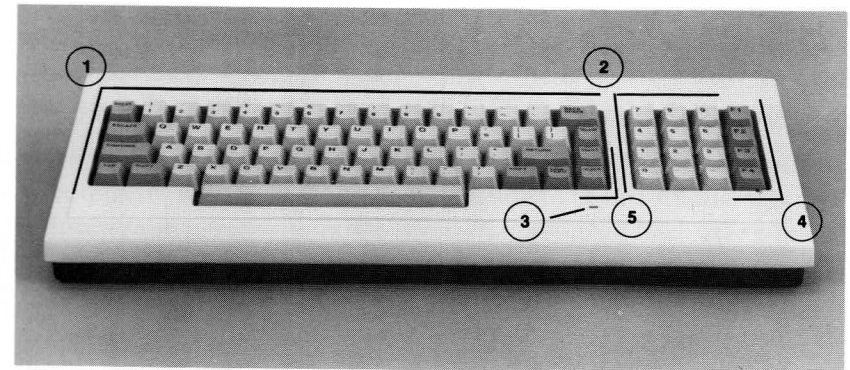
The APT Terminal



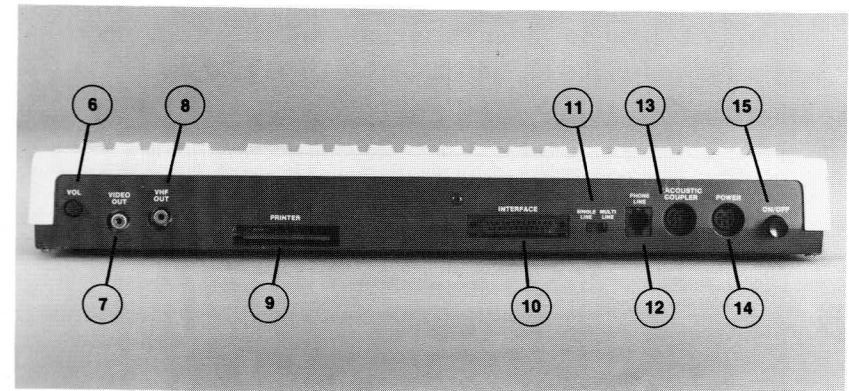
Parts List

1. APT with Built-in Modem
2. Power Converter
3. Antenna Isolation Switch
4. Modular Telephone "T" Adapter
5. Video Cable — RCA Phono to RCA Phono
6. Telephone Cable
7. RCA Phono to "F" Adapter
8. RCA Phono to BNC Adapter
9. Warranty Card
10. User Manual (You're reading it.)

Knowing The APT — Physical Features



- | | |
|---|------------------|
| 1. Alpha-numeric Keypad | 4. Function Keys |
| 2. Numeric Keypad | 5. User Keys |
| 3. Carrier Detect/Clear to Send Indicator | |



- | | |
|--------------------------|--------------------------------|
| 6. Volumn Control | 11. Single/Multi Line Switch |
| 7. Video Output | 12. Telephone Jack |
| 8. VHF Output | 13. Acoustic Coupler Interface |
| 9. Parallel Printer Port | 14. Power Input Jack |
| 10. RS-232C Interface | 15. Power On/Off Switch |

Connection To A Monitor

A monitor should be used for the 80 character per line display mode. The RCA VP-3012D, a high performance, green screen, Data Display Monitor, is excellent for this purpose. If you have not already purchased a VP-3012D, see your dealer for details.

To connect to the monitor, insert one end of the Video Cable in the output labeled VIDEO on the rear of the APT. Connect the opposite end to a standard monitor having a 75 ohm input. An adapter may be required to match the connector on the monitor. An RCA Phono to BNC Adapter and an RCA Phono to "F" Adapter are provided for this purpose. Other adapters, available at electronic specialty stores, may be required.

Connection To A TV Set

The APT is equipped with an RF modulator which allows the video information generated to be displayed on Channel 3 or Channel 4 of a standard black and white or color television receiver by connecting to the television's antenna terminals through an isolation switch.

An Antenna Isolation Switch is provided with the APT. (See Page 6 for identification). It does two things — it isolates your TV antenna from the data terminal's RF signal — and it allows you to select either the terminal or your antenna as input to your television set.

IMPORTANT NOTICE

Before you make the antenna connections, read this important word of caution.

The APT has been FCC approved as a TV interface device. Please follow antenna connection instructions carefully. If you connect the output of the modulator directly to an antenna or make parallel antenna and modulator output connections at the antenna terminal of your TV, it may broadcast a signal. Broadcasting an unauthorized signal could violate certain regulations of the Federal Communications Commission regarding the operation of TV interface devices. Please check and recheck your connections against those in the diagrams that follow.

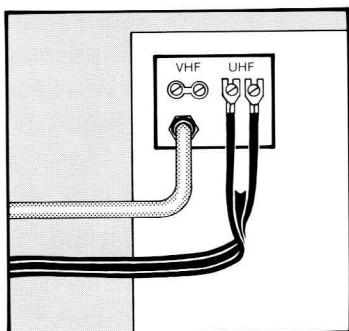
If you do not wish to receive normal TV broadcasts on the television set that is being used for data display, follow the installation instructions in GUIDE 1, on Page 11.

If normal TV reception is desired, review the antenna connections on Page 10. Then use GUIDE 2, 3 or 4, depending upon your present antenna connection configuration, to help you determine the best connection hookup for your particular television and antenna combination.

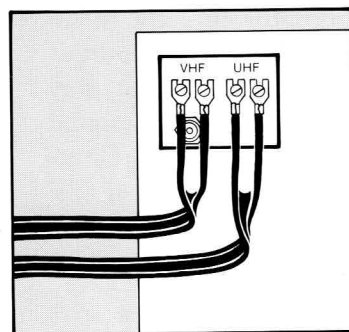
NOTE: Standard television sets are only suitable for the 40 character per line display mode of the APT. For 80 or 40 character per line use a video monitor. See Connection To A Monitor, Page 8.

Antenna Connections

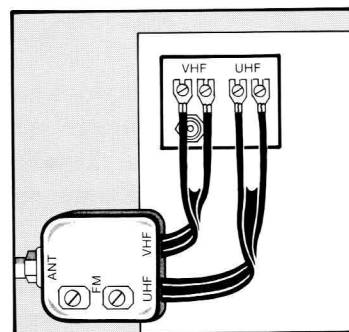
If you wish to receive normal TV broadcasts, compare the antenna connections on the back of your TV set with the following diagrams to determine which of the installation guides shown on Pages 11 and 12, applies.



If your outside VHF antenna is connected to your TV set with a 75-ohm (round) cable: follow GUIDE 2.

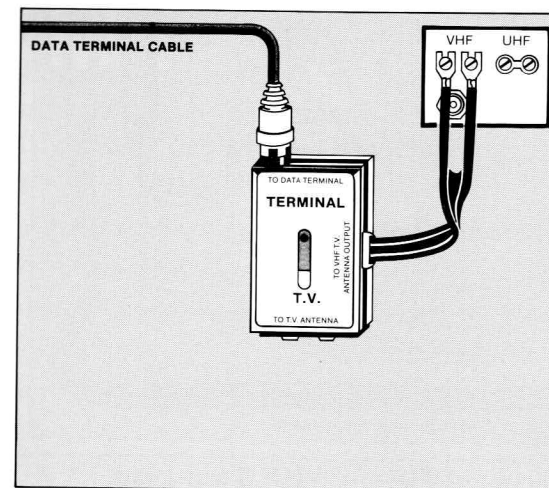


If your outside OR indoor antenna is connected to your TV set with a 300-ohm (flat) twin lead cable: follow GUIDE 3.

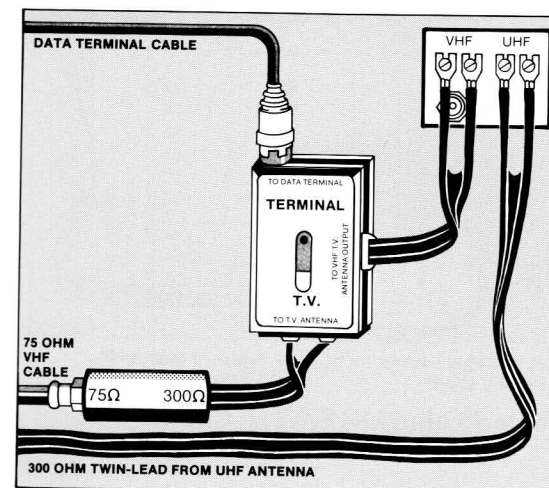


If your outside antenna uses a Signal Splitter to provide VHF and UHF inputs from a 75-ohm (round) cable to the 300-ohm terminals of your TV set: follow GUIDE 4.

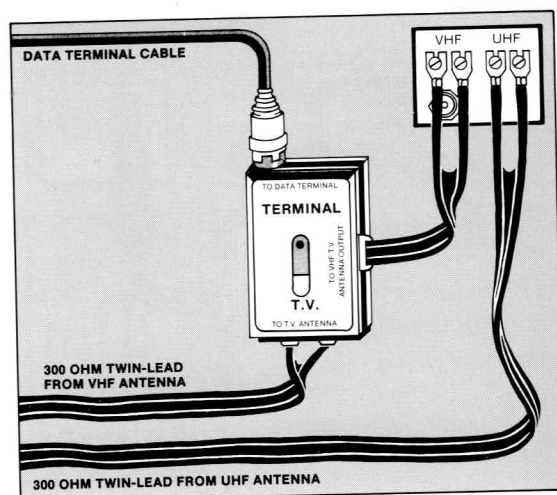
Installation Guides



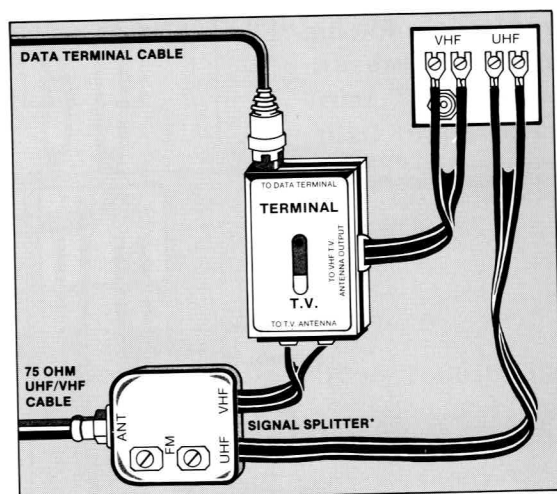
GUIDE 1: Data Terminal Only — No reception of television broadcasts. The APT Video Cable may be connected as shown or may be connected directly to the 75-ohm "F" connector input of the TV set using the adapter provided.



GUIDE 2: 300 ohm UHF Twin-Lead, 75 ohm VHF Cable.



GUIDE 3: 300 ohm UHF and VHF Twin-Lead.



* Not provided - available from TV dealer or electronic specialty shop.

GUIDE 4: Single 75 ohm UHF/VHF Cable.

Connection To The Telephone Line

IMPORTANT NOTICE

Before connecting the APT to the phone lines, you must notify your local telephone company of the following:

FCC Number: AHG9WR-11447-DT-E

Ringer Equivalence Number: 0.7 B

This information also appears on the label affixed to the bottom of the terminal.

The terminal must not be connected to coin operated phones or party line phones.

Notify the telephone company upon disconnection from phone lines.

The APT plugs directly into a modular, wall-mounted phone jack or into the rear of a telephone, using the modular "T" adapter provided. The APT features an audio monitor which allows you to listen to the telephone line audio. You cannot talk over the telephone line using the APT alone. To do so requires the use of a standard telephone set. The APT can serve as an intelligent auto-dialer for voice calls when used with a telephone. A telephone is not required for making data calls.

If you do not have modular connections (See Figure 1), you have these options:

1. Contact your telephone company to have modular phone jacks installed.
2. If your phone has a four prong plug and jack at the wall outlet, purchase a four prong to modular adapter from your telephone company or from an electronics specialty store.
3. Purchase RCA's optional Acoustic Coupler, VP-3001AC. This will allow you to use the handset of a standard telephone and requires no direct connection to the phone lines.

NOTE: The APT will not auto dial if the Acoustic Coupler is used. The APT senses the presence of the Acoustic Coupler and prompts manual dialing. All other APT functions, including auto logon, are available.

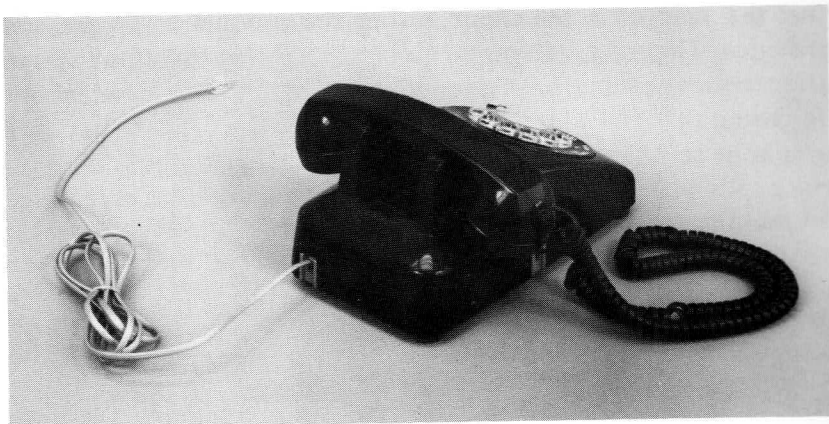


Figure 1 — Modular-Plug Telephone

To connect the APT to the telephone:

1. Plug the Telephone Cable into the back of the terminal at the location labeled **PHONE**.
2. Remove the phone cord with its modular connector from the back of the phone by depressing the tab on the connector and gently pulling outward.

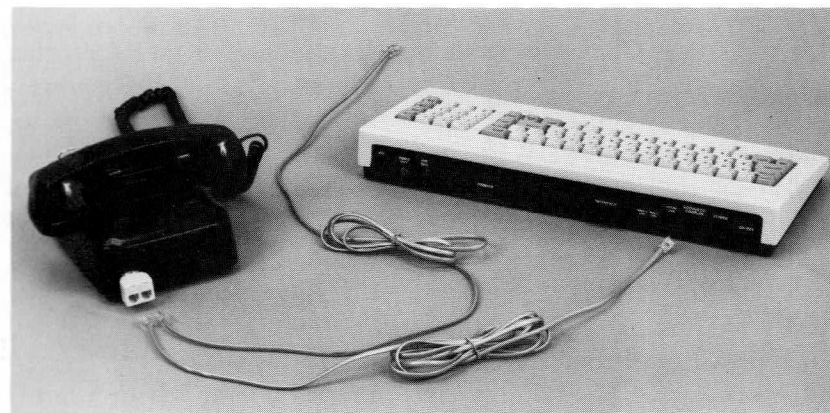


Figure 2 — Terminal/Telephone Connections

3. Insert the "T" Adapter.
4. Insert the telephone cord modular connector in one side of the "T" Adapter and the Telephone Cable modular connector in the other.
5. If you are using the APT on a single line telephone be sure the switch on the rear of the APT is in the **SINGLE LINE** position. If you are using a multiple line push button phone place the switch in the **MULTI-LINE** position. If in doubt, leave it in the **SINGLE LINE** position.

If voice calls are not required, the telephone cable may be plugged directly from the terminal to a wall-mounted phone jack. A telephone is not required for data calls.

NOTE: When not in use, the APT can remain connected to the telephone line. It will not interfere with normal telephone operation.

Checking The Connections When Using A Television For Display

The APT POWER ON/OFF switch should be in the OFF (out) position. Connect one end of the Video Cable to the jack labeled VHF OUT on the rear of the data terminal. Be sure the other end of this cable is attached to the Antenna Isolation Switch Box and that the switch is in the TERMINAL position. (For normal television broadcast reception this switch must be in the TV position).

Plug the Power Converter cable into jack labeled POWER on the rear of the APT. Plug the Power Converter into a 110 V, 60 Hz power outlet. Use only 110 VAC 60 Hz. Turn the TV set on and tune to Channel 3. Push the POWER switch in. The APT MAIN MENU display will appear. Fine tune the TV set if required. Note the quality of the characters displayed. If the picture is not satisfactory, try Channel 4. Select Channel 4 from the DISPLAY SCREEN AND KEYBOARD MENU (See Chapter 4, Menu Selections) and tune the TV to Channel 4. Allow the setting to remain on the Channel which provides the best quality picture.

CHANGES IN TELEPHONE COMPANY FACILITIES, EQUIPMENT, OPERATION OR PROCEDURES. The telephone company may make changes in its communications facilities, equipment, operations or procedures, where such action is reasonably required in the operation of its businesses and is not inconsistent with the rules and regulations of Part 68 of the FCC Rules and Regulations. If such changes can be reasonably expected to render any customer's terminal equipment incompatible with the telephone company communication facilities, or otherwise materially affect its use or performance, the customer shall be given adequate notice in writing to allow the customer an opportunity to maintain uninterrupted service.

CHAPTER 3 — THE MODEM MODE - A Tutorial

Operating The APT In The Telephone-Connected MODEM Mode

The combination of a built-in modem, automatic dialing and automatic logon make the APT ideally suited for data base access and timesharing applications. The MODEM mode refers to APT communication to remote computers using telephone lines as the transmission medium. This chapter is an introduction to programming the APT for this purpose. It is a step by step tutorial. More detailed reference information for each menu selection is available in Chapter 4, Menu Selections.

The operation of the APT is centered around the MAIN MENU which is displayed when your terminal is first powered on.

A "Menu Tree", showing the APT menus and their interrelationship, has been provided with your APT. This would be a good time to look it over.

The use of the Menu Tree and this manual will help you in the beginning. As you become more familiar with the operation of the APT, the self-prompting menus on your display will provide the information necessary to effectively use the APT.

The following tutorial is intended to get you "on-line" quickly with a computer information network data base — probably the most used application of the APT.

We will use CompuServe Information Service* as the example for our tutorial. The procedure presented is similar to that used with other services.

* CompuServe Information Service and CompuServe are registered trademarks of CompuServe Incorporated, an H & R Block Company.

Step 1. — Power On

Turn the power on. You will see the following header briefly:



```
RCA APT VER X.X  
(C) 1983 RCA CORP
```

NOTE: X.X represents the operating system software version resident in your APT. RCA reserves the right to change, modify or improve this operating system in subsequent production without prior notice to its customers.

The MAIN MENU will be displayed when the APT is in a “ready” state. This menu will be the directory of names of data base and voice numbers. Now the directory is blank since you have not yet stored any entries. Four menu selections which take you to other menus are shown below the directory.

MAIN MENU

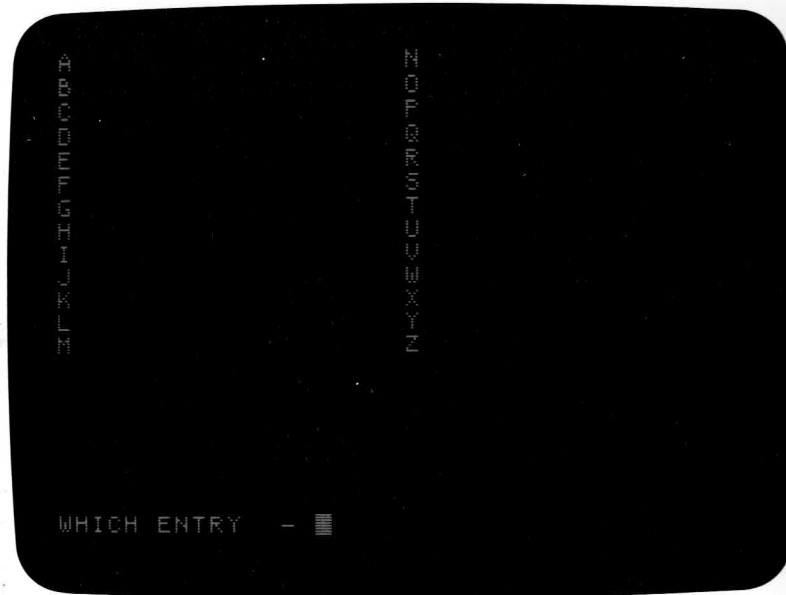


```
A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
  
N  
O  
P  
Q  
R  
S  
T  
U  
V  
W  
X  
Y  
Z  
  
1 - EDIT DIRECTORY INFORMATION  
2 - SYSTEM CONFIGURATION  
3 - TERMINAL COMMUNICATIONS  
4 - KEYBOARD DIAL
```

ENTER CHOICE - ■

Step 2. — Editing the Directory

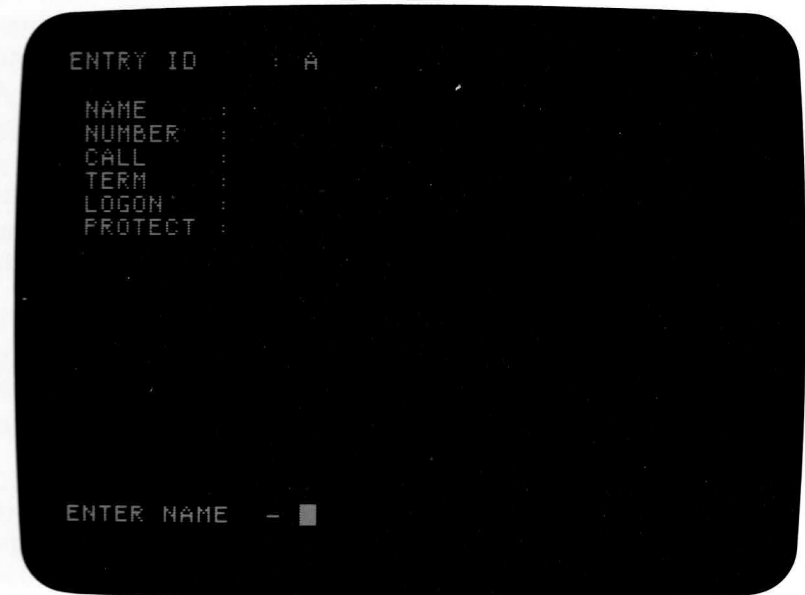
Press the **1** key, **EDIT DIRECTORY INFORMATION**. You will not need to press the **RETURN** key for menu selections. You will see the following display:



WHICH ENTRY requests the letter where the directory entry will reside. Once this choice is made and the entry is programmed, you will only need to press the corresponding letter to automatically dial the number indicated by the directory name. As we will show later, this keypress will also automatically adjust terminal parameters and input information such as your identification number and your password for the particular service you are using. For the purpose of this tutorial, press **A**.

Step 3. — Entering Directory Data

After selecting A, you will see the following display:



ENTRY ID will have an A after it indicating your selection in the last step. Note that the cursor next to the text near the bottom of the screen is asking you to **ENTER NAME**. This is the name that will go into the directory to represent the number you want to call. (Note: If you plan to use most of the 26 directory selections, you should make the names as brief as possible to conserve memory. More on this later.) For this tutorial, type in "COMPUSERVE" and then press **RETURN**. **COMPUSERVE** will appear next to **NAME** on the top part of the screen.

The APT requests **ENTER NUMBER**. Enter the local CompuServe or Tymnet telephone number and press **RETURN**. If you do not have a local number, find out the nearest long distance number. You may enter the number just as you would dial it or you may use **-** or **SPACE** as separators in the number. The APT ignores these separators. If you use access numbers requiring pauses, a 2 second pause may be included by entering a **,** (comma) in the sequence. A 5 second pause may be included by entering a **.** (period). Entry may be up to 63 characters long including pauses. When the phone number entry is complete, press **RETURN**. Note that the telephone number appears next to **NUMBER** on the screen. Complete details of phone number entries and the options available appear in **EDIT DIRECTORY INFORMATION**, in Chapter 4.

If you make a mistakes in entering the name or number, you will be given an opportunity to correct them later. The **BACKSPACE** key may be used, before pressing **RETURN**, for making corrections. Delete may be used to clear the entry for retyping.

The APT prompts **CALL TYPE (V/D)?**, asking if this will be a **VOICE** or **DATA** call. You will be calling CompuServe, a data base. Respond by pressing **D**. The word **DATA** will now appear next to **CALL** on the screen.

You are ask to select **TERMINAL TYPE (0-9)?**. "Terminal Type" details will be covered in later sections. The selected terminal type defines the **COMMUNICATIONS SET-UP**, the **CONTROL COMMAND DEFINITION**, and the **SCREEN AND KEYBOARD SET-UP**. Simply put, these are the controlling parameters that define how the APT will communicate to the host computer and respond to its commands. In our tutorial, you will use the personality which is called the "DEFAULT" terminal type. The definition of this terminal type is stored in memory in the APT at all times. Select **0**. The **DEFAULT** personality will be assigned to this directory entry. The **DEFAULT** terminal type will work with CompuServe and most other data base services.

The ability of the APT to assume a unique personality is a very powerful feature. Chapter 4 covers the details of menu selections that will enable you to define a terminal type and store it in memory to be recalled when needed.

The next request is **AUTO LOGON (Y/N)?**. Selecting **YES** will allow your APT to automatically logon. Press **Y**. After completion of this entry process you will automatically go to a display that will prompt you to program the auto logon sequence for this directory entry.

You will now be asked **PASSWORD PROTECT (Y/N)?**. Remember, your terminal has complete logon capability. It knows your phone numbers, I.D.'s, and security codes. Password protection can prevent unauthorized persons from accessing your personal data or running up charges on your data base account. For now you may not want password protection. Press **N**. You can later add this protection if you desire. Password protection is discussed in more detail in Chapter 4.

Your display should appear as follows:

```
ENTRY ID      : A

NAME      : COMPUERVE
NUMBER    : (TELEPHONE NUMBER)
CALL      : DATA
TERM      : 0  DEFAULT
LOGON     : YES
PROTECT   : NO

0 - DONE
1 - NAME
2 - NUMBER
3 - CALL TYPE
4 - TERMINAL TYPE
5 - AUTO LOGON
6 - PROTECTION
7 - DELETE ENTRY
8 - MODIFY LOGON

ENTER CHOICE - █
```

You are now given a chance to change entries in the event mistakes have been made. Do this by selecting the number corresponding to the item to be changed and enter the corrections. When all the entries are correct, press **0**.

You have selected AUTO LOGON and will see the following display:

```
F1 - WAIT FOR ANY CHARACTER
F2 - WAIT FOR NEXT CHARACTER
F3 - WAIT FOR 5 SECONDS
F4 - INVISIBLE
CTRL/F1 - END OF SEQUENCE

ENTER AUTO LOGON SEQUENCE

█
```

This display prompts you to enter an auto-logon sequence. Displayed are the functions that keys **F1** through **F4** assume during entry of a logon sequence. You will be instructed to enter the logon sequence for CompuServe. Once this sequence is entered correctly, whenever you call CompuServe, your identification number and password will be entered automatically. Complete logon programming details are covered in Chapter 4. For now, take our word that this sequence will work.

First check the information provided by CompuServe to find your user number and password. Also, check to see if the telephone number you entered is a CompuServe or a Tymnet number. Tymnet is a data network service available in many cities and is used to establish a data link to CompuServe and other data services. The logon sequence differs between direct or Tymnet access to CompuServe.

If you *are* using a CompuServe telephone number and *not* a Tymnet telephone number your logon entry should be as follows:

1. Press the **F3** key. (Telling the APT to pause for 5 seconds after a carrier is received).
2. Hold the **CONTROL** key down and at the same time press the **C** key. (Telling the APT to next send the "Control C" that CompuServe looks for to initialize).
3. Press **F2** . (Telling the APT to wait for the character to be defined in the next step before proceeding).
4. Press the **:** key. (The APT will wait for a ":" from CompuServe before entering the next series of characters).
5. Type in your identification number followed by **RETURN** . Your identification number is supplied by CompuServe.
6. Press the **F2** key and then the **:** key. (Waits for the CompuServe "PASSWORD:" request).
7. Type in your password, provided by CompuServe, and then press the **RETURN** key.

Your entry should look like this:

```
F1 - WAIT FOR ANY CHARACTER
F2 - WAIT FOR NEXT CHARACTER
F3 - WAIT FOR 5 SECONDS
F4 - INVISIBLE
CTRL/F1 - END OF SEQUENCE
```

```
ENTER AUTO LOGON SEQUENCE
```

```
F3^CF2:XXXXXX,XXXCrF2:YYYYYYCr
```

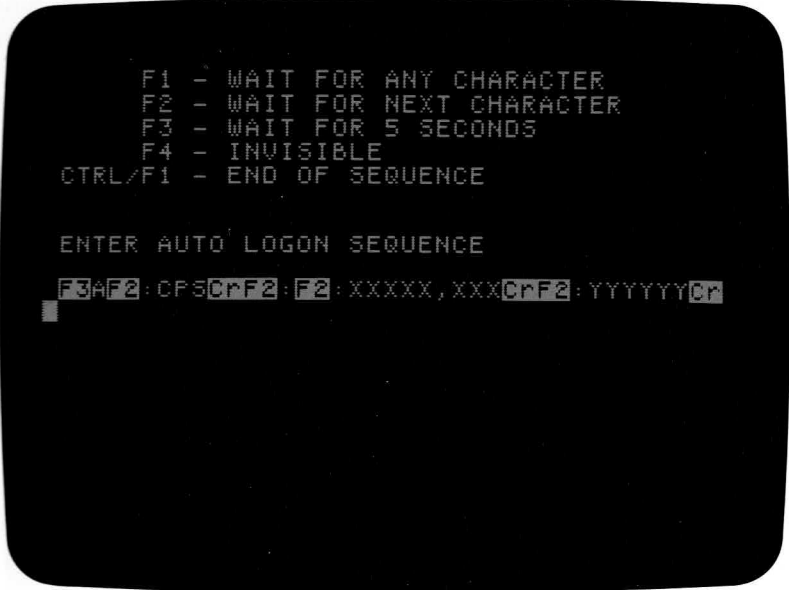
8. Now press **CONTROL** and at the same time press **F1** , terminating the logon sequence.

NOTE: XXXXX,XXX represents your identification number, and YYYYYY represents your password. Both are provided by CompuServe. They may have more or less characters than depicted above. Type them in exactly as provided without spaces.

If you *are* using a Tymnet telephone number and *not* a CompuServe telephone your logon entry should be as follows:

1. Press the **F3** key. (Telling the APT to pause 5 seconds after the carrier is received).
2. Press **A** . (Identifies the terminal to Tymnet).
3. Press the **F2** key. (Telling the APT to wait for the character to be defined in the next step before proceeding).
4. Press **:** . (The APT will wait for a ":" before proceeding).
5. Enter the characters **C P S** , followed by **RETURN** . (This will tell Tymnet you would like to communicate with CompuServe, abbreviated CPS).
6. Enter **F2** followed by **:** and again **F2** followed by **:** . (Waits once for a CompuServe message with a ":" in it and then for CompuServe password entry request which is terminated with a ":").
7. Type in your identification number followed by **RETURN** . Your identification number is supplied by CompuServe.
8. Press **F2** followed by **:** . (Waits for the CompuServe "PASSWORD:" request).
9. Type in your password, provided by CompuServe, followed by **RETURN** .

Your entry should look like this:



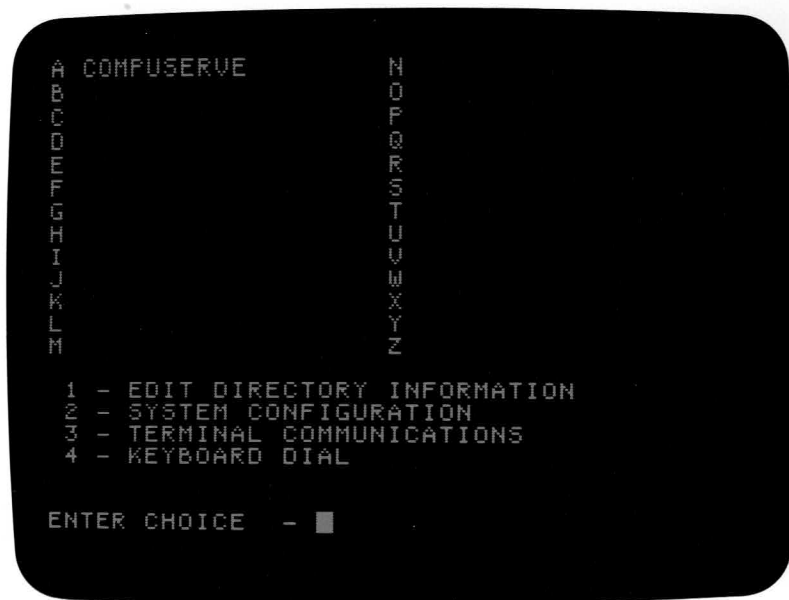
```
F1 - WAIT FOR ANY CHARACTER
F2 - WAIT FOR NEXT CHARACTER
F3 - WAIT FOR 5 SECONDS
F4 - INVISIBLE
CTRL/F1 - END OF SEQUENCE

ENTER AUTO LOGON SEQUENCE
F3AF2:CPSCrF2:F2:XXXXX,XXXCrF2:YYYYYYCr
```

11. Now press **CONTROL** and at the same time press **F1** , terminating the logon sequence.

NOTE: XXXXX,XXX represents your identification number, and YYYYYY represents your password. Both are provided by CompuServe. They may have more or less characters than depicted above. Type them in exactly as provided without spaces.

After pressing **CONTROL F1** , you will return to the MAIN MENU:



You are now ready to automatically dial and logon to a data base service by pressing one key. Check to see that the terminal is installed as described in Chapter 2. If the entry is correct and the installation right, press the **A** key. The APT will take care of the rest.

Try it !

While You Are On-Line . . .

Some features, available while you are on-line, should be pointed out at this time:

1. *Status Line* — When you initiate dialing you will notice the status line, at the bottom of the screen, displaying messages such as PHONE (meaning the APT has connected the phone line), DIALING, WAITING, LOGON, etc. Information on the right side of the STATUS LINE indicates the current function of the **USER1** and **USER2** keys. See Chapter 4 for more details on the status line and the use of the **USER1** and **USER2** keys.
2. *Returning To The MAIN MENU While On-Line* — While you are "ON-LINE" you may return to the MAIN MENU by pressing the **USER2** key (note the word MENU on the status line). You will be in the MENU mode enabling you to examine or change terminal parameters. Your communication link will be maintained by the APT. Return to the on-line mode by selecting **TERMINAL COMMUNICATIONS**, selection 3, on the MAIN MENU. Press **H** , ON-LINE.
3. *RESET* — If, at any time, you find yourself in a situation you don't know how to get out of — there is a way. Press and hold **SHIFT** and **CONTROL** and then **ESCAPE** . You will return to the MAIN MENU. The communication link will be terminated and the telephone line released. This RESET is equivalent to turning the APT power off and then back on again.

Returning To The MAIN MENU Once You Are Off-Line — When you logoff of your data base or if you loose the modem carrier signal from the host computer you will go off-line. The word **LINE** on the status line will change to the word **LOCAL**. The APT retains one display page of information after going off-line. To return to the MAIN MENU do a RESET as described above.

Setting Up the Directory for Voice Calls

Setting up the directory for voice communication calls is similar to setting up data calls. As you did before, select the letter to which the entry will be assigned. Enter the name and number. After entering the name and number, you will be asked for **CALL TYPE (V/D)**. Press **V** for "Voice". The next two menu items will be skipped since they pertain to data calls only. **PASSWORD PROTECT** is asked. For now, answer by pressing the **N** key. After completing these entries you are given a chance to make any corrections. If everything is all right, press the **0** key. You will return to the **MAIN MENU**.

The APT features a telephone audio monitor, however, a standard telephone is required for two way voice communication.

When the APT auto dials a voice call, you will hear the dialing and the telephone ring over the speaker. When the party being called answers, or anytime after dialing, pick-up the phone hand set, press any key to disconnect the terminal from the phone line and proceed with conversation. If there is no answer the ring will stop automatically after the time specified by **ANSWER DELAY** expires. See Chapter 4 for more information on **ANSWER DELAY**. If a busy signal is heard, simply press any key to terminate the call.

CHAPTER 4 — MENU SELECTIONS

The APT features user friendly menus enabling you to completely set up and save all directory entries, communications parameters and control commands. The use of these menus and menu selections are discussed in detail in this chapter. Menu selections are presented in sequential order beginning with the **MAIN MENU**.

Using The Menus

Menu Selection

Menu selections are made by pressing the number or letter corresponding to, and shown to the left of, the menu statement. A menu selection requires only a single keypress. You do not have to press **RETURN** except where information is entered, such as entering a directory name or telephone number.

Most menus offer the ability to return to the previous menu by pressing **0**, zero.

Entering Menu Requested Data

The entry of menu requested data, such as a directory name or telephone number, is terminated and stored in memory by pressing **RETURN**. However, **CONTROL F1** is required to terminate some entries — the auto logon sequence, for example. In these entries **RETURN** is a valid character that may be included in the entry. The menu will indicate if **CONTROL F1** is required.

Data entry may be edited, before terminating with **RETURN** or **CONTROL F1**, by using **BACKSPACE** to delete one character at a time or by using **DELETE** to delete all characters entered for a requested entry.

Menu Selection Number Convention

In this text, each menu selection is numbered according to the key sequence that is required to get to the selection from the MAIN MENU. For example, to change the SCREEN FORMAT you would press **2**, SYSTEM CONFIGURATION. Select **1**, SCREEN AND KEYBOARD SET-UP. And finally **1**, SCREEN FORMAT. Therefore, the reference number for SCREEN FORMAT 2.1.1.

Changing System Configuration Menu Values

Most system configuration set-up selections will have values (parameters) associated with them, either "default" values or other values previously assigned. To change a menu selection, choose the selection to be changed by using the key sequence required. The selection along with its current value will be displayed. The cursor will appear next to the menu selection to be changed. The function keys, **F1** and **F2**, are used to sequence through the choices available for a given menu selection. **F1** sequences through the choices as they are presented in the menu selection discussion in this chapter. **F2** sequences in the opposite direction — convenient where there are multiple choices. If there are only two choices, either **F1** or **F2** alternate between the choices.

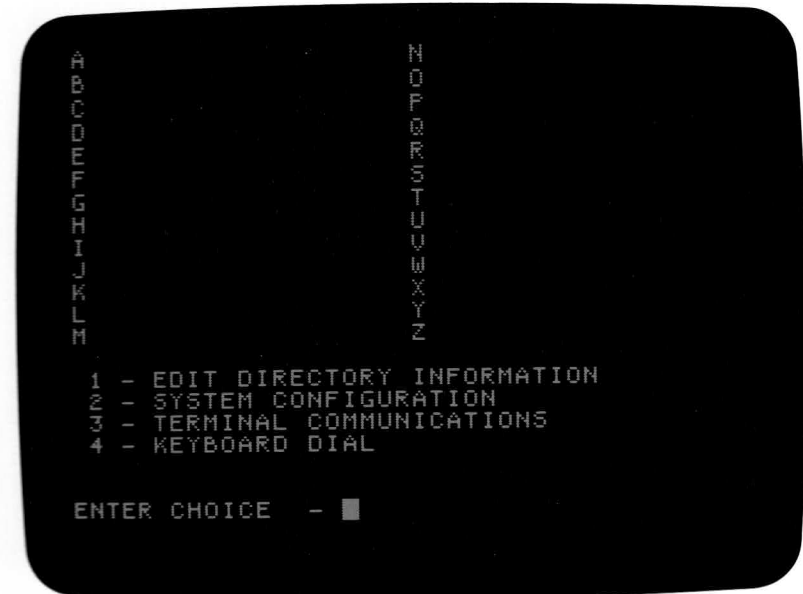
To lock-in the selected value, press **RETURN**, or the number of another menu selection. When **0** is pressed all values displayed will be saved as part of the current terminal personality.

Menu Selection Presentation In This Manual

Menu selections are presented in this manual by reference number and title followed by a list of available choices. The "default" value is the first value listed. The default value is the value assigned by the built-in default terminal type. The default values will work with many data bases.

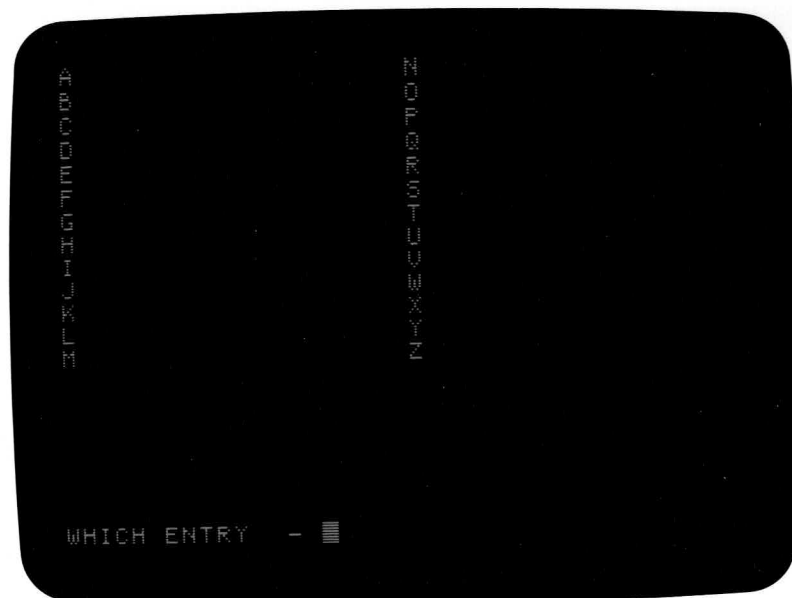
0. MAIN MENU

This is the operations center of the APT. The MAIN MENU will be displayed when the APT awaits your request.



1. EDIT DIRECTORY INFORMATION

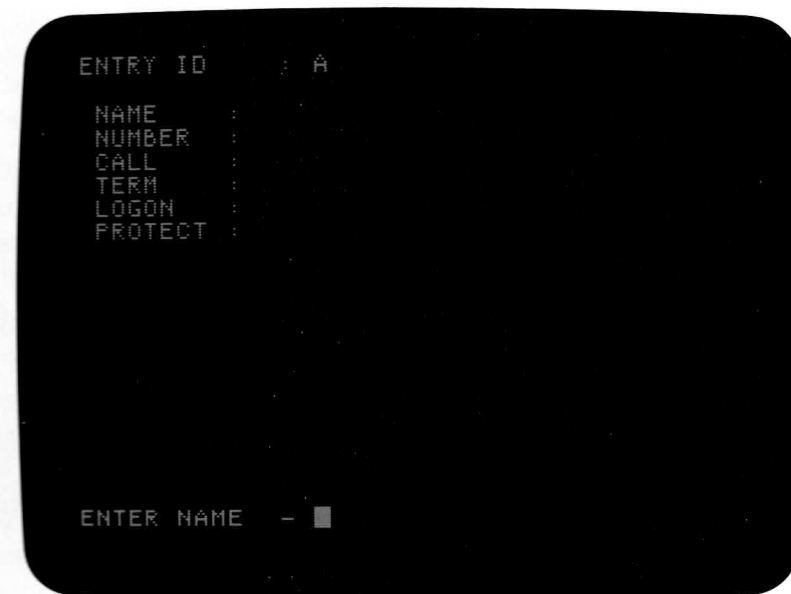
Selecting **EDIT DIRECTORY INFORMATION** from the **MAIN MENU** displays the following menu:



The directory entries, A through Z, are displayed. You are asked **WHICH ENTRY —** . To add a new name to the directory, select a letter corresponding to an unused directory entry.

To edit a previous entry, press the ID letter corresponding to the entry you wish to edit.

If you select an empty directory ID, **A** for example, the following menu will appear:



A discussion of each entry follows. If you make an entry mistake you are given a chance for correction after all entries are completed.

ENTER NAME — Asks for the name that will be assigned to the **ENTRY ID** letter you selected. Choose a name that identifies the number you are going to call — the name of a data base or a person, for example. Up to 15 characters are allowed. If you anticipate using most of the 26 directory selections, to conserve memory space, be conservative in the length of the names you choose.

When you have typed in the name, press **RETURN** . Your entry will appear next to **NAME** in the upper part of the screen.

ENTER NUMBER — Requests the telephone number to be dialed. The number may be for a data base or voice communication. Any valid telephone number sequence may be used.

Separators such as a — or a space may be used. They are ignored in the dialing sequence. The following characters are valid:

0 through 9 - the numbers to be dialed

, - a two second pause

. - a five second pause

/ - indefinite pause, waits for any keypress to continue

T or P - used to switch between tone and pulse dialing within a number sequence.

A - forces the APT into the answer mode rather than its normal originate mode. The answer carrier is put out immediately when A is encountered, therefore, this character is used only at the end of the dialing string.

Pauses are useful when access numbers are used in a telephone dialing sequence. The indefinite pause is used when telephone network switching delays cannot be predicted or for any other reason you would like to manually initiate the automatic dialing of a sequence of numbers. Pressing any key (except **SHIFT**, **CONTROL** or **USER**) will resume the dialing.

Switching between pulse and tone dialing allows you to use telephone network services, such as Sprint and MCI, from a pulse dialing phone system. The local network number may be dialed by pulse dialing. The APT, by encountering a T in the phone number sequence, will then switch to tone dialing (network services only accept tone dial). Tones then send the long distance telephone number and the user's access number to the network service. For more information on TONE and PULSE dialing see 2.7.2 of this chapter.

The APT, when communicating to a data base, normally uses an "originate" carrier. In some communication situations it is desirable to transmit an "answer" carrier even though the call originated from the APT. An example would be when communicating to another terminal or computer set up with an "originate" carrier. Using an A at the end of the dialing string allows the APT to be the "answer" device.

Up to 63 characters may be entered into the number sequence. If you are in the 40 characters per line display mode, only 29 characters will be displayed. The last digit will change as you enter the digits beyond the 29th. All digits beyond 29 and up to 63 are displayed when the APT is in the 80 characters per line mode.

Press **RETURN** after entering the telephone number sequence.

If the directory entry is for operation in the DIRECT mode, do not enter a phone number. The APT will automatically adjust its parameters to those required for the DIRECT computing session, skip over the dialing sequence and, if programmed to do so, output an AUTO LOGON string. See Chapter 7 for more details.

CALL TYPE (V/D)? — Asks if the call is to be a voice **V** call or a data **D** communication call. If a voice call is selected the two subsequent entries, **TERMINAL TYPE** and **AUTO LOGON**, are not appropriate and the APT will skip over them.

TERMINAL TYPE (0-9)? — Requests a number representing the terminal type to be assigned to this directory entry. A “terminal type” is the collection of parameters defining the behavior or “personality” of the APT when a directory entry is selected. You specify these parameters with choices listed under the **SYSTEM CONFIGURATION MENU** (covered later in this chapter). Zero, **0**, will select the default terminal type which has the values and selections originally found in the **COMMUNICATIONS SET-UP**, **CONTROL COMMAND DEFINITION**, and **SCREEN AND KEYBOARD SET-UP** under the **SYSTEM CONFIGURATION MENU**. The APT default terminal type will satisfy the communication and control command requirements for many data services.

A number other than the default value, representing a terminal type you have previously defined, may be assigned to this directory selection. The terminal type number you select along with the name will appear after **TERM** on the display. If the terminal type selected has not been defined the name **UNDEFINED** appears. You may later define a terminal type to the number entered and the parameters defined will be assigned to that entry without returning to this menu.

AUTO LOGON (Y/N)? — Select **Y**, YES, if this directory entry is to have automatic logon. If yes is selected you will have the opportunity to program a logon procedure after you answer all the directory entry menu questions. In the **MODEM** mode auto logon proceeds after the conclusion of auto dialing and a carrier is detected.

Commands for the host computer, such as the request for an applications program, may be included in the logon sequence.

In the **DIRECT** mode auto logon proceeds after selecting a directory entry and when the Clear to Send signal on the interface connector is true. See Chapter 7, The **DIRECT** Mode.

PASSWORD PROTECT (Y/N)? — Selecting **Y**, YES, allows you to set up a local, terminal password for this directory entry. If you select **Y**, you will then be asked to enter a password. Enter the password followed by **RETURN**. You will be asked to verify the password to be sure it is correct. Remember the password! You will not be able to select a password protected directory entry without it. Also, for security reasons, the directory entry information cannot be viewed, edited or deleted without it! If the password is forgotten the only way to delete this directory selection will be to do a **MEMORY DUMP RESET** that will completely clear the terminal's memory. To do this reset, turn the power off, press and hold the **USER1** and **USER2** keys simultaneously and then turn the power on again.

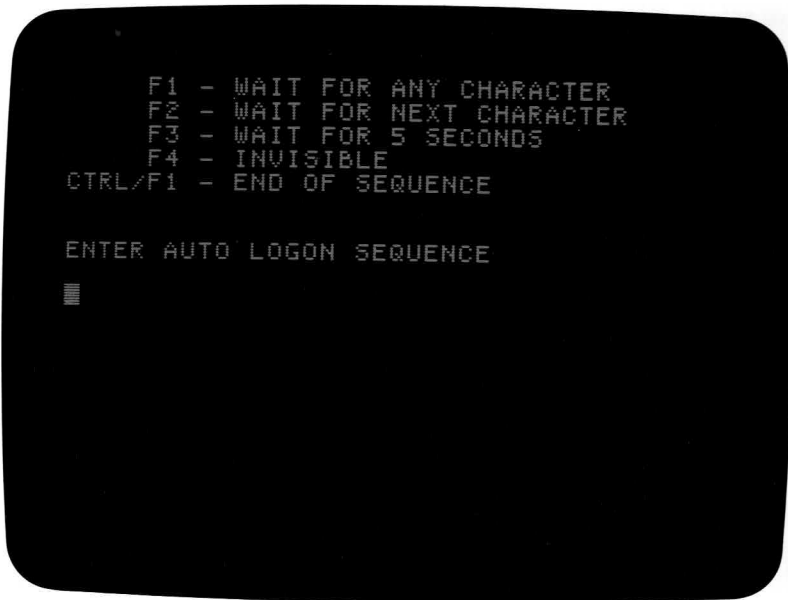
CAUTION: All directory information, terminal definitions, etc. will be lost after this reset.

Each directory entry may be assigned a unique password. In a multi-user environment this can be a way of controlling data access. This password is assigned to a directory entry and should not be confused with the **SYSTEM PASSWORD** (see menu selection 2.9) which prevents unauthorized access to the information stored within directory entries — phone numbers, logon sequences, terminal definitions, etc.

Correcting and Storing Directory Entry Information

After all entries are completed you are given the opportunity to make modifications. The APT will display numbered choices which may be selected for modification. When you are satisfied all entries are correct, press **0**, **DONE**. The entire directory entry will be stored in memory.

AUTO LOGON MENU



```
F1 - WAIT FOR ANY CHARACTER
F2 - WAIT FOR NEXT CHARACTER
F3 - WAIT FOR 5 SECONDS
F4 - INVISIBLE
CTRL/F1 - END OF SEQUENCE

ENTER AUTO LOGON SEQUENCE
█
```

If you selected YES for AUTO LOGON (Y/N) the above menu will appear after pressing **0**, DONE. After auto dialing is completed and a carrier is received from the host system, the APT will automatically begin executing an auto logon sequence according to the commands you program in this menu. Commands in the logon sequence are executed as they are encountered. ASCII characters in the sequence which are not logon commands are transmitted immediately.

The AUTO LOGON sequence may be aborted at any time while logon is in process by pressing any key (except **SHIFT**, **CONTROL** or **USER**). In this event, the communication link is maintained and you may proceed with manual logon. If for some reason the logon sequence is not successfully completed (noise, unexpected messages from the host, etc.), the APT will wait for about one minute and display the message AUTO LOGON ABORT. At this point you may proceed with manual logon or terminate the session with a reset.

For programming logon, the function keys are assigned the following commands:

- F1** - WAIT FOR ANY CHARACTER — The APT waits for any character to be transmitted by the host computer before proceeding.
- F2** - WAIT FOR NEXT CHARACTER — The APT waits until the ASCII character immediately following the F2 command is received from the host before proceeding to the next command or ASCII character in the logon string.
- F3** - WAIT FOR 5 SECONDS — When F3 is encountered in the sequence the APT pauses 5 seconds. Pauses are frequently placed at the beginning of a logon sequence and when messages are expected from the host.
- F4** - INVISIBLE — The logon sequence will not be displayed if this command is used. This command may appear at any time in the logon string. Logon will not be displayed thereafter.

After the logon sequence is entered, pressing **CONTROL F1** stores the sequence and returns control to the MAIN MENU.

If a half-duplex terminal personality is used, the APT will display only characters received from the host during auto logon operation.

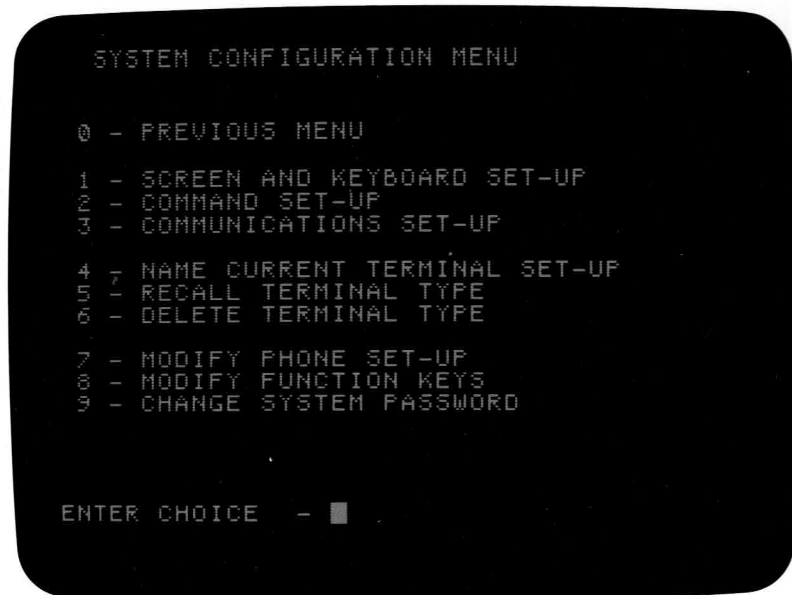
An example of auto logon programming appears in Chapter 3.

Editing Existing Directory Entries, Deleting Directory Entries

To edit existing directory entries, select **1**, EDIT DIRECTORY INFORMATION, from the MAIN MENU. Press the letter corresponding to the directory entry to be changed. The directory entry will be displayed along with a menu from which you can select items to be changed. When you have made all the changes, press the **0** key to return to the MAIN MENU. If you choose DELETE ENTRY, menu selection 7, the entry will be erased from memory and you will automatically return to the MAIN MENU.

2. SYSTEM CONFIGURATION

Selecting **SYSTEM CONFIGURATION** from the **MAIN MENU** displays the following menu with nine choices:



The nine selections are organized in groups of three. The first group, 1 through 3, allows you to set up the terminal parameters that give the APT a unique personality.

Selections 4 through 6 allow you to store, recall or delete these terminal parameters as a "terminal type". This personality can be assigned to a directory entry when **TERMINAL TYPE** is requested in the **EDIT DIRECTORY INFORMATION** selection. Then, when the directory entry is selected from the **MAIN MENU**, the terminal will automatically assume these parameters.

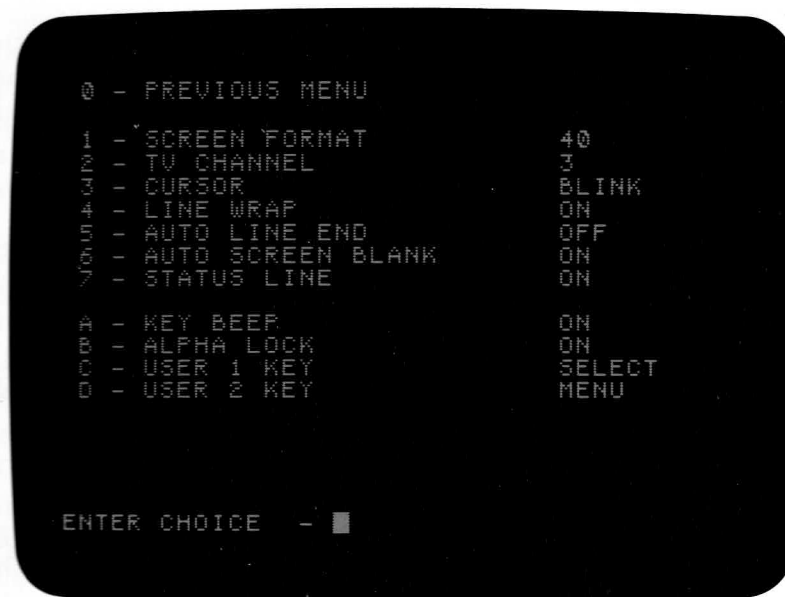
Selections 7 through 9 are used to change terminal parameters that are common to all terminal types in the terminal type directory. They will remain fixed until they are modified through menu selection. The function keys may also be modified by the host computer.

2.0 — PREVIOUS MENU

Returns to the **MAIN MENU**.

2.1 — SCREEN AND KEYBOARD SETUP

Selecting **SCREEN AND KEYBOARD SETUP** from the **SYSTEM CONFIGURATION MENU**, displays the following menu:



2.1.0 — PREVIOUS MENU

Returns to the **SYSTEM CONFIGURATION MENU** making all selected parameters currently displayed active.

2.1.1 — SCREEN FORMAT 40, 80

Selects 40 or 80 characters per line as the display format.

2.1.2 — TV CHANNEL 3, 4

Selects channel 3 or 4 VHF output when a TV set is used for display. This selection is only necessary when you are using a television set instead of a monitor for display.

2.1.3 — CURSOR

BLINK, SOLID

Selects either a blinking or a solid cursor.

2.1.4 — LINE WRAP

ON, OFF

When **LINE WRAP** is **ON**, characters beyond the maximum number per line, 40 or 80, will wrap around to the next line automatically without a line end command from the host computer.

When **OFF**, characters beyond the maximum number per line will be lost unless a line end command is received by the APT. The last character in the line will be replaced by the incoming character as it is received to indicate this condition.

2.1.5 — AUTO LINE END

OFF, CR ON LF,
LF ON CR

If **OFF** is selected the APT expects both a carriage return (CR) and a line feed (LF) from the host computer to terminate a line. Some hosts transmit only a carriage return or a line feed. Select **CR ON LF** if the host sends only line feed. Select **LF ON CR** if the host sends only carriage return.

2.1.6 — AUTO SCREEN BLANK

ON, OFF

AUTO SCREEN BLANK protects the display device from image burn as a result of continuous display of a stationary pattern. The APT will blank off the display if there is no activity for approximately 10 minutes. Any keypress (except **SHIFT**, **CONTROL** or **USER**) or character sent from the host computer will instantly restore the display unchanged. If a key is pressed the character will be sent to the host computer. The **AUTO SCREEN BLANK** feature may be disabled by selecting **OFF**.

2.1.7 — STATUS LINE

ON, OFF

The twenty-fourth data display line can display communication status and the current function of the **USER1** and **USER2** keys. If the twenty-fourth line is required for data display the **STATUS LINE** may be selected **OFF**. When selected **OFF** you can momentarily view the status line by pressing **USER1** or **USER2**. Pressing **USER1** or **USER2** activates the current function of the USER key. The status line displays the function of the USER key when it is released. It may be necessary for you to press the USER key twice to return to the original USER function or, if you anticipate the necessity to check status frequently, select **OFF** as one of the USER key functions. See 2.1.C. When selected **OFF** the status line may be momentarily viewed without effect.

2.1.A — KEY BEEP

ON, OFF

Enables or disables the tone heard when a key is pressed.

2.1.B — ALPHA LOCK

OFF, ON

When selected **ON**, locks the alphabetical characters in upper case. All other keys function normally. See **KEYPRESS/ASCII OUTPUT** table in Appendix C. The selection made determines the initial setting of **ALPHA LOCK** when the APT assumes a terminal type. It can be switched by one of the USER keys as described in 2.1.C.

2.1.C — USER1

SELECT, OFF,
LINE/LOCAL,
ALPHA, PRINTER,
CLEAR, HOME,
PAGE DUMP, MENU

2.1.D — USER2

MENU, OFF,
LINE/LOCAL,
ALPHA, PRINTER,
CLEAR, HOME,
PAGE DUMP

Selects the function that the **USER1** and **USER2** keys will have when the APT is in on-line or in the local mode. The USER key functions appear on the status line if the status line is active. USER keys are active only while on-line or the local mode. Both keys may be programmed uniquely and stored as a terminal type. Their function will be recalled when that terminal is recalled.

USER keys perform local terminal operation functions only. When a USER key is pressed, no characters are transmitted to the host computer in either the MODEM or DIRECT mode.

The following USER key functions are available:

SELECT — When this choice is made for the **USER1** key, the **USER1** key can be used to sequence through the functions available for the **USER2** key. This allows you to change the **USER2** key function while on-line without returning to the menu mode.

OFF — Disables the USER key preventing it from performing any function.

LINE/LOCAL — Allows the selected USER key to act as a line/local switch. In the local mode characters are displayed when typed on the keyboard but they are not transmitted to the host computer. LINE/LOCAL is abbreviated LIN/LOC on the status line.

ALPHA — Selects ALPHA LOCK or normal keyboard mode. When ALPHA LOCK is active the word ALPHA appears on the status line in reverse video. Refer to ALPHA LOCK, 2.1.B above.

PRINTER — Programs the USER key to activate the printer port. In the PRINTER mode, data will be sent to the printer at the time it is sent to or received from the host. The USER key function PRINT appears on the Status Line. When the printer port is active, the word PRINTER will appear on the status line to the left of the USER key labels. For printer interfacing see Chapter 6.

CLEAR — Allows the USER key to be used to clear the screen whenever it is pressed. The cursor will return "Home" to the upper corner of the display.

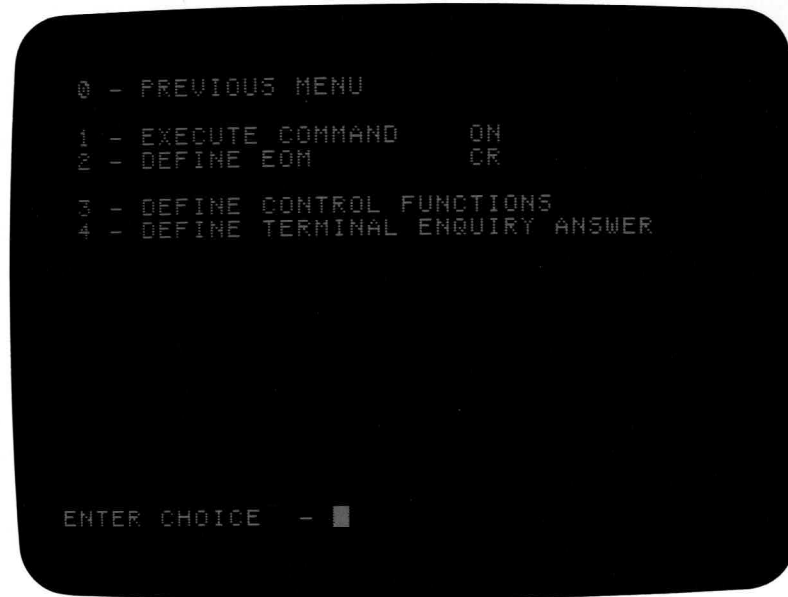
HOME — Programs the USER key to move the cursor to the upper left-hand corner or "Home" screen position without clearing display.

PAGE DUMP — Commands a PAGE DUMP, that is, sends the current display page information to the printer. The status line is not printed. PAGE DUMP acts independent of the PRINTER command.

NOTE: USER key functions can be duplicated using special key sequences. See Chapter 5, Special Features.

2.2 — COMMAND SET-UP

Selecting **COMMAND SET-UP** from the **SYSTEM CONFIGURATION MENU**, displays the following menu:



2.2.0 — PREVIOUS MENU

Returns to the **SYSTEM CONFIGURATION MENU**.

2.2.1 — EXECUTE COMMAND ON, DISPLAY, OFF

The following options are available:

ON — All valid control commands sent to the APT are executed as they are received.

DISPLAY — Control characters are displayed and not executed. All incoming characters wrap continuously on the display. This mode is useful in developing and debugging computer programs.

OFF — In this mode the only control commands recognized are carriage return (CR), line feed (LF), bell (BEL) and backspace (BS). Other commands are neither displayed nor executed. The **OFF** mode allows the APT to act as a “dumb” terminal.

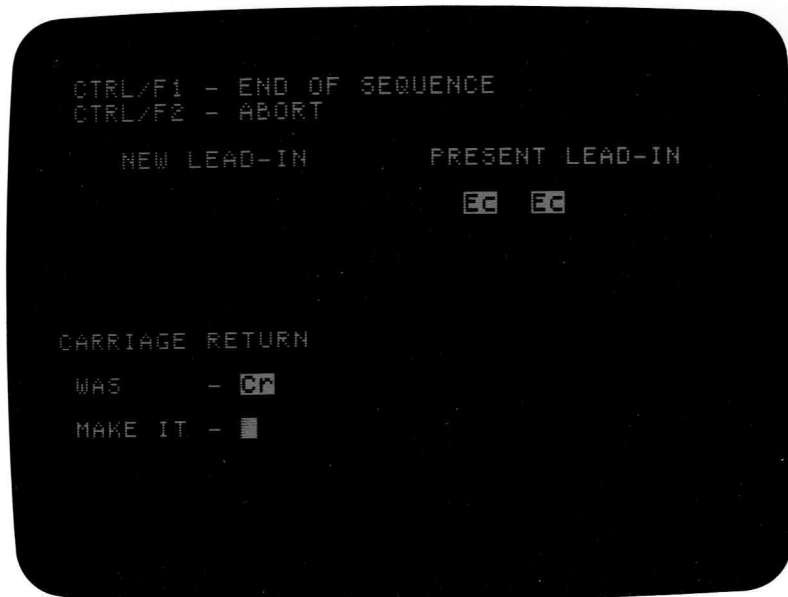
2.2.2 — DEFINE EOM CR, EOT, ETX, NONE

The APT response to some messages requested by a host computer may be appended with an **END OF MESSAGE** character. **DEFINE EOM** gives you the ability to specify the ASCII characters **RETURN** (CR, CONTROL M), **END OF TRANSMISSION** (EOT, CONTROL D) or **END OF TEXT** (ETX, CONTROL C). If an end of message character is not required, select **NONE**.

2.2.3 — DEFINE CONTROL FUNCTIONS

Here you can define the combinations of ASCII codes that will be used to execute terminal commands. To differentiate between display characters and control command characters, a command sequence begins with a lead-in. The first character of a lead-in is always a CONTROL character.

Selecting DEFINE CONTROL FUNCTIONS presents the display:



This is the first display in the set of 39 that allow you to redefine the control command sequences for the APT. Note the present lead-in is **ESCAPE ESCAPE**. Up to three lead-in characters may be used in each command. The first character of any lead-in must be either **ESCAPE** or other control character. The second and third lead-in characters may be any ASCII character. Commands may be up to four characters long. For example, a command may take any of the following forms:

C CX CAX CAAX

where:

- C - any control character including **ESCAPE** as an initial lead-in character (or used by itself, it is a command,)
- A - any ASCII character as a lead-in character,
- X - any ASCII character as a terminating character.

Up to four initial lead-in control characters may be defined and used in the complete set of 39 commands. Up to two sets of four characters may be defined as subsequent lead-in characters. These subsequent characters may be used in any combination with one of the first four lead-in control characters. As you proceed through the list of commands, the defined lead-ins will be displayed in columns under **NEW LEAD IN**. Any ASCII character may be used as the final character in the command sequence (except those commands defined by a single control character. Single control character commands do not count as one of the four initial lead-in characters).

Begin by entering the new command for **RETURN**. Enter that command by pressing **CONTROL F1**. If you do not wish to change the command (often you will not), press **CONTROL F1**. If you want to inhibit the APT from being able to execute a command, enter a null, **CONTROL @**, followed by **CONTROL F1**.

To define the commands for a "terminal type" you must go through all 39 commands. This is necessary since the APT must check each newly entered command for duplication to avoid command conflict. If a duplicate entry is discovered the APT displays **COMMAND ENTRY ERROR** and give you a chance to reprogram that entry.

Note that the currently valid command appears on the display with spaces between ASCII codes if it is more than a single control command. These spaces are for clarity only and are not to be entered when you enter a new command unless the ASCII code for SPACE is part of the command.

The list of definable commands follows. The commands are numbered with a reference number only. They can only be addressed in sequence and cannot be addressed randomly.

Once commands have been entered, the set of commands along with the screen, keyboard and communication set-up may be saved as a terminal type. Refer to this chapter, Section 2.4.

At any time, you may press **CONTROL F2** to abort the present entries you are making. To be sure you have not pressed **CONTROL F2** in error, the APT asks, **ABORT (Y/N)**. YES deletes all entries you have just made, returns you to the **COMMAND SET-UP MENU** and restores the previous command set.

2.2.3 — Control Command List

The following lists the control commands along with their reference numbers in the sequence in which they are displayed. Sequence through the commands by pressing **CONTROL F1**.

- | | |
|-------------------------|---------------------------------|
| 1. RETURN | 21. DELETE CHARACTER |
| 2. LINEFEED | 22. INSERT CHARACTER |
| 3. BELL | 23. DELETE LINE |
| 4. BACKSPACE | 24. INSERT LINE |
| 5. CURSOR CONTROL | 25. ATTRIBUTE CONTROL |
| 6. CURSOR UP | 26. ATTRIBUTE ON |
| 7. CURSOR DOWN | 27. ATTRIBUTE OFF |
| 8. CURSOR RIGHT | 28. DISPLAY CONTROL |
| 9. CURSOR LEFT | 29. 80 CHARACTER DISPLAY FORMAT |
| 10. CURSOR HOME | 30. 40 CHARACTER DISPLAY FORMAT |
| 11. CURSOR TAB | 31. KEYBOARD CONTROL |
| 12. CURSOR REPORT | 32. KEYBOARD DISABLE |
| 13. CURSOR READ | 33. KEYBOARD ENABLE |
| 14. CURSOR SAVE | 34. PRINTER ON |
| 15. CURSOR RESTORE | 35. PRINTER OFF |
| 16. CURSOR ADDRESS | 36. PAGE DUMP |
| 17. CLEAR SCREEN | 37. TERMINAL ENQUIRY |
| 18. ALT CLEAR SCREEN | 38. MODEM CONTROL |
| 19. CLEAR END OF LINE | 39. DEFINE FUNCTION KEY |
| 20. CLEAR END OF SCREEN | |

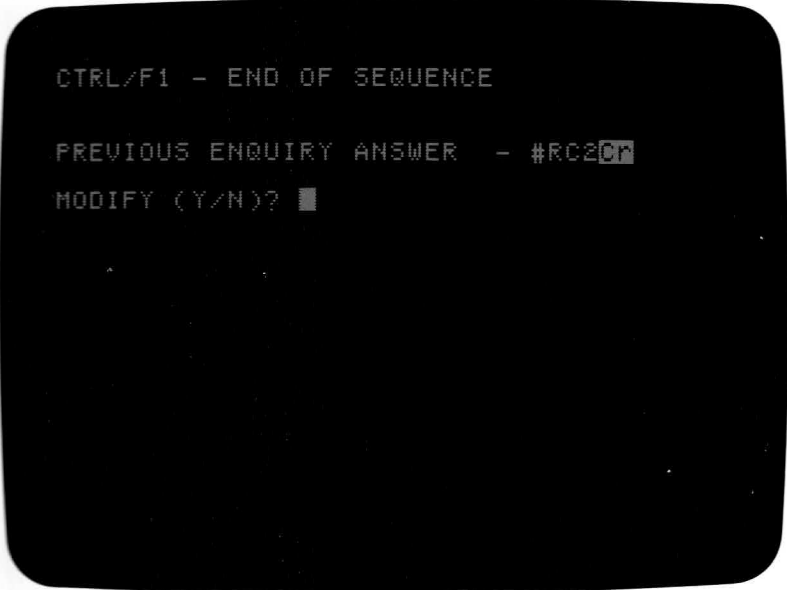
2.2.4 — DEFINE TERMINAL ENQUIRY ANSWER

The ANSWER to a TERMINAL ENQUIRY can be defined here. TERMINAL ENQUIRY, a command issued by a host computer, has several uses in data communications.

It is sometimes necessary for a host computer to identify the terminal it is communicating with. In doing so it can make adjustments to accommodate that terminal, such as sending commands to format the display. TERMINAL ENQUIRY and TERMINAL ENQUIRY ANSWER can be used to allow the host to identify the APT.

Some computers use “enquire/acknowledge”, ENQ/ACK, handshaking when communicating to terminal equipment. The APT may be programmed to respond to this protocol by programming the ASCII code for enquire, CONTROL E, as the TERMINAL ENQUIRY and the ASCII code for acknowledge, CONTROL F, for the TERMINAL ENQUIRY ANSWER.

Selecting DEFINE TERMINAL ENQUIRE ANSWER displays the following menu:

A screenshot of a terminal window showing a menu for defining the terminal enquiry answer. The text is as follows:

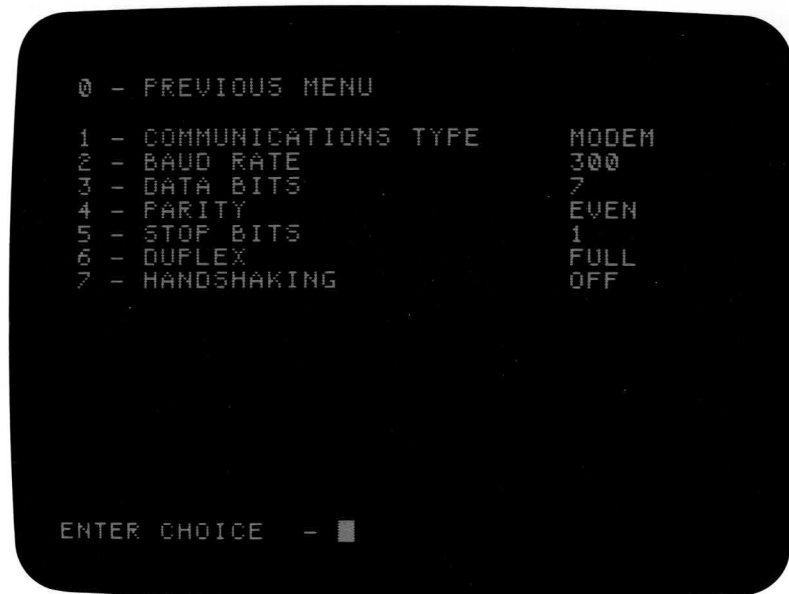
```
CTRL/F1 - END OF SEQUENCE  
  
PREVIOUS ENQUIRY ANSWER - #RC2CR  
MODIFY (Y/N)? █
```

The text is displayed in a monospaced font on a dark background. The cursor is positioned at the end of the third line, after the question mark.

The default response is #RC2(CR). By selecting YES you may change the response to the enquiry. The default enquiry command expected from the host is ESCAPE I. The TERMINAL ENQUIRY menu reference number is 2.2.3-37.

2.3 — COMMUNICATIONS SET-UP

Selecting **COMMUNICATIONS SET-UP** from the **SYSTEM CONFIGURATION MENU** displays the following menu:



2.3.0 — PREVIOUS MENU

Returns to the **SYSTEM CONFIGURATION MENU** saving all parameters displayed.

2.3.1 — COMMUNICATIONS TYPE MODEM, DIRECT

Selects the **MODEM** mode for normal, stand alone operation or **DIRECT** mode for connection to a local computer or other equipment through the RS-232C port (interface connector).

2.3.2 — BAUD RATE 300, 600, 1200, 2400, 4800, 9600, 110

Sets the communications baud rate of the APT. Baud rates in the **MODEM** mode are 110 and 300. If **COMMUNICATIONS TYPE** (menu selection 2.3.1) is set for **MODEM** you will have only these two choices. If set for **DIRECT** you will have all choices. Handshaking is recommended for baud rates above 1200.

2.3.3 — DATA BITS 7, 8

Allows you to select the number of data bits transmitted in the data word. The APT can receive either a 7 or 8 bit word regardless of this selection. The eighth bit, if selected, is always a space (zero).

2.3.4 — PARITY EVEN, ODD, MARK, SPACE, NONE

Selects the type of parity bit the transmitted data word will have. The parity bit follows the last data bit and may be selected as **EVEN** or **ODD**. Selecting **MARK** or **SPACE** fixes this bit as a one or zero, respectively. If **NONE** is selected there is no parity bit location in the data word. The APT does not check parity on incoming data.

2.3.5 — STOP BITS 1, 2

Terminates the transmitted data word with 1 or 2 stop bits. Stop bits are marks (ones). The APT will recognize incoming data with either one or two stop bits. Two stop bits are normally only used in some 110 baud communications.

NOTES:

1. If incoming data words and transmitted data words differ significantly in number of bits errors may occur.
2. See Data Word Format in the Appendix.

2.3.6 — DUPLEX FULL, HALF

Selects full or half duplex transmission mode. In **FULL** duplex the host system "echoes" back the ASCII character sent from the APT before that character is displayed. In **HALF** duplex the character is internally echoed to the display. If you communicate to a host and characters you type appear double on the display, change from **HALF** to **FULL** duplex. What you are seeing is the internally echoed and the host echoed character. If you have established communications to a host and none of the characters typed appear on the display, change from **FULL** to **HALF** duplex.

2.3.7 — HANDSHAKING

OFF, 1-WAY, 2-WAY

Enables XON/XOFF handshaking. The APT is capable of processing characters at the rate of approximately 200 characters per second. Therefore, for data rates of 2400 baud (240 characters per second) and above handshaking is necessary. The APT supports two types of handshaking — XON/XOFF in the MODEM and DIRECT mode, and clear-to-send (CTS)/clear-to-receive (CTR) in the DIRECT mode. CTS/CTR is covered in the Chapter 6. A third method sometimes used is ENQ/ACK, discussed in 2.2.4 of this chapter.

XON/XOFF protocol defines a sequence of transmissions used to regulate the transmitting device's data rate. The receiving device transmits one of two ASCII codes to indicate to the transmitting device the following conditions:

XOFF (CONTROL S) - Receiving device busy. Stop transmission.

XON (CONTROL Q) - Receiving device ready. Resume transmission.

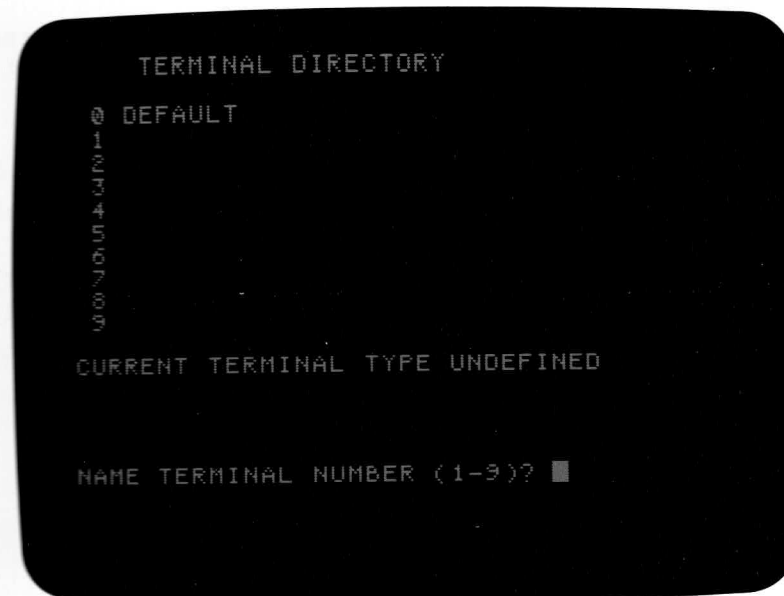
The APT menu selections supporting this protocol are as follows:

- OFF - The APT will not transmit or respond to XON/XOFF codes.
- 1-WAY - The APT will transmit XOFF when its 124 character receive buffer is within 12 characters of being full. When it's buffer is within 16 characters of being empty it will transmit an XON. In the 1-WAY mode the APT transmits XON/XOFF but does not respond to XON/XOFF received.
- 2-WAY - The APT transmit XON/XOFF as above and respond to XON/XOFF received. An XOFF received by the APT will suspend transmission from the APT until XON is received.

2.4 — NAME CURRENT TERMINAL SET-UP

With this menu choice you can save the complete set of parameters defined in the SCREEN AND KEYBOARD SETUP, COMMAND SETUP and COMMUNICATIONS SETUP menus of the SYSTEM CONFIGURATION MENU. These parameters will be saved as a "terminal type". Up to nine terminal types may be defined and stored in memory. A defined terminal type may then be assigned to any directory entry. When the directory entry is selected from the MAIN MENU, all these terminal and communications parameters are automatically recalled to become the current APT "personality".

Selecting NAME CURRENT TERMINAL SET-UP from the SYSTEM CONFIGURATION MENU displays the TERMINAL DIRECTORY:



To save a complete set of terminal parameters, select a number—one not currently used, unless you want to replace a terminal type in memory. This number will be entered by you when assigning a terminal type while creating a directory entry.

After selecting a number, the APT will request **ENTER NAME** —. Enter the name of the terminal type. Choose a name recollective of the characteristics of the terminal or data base for which it is to be used. When you select this terminal number while entering a directory entry, the name will appear on the display to confirm the correct selection. Up to 15 characters may be used for a terminal name, however, short names are recommended to conserve memory.

When the name has been entered, press **RETURN** . The display will blink off momentarily while the terminal parameters are collected and stored in memory.

Pressing **RETURN** without selecting a number will exit this menu and return control to the **SYSTEM CONFIGURATION MENU**.

2.5 — RECALL TERMINAL TYPE

If you select **RECALL TERMINAL TYPE** the APT will display the **TERMINAL DIRECTORY** listing the names of the terminal types in memory. An asterisk appears beside the number of the terminal type currently in effect. The APT requests, **RECALL TERMINAL NUMBER (0-9)?** Selecting a number sets the parameters of the APT to those stored within that terminal type and returns you to the **SYSTEM CONFIGURATION MENU**.

This menu selection allows you to review terminal parameters stored within a terminal type. It allows you to setup other terminal types quickly by recalling a similar terminal type and changing only the parameters that differ. It also allows you to change terminal types while on-line.

CAUTION: If you are on-line in the **MODEM** mode and **RECALL** a terminal type with **DIRECT** as the **COMMUNICATION TYPE**, the terminal to modem data link will be broken.

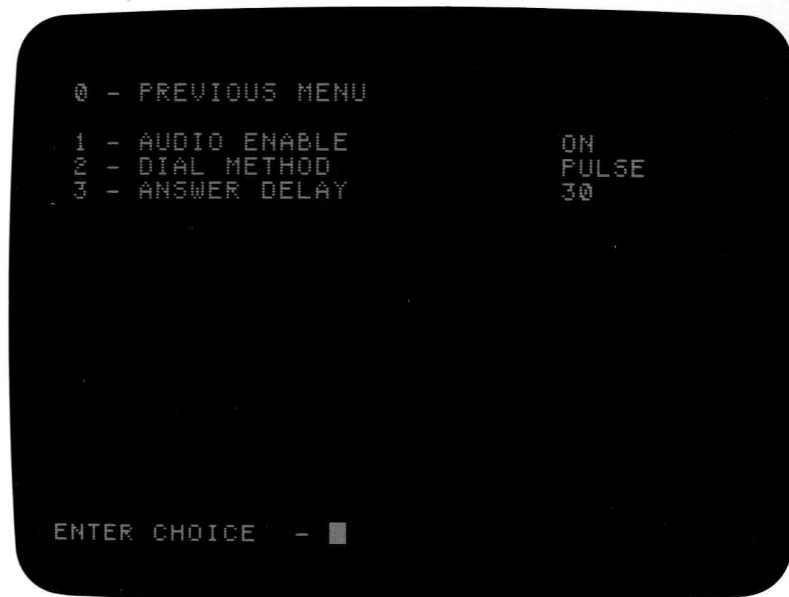
2.6 — DELETE TERMINAL TYPE

Selecting **DELETE TERMINAL TYPE** from the **SYSTEM CONFIGURATION MENU** will display the **TERMINAL DIRECTORY**. Enter the number of the terminal type to be deleted. Unused terminal types may be deleted to free up APT memory.

If you decide not to delete a terminal type, you may press an empty terminal directory number or simply press **RETURN** .

2.7 — MODIFY PHONE SETUP

Selections in this menu choice are telephone related.



2.7.0 — PREVIOUS MENU

Returns to the SYSTEM CONFIGURATION MENU making all displayed values active.

2.7.1 — AUDIO ENABLE ON, OFF

Enables or defeats the telephone audio monitor. If selected **ON**, telephone line audio is enabled when dialing begins for a directory entry selected from the **MAIN MENU**. When a modem carrier is detected from the host system the audio is automatically turned off.

2.7.2 — DIALING METHOD PULSE, TONE

Telephone systems accept two types of dialing. **PULSE** dialing, the physical interruption of the telephone circuit, was the earliest of the two methods used in the United States and its use is still wide-spread. **TONE** dialing, which is faster, is becoming more popular. Most phone companies charge a premium for this **TONE** dialing service. Most **TONE** systems accept **PULSE** dialing, however, not all **PULSE** systems accept **TONE** dialing. The APT can mix **TONE** and **PULSE** dialing within a telephone number independent of this selection (See Section 1.A, **ENTER NUMBER**, in this chapter.)

2.7.3 — ANSWER DELAY 30, 45, 60, 5, 15

ANSWER DELAY is the approximate time in seconds the APT will wait for a modem carrier anticipated from the host, originate or answer. If no carrier is detected in this time, the call will automatically terminate. When making a voice call, the APT will release the telephone line at the end of this time. The only way to maintain the telephone connection beyond this time is with the use of a standard telephone set, which is also necessary for two way voice communication. **ANSWER DELAY** timing begins approximately two seconds after the conclusion of the dialing routine.

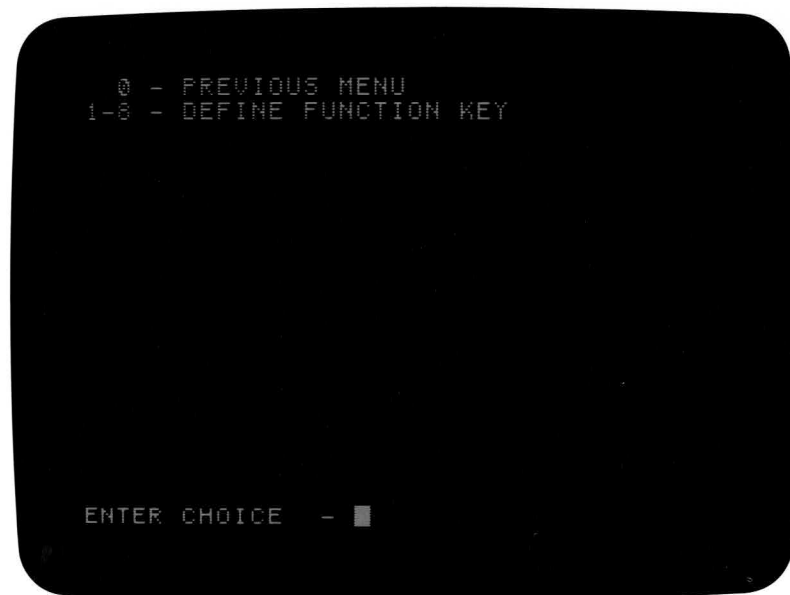
At any time during **ANSWER DELAY** the call may be terminated by pressing any key (except **SHIFT**, **CONTROL** or **USER**). If a key is pressed during dialing, termination will not occur until after dialing is complete. Call termination is commonly used when a busy signal is heard on the telephone line audio monitor or if for some other reason the dialing was not successful.

2.8 — MODIFY FUNCTION KEYS

This menu selection allows you to manually program the 8 function keys, **F1** through **F4** and **SHIFT F1** through **SHIFT F4**. Once programmed the contents of the function keys remain fixed until reprogrammed, either manually through menu selection or by the host computer, or memory is purged by a **MEMORY DUMP RESET**, or loss of power back-up (several days without power plug-in). The function key contents do not change with a terminal type change.

The “default” content of the each function key, as the APT is received or after a memory purge, is **ESCAPE *n***, where *n* is the function key number, 1 through 8.

Selecting **MODIFY FUNCTION KEYS** from the **SYSTEM CONFIGURATION MENU** displays the following menu:



2.8.0 — PREVIOUS MENU

Returns to the **SYSTEM CONFIGURATION MENU**.

2.8.1-8 — DEFINE FUNCTION KEY

Enter the number of the function key to be defined. The current contents of the function key selected will be displayed along with the query **MODIFY (Y/N)?**. Entering **N**, no, returns to the previous display. Entering **Y**, yes, prompts you to define the function key selected.

Any valid ASCII characters may be entered. Up to 31 characters are permitted.

F1 through F8 are valid entries in the function key string. That is, you can call any other function key from a function key. Theoretically you could send a string of 241 characters by pressing a single function key by concatenating all function keys in one. Beware of loops! Loops can be created by having a function key call itself or calling another function key that loops back to the original. The only way out of a function key loop is a **RESET**.

To end the entry process press **CONTROL F1**.

Function keys may be defined by the host computer system. See page 112. This allows a host to load commands or other strings that are appropriate for the specific programs. The host cannot concatenate function key as you can from keyboard entry.

While on-line or in local, pressing any function key dumps the contents of that function key, sending it to the host if on-line or to the display if in local.

2.9 — CHANGE SYSTEM PASSWORD

The **SYSTEM PASSWORD** prevents unauthorized individuals from accessing the information stored within all of the directory entries. Access is denied unless the correct password is entered after selecting **EDIT DIRECTORY INFORMATION** from the **MAIN MENU**. The **SYSTEM CONFIGURATION MENU** is also password protected, preventing anyone from altering system parameters.

Selecting **CHANGE SYSTEM PASSWORD** from the **SYSTEM CONFIGURATION MENU** will display the request **ENTER PASSWORD —**.

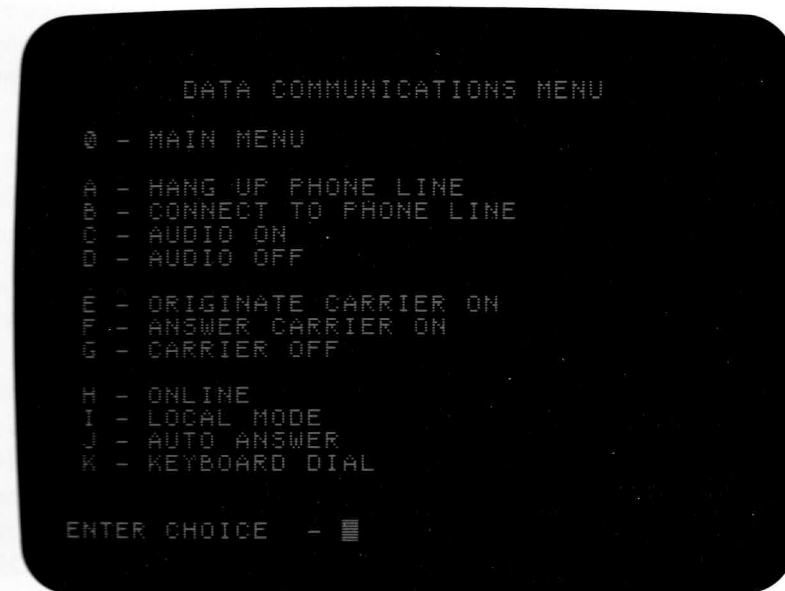
Enter a password followed by **RETURN**. You will be asked to verify the password. Remember the password! The only way to overcome a forgotten password is to do a **MEMORY DUMP RESET** after which all stored directory information and system parameters will be lost.

This password protection is independent of, and should not be confused with, the individual password protection assignable to each directory entry. See Section 1, **EDIT DIRECTORY INFORMATION**, in this chapter.

3. — TERMINAL COMMUNICATIONS

The APT is designed to function entirely automatically for most communication requirements. In certain communication situations or terminal applications it may be necessary to exercise manual control. The APT gives you this ability.

Selecting **TERMINAL COMMUNICATIONS** from the **MAIN MENU** displays the **DATA COMMUNICATIONS MENU**:



The first four choices, A through D, control telephone related functions. The next three, E through G, control the modem carriers.

3.0 — MAIN MENU

Returns to the MAIN MENU.

3.A — HANG UP PHONE LINE

The APT internally disconnects the phone line (releases the line).

3.B — CONNECT TO PHONE LINE

Internally connects the APT to the phone line (captures the line).

3.C — AUDIO ON

Enables audio monitoring of the telephone line through the APT speaker.

3.D — AUDIO OFF

Disables audio monitoring of the telephone line.

3.E — ORIGINATE CARRIER ON

Turns the modem ORIGINATE carrier ON.

3.F — ANSWER CARRIER ON

Turns the modem ANSWER carrier ON.

3.G — CARRIER OFF

Turns either the ORIGINATE or ANSWER carrier OFF.

3.H — ONLINE

Selects the on-line mode and can be used to go back on-line after entering the local mode or the menu mode.

3.I — LOCAL MODE

Selects the local mode, after which characters typed on the keyboard are displayed without sending them to the host computer or device. In this mode the APT, if connected to a printer, can be used as an electronic typewriter.

3.J — AUTO ANSWER

Sets up the APT to automatically answer incoming data calls. In the MODEM mode, the word ANSWER will appear on the status line (if the status line is active) indicating the APT is waiting for an incoming call. The APT will normally answer after one ring and immediately send out an ANSWER carrier. If the ORIGINATE carrier is not received within the ANSWER DELAY time period (See 2.7.3) the telephone line will be released and the APT will wait for another incoming call. **CONTROL SHIFT M** pressed simultaneously will terminate the ANSWER mode and return to the DATA COMMUNICATIONS MENU.

If the APT is connected directly to a computer system, the AUTO ANSWER mode allows a remote terminal (another APT perhaps) to call and access the computer system via telephone from a remote location.

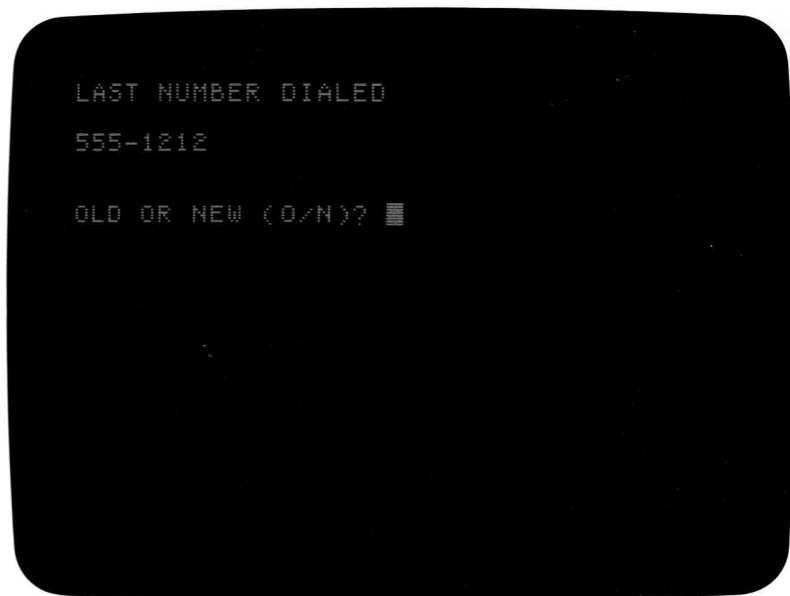
In the DIRECT connected mode the APT can still communicate with its host while auto answer is enabled. If a telephone call comes in the APT will temporarily suspend communication with the direct host and attempt to establish a modem communication link with the incoming caller. When the link is established, or if ANSWER DELAY times out, the APT can continue its communication with the direct connected host. If a link is successfully established with the incoming caller, the DIRECT host may communicate to the MODEM host through the APT modem. See Chapter 7 for more on the DIRECT mode. If this auto answer mode is anticipated handshaking must be used to avoid losing data from the direct host while the modem link is being established.

3.K — KEYBOARD DIAL

Allows manual entry of telephone numbers for auto-dialing. KEYBOARD DIAL selected from the DATA COMMUNICATIONS MENU is functionally identical to selecting KEYBOARD DIAL from the MAIN MENU and is covered in detail on the following page.

4. — KEYBOARD DIAL

Selecting **KEYBOARD DIAL** from the **MAIN MENU** displays the following:



The APT, being an intelligent autodialer, remembers the last number dialed. If you have not used the **KEYBOARD DIAL** feature, the **LAST NUMBER DIALED** message will not appear on the display (or if you have not used it since memory was purged).

You are asked **OLD OR NEW (O/N)?**. If you wish to redial the previous number simply respond, **O**. Dialing will begin immediately. To enter a new number respond, **N**. You will be prompted **ENTER NUMBER**

The number may be for a data base or voice communication. Any sequence of numbers may be used. Separators such as a — or a space may be used. They are ignored in the dialing sequence. The following characters are valid:

0 through 9 - the numbers to be dialed

, - a two second pause

. - a five second pause

/ - indefinite pause, waits for a keypress to continue

T or P - used to switch between Tone and Pulse dialing within a number sequence.

The following characters may be appended to the end of the dialing string:

A - Generates an answer carrier at the conclusion of dialing. Enables **ANSWER DELAY** (See 2.7.3). With **ANSWER DELAY** enabled any keypress terminates the call unless an originate carrier is received, otherwise **ANSWER DELAY** time-out terminates. Returns to the **DATA COMMUNICATIONS** upon completion of the call.

O - After dialing, the APT waits for an answer carrier and then generates an originate carrier. **ANSWER DELAY** terminates the call if an answer carrier is not received. Returns to the **DATA COMMUNICATIONS MENU** upon completion of the call.

V - Used to indicate a voice call. No carrier generated. Any keypress before **ANSWER DELAY** terminates the call, otherwise the **ANSWER DELAY** time-out terminates and returns to the **DATA COMMUNICATIONS MENU**.

(None) - No carrier generated, returns to the **DATA COMMUNICATIONS MENU** awaiting manually entered instructions. **ANSWER DELAY** is not in effect with this option.

Pauses are useful when access numbers are used in a telephone dialing sequence. Switching between pulse and tone dialing allows you to use telephone network services, such as Sprint and MCI, from a pulse dialing phone system. The local network number may be dialed by pulse dialing. The APT, by encountering a T in the phone number sequence, will then switch to tone dialing (network services only accept tone dial). Tones then send the long distance telephone number and the user's access number to the network service. For more information on TONE and PULSE dialing see 2.7.2 of this chapter.

Up to 63 characters may be entered into the number sequence.

After the dialing sequence has been successfully entered, press **RETURN** to initiate the dialing.

If you found yourself in the KEYBOARD DIAL mode by mistake, press **RETURN** without entering a number, to return to the MAIN MENU.

CHAPTER 5 — SPECIAL FEATURES

Memory Backup

The APT's memory is capable of storing 2500 characters of information — names, telephone numbers, logon sequences, terminal personalities, passwords and function key strings (see the Appendix, APT Memory Management). To preserve the contents of memory when the APT is transported or in the event of a power failure, the RAM (Random Access Memory) that this data is stored in is protected by a charge storage device. No batteries are used, so you need not worry about battery replacement.

If power is applied to the APT power converter and the converter is connected to the APT, the contents of memory will be preserved indefinitely regardless of the POWER switch status — ON or OFF. If power is interrupted the contents of memory will be preserved for a minimum of 48 hours. Under ideal conditions memory contents may be preserved for more than a week. High temperature and humidity reduce the storage time.

It is recommended that all stored information be logged and filed for future reference as it is entered. Over a period of years of APT use, being faced with an empty memory is a definite possibility — household power failure during vacation, a forgotten password correctable only with a MEMORY DUMP RESET, etc. Reconstruction of the many directory entries you will accumulate could be a tedious procedure without a permanent record.

Terminal Security

Once programmed the APT knows everything necessary to logon to your data bases — telephone numbers, I. D. numbers, logon procedures, etc. Your data base may contain sensitive information, such as your personal finances or company private data. Your data base may have connect time charges associated with its use, or incur long distance telephone charges.

To protect against unauthorized access to your data bases, the APT has two types of local (terminal resident) password protection. Each directory entry may have a unique password assigned to it. When a protected directory entry is requested from the MAIN MENU you will be asked to enter the password. Enter the password, followed by **RETURN**. If the password is correct the APT will proceed. If not, the display will return to the MAIN MENU. In addition to the directory entry password there is a SYSTEM PASSWORD. Only by correctly entering the system password can you proceed after choosing EDIT DIRECTORY INFORMATION or SYSTEM CONFIGURATION from the MAIN MENU. Unauthorized persons cannot view information in the directory or change system parameters.

For more information on password protection see Chapter 4, Sections 1. and 2.9.

As an additional measure of security, automatic logon can be made entirely invisible. The APT will logon without displaying any characters. See AUTO LOGON MENU, Chapter 4, Page 42.

Special Key Sequences

There are several multiple keypress sequences that perform local terminal functions.

RESET — Press and hold **SHIFT** and **CONTROL** and then press **ESCAPE**. This resets the terminal to the same state as turning the POWER switch ON. The communication link is terminated, the current terminal type values are reinitialized and the display returns to the main menu.

MEMORY DUMP RESET — Turn the POWER switch OFF. Press and hold **USER1** and **USER2** simultaneously and then turn the POWER switch back ON. All stored data will be cleared from memory.

SOFT RESET — Press and hold **SHIFT** and **CONTROL** and then press **X**. A SOFT RESET clears the screen, homes the cursor, turns the printer port off and turns the screen attributes off. It is used to reset without leaving the line mode and can only be used while on-line.

FUNCTIONS — The following functions may be performed while the APT is on-line or in the local mode.

Press and hold **SHIFT** and **CONTROL** and then

press:	A	for	ALPHA LOCK on and off.
	C	to	CLEAR SCREEN and home cursor.
	D	to	DUMP display contents to printer.
	H	to	HOME CURSOR without clearing screen.
	L	for	LINE/LOCAL, alternating.
	M	for	MENU. Returns to the menu.
	O	for	OFF-LINE. Disconnects telephone line.
	P	for	PRINTER ENABLE on and off.

These key presses duplicate USER key functions and can be used when the function you wish to perform is not a current USER key function. This key sequence is convenient to use if the status line is disabled and the current USER function is not known. Notice the character used to invoke the command is the first character of the function, making the command easy to remember.

Acoustic Coupler Interface

In many situations it is not convenient to connect directly to the telephone line for MODEM mode communications. Many older telephone installations and public installations do not use modular jacks common to most telephones. The APT has provisions to use an Acoustic Coupler, RCA Model VP-3001AC, allowing you to use a telephone handset. This coupler provides an audio link between the telephone line and the APT modem making direct connection unnecessary.

The APT senses the presents of the Acoustic Coupler. If you select a directory entry from the MAIN MENU, with the coupler attached the APT will retrieve that entry's telephone number from memory. The APT will prompt your dialing by displaying the telephone number. When the dialing is complete, insert the telephone handset in the cups of the acoustic coupler. The APT can then proceed with logon if a carrier from the host computer is sucessfully received.

CHAPTER 6 — USING THE APT WITH A PRINTER

Using any printer with a Centronics type parallel interface, the APT can function as a printing terminal. Data can be printed as it is received from or transmitted to the host computer, or you can command a PAGE DUMP (print the data as it appears on the display).

The printer port is activated by the PRINT or DUMP function of the **USER1** or **USER2** keys. See Chapter 4, Sections 2.1.C and 2.1.D for complete USER key set-up information. If PRINT is the current USER key function, pressing that USER key activates the printer port. If the status line is active, the word **PRINTER** will appear on the status line to the left of the USER key labels indicating the printer port is enabled.

If DUMP is the current USER key function, the contents of the display will be printed. DUMP automatically activates the printer port and returns the port to its former ON or OFF state after the dump is complete. The status line will not be printed.

USER keys are only active while on-line or in the local mode.

The printer port may also be controlled by the host computer. The computer can enable the printer port automatically or can command a screen dump. The control commands for these functions are listed in Chapter 8.

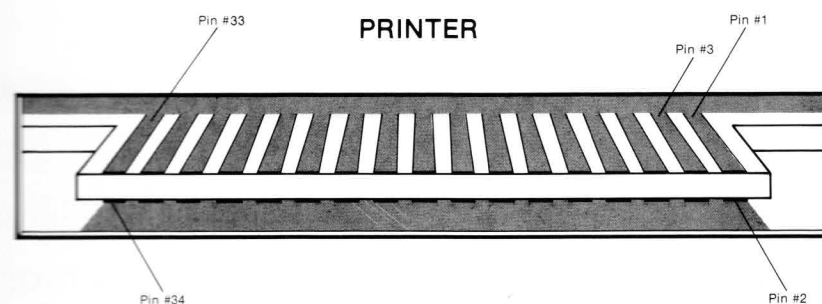
Using The APT As An Electronic Typewriter

The APT, when used with a printer, can function as an electronic typewriter without connecting to a host computer either directly or on-line. To do so, you must be in the LOCAL mode. You can type a display full of information, using cursor commands for editing, and then command a PAGE DUMP to the printer. Or, by enabling the printer port, send a character at a time to the printer. Most common printers are "line printers", meaning they accumulate data in a buffer until a RETURN is received and then print the contents of the buffer.

You can set up a directory entry to quickly and easily select an electronic typewriter function. Create a directory entry with the telephone number blank. Make it a DATA call. Select a terminal type that has been saved in memory that satisfies your electronic typewriter needs. When the directory entry is selected the terminal type will be recalled and no number will be dialed. The APT will briefly look for a modem carrier (which it will not find) and switch to the LOCAL mode. You're now ready to type.

The Printer Port

The printer port, labeled PRINTER on the rear of the APT, uses a card edge type connector with 34 contacts (17 per side, 0.1 inch centers). The printer port, as seen facing the rear of the APT, is shown below:



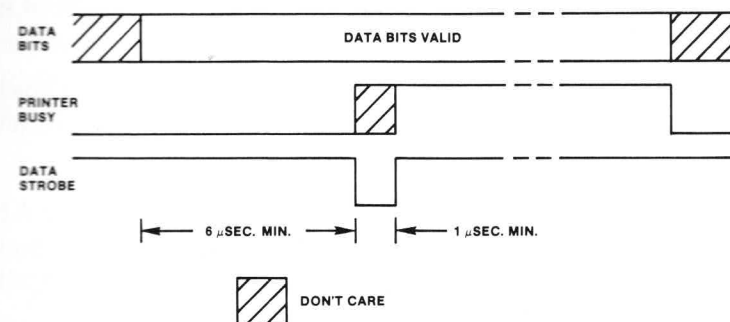
The APT printer port contact numbers and their functions are as follows:

Contact No.	Function	Direction
1	Data Strobe	from Printer
2	GROUND	
3	Data Bit 0 (LSB)	to Printer
4	GROUND	
5	Data Bit 1	to Printer
6	GROUND	
7	Data Bit 2	to Printer
8	GROUND	
9	Data Bit 3	to Printer
10	GROUND	
11	Data Bit 4	to Printer
12	GROUND	
13	Data Bit 5	to Printer
14	GROUND	
15	Data Bit 6	to Printer
16	GROUND	
17	Data Bit 7 (MSB)	to Printer
18	GROUND	
19	NC (Note 1)	
20	NC	
21	Printer Busy	from Printer
22	NC	
:	:	
:	:	
32	NC	
33	GROUND	
34	NC	

Note 1 - Centronics Signal "Acknowledge" is not used by the APT.
NC - No connection internal to the APT.

Printer Port Input/Output Signal Definitions:

DATA STROBE — A negative-logic, pulse output from the APT, used by the printer to latch data bit signals. The APT Data Strobe timing diagram is shown below:



DATA BITS 0 THROUGH 7 — A positive signal (high) represents a logic 1 data bit. The APT only sends a 7 bit ASCII code to the printer. The 8th data bit (Bit 7) is always logic 0.

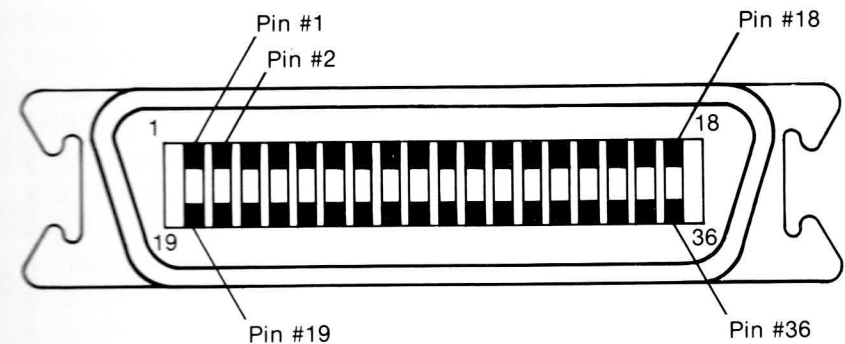
BUSY — This signal from the printer, if true (high), indicates to the APT that the printer cannot accept data. The APT will only output data to the printer if this signal is false (low). If the "Busy" input pin (Pin 21) is not connected, the false condition, Printer Ready, is assumed. The APT's input impedance for this signal is 1 kilohm, minimum.

Some Technical Notes on Printer Interfacing

1. All output lines from the APT are open-collector transistors which drive the signal line to ground. These outputs require pull-up resistors to +5 V in the printer to supply the necessary signal voltage and current. The maximum current sink of each output transistor is 25 mA.
2. Typical interface cable length is 6 feet. Lengths greater than 10 feet may add to much signal capacitance for the printer to function correctly.
3. If the printer cannot keep up with the data rate set by the APT's baud rate, handshaking between the APT and the host computer must be implemented or data overrun will occur and data will be lost.
4. The APT is unable to process any serial data received from the host computer while it is servicing the printer during a PAGE DUMP. If data is expected during PAGE DUMP, handshaking between the APT and the host must be implemented or data overrun will occur and data will be lost.
5. The APT printer interface is designed to allow any power-on sequence of the APT and the printer. For example, the APT may be powered ON and operated with the printer connected and powered OFF.
6. The APT cannot distinguish between printer on and ready, printer not connected, or printer powered off. All three conditions cause the same false (low) "Printer Busy" signal.

Printer Cable, VP-3001PCB

A prewired 72" printer cable, Model VP-3001PCB, is available from your dealer or directly from RCA. It is designed to interconnect the APT and many popular parallel input printers. One end of the cable mates to the APT printer port. The other end has a 36 contact ribbon connector which mates to the connector found on many printers. The printer end of the cable connector is shown below indicating the contact numbering convention.



The contact numbers and their functions are shown below. Check them against the specifications provided with your printer.

Contact No.	Function	Direction
1	Data Strobe	to Printer
2	Data Bit 0 (LSB)	from Terminal
3	Data Bit 1	from Terminal
4	Data Bit 2	from Terminal
5	Data Bit 3	from Terminal
6	Data Bit 4	from Terminal
7	Data Bit 5	from Terminal
8	Data Bit 6	from Terminal
9	Data Bit 7 (MSB)	from Terminal
10	NC (Note 1)	
11	Busy	from Printer
12	NC	
:	:	
:	:	
16	NC	
17	GROUND	
18	NC	
19	GROUND	
:	:	
:	:	
27	GROUND	
28	NC	
29	GROUND	
30	GROUND	
:	:	
:	:	
34	NC	

Note 1 - Centronics Signal "Acknowledge" is not used by the APT.
NC - No connection internal to the APT.

CHAPTER 7 — THE DIRECT MODE - RS-232C

The APT features an RS-232C port which allows you to connect the APT directly to a computer system or other devices which use RS-232C signal levels, such as a serial printer or a 1200 baud modem.

There are two modes of operation discussed in reference to this port — when the terminal is used in the MODEM mode and when it is in the DIRECT mode. These modes are established by menu selection 2.3.1 and can be assigned as a characteristic of a "terminal type".

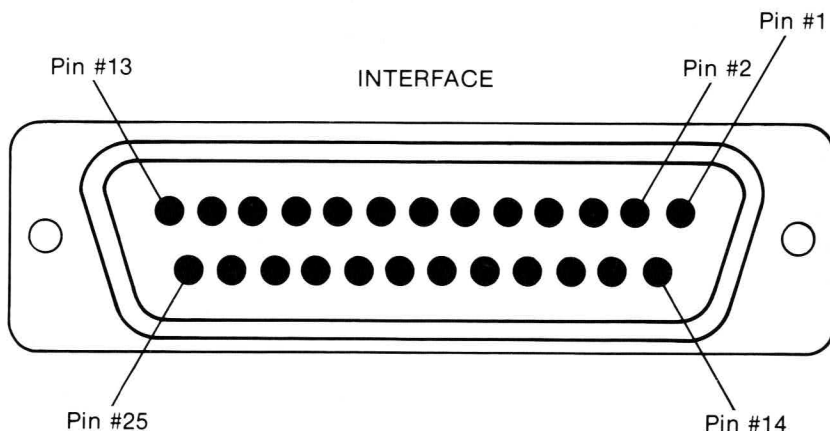
Internal connections between the terminal electronics and modem electronics depend on this menu selection. In the MODEM mode the terminal electronics are internally connected to the modem. In the DIRECT mode this internal connection is broken and a directly connected computer or device may communicate with the terminal and/or the modem independently. This allows a directly connected computer to send data to, or receive data from the terminal as well as a telephone connected host. The APT allows the directly connected computer to control communications including dialing. This capability provides powerful communications capability between a local computer and time sharing hosts. The APT may also be used as a primary or remote terminal to a local computer completely independent of the modem.

Interconnections

The APT has a 25 pin interface connector commonly used in serial communications, labeled INTERFACE on the back of the APT. Pin assignments are listed in Table 1, Page 92.

Details of internal connections in the MODEM and DIRECT modes and the signal functions are summarized in Tables 2 and 3. Interconnection to standard RS-232C equipment with the APT as data terminal equipment (DTE) and as data communications equipment (DCE) appears in Table 4, Page 96.

The APT interface connector and pin numbering convention is shown below:



DIRECT Mode Baud Rates and Handshaking

In the DIRECT mode, available baud rates between the APT and a direct connected host are 9600, 4800, 2400, 1200, 600, 300 and 110. Selection of baud rate must be made after selecting DIRECT as the COMMUNICATIONS TYPE (menu selection 2.3.1 for DIRECT or MODEM and 2.3.2 for BAUD RATE). Handshaking between the external device and the terminal is recommended for baud rates above 1200 baud. Both clear-to-send (CTS)/clear-to-receive (CTR) and XON/XOFF are described in Chapter 4, MENU SELECTIONS, under Section 2.3.7.

Communications through the modem in the DIRECT or MODEM mode are always 300 or 110 baud.

Control Commands — DIRECT Mode

Control commands recognized by the APT in the direct connect mode that are not recognized in the MODEM mode are AUTO DIAL, AUTO ANSWER ENABLE and AUTO ANSWER DISABLE. These commands are redefinable. The default commands and their syntax are summarized in Chapter 8, APT CONTROL COMMANDS. All other commands are redefinable and recognized in both the DIRECT and MODEM modes.

Using AUTO LOGON In The DIRECT Mode

You can take advantage of some of the APT's unique features while in the direct connect mode. To automatically set the APT personality required to communicate to the direct connected computer, define all control commands, screen and keyboard parameters, etc. Select **DIRECT** under **COMMUNICATIONS TYPE** and the desired baud rate under **BAUD RATE**. Define and name this set-up as a "terminal type". Set up a directory entry and when **NUMBER** is requested press **RETURN** leaving the **NUMBER** entry blank. Press **D** to indicate **DATA** communication. Enter the terminal type by number that you defined to accommodate communications to your directly connected host. You have the option of using **AUTO LOGON** or **PASSWORD** protection.

When you select the directory entry from the **MAIN MENU**, terminal parameters will be set automatically as you defined them under **TERMINAL TYPE**. The APT will not initiate an auto dialing sequence since the **NUMBER** entry was left blank. Instead it will proceed to send the string entered in the **AUTO LOGON** menu, if **AUTO LOGON** was selected (CTS, Pin #5 on the interface connector, must also be true or not connected).

The ability to use the **AUTO LOGON** in the **DIRECT** mode provides interesting possibilities. Undoubtedly several applications programs are available on your host. Directory selections may be set-up to automatically access programs or files using the **AUTO LOGON** string to initialize them. Several of your directory entries may be set-up, each to access a different program. Directory entries may simply appear as keyword names such as **FINANCES**, **BASIC**, **WORD PROCESSOR**, **MAIL LIST** or **BLACKJACK**. One key-press and you're there.

If you did not choose **AUTO LOGON**, selecting the directory entry would set terminal parameters, and control would be returned to the keyboard.

Using a 1200 Baud Modem

If baud rates greater than 300 are required in telephone line data transmission applications, an external modem may be used by connecting it to the RS-232C interface. A smart modem can be controlled by using the **AUTO LOGON** feature to send commands to the smart modem. APT function keys may also be used to send commands to intelligent devices attached to the RS-232C port.

Table 1: Interface Connector Pin Assignments

Pin	Function
1	Terminal GROUND
2	Terminal Output - Serial Data Signal
3	Terminal Input - Serial Data Signal
4	Terminal Output - Request to Send (RTS), See Note 3
5	Terminal Input - Clear to Send (CTS), See Note 4
6	NC
7	Terminal GROUND
8	NC
9	NC
10	See Note 2
11	See Note 2
12	See Note 2
13	Modem GROUND
14	Modem GROUND
15	Modem Input - Serial Data Signal
16	Modem Output - Serial Data Signal
17	Modem Output - Carrier Detect (CD)
18	See Note 2
19	Terminal Output - Clear to Receive (CTR)
20	Terminal Output - Data Terminal Ready (DTR), See Note 3
21	See Note 2
22	See Note 2
23	See Note 2
24	See Note 2
25	NC

NOTES:

1. NC - No connection internal to the APT.
2. Pin used for factory testing only — make no connection.
3. Pin pulled to +12V (RS-232C True) through a 3K resistor whenever the APT is powered on.
4. If no connection is made to this pin, the true state will be assumed by the APT.

Table 2: MODEM Mode — APT Internal Connections

For this mode of operation, the following internal connections are made:

Terminal Data Out - To - Modem Data In
Terminal Data In - To - Modem Data Out
Clear To Send - To - Carrier Detect

Any signals present on the following connector pins are ignored by the APT:

Pin	Function
3	Terminal Input - Serial Data
5	Terminal Input - Clear To Send
15	Modem Input - Serial Data

Signals on all other pins are active and valid.

Table 3: DIRECT Mode — APT Interface Connector.

When the DIRECT mode of operation is selected, the internal connections described in Table 2 (MODEM mode) are broken. The following signal inputs and outputs are available:

Pin	Function
2	Terminal Output - Serial Data, RS-232C Signal Level, 110 through 9600 baud, menu selectable
3	Terminal Input - Serial Data, RS-232C Signal Level
16	Modem Output - Serial Data, RS-232C Signal Level, 300 baud maximum
15	Modem Input - Serial Data, RS-232C Signal Level, 300 baud maximum

Modem Handshaking:

Pin 17: Carrier Detect, RS-232C signal level, output from modem. This signal when true (greater than +3 volts), signifies that a data carrier is being detected by the modem.

Terminal Handshaking:

Pin 5: Clear to Send, RS-232C signal level, input to terminal. This signal when true (greater than +3 volts), tells the data terminal that it may send serial data out on Pin 2. If Pin 5 is not connected, the true condition is assumed by the APT.

Pin 19: Clear to Receive, RS-232C signal level, output from terminal. This signal when true (greater than +3 volts), tells the computer that the data terminal is ready to receive serial data on Pin 3. The terminal changes this signal to false (less than -3 volts) when its receive buffer of 124 characters is within 12 characters of being full. The computer must stop transmitting characters within 8 character time intervals after this signal goes false. The computer should not send any additional characters until Clear to Receive is again true. This occurs when the APT's receive buffer is within 16 characters of being empty. This signal is recommended for baud rates greater than 1200, if the XON/XOFF protocol is not used.

Pin 20: Data Terminal Ready, output, RS-232C true signal level (pulled to +12 volts through a 3K resistor) to indicate to the computer system that the APT is powered on.

Table 4: APT Interconnections to RS-232C Equipment

APT Interface Connector Pin #	Signal Name Pin #	RS-232C Interface
DTE {	1 GROUND	1
	2 TRANSMITTED DATA	2
	3 RECEIVED DATA	3
	5 CLEAR TO SEND	5
	7 GROUND	7
	20 DATA TERMINAL READY	20
} DCE		
DCE {	13 GROUND	1
	15 TRANSMITTED DATA	2
	16 RECEIVED DATA	3
	17 CARRIER DETECT	5
	14 GROUND	7
} DTE		

NOTES:

1. DTE - Data Terminal Equipment
2. DCE - Data Communication Equipment
3. APT Interface Connector - 25-Pin male, D-Type
4. DTE Interface Connector - 25-Pin male, D-Type
5. DCE Interface Connector - 25-Pin female, D-Type
6. The RS-232C standard does not provide for the APT's data terminal Clear to Receive signal. Clear to Send can be used at data rates above 1200 baud by providing an additional conductor in the cable, or XON/XOFF protocol handshaking can be enabled in the APT and supported in the host computer system.

CHAPTER 8 — APT CONTROL COMMANDS

Your APT has functions which can be implemented with CONTROL or ESCAPE command sequences. These commands allow host computers or the keyboard to dynamically control many of the APT's operating modes and display functions.

Some of these control functions require special parameters for correct operation and certain syntax conventions apply. If incomplete or invalid commands are received, the APT will ignore the command and will return to normal display of data.

In this text the name of each command supported by the APT will be given followed by the default control sequence that will invoke that command. The default commands listed contain spaces for clarity only. *Do not* include spaces when the command is used.

Where applicable, characters in parenthesis next to the control command represent the ASCII command title abbreviation. They are not part of the command. For example, RETURN has a CTRL/M command and an ASCII command title abbreviation (CR) for "Carriage Return".

Each of the 39 commands listed are redefinable enabling the APT to accommodate different hosts. The set of redefined commands can be saved within a terminal type and the terminal type assigned to a directory entry. Up to nine unique terminal types can be saved. Some control commands have numeric arguments. While control command sequences are definable their arguments are fixed and cannot be redefined.

The commands are presented in the order they are displayed by selecting DEFINE CONTROL FUNCTIONS, 2.2.3.

1 — RETURN CTRL/M (CR)

Causes the cursor to move to the first location on the current line.

2 — LINE FEED CTRL/J (LF)

Causes the cursor to move downward on the screen to the next row. The information on the screen will remain stationary until the last row on the screen is reached. At this point the screen will scroll upward one line and the cursor will be positioned at the same character position on the new blank bottom row. If the status line is off, there will be 24 rows of display. When the status line is on, there are 22 rows of display.

3 — BELL CTRL/G (BEL)

Causes the bell tone to be sounded.

4 — BACKSPACE CTRL/H (BS)

This command non-destructively moves the cursor position one character to the left. If the cursor is backspaced past the first location on a line, it will be placed in the last position of the previous line. If the cursor is at the first position of the first row of the display then, when the backspace command is received, it will "wrap around" to the last position of the bottom line.

5 — CURSOR CONTROL ESC ESC C *n*

where *n* = one of: 0, 1, 2, 3, 4, 5, 6, 7

- 0 - Cursor OFF
- 1 - Cursor ON
- 2 - Cursor Blink
- 3 - Cursor Solid
- 4 - Cursor Save
- 5 - Cursor Restore
- 6 - Cursor Read
- 7 - Cursor Report

With a parameter of 0, 1, 2 or 3, the visual trait of the cursor can be controlled. 0 turns the cursor off, giving no apparent location on the display. 1 turns the cursor on, displaying it at the current active location. 2 and 3 control whether the cursor will be blinking or solid (non-blinking) respectively.

Parameters 4, 5, 6 and 7, provide control over other cursor functions. See the description of these commands below.

6 — CURSOR UP ESC A

This command causes the cursor to move one line upward non-destructively. If the cursor position is on the top line, this command will cause the cursor to wrap-around to the bottom line.

7 — CURSOR DOWN ESC B

The cursor position is moved down one line non-destructively. If the cursor is on the bottom line, the cursor will wrap-around to the same character position on the top line of the display.

8 — CURSOR RIGHT ESC C

This command causes the cursor to be moved one position to the right non-destructively. If the cursor is moved past the last location on a line, it will be placed on the first position of the next line. If the cursor is moved past the last location of the last line, the cursor will wrap-around to the first character position on the top line.

9 — CURSOR LEFT ESC D

Functions the same as the BACKSPACE Command.

10 — CURSOR HOME ESC H

Moves the cursor non-destructively to the first character position on the top line of the display. This is commonly called the cursor HOME location.

11 — CURSOR TAB CTRL/I (HT)

Causes the cursor to move non-destructively to the next TAB position. The TAB stops are set at every 8th location on a line, giving a total of 10 stops across the video screen in the 80 character per line mode, or 5 stops across the screen in the 40 character mode.

The TAB function is very useful in applications where columns of data and special formatting of information is needed. Numerical outputs are normally arranged with TAB stops to make the display of information easier to read and comprehend.

12 — CURSOR REPORT ESC a

On receipt of this command, the APT responds by automatically returning the current location of the cursor. The following sequence is sent to indicate the row and column location of the cursor:

rc<EOM>

where:

r - ASCII code for cursor row

c - ASCII code for cursor column

<EOM> - the currently defined End of Message

The ASCII code coordinate system used to specify row, column information is the same as described for the CURSOR ADDRESS Command.

For *r* and *c* ASCII designation see Appendix G.

13 — CURSOR READ ESC r

Causes the APT to return the character at the current cursor location. The sequence returned is:

a<EOM>

where:

a - the ASCII character at the cursor

<EOM> - the currently defined End of Message

The cursor is not advanced by this command. When used in conjunction with other cursor movement commands, this function allows a host computer to read any or all of the characters currently on the APT's display.

NOTE: This command will send back ASCII coded characters only. If an attributed character is read, the APT will send the equivalent non-attributed ASCII character as its reply.

14 — CURSOR SAVE ESC s

Causes the APT to remember the present row, column screen location of the cursor. This command allows "intelligent programs" to control the APT's cursor position and restore it to a previously saved location by using the CURSOR RESTORE command.

NOTE: The default saved location is HOME.

15 — CURSOR RESTORE ESC t

Causes the APT to position the cursor at the location saved by the last CURSOR SAVE command.

16 — CURSOR ADDRESS

ESC Y *rc*

where:

- r* - ASCII character for video display row
- c* - ASCII character for video display column

This command allows the cursor to be positioned at any row, column location on the screen under computer control. This feature can be very important when the APT is connected to intelligent programs that can utilize cursor addressing to speed up and enhance the display and entry of information. When using cursor addressing the video screen is organized as a grid of locations. The HOME position at the upper left hand corner of the display is defined as the origin, that is, the 0,0 location. The *rc* command parameters stand for two ASCII characters that define the desired row, column display location to the APT. These characters range from the ASCII code for "SPACE" to "o". If an invalid address is specified (i.e. the row or column data is too large) the cursor will be moved to the maximum possible row or column location. In the 80 character per line display format, there are 80 column positions, while in the 40 character per line mode there are 40. If the status line is off, the APT has 24 rows which can be addressed. However, if the status line is on, then the APT has only 22 rows available.

See Appendix G for Tables listing the ASCII characters used to determine cursor row, and column addressing.

17 — CLEAR SCREEN

ESC j

This command will cause the APT to clear the entire video screen (fill with space characters) and HOME the cursor to the first position on the top line. If the status line is on, it will not be cleared.

18 — ALT CLEAR SCREEN

CTRL/L (FF)

Same as the CLEAR SCREEN Command.

19 — CLEAR END OF LINE

ESC K

When this command is executed, the character at the cursor and all characters on the current line to the right of the cursor are cleared. The cursor position is not changed.

20 — CLEAR END OF SCREEN

ESC J

This command causes the APT to clear the video screen from the current cursor position to the end of the screen. The cursor position is left unchanged.

21 — DELETE CHARACTER

ESC Q

On receipt of this command, the character at the cursor position is deleted and all characters on the line to the right of the cursor are move one character position to the left. The last position on the line is cleared. The cursor location is unchanged by this command.

22 — INSERT CHARACTER

ESC P

On receipt of this command, the character at the cursor and all characters to the right of the cursor are moved one character position to the right. A space is created at the cursor position. Any character shifted past the last column of the display is lost. The cursor location is unchanged by this command.

23 — DELETE LINE

ESC M

On receipt of this command, the line the cursor is on is deleted from the display and all lines below it scroll upward. The cursor is moved to the first column of the same row it was on.

24 — INSERT LINE

ESC L

On receipt of this command, an entire new line of spaces is inserted at the present row the cursor is on. The line the cursor was on and all lines below it scroll down one row. The last line of the display is lost (row 24 if status line off, row 22 if status line on).

25 — ATTRIBUTE CONTROL ESC ESC S *n*

where *n* = one of: 0, 1, 2, 3, 4, 5, 6, 7

- 0 - Attribute Flag Off
- 1 - Attribute Flag On
- 2 - Normal Characters
- 3 - Reverse Video Characters
- 4 - Blinking Characters
- 5 - Blinking Reverse Video Characters
- 6 - Graphics
- 7 - Blinking Graphics

Parameters of 0 and 1 are used to establish which characters on the screen are to be modified by the screen attribute. All characters received after the Attribute Flag On Command will be modified by the screen attribute in effect. All characters received after the Attribute Flag Off Command will not be effected by the the screen attribute.

Parameters 2, 3, 4, 5, 6 and 7, are used to select the current screen attribute which will modify all attribute flagged characters. The Normal Characters attribute will force all attributed characters to appear as normal characters. This allows the creation of special visual effects by switching normal looking text, which has been attributed, to some other attribute mode.

The Reverse Video Characters attribute will cause all attribute flagged characters to appear as dark characters within a lighted character block. Many times this is used to create a contrasting display area to draw attention to important data, or to signify data to be entered.

The Blinking Characters attribute will cause all attributed characters to blink two times a second.

The Blinking Reverse Video Characters attribute will create blinking dark characters within a lighted character block.

The Graphics attribute allows the APT to create block type images. When this mode is enabled, attributed characters are displayed as a graphics character made up of a 2 x 3 element graphics matrix. See Appendix F for a list of graphic characters.

The Blinking Graphics attribute will function similarly to the Graphics attribute, but will also cause the graphic characters to blink.

NOTE: In order for graphic characters to be displayed correctly, the APT does a character translation when the graphics mode is enabled. Thus, if the attribute is changed from graphics to another selection, unexpected display characters may appear where graphics characters existed.

26 — ATTRIBUTE ON CTRL/N (SO)

Same as the ATTRIBUTE CONTROL 0 command.

27 — ATTRIBUTE OFF CTRL/O (SI)

Same as the ATTRIBUTE CONTROL 1 command.

28 — DISPLAY CONTROL ESC ESC D *n*

where *n* = one of: 0, 1, 2, 3

- 0 - Display OFF
- 1 - Display ON
- 2 - 40 Character Display Format
- 3 - 80 Character Display Format

The display can be turned on or off using parameters 0 and 1. They can be used in applications where it is desireable to turn the video screen off, fill the display with data, and then turn the screen back on to present the information all at once.

Parameters 2 and 3 can be used to control the display screen format, causing either a 40 character per line or an 80 character per line format to be established. When a display format command is received, the display will be cleared and the cursor moved to HOME.

29 — 80 CHARACTER DISPLAY ESC I
 FORMAT

This command sets the screen format to 80 characters per line. It is the same as the DISPLAY CONTROL 3 command.

30 — 40 CHARACTER DISPLAY ESC m
 FORMAT

This command sets the screen format to 40 characters per line. It is the same as the DISPLAY CONTROL 2 command.

31 — KEYBOARD CONTROL ESC ESC K *n*

where *n* = one of: 0, 1, 2, 3

- 0 - Keyboard Disable
- 1 - Keyboard Enable
- 2 - Keybeep Off
- 3 - Keybeep On

The keyboard on the APT can be turned off and on under program command, by using parameters 0 and 1 respectively. This provides control over all key entries and can prevent unwanted keyboard input from effecting program execution.

Parameters 2 and 3 allow the key-press beep to be enabled or disabled under program control.

NOTE: When the keyboard is disabled, the only way to enable it again manually is by powering the APT off, then back on.

32 — KEYBOARD DISABLE ESC b

Same as the KEYBOARD CONTROL 0 command.

33 — KEYBOARD ENABLE ESC c

Same as the KEYBOARD CONTROL 1 command.

34 — PRINTER ON CTRL/R (DC2)

Turns on the parallel printer port. All characters received by the APT after this command will be sent to the printer as well as to the display.

35 — PRINTER OFF CTRL/T (DC4)

Disables the printer port.

36 — PAGE DUMP ESC O

Causes the contents of the display screen to be dumped to the printer port. This command does not effect the current state of the printer port (on/off).

37 — TERMINAL ENQUIRY ESC I

Causes the APT to transmit the TERMINAL ENQUIRY ANSWER string of ASCII characters, which is definable by the user. The default TERMINAL ENQUIRY ANSWER response is:

#RC2<CR>

38 — MODEM CONTROL

ESC ESC M *n*

where *n* = one of: 0, 1, 2, 3, 4

0 - On Hook

1 - Auto Dial *

2 - Auto Answer Off *

3 - Auto Answer On *

4 - Modem Status Report

* Only functions in DIRECT mode.

With these commands the internal modem and telephone interface of the APT can be controlled. Parameter 0 forces the APT to hang up the telephone line putting it into the ON HOOK state.

Parameter 1 permits a computer connected to the RS-232 interface of the APT to do automatic dialing of the telephone. This function requires an additional string of ASCII characters be sent to the APT, which inform it of the number and call type being made. This string can contain up to 63 characters, and must be terminated with a (CR). If the string fails to meet these requirements, the APT will ignore the entire command, and resume normal operation. The format of this command is:

ES ES M 1 D [T,P] [number] [O,A,V] (CR)

where:

D - Dial command

T - Tone dial mode

P - Pulse dial mode

number - Number to be dialed

O - Originate type data call

A - Answer type data call

V - Voice call

The D is required as the first character of the string to tell the APT to begin the dialing process. If AUDIO ENABLE has been selected ON as a set-up configuration, the dialing will be heard from the built in speaker of the APT. If the status line is on, it will indicate that dialing has begun.

T and P are optional mode switches that can force the APT into either the (T)one or (P)pulse method of dialing. If neither of these switches occur, the APT will dial with the method selected by the DIAL METHOD configuration set-up. These switches can occur anywhere within the number sequence and can be used to alter the dialing method during the dial. See section on ENTER NUMBER for more details.

The number can be any valid telephone number using digits 0-9.

Also, pause characters can be used to suspend or halt the dialing process to accommodate the special requirements of some phone systems and networks. The valid pause characters are:

, - 2 second pause

. - 5 second pause

/ - wait for any keypress

The characters O, A and V are switches which inform the APT of the type of call being made. They should be included at the end of the number to be dialed to switch the APT into the appropriate call type waiting mode. The O call is an originate data call. After the number has been dialed, the APT will wait for an answer carrier to be received. If a carrier is found, the APT will enable its originate carrier and thus establish a data communications link with the number called. If no answer carrier is found, the APT will hang up the phone line after the delay time has elapsed. This delay time is selected by the ANSWER DELAY configuration set-up. In either case, the APT will send back to the direct connect computer a MODEM STATUS Reply to inform it of the success or failure of the call.

The A switch works similarly to the O switch, except that the APT sends out an answer carrier and waits for an originate carrier to be received from the number called.

The V switch tells the APT that a voice call is being made. In this case, no carrier is looked for and the APT will wait for the ANSWER DELAY time to expire, then disconnect the phone line and return the MODEM STATUS Reply.

All of the call types can be terminated during the waiting period by pressing any key on the keyboard. If this occurs, the APT will abort the wait, hang up the phone line and return the MODEM STATUS Reply. To keep keypresses from terminating these telephone calls, the KEYBOARD DISABLE command can be used to lock out all keyboard entries until the APT has returned the MODEM STATUS. Then, the KEYBOARD ENABLE command can be given to re-activate keyboard operation.

NOTE: When the APT is put into the auto dial mode, it suspends normal terminal operations. The APT will continue to receive data via the RS-232 interface until its buffer becomes full, and then it will signal that no more data can be accepted. Therefore in order to insure proper operation of this mode, handshaking must be used.

Parameter values of 2 and 3 are used to control the APT's auto answer capabilities. Auto Answer Off, which is the default condition, disables the APT's auto answer function from operating. When Auto Answer On has been selected, the APT will automatically answer any telephone calls that it receives, set its answer carrier, and wait for an originate carrier to be found. If it finds a carrier, the APT will set up a data communications link, and then resume normal operation. If no carrier is found after waiting the specified ANSWER DELAY time, the APT will hang up the telephone line and return to normal online operation. Once auto answer has been enabled, it will stay in effect until either the Auto Answer Off command is received or until the APT is reset by power off or by a RESET key sequence.

NOTE: While the APT is waiting for a carrier to be detected, after answering an incoming telephone call, all normal terminal operations are suspended. If this auto answer mode of operation is anticipated, then the APT must be used in a handshaking interface mode. The APT will continue to receive characters from the RS-232 interface until its buffer fills up, and then signal that it can no longer receive any data. When the auto answer function has been completed, the APT will return to normal operation and continue receiving data from the RS-232 interface.

Parameter value 4 is used to interrogate the status of the APT's telephone modem. This command allows the computer to find out the current condition of the communications link. The APT also sends this modem status after an auto dial command has been completed. The modem status response is as follows:

n <EOM>

where n = one of: 0, 1, 2

0 - No Carrier, the telephone line is on-hook

1 - Carrier Detected, the link is established

2 - Accoustic Coupler, the APT can't Auto Dial or Auto Answer

<EOM> - The currently defined End of Message

NOTE: While on-line, the APT will automatically hang up the phone line if the data link carrier is lost. If auto answer has been enabled, the APT will remain in that mode and continue to answer incoming telephone calls.

39 — DEFINE FUNCTION KEY ESC ESC F *n a* [DATA]
where:

n - Function Key Number (1-8)

a - ASCII Coded Character Count of [DATA]

[DATA] - ASCII Data to store in Function Key

This command allows the computer to load the programmable function keys of the APT. This is a very desirable feature to have where the computer can load the function keys with special strings of data, commands, or characters and then have the terminal user simply press one or more of the function keys to satisfy program input requirements. The *n* parameter signifies which function key is to be programmed. Valid numbers are from 1 to 8. The *a* parameter is an ASCII encoded character count that tells the APT how many characters the [DATA] string contains. This character count code is derived from the same Table used for the CURSOR ADDRESS command, Appendix G. The maximum number of characters that can be programmed into a function key is 31. If the *a* parameter is zero (ASCII character SPACE), the function key will be cleared. If either the *n* or *a* parameter is an invalid value, the APT will ignore the command, and all the [DATA] characters will be processed as if they were normal characters sent to the terminal.

The [DATA] sequence is the actual data that will be loaded into the function key. Any combination of ASCII characters can be used, including the ASCII Control Code characters (The only exception is NULL, ASCII 00). As an example, to load function key 4 with the string "This Is An Example." the command sequence would be:

ESC ESC F 4 3 This Is An Example.

where:

4 - Function Key 4

3 - ASCII Coded Character Count for 19 characters, see Appendix G

This Is An Example. - The string to be programmed

Remember — the spaces are only for clarity and are not included in actual use, except for the spaces in the [DATA] string.

SPECIFICATIONS

Display

Screen Format 24 lines of either 80 or 40 characters. Control sequence or menu selectable.

Character Format 5 x 7 dot matrix in a 7 x 8 dot block. Descenders for lower case characters.

Display Mode Menu selectable; Execute Command On, Execute Command Off, Command Display.

Characters Available 52 upper and lower case alphabetic; 10 numeric; 32 punctuation and math; 1 blank. 33 graphic control characters (Command Display mode only).

Cursor Blinking or Solid; Menu Selectable. Blinking, Solid, On/Off; Control sequence selectable.

Page Attribute Selected attributed characters on each page may be: Blinking; Reverse Video; a 2 x 3 Graphic Pattern; Blinking Reverse Video; Blinking Graphics; or Normal.

Status Line Non-scrolling 24th line display of current terminal status with 23rd line blank. 23rd and 24th lines menu selectable for data display.

Scrolling Soft - Modem Mode. Character Line - Direct Mode.

User Definable Control Sequences

Cursor Up, Down, Left, Right, Return, Home, Linefeed, Backspace, Tab, Address Position, Report Position, Save Position, Read Character at Position, Restore to Saved Position.

Display 80/40 characters per line. Display On/Off.

Printer On/Off. Page Dump to Printer.

Keyboard Enable/Disable. Key Beep On/Off.

Attributes On/Off. Blinking, Reverse, Blinking Reverse and Normal Video. Graphics and Blinking Graphics. (64 available graphics characters.)

Modem/Telephone Interface On Hook, Modem Status Report. Plus Auto Dial, Auto Answer in Direct Mode only.

Edit Clear Screen, Alternate Clear Screen, Clear to End of Line, Clear to End of Screen, Insert Character, Delete Character, Insert Line, Delete Line.

Miscellaneous Terminal Enquiry, Define Function Key.

Keys and Keyboard

Format:

58-key alphanumeric typewriter keypad — includes two user keys to initiate special terminal functions. Functions menu selectable.

16-key numeric keypad — includes F1, F2, F3, F4 function keys.

Keyswitches:

VP-4801 — Full stroke, sculptured.

VP-3801 — Flexible Membrane, Polycarbonate.

Key Life Greater than 10 million operations.

Character Set:

Upper/Lower Case — 95 printable, 33 control. 128 total.

Upper Case Only — 69 printable, 33 control. 102 total.

Key Repeat Automatic when key held longer than 1 sec.

Break Key Causes 200 msec transmission of binary zero.

Control Keys Backspace; Line Feed; Escape; Return; Tab.

Special Keys User (2); Control; Shift (2); Functions (4).

Audio

Keypress Tone Menu or control command selectable, 25 msec, 1 kHz.

Bell Tone 100 msec. 2 kHz.

Keypress Overrun Error Tone 25 msec, 2 kHz.

Volume Control Rear panel. Finger-tip adjustable.

Phone Line Monitor Audio monitoring of Dial Tone; Ring; Answering Modem; Answering Party. Menu-enabled/disabled.

Audio Output Built-in speaker.

Display Output

TV RF modulated to Channel 3 or 4, menu selectable. RCA Phono connector output jack. 10' Phono to Phono 75 ohm cable, antenna isolation switch and Phono to "F" adaptor included. Suitable for displaying 40 characters per line.

Monitor Video output. 1 V p-p into 75 ohms. RCA Phono connector output jack. Phono to BNC monitor adaptor included. Suitable for displaying 80 or 40 characters per line.

Type NTSC compatible, composite monochrome.

User Control

Operating Mode Menu Selectable.

Modem Mode — Standalone Timesharing. No interface connections.

Direct Mode — Communication/Computer Interface. Computer may be directly connected to APT's terminal/modem via Expansion Interface Connector. Computer may be used to control Auto-Dial and Auto-Answer.

Function/Configuration Selected by ROM resident, on-screen menus. Controlled functions include:

Auto Dial-Up	Directory Maintenance
Auto Log-On	Terminal Password Protection
Auto Answer	Terminal Configuration*
User Key Definition	Modem Configuration

* 9 user definable terminal personalities plus one RCA defined default personality. Configuration specified for a directory entry is automatically recalled when a data call is made.

Memory

Page Storage RAM. One page of 80:24 or 40:24 format.

Directory, Logon, Setup Non-volatile RAM (internal power backup) 48 hour minimum protection (fully charged backup). RAM is powered and backup recharging whenever unit is connected to power, power switch on or off.

Function Keys RAM. 8 total (includes F1 thru F4 and Shift F1 thru F4). User or host definable. 31 characters each maximum.

Data Transmission and Reception

Method Asynchronous, serial-by-bit, serial-by-character, ASCII.

Format Menu selectable. 1 start bit; 7 or 8 data bits; None or 1 parity bit (odd, even, mark, or space); 1 or 2 stop bits.

Full/Half Duplex Local echo Off/On.

Handshaking CTS/CTR. XON/XOFF (Menu selectable; 1-Way, 2-Way, Off).

Data Rate:

Modem Mode — 110 or 300 Baud. Menu Selectable.

Direct Mode — 110, 300, 600, 1200, 2400, 4800, 9600 Baud. Menu Selectable. Handshaking recommended above 1200 baud.

Expansion Interface

Pinouts RS-232 signal levels, Terminal and Modem I/O signals. DB25 connector.

Modem

Type Bell 103 compatible, 110 or 300 Baud, direct connect.

Phone Interface:

Direct Connect — RJ11C Jack.

Acoustic — Requires RCA VP-3001AC Acoustic Coupler. Terminal senses coupler and switches from auto dialing to prompted dialing.

Modes Originate/Answer — with auto-dial and auto-answer.

Auto Dial Pulse or Dual Tone. Menu selectable.

“A” Line Simulation Allows use on single or multi-line systems. Rear panel switch selectable.

Printer Interface

Type Parallel. Centronics type.

Connector 34-pin Card Edge. 17 pins per side. 0.1 in. spacing.

Indicators

Carrier Detect (MODEM Mode) LED “On”.

Clear to Send (DIRECT Mode) LED “On”.

Bell Audible Tone.

Power

Input 120 V, 60 Hz, 14 W, nominal. UL listed, wall receptacle type, power supply.

Physical

Size 17" L x 7" D x 2" H approx. **Shipping Weight** 6 lbs. approx.

Accessories

Printer Cable Ribbon. 34-pin Card Edge to 36-pin connector. VP-3001PCB.

Acoustic Coupler VP-3001AC

“D” Connector 25-pin, male. VP-626.

CONTROL COMMAND FORMAT — SUMMARY

COMMAND	DEFAULT SEQUENCE
RETURN	CTRL/M (CR)
LINEFEED	CTRL/J (LF)
BELL	CTRL/G
BACKSPACE	CTRL/H (BS)
CURSOR CONTROL	EC EC C <i>n</i>
where <i>n</i> = one of: 0, 1, 2, 3, 4, 5, 6, 7	
0 - OFF	
1 - ON	
2 - BLINK	
3 - SOLID	
4 - SAVE	
5 - RESTORE	
6 - READ (Returns: <i>a</i> <EOM> where <i>a</i> = ASCII Char at Cursor)	
7 - REPORT (Returns: <i>rc</i> <EOM> where <i>rc</i> = Row, Column ASCII Char Code)	
CURSOR UP	EC A
CURSOR DOWN	EC B
CURSOR RIGHT	EC C
CURSOR LEFT	EC D
CURSOR HOME	EC H
CURSOR TAB	CTRL/I (HT)
CURSOR REPORT	EC <i>a</i> (Returns: <i>rc</i> <EOM>)
CURSOR READ	EC <i>r</i> (Returns: <i>a</i> <EOM>)
CURSOR SAVE	EC <i>s</i>
CURSOR RESTORE	EC <i>t</i>
CURSOR ADDRESS	EC Y <i>rc</i> (where <i>rc</i> = Row, Column ASCII Char Code)
CLEAR SCREEN	EC <i>j</i>
ALT CLEAR SCREEN	CTRL/L (FF)
CLEAR END OF LINE	EC K
CLEAR END OF SCREEN	EC J
DELETE CHARACTER	EC Q
INSERT CHARACTER	EC P
DELETE LINE	EC M
INSERT LINE	EC L

COMMAND	DEFAULT SEQUENCE
ATTRIBUTE CONTROL	EC EC S <i>n</i>
where <i>n</i> = one of: 0, 1, 2, 3, 4, 5, 6, 7	
0 - OFF	
1 - ON	
2 - NORMAL CHARACTERS	
3 - REVERSE VIDEO CHARACTERS	
4 - BLINKING CHARACTERS	
5 - BLINKING REVERSE VIDEO CHARACTERS	
6 - GRAPHICS	
7 - BLINKING GRAPHICS	
ATTRIBUTE ON	CTRL/N (SO)
ATTRIBUTE OFF	CTRL/O (SI)
DISPLAY CONTROL	EC EC D <i>n</i>
where <i>n</i> = one of: 0, 1, 2, 3	
0 - OFF	
1 - ON	
2 - 40 CHARACTER DISPLAY FORMAT	
3 - 80 CHARACTER DISPLAY FORMAT	
80 CHARACTER DISPLAY FORMAT	EC 1
40 CHARACTER DISPLAY FORMAT	EC m
KEYBOARD CONTROL	EC EC K <i>n</i>
where <i>n</i> = one of: 0, 1, 2, 3	
0 - DISABLE	
1 - ENABLE	
2 - BEEP OFF	
3 - BEEP ON	
KEYBOARD DISABLE	EC b
KEYBOARD ENABLE	EC c
PRINTER ON	CTRL/R (DC2)
PRINTER OFF	CTRL/T (DC4)
PAGE DUMP	EC O
TERMINAL ENQUIRY	EC I (Default answer is #RC2<CR>)

COMMAND	DEFAULT SEQUENCE
MODEM CONTROL	EC EC M <i>n</i>
where <i>n</i> = one of: 0, 1, 2, 3, 4	
0 - ON HOOK	
*1 - AUTO DIAL (Returns Status)	
Followed by:	
D [T, P] [number] [O, A, V] (CR):	
where:	
D - DIAL	
[T, P] - OPTIONAL DIAL MODE, TONE OR PULSE	
[number] - NUMBER TO BE DIALED	
[O, A, V] - ORIGINATE, ANSWER OR VOICE TYPE CALL	
<CR> - CARRIAGE RETURN IS THE DIAL STRING TERMINATER	
*2 - AUTO ANSWER OFF	
*3 - AUTO ANSWER ON	
4 - MODEM STATUS (Returns Status)	
Status Reports:	
0<EOM> - NO CARRIER	
1<EOM> - CARRIER	
2<EOM> - ACOUSTIC COUPLER	
*Only valid in direct connect mode	
DEFINE FUNCTION KEY	EC EC F <i>na</i> [data]
where:	
<i>n</i> - FUNCTION KEY NUMBER (1-8)	
<i>a</i> - ASCII CODED CHARACTER COUNT OF [data]	
[data] - ASCII DATA TO BE PROGRAMMED INTO FUNCTION KEY	
Examples:	
To dial number 123-4567 as an originate call the sequence would be:	
EC EC M 1 D1234567O<CR>	
To program Function Key 1 with the string "This is Fkey 1" the sequence would be:	
EC EC F 1.This is Fkey 1	

APT KEYPRESS/ASCII CHARACTER OUTPUT

The tables on the following 2 pages give the APT output response to each keypress with:

- Alpha Lock On
- Alpha Lock Off
- Shift Key Depressed
- Control Key Depressed
- Shift and Control Keys Depressed

The final page of Appendix C is a definition of non-ASCII symbols used in the table.

APT Key Press/ASCII Character Output

Valid for line/local mode only. Not valid in menu mode.

APT KEY	0	0	0	1	1	CONTROL
	0	0	1	0	1	SHIFT
	OFF	ON	X	X	X	ALPHA LOCK
A	a	A	A	SOH	<i>a</i>	
B	b	B	B	STX	<i>nv</i>	
C	c	C	C	ETX	<i>c</i>	
D	d	D	D	EOT	<i>d</i>	
E	e	E	E	ENQ	<i>nv</i>	
F	f	F	F	ACK	<i>nv</i>	
G	g	G	G	BEL	<i>nv</i>	
H	h	H	H	BS	<i>h</i>	
I	i	I	I	HT	<i>nv</i>	
J	j	J	J	LF	<i>nv</i>	
K	k	K	K	VT	<i>nv</i>	
L	l	L	L	FF	<i>l</i>	
M	m	M	M	CR	<i>m</i>	
N	n	N	N	SO	<i>nv</i>	
O	o	O	O	SI	<i>o</i>	
P	p	P	P	DLE	<i>p</i>	
Q	q	Q	Q	DC1	<i>nv</i>	
R	r	R	R	DC2	<i>nv</i>	
S	s	S	S	DC3	<i>nv</i>	
T	t	T	T	DC4	<i>nv</i>	
U	u	U	U	NAK	<i>nv</i>	
V	v	V	V	SYN	<i>nv</i>	
W	w	W	W	ETB	<i>nv</i>	
X	x	X	X	CAN	<i>x</i>	
Y	y	Y	Y	EM	<i>nv</i>	
Z	z	Z	Z	SVB	<i>nv</i>	
0	0	0	0	<i>nv</i>	<i>nv</i>	
1	1	1	!	<i>nv</i>	<i>nv</i>	
2	2	2	"	<i>nv</i>	<i>nv</i>	
3	3	3	#	<i>nv</i>	<i>nv</i>	
4	4	4	\$	<i>nv</i>	<i>nv</i>	
5	5	5	%	<i>nv</i>	<i>nv</i>	
6	6	6	&	<i>nv</i>	<i>nv</i>	
7	7	7	'	<i>nv</i>	<i>nv</i>	
8	8	8	(	<i>nv</i>	<i>nv</i>	
9	9	9	)	<i>nv</i>	<i>nv</i>	

APT Keypress/ASCII Character Output

APT KEY	0	0	0	1	1	CONTROL
	0	0	1	0	1	SHIFT
	OFF	ON	X	X	X	ALPHA LOCK
:	:	:	*	<i>nv</i>	<i>nv</i>	
:	:	:	+	<i>nv</i>	<i>nv</i>	
:	:	:	<	FS	<i>nv</i>	
:	:	:	=	GS	<i>nv</i>	
.	.	.	>	RS	<i>nv</i>	
/	/	/	?	US	<i>nv</i>	
[	[	[	{	<i>nv</i>	<i>nv</i>	
\	\	\	:	<i>nv</i>	<i>nv</i>	
]	]	]	}	<i>nv</i>	<i>nv</i>	
^	^	^	~	NUL	<i>nv</i>	
DELETE	DEL	DEL	_	DEL	<i>nv</i>	
@	@	@	'	NUL	<i>nv</i>	
(SPACE)	SP	SP	SP	<i>nv</i>	<i>nv</i>	
RETURN	CR	CR	CR	CR	<i>nv</i>	
LINE FEED	LF	LF	LF	LF	<i>nv</i>	
TAB	HT	HT	HT	HT	<i>nv</i>	
ESCAPE	ESC	ESC	ESC	ESC	<i>rst</i>	
BACK SPACE	BS	BS	BS	BS	<i>nv</i>	
USER 1	<i>uf1</i>	<i>uf1</i>	<i>uf1</i>	<i>uf1</i>	<i>uf1</i>	
USER 2	<i>uf2</i>	<i>uf2</i>	<i>uf2</i>	<i>uf2</i>	<i>uf2</i>	
F1	<i>f1</i>	<i>f1</i>	<i>f5</i>	<i>mc1</i>	<i>nv</i>	
F2	<i>f2</i>	<i>f2</i>	<i>f6</i>	<i>mc2</i>	<i>nv</i>	
F3	<i>f3</i>	<i>f3</i>	<i>f7</i>	<i>nv</i>	<i>nv</i>	
F4	<i>f4</i>	<i>f4</i>	<i>f8</i>	<i>nv</i>	<i>nv</i>	
BREAK	<i>brk</i>	<i>brk</i>	<i>brk</i>	<i>brk</i>	<i>nv</i>	

Notes

1. Top of chart:

- 1 — Key Pressed
- 0 — Key Not Pressed
- X — Don't Care

2. Italicized characters in the table are not ASCII codes. Refer to non-ASCII response list.

APT Non-ASCII Key Press Responses* (Symbols Used in Table)	
<i>a</i>	Alpha Lock (On/Off).
<i>c</i>	Clear Screen and Home Cursor.
<i>d</i>	Dump Display Page to Printer.
<i>h</i>	Home Cursor.
<i>l</i>	Line/Local (Alternate).
<i>m</i>	Menu - Returns to Menu When On-Line.
<i>o</i>	Off Line - Disconnects Telephone Line.
<i>p</i>	Printer Enable (On/Off).
<i>x</i>	Soft Reset.
<i>rst</i>	Reset - Returns to Main Menu. Equivalent to Power On.
<i>brk</i>	Break. 200 msec Transmission of Binary State 0.
<i>mc1</i>	Menu Control 1. Used in Menu Operations, Otherwise <i>nv</i> .
<i>mc2</i>	Menu Control 2. Used in Menu Operations, Otherwise <i>nv</i> .
<i>nv</i>	Non-Valid Key Press. No Output. No Terminal Response.
<i>f1</i> : <i>f8</i>	Function Keys 1 Through 8 - Transmits the ASCII String. Contents of <i>f1</i> Through <i>f8</i> . Default Output is ESC 1 Through ESC 8.
<i>uf1</i>	User Function 1. Menu Defined.
<i>uf2</i>	User Function 2. Menu Defined.
*No ASCII Character is Transmitted Except for Contents of Function Keys <i>f1</i> through <i>f8</i> .	

ASCII CODE TABLE

The following table lists the 128 ASCII characters and their hexadecimal equivalent. The most significant digit of the hexadecimal equivalent appears at the top of the chart.

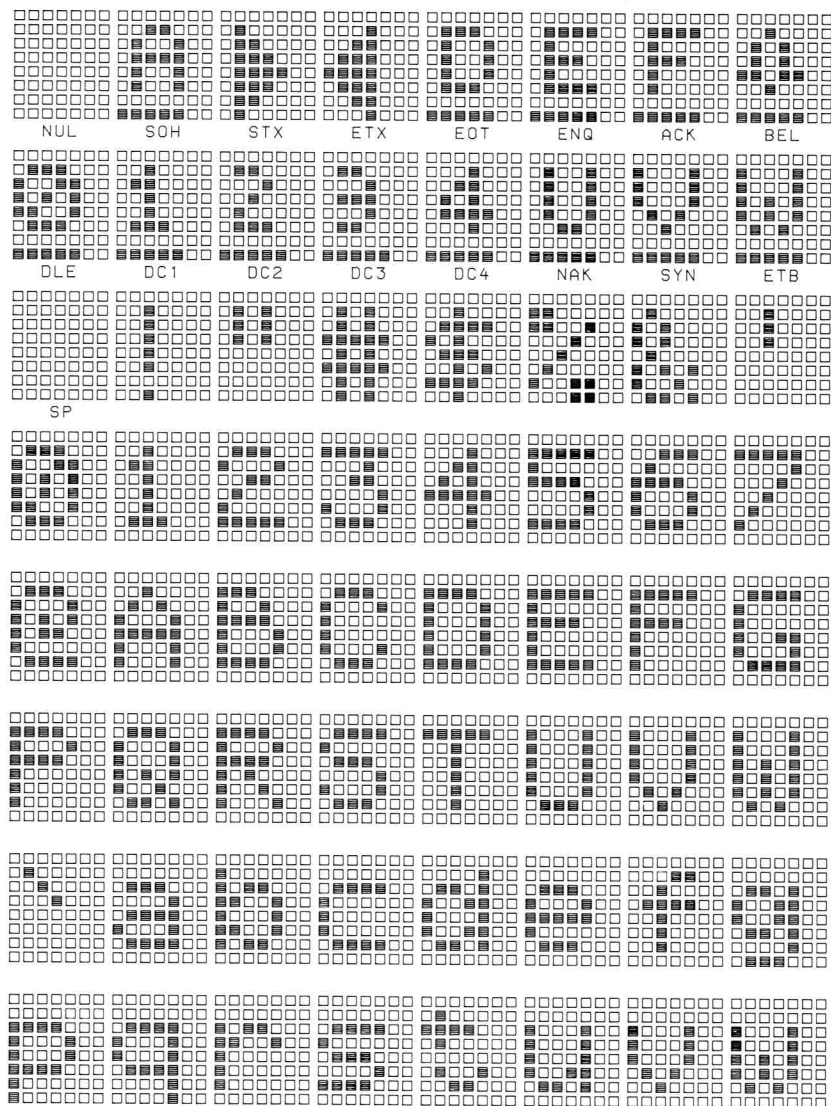
	0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	!
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

Example: Carriage Return (CR) is 0D in hex.

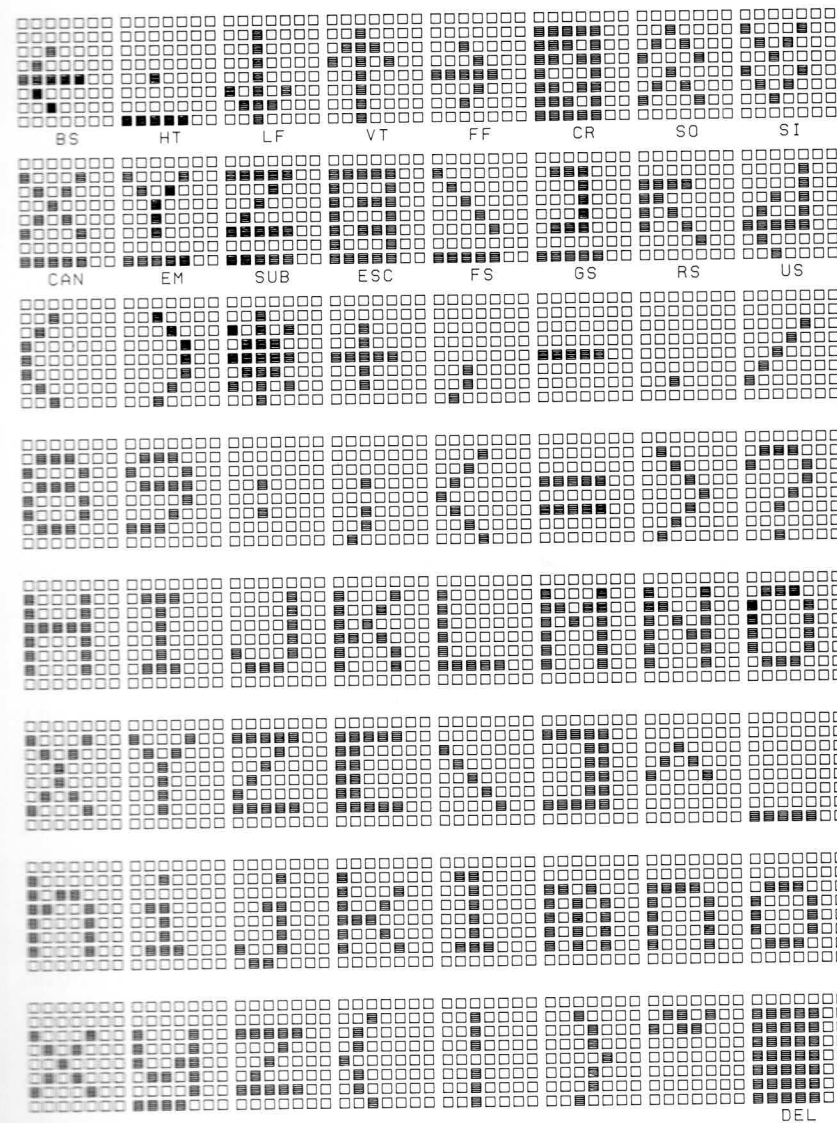
CHARACTER BIT MAPS

The character bit maps displayed for each of the 128 ASCII characters are shown on the following two pages.

Character Bit Maps



Character Bit Maps



GRAPHICS CHARACTERS

Every APT character space is a 7 x 8 matrix. For graphics purposes this character space is divided into 6 blocks as shown in the figure below:

B3 4x3	B0 3x3
B4 4x3	B1 3x3
B5 4x2	B2 3x2

Graphics are created by mapping character blocks on the display.

ASCII characters with their corresponding equivalent graphics character are shown in Table 1 on Pages 132 and 133.

The graphics characters arranged according to patterns with their corresponding equivalent ASCII character are shown in Table 2 on Pages 134 and 135. This table is convenient to use when creating a graphics display.

The graphics characters depicted in these tables are shown assuming equal height and width dot pixels in the 7 x 8 dot matrix. This is approximately the way the graphics character will appear on the display in the 40 characters per line display mode. The aspect ratio of the graphics character may vary dependent on the display's verticle height adjustment. In the 80 characters per line mode the graphics characters will appear one-half the width.

ASCII Characters/Graphics Characters

(space)	!	"	#	\$	%	&	-
0	1	2	3	4	5	6	7
@	A	B	C	D	E	F	G
P	Q	R	S	T	U	V	W

Table 1

Graphics Character shown below the ASCII Character in Table 1 applies ONLY when:

- The Attribute Control is On (EC EC S1),
- The Graphics Attribute is selected (EC EC S6 or EC EC S7).

Then, when the ASCII Character is entered, a Graphics Character will appear on the display in place of the ASCII Character.

()	*	+	,	-	.	/
8	9	:	;	<	=	>	?
H	I	J	K	L	M	N	O
X	Y	Z	[\]	^	_

Graphics Characters/ASCII Characters



































0		(space)
1	 	(! 0 " @ \$
2	 	8 # P & * 1 4 G
3	 	X J 9 + R 6 : 3
	 	1 5 F T — I E L
4	 	G \ / Y U N K =
5	 	W ^ O] ? [
6		—

Table 2

 	 	 	 
, A H %) 2 D			
 			
* C			
 			
Q <			
 	 	 	 
S > 7 Z V M ;			

Graphics Character shown above the ASCII Character in Table 2 applies ONLY when:

The Attribute Control is On (EC EC S1).

and

The Graphics Attribute is selected (EC EC S6 or EC EC S7).

Then, when the ASCII Character is entered, a Graphics Character will appear on the display in place of the ASCII Character.

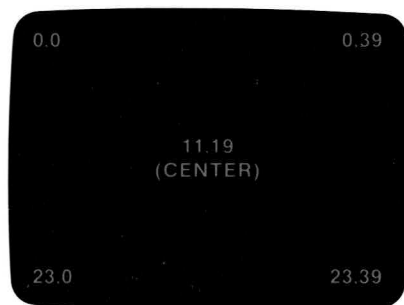
ASCII CHARACTER EQUIVALENTS

Character Count, Row or Column

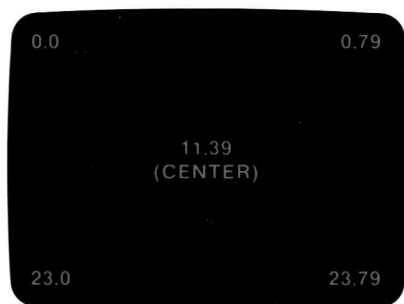
The following table is used in control commands for counting function key characters and row and column screen locations.

Char Count, Row or Column	ASCII Equiv.	Char Count, Row or Column	ASCII Equiv.
0	space	40	H
1	!	41	I
2	"	42	J
3	#	43	K
4	\$	43	L
5	%	45	M
6	&	46	N
7	'	47	O
8	(	48	P
9	)	49	Q
10	*	50	R
11	+	51	S
12	,	52	T
13	-	53	U
14	.	54	V
15	/	55	W
16	0	56	X
17	1	57	Y
18	2	58	Z
19	3	59	[
20	4	60	\
21	5	61]
22	6	62	^
23	7	63	_
24	8	64	`
25	9	65	a
26	:	66	b
27	:	67	c
28	<	68	d
29	=	69	e
30	>	70	f
31	?	71	g
32	@	72	h
33	A	73	i
34	B	74	j
35	C	75	k
36	D	76	l
37	E	77	m
38	F	78	n
39	G	79	o

Some useful row/column display coordinates:



Low Resolution Mode
40 Characters/Line Mode



High Resolution Mode
80 Characters/Line Mode

MEMORY MANAGEMENT

The APT is designed to allow you maximum flexibility in defining terminal personalities and data base directory entries. The APT stores entered data in RAM. If this RAM reaches capacity you will encounter a "MEMORY FULL" message during data definition operations. In this case, APT will automatically delete the data it was trying to save. If this condition happens, you can go through the menus and edit existing entries to shorten the amount of data that is currently saved. Some obvious changes that can be made are:

- A) Shorten directory entry names to more cryptic forms.
- B) Eliminate any unnecessary characters from telephone numbers (i.e. remove brackets, spaces, hyphens, etc., that you may have used for clarity).
- C) If passwords have been used, they can either be eliminated or shortened as well.
- D) Check auto-logon sequences for any non-essential characters.
- E) Eliminate any unused terminal personality types from the terminal directory (this will free up a large amount of storage space).
- F) Use more cryptic terminal personality names.

Memory Allocation

The total amount of storage space available in APT is 2500 characters.

To help you in determining the total amount of data that has been stored in your APT the following table provides an indication of the number of characters required to save particular data entries:

Data Type	Approx. Characters Required
Terminal Personality	117 min - 150 max
Directory Name	5 min - 20 max
Directory Telephone Number	5 min - 68 max
Directory Call Type	8 Constant
Directory Logon	5 min - 132 max
Passwords	5 min - 15 max
Keyboard Dial Telephone Number	5 min - 68 max

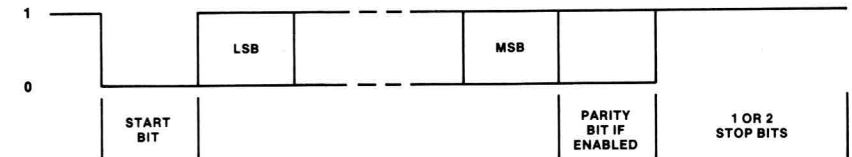
NOTE: Minimum number of characters is that required for memory maintenance.

Function Key Memory

The APT has an independent block of memory set aside for function key definition. This section of memory has no effect on the amount of data that is stored for terminal personalities, directory entires, logons, passwords, etc. You need only be concerned that each of the eight function keys can store 31 characters maximum.

DATA WORD FORMAT

The following data word format applies to characters serially transmitted in both the DIRECT and MODEM modes:



GLOSSARY

Acoustic Coupler — A device that converts modem signals to audible tones that can be picked up by a telephone handset for transmission over telephone lines.

Adapter — A device that converts the electrical connections between two devices. An adapter usually changes the mechanical arrangement of signal connections between two devices as compared to an interface that alters the actual electrical signals.

Alpha Lock — a keyboard mode which enables only upper case alphabetical characters. Other characters including numeric characters operate normally.

Answer Mode — The state of the modem which, by convention, answers the telephone call establishing a communication link. In this state, the modem will transmit in the frequency range 2025-2225 Hz, and receive the frequency range 1070-1270 Hz.

ASCII (American Standard Code for Information Interchange) — A standard 7-bit information code used in the exchange of data between most computers and data terminals.

Asynchronous Transmission — A method of transmitting data in which each transmitted character is preceded by a start bit and followed by a stop bit, thus permitting the time interval between characters to vary.

Auto Answer — A mode of modem operation in which the telephone line is monitored for a ring. When a ring is detected, the modem will automatically answer the call and transmit a carrier, normally the answer carrier.

Baud — A term to express bits per second as the unit of measure of data flow rate. Typical baud rates are 110, 300, 1200, 2400, 4800, and 9600.

Bell 103A — Specification for a modem that divides the telephone voice frequencies into two narrow bands, using each for sending messages in one direction only, thus creating two channels usable at the same time on the same telephone line. See *Duplex, Full*.

Bit — A binary digit representing the smallest unit of data. In the binary numbering system, only two digits or two states are used. 0 and 1 are used to represent the two states. Bits are used in electronics systems to encode information, instructions, and data.

Buffer — A data-storage medium that holds data temporarily.

Byte — Consecutive binary digits, usually eight bits. A byte is used to represent a single character.

Carrier — An analog signal of fixed frequency and amplitude. A carrier is generated and modulated by the modem to represent serial data.

Code — A set of symbols & rules used to represent information.

CPS — Characters per second. Also, an abbreviation used for CompuServe Information Service.

Cursor — A position indicator on a video display indicating the active display position in which data is to be entered or deleted.

Data Communication — The use of a communications system to move messages, information, and files.

Data Terminal — A device which normally consists of a keyboard to input data and a CRT or printer to display output data. A data terminal provides communications to and from a computer or other data transmission device.

Demodulator — The circuits in the modem that convert incoming analog frequencies into bits representing the original data before it was converted to frequencies.

Duplex, Full — Data communications that allow the device at each end to simultaneously transmit and receive.

Duplex, Half — Data communications between two devices allowing only one of the devices to transmit at a time.

EIA Interface — Electronics Industries Association standards for the characteristics of signals used in connecting terminals to modems.

FSK — Frequency shift keying. A form of frequency modulation in which the two possible binary states (1 and 0) are transmitted as two separate frequencies.

Handshaking — A predetermined method to control the communications between two devices such that the devices can receive or transmit data when they are ready. The systems mutually agree when data can be transmitted, thus the term "handshake".

Hard Copy — Typewritten or printer copy of data on paper.

Reverse Video — Characters displayed with black characters on a white background (normally white on black) in order make more visible or noticeable.

Hz — Abbreviation for Hertz (cycles per second), a measurement of frequency.

IC — Generally the abbreviation for integrated circuit.

I/O (Input/Output) — A term used in describing the flow of information to and from a computer or other device.

Linefeed — A signal to advance the cursor or paper by one line.

Line — The mode of terminal operation in which the terminal is connected to the communications channel and is ready to send and receive data. Also known as *On-line*.

Local — The mode of terminal operation in which characters typed will be displayed but not transmitted.

Memory — A device that can store binary bits that represent data. Memory can be addressed to retrieve the data at any time.

Menu — A list of items that are available for selection.

Modem — An acronym for MODulator/DEModulator. A device that transforms a serial data to audible tones for transmission over a telephone lines to another computer or terminal.

Modulator — The circuit in the modem that converts digital signals into analog frequencies for sending out over a telephone line. Also, a device that converts video signals to radio frequency signals for reception by and display on a standard TV set (known as an RF modulator).

Network — A group of data information points that are connected by common communications channels.

On-line — See *Line*. *On-line* frequently implies a telephone connected data link to a host computer.

Originate Mode — The state of the modem which by convention originates the telephone call establishing a communication link. In this state, the modem will transmit in the frequency range 1070-1270 Hz, and receive the frequency range 2025-2225 Hz.

Parallel Port — A port is an electrical interface for transferring data in and out of the computer. A parallel port transfers the data bits of a data word (byte) all at one time. In comparison, a serial port transmits the data one bit at a time.

Parity — Relates to the summation of the binary digits in a data word and is used for transmission error checking. The binary bits are counted before transfer and a bit, called a parity bit, is added to the data word which indicates if the sum was odd or even. The data word and parity bit is then checked on receipt.

Peripheral — Any interface device connected to a computer.

Protocol — A convention used for transmitting data over a communications line.

RS-232C — A standard of interfacing serial data transmission between peripherals, systems, and modems. The Electronic Industries Association (EIA) of America has, by consent of various manufacturers and users, standardized a 25-pin connection with appropriate signal levels called the RS-232 interface.

Serial Interface — A data interface that transmits data words one bit at a time in a group, usually with a start bit indicating the beginning of a data word and a stop bit indicating the end of the data word.

Start Bit — A bit placed in the front of a data word by the sending device indicating the beginning of the data word to the receiving device.

Stop Bit — A bit placed at the end of a data word by the sending device indicating the end of the data word to the receiving device.

String — A serial sequence of ASCII characters.

Time Sharing — The simultaneous access of a computer or data base by more than one user allowing multiple tasks to be performed by the computer.

Upper Case — Capital letters created when the SHIFT key is held down.

User friendly — A term used to describe both hardware and software that is designed to be easy to use, self instructing, error proof, etc.

INDEX

ACOUSTIC COUPLER INTERFACE	78
ADDRESS CURSOR	102, 137, 138
ALPHA LOCK	47, 49
ALTERNATE CLEAR SCREEN (Control Command)	102
ANSWER CARRIER	70, 73, 109
ANSWER DELAY	65
ANTENNA CONNECTION	10
ANTENNA ISOLATION SWITCH BOX	9
ASCII CHARACTER EQUIVALENT COUNT, ROW, COLUMN, TABLE	137
ASCII CHARACTER OUTPUT	121
ASCII CODE TABLE	125
ATTRIBUTE CONTROL (Control Command)	104
ATTRIBUTE OFF (Control Command)	105
ATTRIBUTE ON (Control Command)	105
AUTO ANSWER	71
AUTO DIAL	13, 32, 38, 108
AUTO ENABLE, ON/OFF	65
AUTO LINE END	46
AUTO LOGON	42, 90
AUTO LOGON, EXAMPLE	26, 28
AUTO REPEAT	3
AUTO SCREEN BLANK	46
BACKSPACE (Control Command)	98
BAUD RATE	58, 89
BELL (Control Command)	98
CALL TYPE	39
CARRIER ON/OFF	70
CHANGE MENU VALUES	34
CHANGE SYSTEM PASSWORD	68
CHARACTER BIT MAPS	127

CLEAR	49
CLEAR END OF LINE (Control Command)	102
CLEAR END OF SCREEN (Control Command)	103
CLEAR SCREEN (Control Command)	102
COMMAND SETUP	50
COMMUNICATION SETUP	58
COMMUNICATION TYPE, MODEM/DIRECT	58
CONTROL COMMAND FORMAT SUMMARY	117
CONTROL COMMAND LIST	55
CONTROL COMMANDS	97
CORRECTING DIRECTORY INFORMATION	41
CTS/CTR HANDSHAKING	60, 89, 95
CURSOR ADDRESS (Control Command)	99
CURSOR BLINK/SOLID	46
CURSOR CONTROL (Control Command)	99
CURSOR DOWN (Control Command)	99
CURSOR HOME (Control Command)	102
CURSOR LEFT (Control Command)	100
CURSOR READ (Control Command)	101
CURSOR REPORT (Control Command)	100
CURSOR RESTORE (Control Command)	101
CURSOR RIGHT (Control Command)	99
CURSOR SAVE (Control Command)	101
CURSOR TAB (Control Command)	100
CURSOR UP (Control Command)	99
Connection to a Monitor	8
Connection to a TV Set	9
Connection to a Telephone	13
DATA BITS, 7 or 8	59
DATA WORD FORMAT	141
DEFINE CONTROL FUNCTIONS	52
DEFINE EOM (End Of Message)	51
DEFINE FUNCTION KEY (Control Command)	112

DEFINE FUNCTION KEYS	66
DEFINE TERMINAL INQUIRY ANSWER	56
DELETE CHARACTER (Control Command)	103
DELETE DIRECTORY ENTRY	43
DELETE LINE (Control Command)	103
DELETE TERMINAL TYPE	63
DIALING METHOD	65
DIRECT MODE	58, 87, 94
DISPLAY CONTROL (Control Command)	105
DISPLAY COORDINATES	137, 138
DUMB TERMINAL, The APT as a	51
DUPLEX FULL/HALF	59
EDIT DIRECTORY INFORMATION	20, 36, 43
EDIT EXISTING DIRECTORY INFORMATION	43
EIGHTY CHARACTER DISPLAY FORMAT (Control Command)	106
ELECTRONIC TYPEWRITER, Using the APT as	80
END OF MESSAGE (EOM)	51
ENQUIRY ANSWER	56, 60
ENQUIRY/ACKNOWLEDGE HANDSHAKING	60
ENTER NUMBER	38
ENTERING DIRECTORY DATA	21, 36
ENTERING MENU-REQUESTED DATA	33
EXECUTE COMMAND	51
FCC IDENTIFICATION NUMBER	13
FORTY CHARACTER DISPLAY FORMAT (Control Command)	106
FUNCTION KEYS	66, 112
FUNCTIONS, SPECIAL KEY SEQUENCES	77

GLOSSARY	143
GRAPHIC CHARACTER TABLES	132, 133
GRAPHICS	131
HANDSHAKING	60, 89, 95
HOME CURSOR	49
INSERT CHARACTER (Control Command)	103
INSERT LINE (Control Command)	103
INSTALLATION	5
INSTALLATION GUIDES	11, 12
INTRODUCTION TO THE APT	1
INVISIBLE LOGON	43, 76
KEY BEEP ON/OFF	47
KEY SEQUENCES, SPECIAL	77
KEYBOARD CONTROL (Control Command)	106
KEYBOARD DIAL	71, 72
KEYBOARD DISABLE (Control Command)	106
KEYBOARD ENABLE (Control Command)	106
KEYPRESS/ASCII CHARACTER OUTPUT	121
LAST NUMBER DIALED	72
LINE WRAP	46
LINE/LOCAL	48
LINEFEED (Control Command)	98
LOCAL MODE	70
MAIN MENU	19, 35
MEMORY ALLOCATION	140
MEMORY BACKUP	75
MEMORY DUMP RESET	77
MEMORY MANAGEMENT	139

MENU NUMBERING CONVENTION	34
MENU SELECTIONS	33
MODEM CONTROL (Control Command)	108
MODEM MODE	17, 58, 93
MODIFY FUNCTION KEYS	66
MODIFY PHONE SETUP	64
MONITOR, Connection to	8
NAME CURRENT TERMINAL SETUP	61
NUMBERING CONVENTION, MENU	34
OFF LINE	31
ON LINE	31, 70
ORIGINATE CARRIER	70, 73, 109
PAGE DUMP	49
PAGE DUMP (Control Command)	107
PARITY	59
PARTS LIST	6
PASSWORD PROTECTION, DIRECTORY ENTRY ..	41, 76
PASSWORD PROTECTION, SYSTEM	68, 76
PHYSICAL FEATURES OF THE APT	7
PRINTER CABLE, VP-3001PCB	85
PRINTER OFF (Control Command)	107
PRINTER ON (Control Command)	107
PRINTER PORT	81
PRINTER, Using the APT with a	79
RECALL TERMINAL TYPE	63
REPEAT, AUTO	3
RESET	31, 77
RETURN (Control Command)	98
RF MODULATION	9
RINGER EQUIVALENCE NUMBER	13
RS-232C	87

SCREEN AND KEYBOARD SETUP	45
SCREEN BLANK	46
SCREEN FORMAT, 80/40 CHARACTERS	45
SELECT	48
SOFT RESET	77
SPECIAL KEY SEQUENCES	77
SPECIFICATIONS	113
STATUS LINE	31, 47
STOP BITS	59
STORING DIRECTORY INFORMATION	41
SYSTEM CONFIGURATION	44
SYSTEM CONFIGURATION MENU	44
 TAB	100
TELEPHONE AUDIO	13, 32, 65, 70
TELEPHONE NUMBER ENTRY	38, 72
TELEPHONE SETUP	64
TELEPHONE, Connection to	13
TELEVISION, Connection to	9
TERMINAL COMMUNICATIONS	58, 69
TERMINAL ENQUIRY (Control Command)	107
TERMINAL TYPE	40, 61
TONE DIALING	38, 65, 73, 108
TV CHANNEL	16, 45
 USER KEYS	31, 47, 48
Using a 1200 Baud Modem	91
Using the APT as an Electronic Typewriter	80
Using the APT with a Printer	79
Using the Menus	33
 VOICE CALLS	13, 32, 39, 73, 108
 XON/XOFF HANDSHAKING	60, 89, 95