



Burroughs

BTOS Asynchronous Terminal Emulator (ATE)

Operations
Guide

Copyright © 1986, Burroughs Corporation, Detroit, Mi. 48232

Relative to Release Level 5.0
Priced Item
March 1986

1196813



Burroughs

BTOS Asynchronous Terminal Emulator (ATE)

Operations
Guide

Copyright © 1986, Burroughs Corporation, Detroit, Mi. 48232

Relative to Release Level 5.0
Priced Item
March 1986

1196813

Burroughs believes that the software described in this manual is accurate, and much care has been taken in its preparation.

The customer's attention is drawn to the provisions of the Trade Practices Act 1974 (as amended) ('the Act') which imply conditions and warranties into certain contracts for the supply of goods and services. Where such conditions and warranties are implied Burroughs's liability shall be limited (subject to the provision of Section 68A of the Act) to the replacement or repair of the goods or the supply of equivalent goods.

The customer should exercise care to assure that use of this manual and the software will be in full compliance with the laws, rules and regulations of the jurisdiction in which it is used.

The information contained herein is subject to change. Revisions may be issued from time to time to advise of changes and/or additions.

The names, places and/or events depicted herein are not intended to correspond to any individual, group or association existing, living or otherwise. Any similarity or likeness of the names, places and/or events with the name of any individual living or otherwise, or that of any group or association is purely coincidental and unintentional.

The Asynchronous Terminal Emulator contains software routines that drive the following hardware peripherals NOT supported by Burroughs Corporation:

Hayes SmartModem 1200
Hayes SmartModem 2400
Racal-Vadic Maxwell Modem 2400V

The particular device selected is the customer's responsibility.

Correspondence regarding this publication should be forwarded, using the Product Improvement Card at the back of the manual, or remarks may be addressed directly to Burroughs Corporation, Corporate Product Information East, 209 W. Lancaster Ave., Paoli, PA 19301, USA.

| Title | Page |
|--|------------|
| Preface | ix |
| Section 1: General Description | 1-1 |
| Introduction | 1-1 |
| Terminology | 1-1 |
| Character Interpretation | 1-1 |
| Video Escape | 1-2 |
| Special Keys | 1-2 |
| Overview | 1-2 |
| ATE Modes | 1-3 |
| Attended Mode | 1-3 |
| Unattended Mode | 1-3 |
| Auto-ATE Mode | 1-4 |
| The Configuration File | 1-4 |
| Hardware Requirements | 1-5 |
| Installing ATE | 1-5 |
| Invoking ATE | 1-6 |
| A T E-GO | 1-6 |
| A T E-RETURN | 1-7 |
| Section 2: Attended Mode | 2-1 |
| Asynchronous Terminal Emulation | 2-1 |
| Entering Attended Mode | 2-1 |
| Activating the Attended ATE Functions | 2-2 |
| Attended Mode ATE Function | 2-3 |
| ATE Function Keys | 2-6 |
| F1 (Change Baud Rate) | 2-6 |
| F2 (Change Communications Options) | 2-7 |
| F3 (Change Display Mode) | 2-7 |
| F4 (File Transfer In) | 2-7 |
| F5 (File Transfer Out) | 2-9 |
| F6 (File Recording) | 2-10 |
| F7 (File Transmit) | 2-12 |
| F8 (DC1 Wait Override) | 2-13 |
| F9 (XModem File Transfer In) | 2-13 |
| F10 (XModem File Transfer Out) | 2-16 |
| SHIFT-F1 (Configuration Parameters) | 2-17 |
| SHIFT-F2 (Communications Parameters) | 2-22 |
| SHIFT-F3 (Unattended Mode Parameters) | 2-24 |
| SHIFT-F4 (Character Mapping Mode Utilities) | 2-26 |
| SHIFT-F5 (Auto-ATE) | 2-30 |
| SHIFT-F6 (ATE Utilities) | 2-31 |
| Additional Function Keys | 2-35 |
| Section 3: Unattended Mode | 3-1 |
| Entering Unattended Mode | 3-1 |
| Unattended Mode from the User's Viewpoint | 3-1 |
| SHIFT-F3 (Returning to Attended Mode) | 3-2 |
| ACTION (Refreshing the Screen Display) | 3-2 |
| ACTION-CANCEL (Aborting a File Transfer) | 3-2 |

| Title | Page |
|--|------|
| Error Correction with CTRL-x and CTRL-y | 3-4 |
| The File Transfer Aborted Message | 3-4 |
| Disconnect | 3-5 |
| Undetected Disconnect | 3-5 |
| Modem Operating Hints | 3-5 |
| Remote User Command | 3-6 |
| HELP | 3-6 |
| DIR | 3-7 |
| LIST | 3-7 |
| COPY | 3-8 |
| KILL | 3-9 |
| BYE | 3-9 |
| XSEN | 3-9 |
| XREC | 3-11 |
| ASEN | 3-13 |
| AREC | 3-15 |
| Remote Commands | 3-17 |
| Command Prompt Controls | 3-17 |
| | |
| Section 4: The Auto-ATE Utility | 4-1 |
| Creating a Command File | 4-1 |
| Auto-ATE Commands | 4-2 |
| RE (Retry) | 4-2 |
| TO (Time Out) | 4-2 |
| ST (Start Time) | 4-2 |
| DM (Display Minutes) | 4-2 |
| DS (Display Seconds) | 4-2 |
| NF (New File) | 4-2 |
| XT (Transmit) | 4-3 |
| OR (Override) | 4-3 |
| XR (Receive) | 4-3 |
| Exit Error Strings | 4-4 |
| EI (End If Block) | 4-4 |
| IF (Begin If Block) | 4-4 |
| Special Characters | 4-5 |
| (-) Carriage Return | 4-5 |
| (^) Carriage Return Line Feed | 4-6 |
| (-) ASCII Code Number | 4-6 |
| Syntax Checker Error Messages | 4-7 |
| Syntax Checker Warning Messages | 4-7 |
| Using the NEXT Key During an Auto-ATE Session | 4-8 |
| | |
| Appendix A: Modem Configuration Settings | A-1 |
| | |
| Appendix B: File Transfer Protocols | B-1 |
| | |
| Appendix C: OFISfile/ATE Interface | C-1 |
| | |
| Appendix D: Additional Keyboard Codes | D-1 |

| Title | Page |
|---|------|
| Appendix E: ASCII Format Table | E-1 |
| Appendix F: Status Codes | F-1 |

Audience

This manual is written for nontechnical users, system operators, and programmers.

Organization

Section 1, "General Description," is an introduction to the ATE.

Section 2, "Attended Mode," and Section 3, "Unattended Mode," give detailed descriptions of the features in these modes.

Section 4, "Auto-ATE Mode," describes how to create command files that automatically execute the functions described in Sections 2 and 3.

Related Documents

B 20 Systems: Operating System (BTOS) Reference Manual

B 20 Systems: System Software Operation Guide

General Description

Introduction

The Burroughs Asynchronous Terminal Emulator (ATE) is an enhanced software utility that enables a Burroughs BTOS workstation to emulate an asynchronous, character-oriented ASCII terminal (teletype CRT), provide file transfer capabilities, and operate under attended, unattended and auto modes.

Remote attended operation enables the BTOS workstation to access files from another computer. Unattended operation allows the workstation to access files without an operator. Auto-ATE allows two unattended BTOS workstations to communicate.

Terminology

In this manual, *CR* refers to the ASCII carriage return (0Dh), *LF* to the ASCII linefeed (0Ah), and RETURN to the B 20 System RETURN that has the same 8-bit representation as an ASCII linefeed. *CR/LF* refers to the carriage return/linefeed pair.

Character Interpretation

In general, characters typed at the keyboard are interpreted as they would be by a character-mode CRT. However, the CODE key is used as the CONTROL key. Keys such as TAB, BACKSPACE, RETURN, and DELETE generate an appropriate ASCII equivalent. ASCII ESC (escape) is generated by the GO key, ASCII CR by the RETURN key, and LF by the down-arrow key. Keys for which there is no appropriate ASCII equivalent are ignored; pressing them sounds an alarm momentarily. Appendix E contains an ASCII format table.

Received characters, including the video escape character (OFFh), are displayed by the Sequential Access Method (SAM). (Refer to the *B 20 Operating System Reference Manual*.) Characters received with a parity error are displayed in reverse video.

Video Escape

An ASCII escape character (1Bh) is optionally translated to a video escape character (OFFh) to permit access to the Sequential Access Method multibyte escape sequence facilities (cursor positioning, control of attributes, etc.).

Special Keys

The 16 function keys (some SHIFTeD) change the communications options, initiate file transfers, or invoke a utility of the ATE. (Refer to Section 2.) Pressing HELP displays a list of the functions performed by the ten keys.

Pressing MARK causes ATE to transmit a break signal onto the communications line.

Pressing ACTION-CANCEL causes ATE to abort a file transfer.

Pressing FINISH causes ATE to disconnect the communications line and exit to the Executive.

In addition to the function keys, ATE allows you to program certain keys to perform a desired function. These "softkeys" can be configured to correspond to the function keys f1-f10 on the top of the keyboard as well as the numeric keypad on the right side of the keyboard. These keys are then accessed by pressing ACTION and a function key simultaneously. A comprehensive description of softkeys are under ATE Utilities (SHIFT-F6) in Section 2.

Note: If the ATE is running in the foreground of the Context Manager, the upper ten softkeys (ACTION-F1 to ACTION-F10) should not be used. The Context Manager uses these keys for partition swapping and if the keys are declared in a softkey file the results will be unpredictable.

Overview

ATE's main function is to transfer files between a BTOS workstation and another computer. Many file transfer programs require operators at both ends of the line to control the transfer. ATE makes it possible to transfer files between an attended BTOS workstation and another attended computer, between an attended computer and an unattended BTOS workstation running ATE, or even between two unattended BTOS workstations running ATE.

ATE allows you to interactively specify communication options.

To ensure accurate file transmission, ATE offers several file transfer protocols: XModem, an ASCII block format protocol, and a binary block protocol. In addition, a file transfer method with no formal protocol is also provided, permitting communication with computers not running a compatible file transfer protocol (see File Recording).

ATE Modes

ATE can be shifted into one of three modes, depending on how you want to accomplish the file transfer. In this manual, user is defined as a person running the ATE program from a BTOS workstation. A *remote user* is anyone calling the user's-BTOS workstation. For security reasons, a remote user's capabilities are different from and more limited than those of a user.

Attended Mode

Attended mode allows a user to perform file transfers between the attended BTOS workstation running ATE and another attended computer running a compatible file transfer program. Attended mode also allows the user with a BTOS workstation to access numerous file manipulation utilities, and includes all of the original ATE terminal emulation functions. (User commands are discussed in Section 2.)

Unattended Mode

Unattended mode is used for file transfers between an unattended BTOS workstation running ATE and a remote user at the other computer. Switching into unattended mode allows the BTOS workstation to respond automatically to commands from the remote user located at any computer running a compatible file transfer program. Although unattended mode supplies some file manipulation utilities to the remote user, these are limited for security reasons. (Remote user commands are discussed in Section 3.)

Note: You can run ATE in unattended mode in the background of Context Manager without dedicating a terminal to that function. When ATE is running in the foreground of the Context Manager, however, all processing in the background will be suspended.

Auto-ATE Mode

Auto-ATE mode is used for file transfers between two unattended BTOS workstations running ATE. The BTOS workstation in Auto-ATE mode acts exactly like an attended ATE terminal, but commands are issued by a previously created command file rather than by a user. The other BTOS workstation operates in normal unattended mode. (The commands that can be used in an Auto-ATE command file are discussed in Section 4.)

The Configuration File

When ATE is first invoked, it must be informed of certain facts about the system in which it is operating. To save the user from having to enter all of these facts, ATE consults a special *configuration file*. A version of this file, `<sys>ATE.config`, is automatically read at the beginning of every ATE session, unless the user chooses to use a different version. You can alter the configuration file during an ATE session. Any number of new configuration files may be created, saved, and used as needed.

Note: When changing communication channels during an ATE session, be sure to manually re-enter all configuration parameters as you originally intended them. If you bring up the configuration file form during a session to only change the channel without specifying the other parameters, they will revert to their default values.

The ATE configuration file is discussed in "Configuration Parameters" in Section 2.

Hardware Requirements

ATE requires a BTOS workstation with the following peripherals and characteristics:

- 256K minimum for a slave unit or 384K minimum for a master
- RS-232C serial communications port
- One hard disk drive on the cluster or master station
- Hayes SmartModem 1200, Hayes SmartModem 2400, or a Racal-Vadic Maxwell Modem 2400V for unattended operations.*

Note: In order for ATE to function correctly in unattended mode, some of the factory settings for the Hayes or Racal-Vadic modems must be changed. For further information on modem settings, see Appendix A.

Installing ATE

To install ATE on a standard BTOS workstation:

- 1 Insert the ATE disk into floppy disk drive unit [f0] on the workstation.
- 2 Enter **Software Installation** (or **S I**) and press GO. Software installation automatically installs the necessary files and creates the necessary commands to run ATE.
- 3 The workstation displays a message, asking you to disable all clustered BTOS stations before performing the installation procedures. Either turn off all other workstations in the cluster, or enter *Disable Cluster* if it is available on your system.
- 4 A message is displayed when ATE installation is complete. All operating instructions for ATE are contained in this manual.
- 5 The default configuration file <sys>ATE.CONFIG is provided on the installation disk. To create a different configuration file, see the SHIFT-F1 function description in Section 2.

**SmartModem 1200 and SmartModem 2400 are trademarks of Hayes Microcomputer Products, Inc. Maxwell Modem 2400V is a trademark of Racal-Vadic.*

To install ATE on the XE 520:

1 Enter **Submit** and press RETURN. The workstation will display the following form:

```
Command submit
Submit
File list          [f0]<sys>xeinstall.sub
[Parameters]      [!sys]<sys>sys.cmds [!sys]<sys>
[Force Expansion?] yes
[Show Expansion?]
```

2 Press GO.

Note: If, after the installation, you are using a cluster workstation that is booted locally, but wish to use the ATE that is residing on the XE 520, you must first copy the two text files AteText1.Sys and AteText2.Sys to the local hard disk before ATE will work on that workstation. For more information on the XE 520, refer to the XE 520 BTOS User's Guide or the XE 520 System Administrator's Handbook.

Invoking ATE

The installation procedure creates the ATE executive command. This command may be executed with ATE-GO or ATE-RETURN.

A T E-GO

Enter **A T E** (upper- or lowercase and a space between the letters) on a command line and press GO. The program automatically loads and reads the default configuration file, <sys>ATE.config, and the two text files, ATEText1.Sys and ATEText2.Sys, residing on the <Sys> directory. If the configuration file is not found or is invalid, the Create Configuration File form is displayed. See "Recreating a Default Configuration File" in Section 2 for recovery instructions. If either of the text files are not found, an error message appears and ATE aborts.

ATE-RETURN

Enter **ATE** (upper- or lowercase and a space between the letters) on a command line and press RETURN. A form appears allowing you to specify any existing configuration file name. Then press GO. If the specified configuration file does not exist or is invalid, the ATE displays the Create Configuration File form. See "Recreating a Default Configuration File" for recovery instructions. French and French Canadian users, refer to Appendix C for invoking the OFISfile/ATE interface.

Screen Form Displayed by the ATE-RETURN Command

```
Command a t e
Asynchronous Terminal Emulator
  [Configuration Filename]
```

The user's mode (attended/unattended/auto-ATE) is set by the configuration file.

Note: If ATE is set to begin operation in unattended mode, the modem must be turned on before starting the program.

Attended Mode

This section discusses four major capabilities supplied by attended mode ATE:

- 1 The ATE allows the BTOS workstation to act as a terminal capable of accessing interactive programs on another computer.
- 2 The various file transfer functions allow files to be transferred between the attended BTOS workstation running ATE and another computer running a compatible file transfer program.
- 3 Several utilities for accessing and manipulating files are available through a set of function keys.
- 4 Function keys allow all of the parameters defined in the ATE configuration file to be interactively redefined.

Asynchronous Terminal Emulation

In attended mode, ATE allows a Burroughs workstation to act as an asynchronous, character-oriented ASCII terminal (glass TTY).

By emulating a terminal, the user's BTOS workstation can communicate with another computer; for example, the ATE can be used to issue commands to another BTOS workstation running unattended ATE. The emulator causes each typed character to be immediately transmitted to the other computer. Each character received from the other computer is immediately displayed on the BTOS workstation screen.

Entering Attended Mode

The default configuration file causes ATE to begin in attended mode. If ATE has been shifted into unattended mode, it can be switched back using the SHIFT-F3 function (see "Unattended Mode Parameters" in this section).

Attended ATE Startup Screen (Using the Default Configuration File)

```
Burroughs A.T.E. R5.0.00/aUS Attended Mapping Off
1200 Boud 7 Data Bits Even Parity Full Duplex Jan 27, 1986 2:04 PM
Path: [sys]<karl>
```

When ATE is running, the video display is divided into two frames, as shown in the preceding example. The *status frame*, occupying the top three lines of the screen, supplies current information on certain ATE parameters. The rest of the screen makes up the *emulation frame*, where the interactive text is displayed.

The first line of the status frame shows what mode ATE is currently in, and whether or not any character mapping is taking place. The second line shows the current settings of the more important communications parameters (baud rate, number of data bits, parity, and display mode), and displays the time and date. The third line is a divider between the status frame and the emulation frame and indicates the current path.

The emulation frame displays all text received from the other computer. Text entered by the user on the BTOS workstation keyboard can also be displayed if ATE is operating in half-duplex or echoplex display mode.

Activating the Attended ATE Functions

In attended ATE, the user can access a set of menu-driven functions that are invoked by pressing function keys. File transfer, file manipulation, and redefinition of the configuration file are all accomplished using function keys.

When you press a function key, a form (or a menu, allowing the user to choose one of several forms) appears in the emulation frame. Each form asks questions about the function. When you type a response to a question, the response appears in a highlighted area to the right of the question. If no response is entered, ATE uses the default value.

Three keys have special applications when filling in a form:

- RETURN** Causes the cursor to tab to the next question on a form. The tab function is circular, that is, when the last question in the form has been reached, pressing RETURN again takes the cursor back to the top of the form.
- GO** Causes ATE to perform the indicated function, using the responses to the form that are displayed on the screen.
- CANCEL** Allows you to exit a menu or form invoked by one of the function keys. Pressing CANCEL to exit a form also clears out any new values that you entered on the screen. You must use GO rather than CANCEL if you want to save the values that you entered.

Attended Mode ATE Functions

Detailed explanations of each function follow this section.

ATE Parameters

- F1** Change Baud Rate: Sets baud rate and number of stop bits.
- F2** Change Communications Options: Sets parity and number of bits per character.
- F3** Change Display Mode: Display mode options are: full duplex, half duplex, echoplex, and hexadecimal.

Enhanced ATE Parameters

- F8** Override Wait for DC1: When F8 is lit, pressing it stops ATE from waiting for a DC1 control character from the other computer.
- SHIFT-F1** Configuration Parameters: Create, save, and print a configuration file, or load a different preexisting configuration file during an ATE session.

- SHIFT-F2 Communications Parameters: Set Auto Line Feed, Escape Code, Time Out, Wait for DC1, and XON/XOFF during an ATE session.
- SHIFT-F3 Unattended Mode Parameters: Switch ATE between attended and unattended modes. Also allows setting of Hello Line, Password, and Remote Logoff Interval.

ATE File Manipulation Utilities

- SHIFT-F4 Character Mapping Mode Utilities: Map any character (either incoming or outgoing) to any other character. Once a character mapping file is created, it can be saved for future use, retrieved for use during an ATE session, displayed at the terminal, or sent to a printer.
- SHIFT-F5 Auto-ATE: Activate the Auto-ATE feature, enabling a previously created command file to implement most of the commands available to an attended ATE user.
- SHIFT-F6 ATE Utilities: Give access to File Copy, Soft Keys, and Timer Activation utilities:

File Copy allows copying from any available file or device to any other legal file or device.

Soft Keys allow you to define character strings up to 80 characters, which may then be entered at any time with one keystroke combination. Among other uses, soft keys enable auto-dialing of frequently used phone numbers.

Timer Activation allows a pair of user-defined character strings to control activation of an on-screen timer.

File Transfer Functions

- F4** File Transfer In: Copy incoming ASCII or binary data using a positive acknowledgment protocol, verifying file transfers with ACK and NAK characters.
- F5** File Transfer Out: Transmit ASCII or binary data using a positive acknowledgment protocol, verifying file transfers with ACK and NAK characters.
- F6** File Recording: Copy incoming data just as received, with no positive acknowledgment. ATE allows the beginning and end of the file to be defined by CTRL-R and CTRL-T characters to allow you to remove unwanted data at the start or end of a file.
- F7** File Transmit: Transmit each character from the file in sequence, with no positive acknowledgment. ATE allows the beginning and end of the file to be defined by CTRL-R and CTRL-T characters to allow you to remove unwanted data at the start or end of a file.
- F9** XModem File Transfer In: Receive a file using the Xmodem file transfer protocol.
- F10** XModem File Transfer Out: Transmit a file using the Xmodem file transfer protocol.

ATE Function Keys

The 16 ATE function keys are:

| Key | Description |
|----------|-----------------------------------|
| F1 | Change the baud rate |
| F2 | Change the communications options |
| F3 | Change the display mode |
| F4 | Transfer in a file |
| F5 | Transfer out a file |
| F6 | Record to a file |
| F7 | Transmit from a file |
| F8 | DC1 Wait Override |
| F9 | XModem File Transfer In |
| F10 | XModem File Transfer Out |
| SHIFT-F1 | Configuration file utilities |
| SHIFT-F2 | Communications parameters |
| SHIFT-F3 | Unattended mode parameters |
| SHIFT-F4 | Character mapping mode utilities |
| SHIFT-F5 | Auto-ATE |
| SHIFT-F6 | ATE utilities |

F1 (Change Baud Rate)

Change Baud Rate

[Baud rate (20 - 9600; default = previous value)]
[Stop Bits (1 or 2; default = previous value)]

[Baud Rate (20-9600; default = previous value)]

Change the baud rate by specifying any transmission speed between 20 and 9600 baud.

[Stop Bits (1 or 2; default = previous value)]

Enter 1 or 2 to change the number of stop bits for each character. Usually 2 stop bits are used at 110 baud, and 1 stop bit at all other rates.

F2 (Change Communications Options)

Change Communications Options

[Data Bits (5-8; default = previous value)]

[Parity (none, even, odd, 0 or 1; default = previous value)]

[Data bits (5-8; default = previous value)]

Enter **5**, **6**, **7**, or **8** to change the number of bits per character. Data bits specifies the number of bits per character, not including the parity bit if even, odd, 0, or 1 is specified. The parity bit is in addition to the number of data bits specified. That is, if you specify 8 bits and odd parity, 9 bits are transmitted for each byte of data (8 data bits and 1 parity bit). Because ASCII encoding is always used, 7 bits with even, odd, 0, or 1 parity is normally used.

[Parity (none, even, odd, 0 or 1; default = previous value)]

Enter a parity specification of **none**, **even**, **odd**, **0**, or **1**. Specifying 0 or 1 causes the specified value to be used on outgoing characters as the parity bit and ignored on incoming characters. You cannot specify 0 or 1 when you specify 8 for the [Data bits] field.

***Note:** In echoplex mode, when the ATE receives a character with parity error, it sends back an invalid character (FFh for 8 data bits) along with the received character.*

F3 (Change Display Mode)

Change Display Mode

[Display Mode (fdx, hdx, echoplex or hex; default = previous value)]

The display modes are full duplex (fdx), half duplex (hdx), echoplex, and hexadecimal (hex). In all modes, typed characters are transmitted through the communications line, while characters received from the communications line are displayed on the video display. In full-duplex mode, nothing else happens. In half-duplex mode, typed characters are displayed on the video display, as well as transmitted through the communications line. In echoplex mode, characters received from the communications line are retransmitted, as well as displayed on the video display. In addition, typed characters are shown on the screen. In hexadecimal mode, communications are in full duplex and received characters are displayed as two-digit hexadecimal numbers rather than as characters.

F4 (File Transfer In)

File Transfer In

Filename:

[File transfer mode (ASCII or binary; default = ASCII)]

[File input mode (overwrite or append; default = append)]

[CR/LF mapping mode (binary or new line; default = new line)]

Filename represents the name of the file into which you copy incoming data. A new file is created if one does not exist. If a file of the specified name already exists, the [File input mode (overwrite or append; default = append)] field determines whether the new file is to replace the existing file or be appended to it. This mode uses a protocol with positive acknowledgment, one that sends an acknowledgment (ACK) character in response to a correctly received record, or a negative acknowledgment (NAK) character in response to a record received with errors.

[File transfer mode (ASCII or binary; default = ASCII)]

Enter the specification of the file transfer mode. Binary transfer uses a byte count and checksum in each record and is therefore more reliable than ASCII transfer. You cannot transfer 8-bit data (such as object modules or word processor files) with ASCII transfer mode.

[File input mode (overwrite or append; default = append)]

Enter the specification of whether the new file is to replace the existing file or be appended to it. Responding with the default or entering no response causes the new file to be appended to the existing file.

[CR/LF mapping mode (binary or new line; default = new line)]
Enter the specification of how to map incoming CRs and LFs. Responding with the default or entering no response both select the new line mapping mode. The new line option maps all received CRs and LFs to the destination file into BTOS workstation system RETURNS (OAh) according to the following algorithm. A single CR, a single LF, or a CR/LF combination is mapped into a single BTOS workstation system RETURN. The binary option copies all characters to the destination file exactly as received. After you press GO, ATE opens the file and begins the transfer. After completing the transfer, ATE closes the file and returns to normal operation. To request a premature termination of the transmission, press ACTION-CANCEL. When transmitting data between BTOS workstation systems, you obtain maximum flexibility and reliability by using binary mode and specifying (with the F2 key) 8 data bits and odd parity. Naturally, compatible parameters must be specified to both workstations.

Note: File Transfer In (F4) should be invoked before File Transfer Out (F5) is invoked to allow for proper handshaking between the terminals performing the file transfer.

F5 (File Transfer Out)

File Transfer Out

Filename:
[File transfer mode (ASCII or binary; default = ASCII)]
[New line mapping mode (binary, CR, or CRLF; default = CRLF)]
[First record text (default is none)]:

Filename:

Enter the name of the file to transfer.

[File transfer mode (ASCII or binary; default = ASCII)]
Enter the specification of the mapping mode to use. Responding with the default or entering no response selects the CR/LF mapping mode. The binary option transfers the file exactly as is. With this option, ATE can transfer binary data. The CR option replaces all BTOS workstation system RETURNS (OAh) with ASCII CR/LF character pairs. With this option, ATE can emulate a host computer by transmitting the CR/LF combination.

[First record text (default is none)]

Enter the text of the first record to be transmitted (before the first record of the file). After you press GO, the transfer begins. After the file is transmitted, ATE transmits an ASCII EOT (end-of-transmission, 04h) character, closes the file, and returns to normal operation. To request a premature termination of the transmission, press ACTION-CANCEL.

Note: File Transfer Out (F5) should be invoked after File Transfer In (F4) is invoked to allow for proper handshaking between the terminals performing the file transfer.

F6 (File Recording)

File Recording

Filename:

[File input mode (overwrite or append; default = append)]
[CR/LF mapping mode (binary or new line; default = new line)]
[Character to ignore? (Value in dec or hex) default = none.]
[Enable ASCII Buffer Control Codes? (default = No)]

For *Filename*: enter the name of the file or device into which the incoming data is to be copied. A new file is created if one does not exist. If a file of the specified name already exists, the [File input mode (overwrite or append; default = append)] field determines whether the new file is to replace the existing file or be appended to it. This command puts the workstation in the mode used to record all received characters, as well as displaying them on the video display. This is useful for later review of the received text or for printing. It can also be used to transfer files from other computers to a Burroughs system. To accomplish this, the other computer simply transmits each character of the file in sequence. This method of file transfer is susceptible to undetected errors caused by communications line noise because it does not have positive acknowledgment. Also, while performing a file recording when either half duplex or echoplex mode are invoked, all characters typed at the keyboard will be entered into the open recording file. If possible, use the file transfer protocols that have protocol handling (see F4 File Transfer In and F9 XModem File Transfer In in this section).

[File input mode (overwrite or append; default = append)]

Enter the specification of whether the new file is to replace an existing file or be appended to it.

[CR/LF mapping mode (binary or new line; default = new line)]

Enter the specification of how to map incoming CRs and LFs. The new line option maps all received CRs and LFs to the destination file into BTOS workstation system RETURNS (0Ah) according to the following algorithm. A single CR, a single LF, or a CR/LF combination is mapped into a single BTOS workstation system RETURN. The binary option copies all characters to the destination file exactly as received.

[Character to ignore? Value in dec or hex) default = none]

By specifying a character in the 0-255 (00h-FFh) range ATE will not place that character in the recorded file. When using hex numbers, use the convention "h" following the number (for example 7ch).

[Enable ASCII Buffer Control Codes? (default = No)]

Enabling the control codes (CTRL-R and CTRL-T) causes ATE to wait for a CTRL-R before beginning file recording and to stop recording upon receiving a CTRL-T. This allows ATE to record only a file bounded by those codes, rather than everything that comes over the line after you press GO.

If control codes are not enabled, file recording occurs unaltered.

On BTOS workstations the CODE key is substituted for CONTROL.

After you press GO, ATE opens the file and the normal operation resumes (with the recording file active). To close the recording file, press F6 again, leave the file name field blank (or specify another file), and press GO.

When ATE records a continuous stream of bytes at high baud rates, the video display may discontinue temporarily; this ensures that no incoming characters are dropped and the recording is not corrupted. The video display resumes in time to display the last few pages of the incoming stream of characters. If any characters are dropped, an error message is displayed at the end of the recording session.

F7 (File Transmit)

File Transmit

Filename:

[New line mapping mode (binary, CR, or CRLF; default = CRLF)]
[Line control mode (none, XON/XOFF or CTS; default = none)]
[Enable ASCII Buffer Control Codes? (default = No)]

For *Filename*: enter the name of the file you want to transmit. File transmit enables the workstation to transfer files from a Burroughs system to other computers by sending one character at a time. Because file transmit issues no positive acknowledgment signal, it is susceptible to undetected errors introduced by communications line noise. If possible, use the file transfer protocols that have protocol handling (see F5 (File Transfer Out) and F10 (XModem File Transfer Out) in this section).

[New line mapping mode (binary, CR, or CR/LF; default = CR/LF)]

Enter the mapping mode you want to use. The binary option transfers the file exactly as is. With this option, ATE can transfer binary data. The CR option replaces all BTOS workstation system RETURNS (0Ah) with ASCII RETURNS. This option enables ATE to simulate an ASCII terminal. CR/LF replaces all BTOS workstation system RETURNS (0Ah) with ASCII CR/LF character pairs. This enables ATE to emulate a host computer by transmitting the CR/LF combination.

[Line control mode (none, XON/XOFF, or CTS; default = none)]

Enter the specification used by the receiving computer. XON/XOFF suspends transmission from the time it receives XOFF control (13h) until receipt of an XON control character (11h). CTS suspends transmission while the CTS (Clear to Send) signal is not received. Certain devices (like printers) use CTS to control data flow.

[Enable ASCII Buffer Control Codes? (default = No)]

During a file transmit, enabling the buffer control codes (CTRL-R (12h) and CTRL-T (14h)) causes them to be transmitted automatically at the beginning and end of a file. This allows file transfer programs that recognize those codes to identify the boundaries of the file.

If the control codes are not enabled, file transmission occurs as usual.

On the BTOS workstation, CODE is substituted for CONTROL.

After you press GO, ATE begins transmission. The data being transmitted is displayed only if the other computer echoes the data. When the file is transmitted, ATE closes the file and returns to normal operation. The display in the status frame indicates when the file is completely transmitted. To request a premature termination of the transmission, press ACTION-CANCEL.

The other computer must be started before file transmit is started or data can be lost.

F8 (DC1 Wait Override)

Pressing F8 when it is lit causes ATE to stop waiting for a DC1 (11h) control character from the other computer.

When the [After CR Wait for DC1] field is set to *yes* in the configuration file, ATE waits for a DC1 control character after sending each block of data (terminated by a carriage return) to the other computer. F8 lights whenever the BTOS workstation has transmitted a carriage return and starts waiting for the DC1. Once the wait starts, characters entered at the keyboard are buffered and displayed in a reverse video field near the bottom of the screen until a DC1 is received (which can be forced by pressing the CODE SCROLL UP key) or F8 (overrides carriage return wait command) is pressed.

Pressing F8 overrides the wait function and causes the next block of data to be transmitted immediately. Since the DC1 character is used to synchronize transmissions between the two computers, F8 should be used only when the user knows that the other computer will not be sending back a DC1.

F9 (XModem File Transfer In)

Pressing F9 invokes the file receiver portion of the XModem protocol on the user's BTOS workstation. This protocol will turn character mapping off and use 8 data bits with no parity.

Initialize Remote File Sender

Initialization of the file sender on the other computer is usually accomplished from the ATE emulation mode by executing the program that implements the XModem protocol on the sending computer. (For details, see the XModem file transfer documentation for the sending computer.) The sending computer must be told that the user wishes to receive, and it must be provided with the name of an existing file. Failure to provide a valid file name results in an error that aborts the file transfer. When the file from which data is to be read is properly identified, the sending computer indicates that the file is open and ready to be transmitted.

Note: See Section 3 for an example of this procedure. The example uses ATE to initialize the remote file sender.

Invoke File Receiver

The file receiver is invoked using the form provided by the F9 function key. This command puts the workstation in the mode used to transfer files to the BTOS workstation system from other computers using the XModem protocol. For details, see Appendix B.

After the transfer is completed, the file is closed, and the user's BTOS workstation returns to emulation mode. To request premature termination of the transmission, press ACTION-CANCEL.

Screen Form Displayed for F9

XModem File Transfer In

```
Filename:  
[File input mode (overwrite, append or New; default = New)]  
[CR/LF mapping mode (binary or new line; default = new line)]  
[B20 specific file? (run or word processor file; default = No)]  
[Wordstar file? (default = No)]
```

Filename:

Name of the file into which the incoming data is copied. This parameter is required. Failure to enter a name in this field results in an error condition, and the file transfer is aborted. A new file is created if one does not already exist. However, if a file of a specified name does already exist, the [File input mode] field then determines whether the new file will replace the existing file or be appended to it.

[File Input Mode (overwrite, append, or New; default = New)]

overwrite

Incoming data is written to the file starting at the defined beginning of the file, overwriting any data previously stored in that file.

append

Incoming data is written to the file starting at the defined end of the file, adding to the data in the file, but not destroying any previously stored data.

new

Incoming data is written to a newly created file whose name was specified in the *Filename:* parameter previously described. If this option is specified and the named file already exists, the file transfer operation is aborted and a message is displayed.

[CR/LF mapping mode (binary or new line; default = new line)]

binary

Copies all characters to the destination file exactly as they are received.

new line

A single CR, a single LF, or a CR/LF combination is mapped into a single BTOS workstation system RETURN (0Ah) before being written to the file.

[B 20 specific file? (run or word processor file; default = No)]

Flags a file with contents specific to the BTOS workstation, such as a run file or a WRITEone word processing file.

[Wordstar file?]

Tells ATE that the file is a Wordstar word processed file and marks it for special handling.

F10 (XModem File Transfer Out)

Pressing F10 invokes the file sender portion of the XModem protocol on the user's BTOS workstation.

Initialize Remote File Receiver

Initialization of the file receiver on the other computer is usually accomplished from the ATE emulation mode by executing the program that implements the XModem protocol on the receiving computer. (For details, see the XModem file transfer documentation for the receiving computer.

The receiving computer must be told that the user wishes to send; it also needs the name of a file. Failure to provide a valid file name causes the file transfer to be aborted. If the file does not exist, it is created. If the file does exist, the action taken depends on the receiving section of the XModem protocol on the other computer. In general, data should be sent from the BTOS workstation to a newly created file on the receiving computer. When the file into which data is to be written is properly identified, the receiving computer responds that the file is open and ready to receive.

Note: See Section 3 for an example of this procedure. The example uses ATE to initialize the remote file receiver.

Invoke File Sender

The file sender is invoked using the form provided by the F10 function key. This command puts the workstation in the mode used to transfer files from the BTOS workstation system to other computers using the XModem protocol. For details, see Appendix B.

After the transfer is completed, the file is closed and the user's BTOS workstation returns to emulation mode. Press ACTION-CANCEL to request premature termination of the transmission.

Screen Form Displayed for F10

Xmodem File Transfer Out

Filename:

[New line mapping mode (binary, CR, or CRLF; default = CRLF)]
[B20 specific file? (run or word processor file; default = No)]

Filename:

Name of the file to be sent. This parameter is required. Failure to enter a name in this field results in an error condition, and the file transfer is aborted.

[New line mapping mode (binary, CR, or CR/LF; default = CR/LF)]

binary

Transfers the file exactly as is.

CR

Replaces any BTOS workstation system RETURNS (0Ah) with carriage return characters (0Dh).

CR/LF

Replaces all BTOS workstation system RETURNS (0Ah) with ASCII CR/LF (0Dh 0Ah) character pairs. With this option, the user's BTOS workstation can emulate a host computer that uses the CR/LF combination.

[B 20 specific file? (run or word processor file; default = No)]

Flags a file with contents specific to the BTOS workstation, such as a run file or a WRITEone word processing file.

SHIFT-F1 (Configuration Parameters)

When ATE is invoked, it must be informed of certain facts about the system in which it is operating. ATE reads this set of facts into the BTOS workstation's memory from a special configuration file. A version of this file, *<sys>ATE.config*, is automatically read at the beginning of every ATE session unless the user chooses to use a different version. Configuration file parameters may be altered during an ATE session. The set of parameters currently in the BTOS workstation memory at a given time is referred to as the *parameter set*. The menu invoked by SHIFT-F1 allows the user to create, save, or print any number of new configuration files, or to load a parameter set from a preexisting configuration file during an ATE session.

Screen Menu Displayed for SHIFT-F1

Configuration Files {Press Cancel to Exit}

1. Create Configuration File
2. Save Current Parameters
3. Print Configuration File
4. Load Pre-existing Config File

Please select one, then press GO key

Default parameter settings for the ATE configuration file follow.

| Parameter | Default Values |
|-------------------------|----------------|
| Recording File | None |
| Communications Channel | B |
| Baud Rate | 1200 |
| Number of Stop Bits | 1 |
| Parity | Even |
| Number of Data Bits | 7 |
| Display Mode | Full Duplex |
| Auto Line Feed | Yes |
| Recognize Escape Code | No |
| Time Out (in seconds) | 10 |
| Xon/Xoff | No |
| Wait for DC1 After CR | No |
| Program Mode | Attended |
| Hello Line File | None |
| Password | None |
| Remote Log Off Interval | 10 |
| Mapping enabled | No |
| Map file | None |
| AUTO-ATE file name | None |
| AUTO-ATE enabled? | No |

Menu Option 1: Create Configuration File

The user may create a new set of ATE configuration parameters. Refer to the individual function key entries for a complete explanation of the parameters not discussed in detail here.

Screen Form Displayed for Option 1

Create Configuration File {Press Cancel to Exit}

```
[Recording File]
[Communications Channel default = B]
[Baud Rate (20-9600) default = 1200 ]
[Stop Bits (1 or 2) default = 1]
[Parity (none, even, odd, 0, or 1) default = Even]
[Data Bits (5-8) default = 7]
[Display mode (fdx, hdx, echoplex, or hex) default = fdx]
[Auto Line Feed? (yes or no) default = yes]
[Recognize Escape Code? (yes or no) default = no]
[Time Out (seconds) default = 10]
[Send Xon/Xoff? (yes or no) default = no]
[After Cr wait for Dc1? (yes or no) default = no]
[Program mode (attended or unattended) default = attended]
[Hello File (default = None)]
[Password (default = none)]
[Log Off Interval (1-360, default = 10 Min.)]
[Mapping On? (Yes/No) default = No]
[Mapping File (default = None)]
[AUTO-ATE File Name (default = None)]
[Enable AUTO-ATE? (Yes/No, default = No)]
[Save these parameters? (yes or no) default = no]
[Config File Name (def=<sys>ATE.config)]
[Make these parameters current? (yes or no) default = no]
```

[Communications Channel default = B]

This parameter specifies which line of the SIO (serial input/output) communications controller to use. Any of 10 ports are valid for host or printer communications. This includes the standard A and B plus two 4-port expanders with port designations: 1A, 1B, 1C, 1D, and 2A, 2B, 2C, and 2D. The default is channel B. This is the only configuration file parameter that cannot be altered by one of the other function keys.

Note: When changing communication channels during an ATE session, be sure to manually re-enter all configuration parameters as you originally intended them. If you bring up the configuration file form during a session to only change the channel without specifying the other parameters, they will revert to their default values.

[Save these parameters? (yes or no) default = no]

[Config File Name (default = >sys>ATE.config)]

[Make these parameters current? (yes or no) default = no]

The last three items on the form allow the user to save the new parameters, to designate a file name (if a file other than the default <sys>ATE.config is to be created or altered), and to make the new parameters take effect immediately. If the parameters are made current, but are not saved, they will alter only the current parameter set, rather than permanently creating or altering a configuration file on the disk.

Re-creating a Default Configuration File

If the default <sys>ATE.config file is gone, it can be re-created by going to the Create Configuration File form, answering yes to [Save these parameters?], and pressing GO without answering any of the other questions.

Note: If the default configuration file is not on disk when the ATE-GO command is executed, the Create Configuration File form is displayed. If this occurs, either create a new default file or load it in from back up. If a new default file is created, answer yes to [Make these parameters current?].

Menu Option 2: Save Current Parameters

The user may save the current parameter set to a configuration file. This is desirable if the user has made a number of changes to the parameter set using individual function keys and is satisfied with the operation of the system using the new parameters. The new parameters may be saved as an auxiliary configuration file under a new name, or as the default configuration file <sys>ATE.config. Saving current parameters gives the same results as altering and saving the same parameters on the Create Configuration File form.

Screen Form Displayed for Option 2

Save Current Parameters {Press Cancel to Exit}

[Config File Name (def=<sys>ATE.config)]

Menu Option 3: Print Configuration File

The user may print a configuration file. Any configuration file available to the ATE may be printed. The current parameter set is selected for printing if no other file is specified. The configuration file is printed to the screen if no print file is named.

Screen Form Displayed for Option 3

Print out a Configuration File {Press Cancel to Exit}

[Config File (default=Current Params)]

[Print File (default = Screen)]

Menu Option 4: Load Preexisting Configuration File

The user may load a new parameter set from any valid, preexisting configuration file.

Screen Form Displayed for Option 4

Load Parameters From Existing Config File

[Config File Name (def=<sys>ATE.config)]

SHIFT-F2 (Communications Parameters)

The menu invoked by SHIFT-F2 allows the user to change features regarding communication parameters.

Screen Menu Displayed for SHIFT-F2

Communications Parameters {Press Cancel to Exit}

1. Line Feed or Escape Code
2. Time Out or Xon/Xoff
3. After Cr Wait for Dcl

Please select one, then press GO key

Menu Option 1: Linefeed or Escape Code

[Auto Line Feed? (default = yes)]

Allows ATE to maintain a proper display whether receiving data with only ASCII carriage returns (CR), or with carriage return/linefeed (CR/LF) combinations. ATE can thus receive transmissions from both dumb terminals and from other computers.

If set to *yes* (the default value), incoming ASCII CRs position the cursor in the first column of the next line, and ASCII LFs are ignored. If set to *no*, incoming ASCII CRs position the cursor in the first column of the present line, and ASCII LFs position the cursor in the current column on the next line.

[Recognize Escape Code? (default = no)]

If set to *yes*, an incoming ASCII ESC character (1Bh) is translated to a video escape character (OFFh). This permits computers that can generate only 7-bit codes to access the BTOS workstation system video facilities (cursor positioning, control of attributes, etc.).

Screen Form Displayed for Option 1

Change Line Feed or Recognize Escape Code {Press Cancel to Exit}

[Auto Line Feed; def = previous value]

[Recognize Escape Code; def = previous]

Menu Option 2: Time Out or XON/XOFF

[Time Out (default = 10 sec.)]

Amount of time (in seconds) the XModem waits for a response from the other computer before implementing error recovery procedures.

[Send XON/XOFF (default = Yes)]

If enabled, the control character XOFF (ASCII 13h) is sent when the ATE input buffer is almost full. The control character XON (ASCII 11h) is sent when its input buffer is almost empty.

Screen Form Displayed for Option 2

Set Time Out or Xon/Xoff {Press Cancel to Exit}

[Time Out (default = 10 sec.)]

[Send Xon/Xoff (default = no)]

Menu Option 3: After CR Wait For DC1

When [After CR Wait for DC1] is set to **yes** (either here or in the configuration file), ATE waits for a DC1 control character after sending each block of data (terminated by a carriage return) to the other computer. This allows the BTOS workstation, when used as a terminal emulator, to synchronize more accurately with a mainframe computer. F8 lights whenever the BTOS workstation transmits a carriage return and starts waiting for the DC1. Once the wait starts, characters entered at the keyboard are buffered and displayed in a reverse video field near the bottom of the screen until a DC1 is received (which can be forced by pressing the CODE SCROLL UP key) or the F8 key is pressed.

Screen Form Displayed for Option 3

Wait for Cr after DC1 {Press Cancel to Exit}

[After Cr wait for DC1? (def = previous)]

SHIFT-F3 (Unattended Mode Parameters)

The menu invoked by SHIFT-F3 allows the user to change features in the unattended mode parameters.

Screen Menu Displayed for SHIFT-F3

Unattended Mode Parameters {Press Cancel to Exit}

1. Change Program Mode (Att/Unatt)
2. Hello line or Password
3. Remote Log Off Interval

Please select one, then press GO key

Menu Option 1: Change Program Mode

Allows the user to change between attended and unattended mode by typing **A** or **U**. The current program mode is indicated in the status frame at the top of the screen. When ATE first starts running, the mode is determined by the Program Mode parameter in the configuration file.

Screen Form Displayed for Option 1

Change Program Mode (Attended/Unattended) {Press Cancel to Exit}

[New Mode (default = previous value)]

Menu Option 2: Hello Line or Password*[Enter Hello Line File]*

Allows the user to load a previously created Hello Line message to be sent to the remote user at the beginning of an unattended ATE session. The user may create a one-line custom message of up to 240 characters, which will precede the Burroughs proprietary message when unattended ATE is activated by a remote user. If no custom message is provided, the default message (a line of asterisks) is displayed. The Hello Line message must be created using the BTOS workstation Editor. If the Hello Line is to take up more than one line on the screen, each line must be terminated by a SHIFT-RETURN (ODh) character. After the Hello Line file is created, the name of the file should be entered as the Hello File parameter for whatever configuration file is to be used.

[Password (Enter "none" for no password; def = last value)]

The user may require remote users to enter a password of up to 20 characters when logging on to unattended ATE. The password may be turned off by entering "none". The [Password] parameter in the configuration file determines what password is active when the user first invokes ATE. The default password value is the last value that was entered for the password. Upper- and lowercase letters are significant in the password, that is, the password must be entered exactly as it was entered the first time. The remote user is given three tries to properly enter the password before he is automatically logged off the ATE.

Screen Form Displayed for Option 2

Hello line file or Password {Press Cancel to Exit}

[Enter Hello line file]

[Password (default = last value)]

Menu Option 3: Remote Log Off Interval

Allows the user to change the automatic log off interval from the default of 10 minutes to a different time interval. At the end of timeout, the ATE displays a message alerting the remote user that in 30 seconds the remote user will be automatically logged off ATE (assuming there has been no activity at the remote user's station within the specified auto logoff time interval). When the user first invokes ATE, the interval is determined by the [Log Off Interval] parameter in the configuration file.

Screen Form Displayed for Option 3

Remote Log Off Interval {Press Cancel to Exit}

[Log Off Interval (1-360, default = 10 Min.)]

SHIFT-F4 (Character Mapping Mode Utilities)

The menu invoked by SHIFT-F4 allows the user to access or change features of character mode mapping. The user defines a map by entering the decimal or hexadecimal value of a character to be mapped and the decimal or hexadecimal character it should be mapped to. The function also allows the user to define and save multiple maps for future access, to display a defined map on the BTOS workstation screen, and to print a hard copy of a map definition.

Screen Menu Displayed for SHIFT-F4

Character mapping mode {Press Cancel to exit}

1. Mapping enable/disable
2. Output character mapping
3. Input character mapping
4. Save current maps
5. Get a map
6. Display maps

Please select one, then press GO key

Menu Option 1: Mapping Enable/Disable

Allows the user to turn character mapping on or off while in the ATE program. Once mapping is on, all mapping is transparent to the user. Inbound characters being mapped will be mapped as they are received off the communications line, prior to any other processing. The outbound characters will be mapped just before being sent to the communications line. Use care if mapping characters in the control character range (00-1Fh). The current state of mapping is indicated in the status frame at the top of the screen. When the user first invokes the ATE, the setting of this option is determined by the [Mapping On?] parameter in the configuration file.

Screen Form Displayed for Option 1

Character mapping state (ON/OFF). {Press cancel key to exit}

[Mapping On? (Yes/No) default = previous state]

Note on defining characters in Options 2 and 3: The default entry mode is decimal. To enter hexadecimal numbers, type h after the entry. For example, to enter decimal 183 as a hexadecimal, type B7h. If the values entered are not within 0 to 255 decimal or 0 to FF hexadecimal, the number is not be processed, and an error message shows on the status frame at the top of the screen.

Menu Option 2: Output Character Mapping

Allows the user to define the outbound characters to be mapped and the characters to which they should be mapped before being sent. Multiple one-to-one character mappings can be defined in a single map definition. Any outbound character from the BTOS workstation may be mapped to any other character. Character strings cannot be mapped.

Screen Form Displayed for Option 2

Character mapping of outbound communications. {Press cancel key to exit}

Value of character to be mapped (default = decimal)

Value of character to map to (default = decimal)

Menu Option 3: Input Character Mapping

Allows the user to define the inbound character to be mapped and the character to which it should be mapped. Multiple one-to-one mappings can be defined in a single map definition. As in outbound character mapping, no character strings can be mapped.

Screen Form Displayed for Option 3

Character mapping of inbound communications. {Press cancel key to exit}

Value of character to be mapped (default = decimal)

Value of character to map to (default = decimal)

Menu Option 4: Save Current Maps

Allows the user to save an established map definition for later recall and use. Each map definition to be saved must be given a unique map name by the user. By saving a map definition, the user eliminates the need to redefine a map each time the ATE program is run.

Screen Form Displayed for Option 4

Save the current map. {Press cancel key to exit}

Map file name

Menu Option 5: Get A Map

Allows the user to retrieve a previously defined map from BTOS workstation disk and move it to the current map status. To enable the map, the user must invoke the Mapping Enable/Disable feature (SHIFT-F4 option 1). When the user first invokes ATE, the current map is determined by the Mapping File parameter in the configuration file.

Screen Form Displayed for Option 5

Read a pre-created mapping file. {Press cancel key to exit}

Map file name

Menu Option 6: Display Maps

Allows the user to print or display the current map definition or any map definition available to the ATE. The displayed version of the map definition (as opposed to the binary version) can also be saved in a file on BTOS workstation disk by specifying the appropriate path for the print file. The print file can be directed to the standard BTOS workstation spooler utility for subsequent printing, or it can be sent to a local printer attached to the user's BTOS workstation.

Screen Form Displayed for Option 6

Map Table File {Press Cancel to Exit}

[Mapping File (default = Current)]

[Print File (default = Screen)]

Typical Map Printout from Option 6

Map Table Current

DISPLAY OF INBOUND MAPPING

No Characters Were Mapped

DISPLAY OF OUTBOUND MAPPING

| Original | | Mapped To | |
|----------|---------|-----------|---------|
| HEX | DECIMAL | HEX | DECIMAL |
| 42 | 66 | 2C | 44 |
| B7 | 183 | 2E | 46 |

Press RETURN to Continue

SHIFT-F5 (Auto-ATE)

The form invoked by SHIFT-F5 allows the user to implement the Auto-ATE utility. An Auto-ATE command file must be prepared before using this form (see Section 4).

Screen Form Displayed for SHIFT-F5

AUTO-ATE Parameters

```
[Check Syntax or Execute (def = Neither)]  
[AUTO-ATE File Name (def = Previous)]  
[Error Listing File (default = Screen)]
```

Check Syntax or Execute

Enter C to invoke the command file syntax checker, or enter E to begin execution of a command file. If neither option is entered, the user is returned to regular ATE when GO or CANCEL is pressed. An Auto-ATE file can also be set to start execution as soon as the user invokes ATE by setting the [Enable AUTO-ATE] parameter in the configuration file to **yes**.

Auto-ATE File Name

Enter the name of a valid Auto-ATE command file. If no file name is entered, the [Auto-ATE File Name] parameter in the configuration file is used as the default. The Auto-ATE file name in the current parameter set is changed to whatever name is entered here.

Error Listing File

Enter the name of the file or device (including volume and directory, if necessary) in which syntax checker error messages are to be recorded. If no file name is entered, the error messages is sent directly to the screen. Since there is no control on the screen scrolling, a program whose length is greater than one screenfull should generate an error listing file. Otherwise any errors caught pass by too quickly to be seen.

SHIFT-F6 (ATE Utilities)

The menu invoked by SHIFT-F6 allows the user to select from a useful set of ATE utilities:

File Copy Utility allows copying from any available file or device to any other legal file or device.

Soft Key File Load allows the user to define up to twenty different character strings, any of which may then be entered at any time with a single keystroke combination.

Timer Activation String allows the user to designate a pair of character strings that will control activation of a timer.

Screen Menu Displayed for SHIFT-F6

```
ATE Utilities {Press Cancel to Exit}
1. File Copy Utility
2. Soft Key File Load
3. Timer Activation String
```

Please select one, then press GO key

Menu Option 1: File Copy Utility

Allows the user to copy any available file or device to any other legal file or device. Among other applications, this allows the user to send an ATE file to a spooler for printing.

It is also possible to use this utility to display files directly on the screen by entering [vid] after the [File to copy to?] prompt. When copying a file to the screen, NEXT PAGE and SCROLL UP may be used to advance the display, and CANCEL may be used to exit the file copy before the end of the file is reached.

When the file copy is finished, the message *File copy complete. You may continue* is displayed.

Screen Form Displayed for Option 1

```
ATE File Copy Utility
```

```
File to copy from?
[File input mode (overwrite, append or New; default = New)]
File to copy to?
```


File to copy from?

Enter the name (including volume and directory, if necessary) of a valid file or device to copy from. If no file is specified, the message *No file name specified* is displayed in the status frame at the top of the screen. If the file or device cannot be located, the message *Sorry, file is non-existent* is displayed.

[File input mode (overwrite, append, or New); default = New]

Enter **O** to overwrite, **A** to append, or **N** for a new file. If the default is not entered, the error message *Input mode must be append, overwrite, or New File* appears. If the file input mode is mistakenly specified as *New*, but the file to be sent to already exists, *File already exists* appears in the status frame. If this happens, exit the file copy utility by pressing **CANCEL** and reenter.

File to Copy to?

Enter the name (including volume and directory, if necessary) of a valid file or device to copy to. If an invalid name is entered, an error message is displayed:

Error occurred. File copy aborted.

Menu Option 2: Soft Key File Load

Allows the user to invoke a previously created file of up to twenty different character strings, any of which may then be entered at any time by pressing an **ACTION-*<numeric/function key>*** key combination.

The soft key file is created using the Editor utility that comes with the BTOS operating system. The file may contain up to twenty lines of up to eighty characters each. Each line should end with a regular carriage return. If there are any additional characters between the eightieth character on the line and the carriage return that ends that line, they are ignored. To enter nonprinting characters (function keys, carriage returns, etc.) into a character string, the file may use the special characters (**_**) and (**~**) as defined in "Auto-ATE Special Characters" in Section 4.

Lines in the file are automatically assigned to a corresponding numeric or function key: Lines 1 to 10 are assigned to numeric keys 0 to 9 (numeric keypad keys only), and lines 11 to 20 are assigned to function keys F1 to F10.

Blank lines are permitted in the file. For example, a file of three character strings could be preceded by ten blank lines (carriage returns). This would cause the three regular strings to be represented by the ACTION-function keys F1 to F3, while the numeric keys would simply be ignored.

Note: If the ATE is running in the foreground of the Context Manager, the upper ten softkeys (ACTION-F1 to ACTION-F10) should not be used. The Context Manager uses these keys for partition swapping and if the keys are declared in a softkey file the results will be unpredictable.

Screen Form Displayed for Option 2

ATE Load Soft Key Utility

Soft Key File Name

Display Soft Key Strings? (def = No)

If *Soft Key File Name* is left blank and [Display Soft Key Strings] is answered **yes**, the current soft key file is displayed.

Note: Soft keys work only in attended mode or with the Auto-ATE override command using the keyboard entry option. In addition, soft keys are locked out if an ATE function is entered by manually activating the function key. An entire ATE function key command, or the first part of one, may be entered if the first character in the soft key string is the appropriate function key code. For instance, the string:

~D9h~C_AutoTest.tst_

would summon the Auto-ATE function and fill in the first two parameters with "C" and "AutoTest.tst", leaving the user to determine how the final parameter is to be set.

Using Auto-ATE to Automatically Load a Soft Key File

It is possible to use the Auto-ATE utility to load a soft key file automatically when ATE is first entered. To do so, the configuration file used when the ATE is invoked must have the [Enable Auto-ATE?] parameter set to **yes**, and must specify an appropriate [Auto-ATE File Name] parameter. (See "Create Configuration File" in Section 2). The Auto-ATE command file to load the soft key file *Softkey.file* would look like the following:

```
|XT|~DAh~2_SoftKey.file~1B~~07h~
```

See Section 4 for creating and implementing a command file.

Using Soft Keys for Auto-Dialing

One of the most useful applications of soft keys is as an auto-dialing utility. Create a file of phone numbers to be dialed by a Hayes Smartmodem 1200 with the following format:

```
ATDT<phone number> _
```

When this file is invoked, the user may dial any number in the file by pressing the appropriate ACTION-<numeric/function key> combination. If a different modem is used, substitute the appropriate dialing command for the Hayes *ATDT* command shown.

Menu Option 3: Timer Activation String

Allows the user to designate a pair of character strings that control activation of a timer. Reception of the first string starts the timer, sets it to 00:00:00, and displays elapsed time on the screen. Reception of the second string shuts the timer off.

A typical example would be *CONNECT* for the start timer string, and *NO CARRIER* for the stop timer string. This pair allows a file transfer to be timed from connect to disconnect.

Note: It is possible for the user to enter these strings from the keyboard if some device is echoing the keyboard characters back to the user's BTOS workstation.

The timer display appears in the status frame at the top of the screen, as shown in the following example. After the stop timer string is received, the total elapsed time remains on the display until ATE is exited or the timer is restarted.

Screen Form Displayed for Option 3

ATE-TIMER Utility

```
Start Timer String CONNECT
Stop Timer String NO CARRIER
```

Additional Function Keys

CODE-COPY (Copy Screen to Printer)

CODE-COPY allows the user to print the existing screen to a parallel printer port. A local printer must be attached to the workstation invoking CODE-COPY. If a printer is not attached, the system from which CODE-COPY is attempted lock ups momentarily, and the message *Printer Unavailable* is displayed. Printing is not sent to a printer attached to the master workstation in a cluster environment. This option does not work while filling in menu parameters.

Note: CODE-COPY initiated at the master workstation locks out all other BTOS workstations in a cluster environment until the master is finished.

ACTION-CANCEL (Abort File Transfer)

ACTION-CANCEL aborts the file transfer in progress.

CODE-I (Line Monitor Toggle)

CODE-I turns the line monitor on or off. The line monitor is a four-line display at the bottom of the screen that allows monitoring of characters being sent or received. This monitoring is suspended during all file transfers except for file recording. The first and third lines always display what is being received (either a file being received from another computer, or an echo of a file being sent), and is shown before mapping. The second and fourth lines display characters being sent by the user's BTOS workstation, and is shown after mapping. This allows the user to monitor what is actually going across the communications line.

Note: While the line monitor is displayed, the Help or Configuration menus may not fit on the screen due to the monitor being used. Turn off the line monitor to display these menus properly.

CODE-p (*Line Monitor Pause Toggle*)
CODE-p freezes the line monitor.

FINISH (*Return to Executive*)
FINISH exits ATE and returns the user to the Executive.

HELP (*Display Help File*)
HELP displays the Help file (following).

Screen Display for the HELP Key

Available functions are:

F1 — Change Baud Rate
 F2 — Change Communications Options
 F3 — Change Display Mode
 F4 — File Transfer In
 F5 — File Transfer Out
 F6 — File Recording
 F7 — File Transmit
 F8 — (When Lit) Pressing Overrides Cr Wait
 F9 — XModem File Transfer In
 F10 — Xmodem File Transfer Out
 Shift-F1 — Configuration File Utilities
 Shift-F2 — Communications Parameters
 Shift-F3 — Unattended Mode Parameters
 Shift-F4 — Character Mapping Mode Utilities
 Shift-F5 — AUTO-ATE Utility
 Shift-F6 — ATE Utilities
 Code-Copy — Print Screen to Parallel Printer
 Code-l — Line Monitor (On/Off)
 Code-p — Line Monitor Pause (On/Off)
 Action-Cancel — Abort File Transfer in Progress
 Finish — Return to Executive

CANCEL (*Exit from Function*)

CANCEL allows the user to exit any ATE function, or return to a higher level in a menu or form.

Note: The Screen Refresh function. When there is no activity at the keyboard for more than the specified 'Screen Timeout' time (designated at the executive level) and the screen goes blank, it can be restored by pressing the ACTION key. Pressing ACTION does not affect any ongoing processing.

Unattended Mode

ATE's unattended mode is used for file transfers between an unattended BTOS workstation running ATE and a remote user at another computer. Switching into unattended mode allows the BTOS workstation to respond automatically to a special set of command words from the remote user, who can be located at any computer running a compatible file transfer program. The unattended mode commands give the remote user both file transfer capability and limited file manipulation ability. The ability to manipulate files on the unattended BTOS workstation is limited for security reasons.

Entering Unattended Mode

The mode currently being used is displayed in the status frame at the top of the BTOS workstation's screen. If ATE is running in attended mode on the user's BTOS workstation, unattended mode can be entered by using the SHIFT-F3 function. The modem must be connected and turned on before unattended mode is entered.

Note: The baud rate must be set at the highest rate allowable for the modem being used before invoking unattended mode.

It is also possible to set the configuration file so that ATE automatically begins in unattended mode. If this is done, the modem must be connected and turned on before the ATE program is started.

Unattended Mode from the User's Viewpoint

When unattended mode is entered, the user's BTOS workstation displays the message:

Please stand by. I am initializing the modem.

This message is followed by characters generated by the initialization process. The keyboard must be left alone during initialization. When initialization is complete, the BTOS workstation displays:

Initialization complete. Waiting for a phone call.

When a remote user calls the ATE, a display at the user's screen shows which remote command is currently being used.

The BTOS workstation in unattended mode is intended for use only by a remote user using a different computer and issuing commands to the BTOS workstation over a phone line. For this reason, most of the BTOS workstation's keys are locked up and unavailable to the user after unattended mode is entered. Three keystroke combinations are available to the user: SHIFT-F3, ACTION, and ACTION-CANCEL.

Note: When the BTOS workstation is in unattended mode, the user should not press any keys other than SHIFT-F3, ACTION, and ACTION-CANCEL.

SHIFT-F3 (Returning to Attended Mode)

Pressing SHIFT-F3 invokes the Unattended Mode Parameters menu, allowing the user to return the BTOS workstation to attended mode.

ACTION (Refreshing the Screen Display)

When there is no activity at the keyboard for more than the specified 'Screen Timeout' time (designated at the executive level) and the screen goes blank, it can be restored by pressing the ACTION key. Pressing ACTION does not affect any ongoing processing. The screen also goes blank during an extended file transfer. In this case, the screen cannot be restored until the file transfer has ended.

ACTION-CANCEL (Aborting a File Transfer)

Occasionally the user may have to cancel a file transfer in order to regain control of the BTOS workstation, since it isn't possible to switch back to attended mode while a file transfer is in progress. Repeatedly pressing ACTION-CANCEL aborts any ongoing file transfer.

The remote user starts an unattended ATE session by calling the unattended BTOS workstation from any computer running a compatible file transfer program. Methods for dialing the number may vary from the example in this section if the modem at the remote user's computer does not use the Hayes AT command set.

Unattended ATE constantly checks for a ring detect, generated by a modem, on the communications channel. When a ring detect is received, indicating that a remote user is calling, ATE answers on the first or second ring. It then checks for a carrier detect, which confirms that contact has been made between the BTOS workstation and the remote computer. Once the carrier detect is found, a welcome message is sent to the remote user. ATE then sends the prompt *ATE>* to let the remote user know that the unattended BTOS workstation is awaiting a command.

When ATE is switched to unattended mode, the default directory is automatically set to *<ATE>*. For security reasons, the *<ATE>* directory is the only directory on the unattended BTOS workstation that a remote user can directly access. Before any other file on the BTOS workstation can be accessed, it must be copied into the *<ATE>* directory using the COPY command. All file transfers must be made to or from this directory.

In addition to the COPY command, the remote commands DIR, LIST, and KILL are available to allow manipulation of the *<ATE>* directory. The commands XSEN, XREC, ASEN, and AREC allow file transfers between the *<ATE>* directory and the remote user. Remote commands are discussed later in this section.

Typical Remote Startup Screen

```
ATZ                [Hayes AT command to reset modem]
OK                 [Acknowledgment from the modem]
ATDT 4429          [Hayes AT command to dial the number]
CONNECT           [Unattended workstation has found the carrier detect]

..... [Default "Hello" message from ATE]
Feb 17, 1986 8:23 AM
Burroughs R5.0.01
Copyright, 1986, Burroughs Corp.

ATE>              [Unattended ATE command prompt. The remote user has
                  successfully contacted the unattended workstation and
                  may now enter any remote commands.]
```


Error Correction with CTRL-x and CTRL-y

CTRL-x and CTRL-y (CODE-x and CODE-y on BTOS workstations) provide the remote user with short-cuts for correcting a number of common errors. If the remote user responds to an ATE> prompt, but realizes before pressing RETURN that the response is incorrect, CTRL-y may be used to erase the entire response. (This may be more convenient than backspacing over each letter of a long string.)

ATE responds to most of the remote commands with a set of questions concerning how the command is to be executed. The CTRL-x combination may be entered after any ATE> prompt to terminate a series of questions in progress and ready the BTOS workstation for another remote command. When the LIST command is being used, CTRL-x can terminate the file listing at the end of any page.

To abort a file transfer, the remote user must first press CTRL-x once to abort the file transfer on the remote end, and then press CTRL-x again repeatedly until unattended ATE detects it and stops the file transfer from the other end. To abort a file transfer at the user's end, the user presses ACTION-CANCEL.

Note: If a BTOS workstation is being used as the remote terminal, the remote user must enter CODE-x and CODE-y in lowercase letters.

The File Transfer Aborted Message

When ATE displays a File Transfer Aborted message during a file transfer, it may mean that there is not enough disk space on the BTOS workstation to complete the file transfer. If this happens, the remote user should first use the KILL command to delete all unnecessary files from the <ATE> directory, and then try the file transfer again. If making space on the disk by deleting files doesn't work, a different telephone line should be tried (in case the problem is in the phone line or connection).

If the message continues to appear, the disk is still too full to hold the file being transferred. It may still be possible to transfer a smaller file. The <ATE> directory should be regularly maintained to avoid cluttering the directory with old or unused files.

Disconnect

When the remote user is done, the communications link can be disconnected either by entering the BYE command or by hanging up. If the program receives a BYE command, it issues a communications break and goes back to waiting for another remote user to call.

If ATE detects that the carrier is missing (indicating that the remote user hung up) it resets itself as if the remote user had issued a BYE command. To disconnect, issue the BYE command and then hang up, since ATE may not immediately notice that the carrier is missing.

When the remote session is completed, the ATE drops DTR (Data Terminal Ready) to hang up the telephone line. Proper functioning of this feature requires alteration of the Hayes Smartmodem 1200 or Racal-Vadic factory settings. For further information about the modem settings, see Appendix A.

Undetected Disconnect

If the carrier tone is dropped during a file transfer (for example, if a remote user decides to hang up before the file transfer has been completed without first aborting the transfer), ATE may not immediately detect the problem. If a call is made to the unattended BTOS workstation and the phone rings more than twice, the remote user should hang up and wait two or three minutes before trying again.

Modem Operating Hints

In unattended mode, the ATE is designed to function with a Hayes Smartmodem (1200 or 2400) or Racal-Vadic 2400V modem attached to the unattended BTOS workstation. (ATE may not function properly with other modems. This is the case only for the BTOS workstation in unattended mode; attended mode and Auto-ATE mode work with any full duplex asynchronous modem.) Certain modem responses are affected by the procedure ATE uses to initialize the modem. For example, ATE may turn off the echo, which prevents the user from seeing what is typed after returning to attended mode. If this occurs, the user should perform a software reset on the modem (the Hayes ATZ command) or turn the modem off and back on again.

ATE constantly monitors the communications channel. For this reason, it is strongly recommended that a BTOS workstation using the ATE system not be engaged in any other form of I/O while the ATE is running.

Remote User Commands

The following pages illustrate remote user commands in use, as they would appear on the screen.

HELP

Displays a list of all remote user commands.

ATE>HELP

HELP - Display commands and definitions.
DIR - Display directory of files available for your use.
LIST - Display a file as is (Use caution with binary files).
COPY - Copy any file to the default directory.
KILL - To remove a file from the default directory.
BYE - To hang up and finish a session.
XSEN - Sends a file to your terminal (Xmodem).
XREC - Receives a file from your terminal (Xmodem).
ASEN - Sends a file to your terminal (ASCII).
AREC - Receives a file from your terminal (ASCII).
Ctrl-y - To redo a command line.
Ctrl-x - To abort a utility at a command prompt.
All commands must be completely typed in. If any part of the command string is typed in wrong, an error message will be issued. Code-y (control y combination) may be used to redo a command line, instead of having to backspace the entire line. Code-x (control x combination) may be used to abort a utility started by the user at any command prompt.

ATE>

DIR

Displays the names of files in the <ATE> directory. An asterisk may be used as a wild card symbol at either the beginning or the end of the file request (i.e., requests such as *test.**, *t**, **.txt*, and **t* are legal. A command using an embedded wild card, such as *t*.txt*, ignores everything after the wild card; *t*.txt* is treated as if only *t** were entered). Entering only the wild card causes the entire list of files in the <ATE> directory to be displayed.

```
ATE>DIR
```

```
File list desired?  
ATE>
```

```
Personnel.Names  
Highsales.85  
Inventory.85  
Labor.stock  
Interest.85  
Production.Jan  
Sales.Jan
```

```
Directory display complete.
```

```
ATE>
```

LIST

Displays the contents of a specified file from the <ATE> directory. The display is not designed for viewing binary files. The listing is displayed in sections of approximately eight hundred characters each. The message *Press any key to continue* is displayed at the end of each section if the listing has not yet reached the end of the file.

CTRL-S may be used at any time to temporarily halt the listing, and CTRL-Q causes it to resume. CTRL-x may be used at the end of any section (i.e., immediately after *Press any key to continue* to abort the listing before it reaches the end of the file.

ATE>LIST.

What file is to be listed?

ATE>SALES.JAN.

File name: SALES.JAN. Is this correct (Y/N)?

ATE>Y.

Salesman.....Units.....Zone.

| | | |
|------------------|--------------|----------|
| M. Dash..... | 125,000..... | South. |
| T. Harvey..... | 150,000..... | N.Y. |
| K. Kaeten..... | 95,000..... | East. |
| P. Faustine..... | 100,000..... | North. |
| B. Williams..... | 85,000..... | West. |
| P. Williams..... | 105,000..... | Central. |

Total Sales (Jan).....660,000.

Strike any key to continue..

ATE>.

COPY

Copies a specified file on the unattended BTOS workstation from any directory to the default <ATE> directory. The COPY command cannot be used to copy files from the <ATE> directory to any other directory. The remote user must supply the path as well as the file name of files to be copied into the <ATE> directory.

ATE>copy

File copied from. Please type in entire path and file name.

ATE><backup>Sales.1984

File name: <backup>Sales.1984 Is this correct (Y/N)?

ATE>y

File Copied to. Please type in the file name only.

ATE>Sales.1984

File name: Sales.1984 Is this correct (Y/N)?

ATE>y

Please stand by. Attempting to copy files now.

File copy complete. You may continue.

ATE>

KILL

Deletes a specified file from the <ATE> directory. No other directory on the BTOS workstation can be affected by this command.

```
ATE>KILL
What file is to be deleted?
ATE>Sales.Tmp
File name: Sales.Tmp Is this correct (Y/N)?
ATE>y
Attempting to delete the file now.
ATE>
```

BYE

Hangs up the data comm line and finishes the remote session, causing unattended ATE to reset and wait for the next call.

```
.
.
ATE>BYE.
.
...GOODBYE.from.Burroughs.ATE...Please.hang.up.now.
...[Characters.generated.by.modem.disconnect.
...will.appear.here.].
NO.CARRIER.
.
```

XSEN

XSEN tells unattended ATE to send a file from the BTOS workstation's <ATE> directory to the remote user, using the XModem protocol. XSEN can be used only when the remote user's computer is also running an XModem file transfer program. The XSEN command should be used rather than ASEN whenever possible, since XModem is a much more accurate method of transmission.

What file is to be transferred?

File name: <filename> Is this correct (Y/N)?

ATE requests the name of the file to be transferred, and asks the remote user to confirm that it has found the right one. If the file does not exist, or if the remote user enters "N," ATE again asks the remote user for the file name.

*B20 specific file (Y/N) (i.e. B20 Run or word processor file)
Wordstar file? (Y/N)*

Once a correct file name is given, ATE asks for information about the file. This question allows special processing to take place if the file is a BTOS workstation run file or a WRITEone word processor file.

1} Binary 2} CR 3} CR/LF. Please pick the appropriate no.
The selection of *Binary*, *CR*, or *CR/LF* establishes how end-of-line characters are mapped. The BTOS workstation uses a line-feed to indicate end-of-line, while most other computers use either a carriage return or a carriage return/line-feed combination. *Binary* should be selected only if the remote user's computer is also a BTOS workstation, and the line-feeds are to remain unaltered. Otherwise, *Cr* or *Cr/Lf* should be selected, depending on the remote user's computer.

File <filename> ready to send.

Estimated time of transfer is: <transfer time>

Prepare your station to receive.

Once ATE has all the necessary information, it sends a message informing the remote user that it is prepared to start the file transfer and is awaiting the signal to proceed. An estimated time for file transfer is given at this point. If the remote user's computer is also a BTOS workstation running ATE, preparation to receive is accomplished by pressing F9 (XModem File Transfer In).

ATE>XSEN

What file is to be transferred?

ATE>File.Test

File name: File.Test Is this correct (Y/N)?

ATE>y

B20 specific file? (Y/N (i.e. B20 Run or word processor file)

ATE>n

EOL Mapping 1} Binary 2} Cr 3} Cr/Lf. Please pick the appropriate no.

ATE>3

File File.Test ready to send.

Estimated time of transfer is :

Less than 1 minute.

Prepare your station to receive.

XModem File Transfer In

Filename: File.In

[File input mode (overwrite, append or New; default = New)]

[CR/LF mapping mode (binary or new line; default = new line)]

[B20 specific file? (run or word processor file; default = No)]

XModem Incoming Transmission Statistics.

XM: Successful transfer of 2 blocks.

0 blocks were NAKd.

0 total NAKs were sent as responses.

File transfer took 0 hours 0 minutes 23 seconds.

File transfer complete

ATE>

XREC

The XREC command tells unattended ATE to receive a file from the remote user, using the XModem protocol. This protocol can be used only when the remote user's computer is also running an XModem file transfer program. The XREC command should be used rather than AREC whenever possible, since XModem is a much more accurate method of transmission.

What file is to be transferred?

File name: <filename> Is this correct (Y/N)?

ATE first requests the name of the file to be transferred, and then echos it back to the remote user to make sure it is correct. If it isn't correct, ATE asks the remote user for another file name.

File <filename> already exists.

Would you like to append or overwrite the file (Y/N)?

If the name is correct but the file already exists, the ATE asks the remote user if the file is to be appended or overwritten. If neither option is desirable, CTRL-x may be used to request an abort of the transmission.

B20 specific file? (Y/N) (i.e. B20 run or word processor file)

Wordstar file? (Y/N)

Once a correct file name is given, ATE asks for information about the file. *B20 specific?* allows special processing to take place if the file is a B20 run file or a WRITEone word processor file. *Wordstar file?* allows resetting of the special high bits in Wordstar text files, converting them to a standard ASCII format that can be handled by the Editor or WRITEone on the BTOS workstation.

1} Binary 2} New Line. Please pick the appropriate no.

The selection of *Binary* or *New Line* establishes how end-of-line characters are mapped. The BTOS workstation uses a line-feed to indicate end-of-line, while most other computers use either a carriage return or a carriage return/line-feed combination. *Binary* should be selected only if the remote user's computer is also a BTOS workstation, and end-of-line symbols in the incoming file are already line-feeds. Otherwise, *New Line* should be selected, causing all incoming carriage returns and carriage return/line-feed combinations to be converted to line-feeds.

File <filename> is ready to be received.

Prepare your station to send.

Once ATE has all the necessary information, it sends a message informing the remote user that it is prepared to start the file transfer and is awaiting the signal to proceed. If the remote user's computer is also a BTOS workstation running ATE, preparation to send is accomplished by pressing F10 (XModem File Transfer Out), filling out the form that it displays, and pressing GO.

ATE>XREC

What file is to be transferred?

ATE>File.Test

File name: File.Test Is this correct (Y/N)?

ATE>y

B20 specific file? (Y/N (i.e. B20 Run or word processor file))

ATE>n

EOL Mapping 1} Binary 2} New Line. Please pick the appropriate no.

ATE>2

Wordstar file? (Y/N)

ATE>n

File File.Test is ready to be received.

Prepare your station to send.

XModem File Transfer Out

Filename: junk

[New line mapping mode (binary, CR, or CRLF; default = CRLF)]
[B20 specific file? (run or word processor file; default = No)]

XModem Outgoing Transmission Statistics.

XM: Successful transfer of 2 blocks.

0 blocks were NAKd.

0 total NAKs were received as responses.

File transfer took 0 hours 0 minutes 25 seconds.

File transfer complete

ATE>

ASEN

The ASEN command tells unattended ATE to send a file from the BTOS workstation's <ATE> directory to the remote user by executing the TRANSMIT FILE utility (the F7 function in attended mode). ASEN, unlike XSEN, merely transmits each character from the file in sequence, without requiring any positive acknowledgment that the file is being received correctly. In most cases, therefore, this command should be used only when the remote user's computer does not have a version of the XModem file transfer protocol.

What file is to be transferred?

File name: <filename> Is this correct (Y/N)?

ATE requests the name of the file to be transferred and asks the remote user to confirm that it has found the right one. If the file does not exist, or if the remote user enters "N," ATE again asks the remote user for the file name.

1} Binary 2} Cr 3} Cr/Lf. Please pick the appropriate no. The selection of *Binary*, *CR*, or *CR/LF* establishes how end-of-line characters are mapped. The BTOS workstation uses a line-feed to indicate end-of-line, while most other computers use either a carriage return or a carriage return/line-feed combination. Binary should be selected only if the remote user's computer is also a BTOS workstation, and the line-feeds are to remain unaltered. Otherwise, either *CR* or *CR/LF* should be selected, depending on the remote user's computer.

File <filename> ready to send.

Estimated time of transfer is: <transfer time>

Prepare your station to receive.

File transfer sequence is as follows:

1. *Control-R (12h) - opens file*
2. *Transfer ASCII file*
3. *Control T (14h) - closes file.*

Press any key to continue

Once ATE has all the necessary information, it sends a message informing the remote user that it is ready to start the file transfer and is waiting for the signal to start. The remote user should prepare the workstation by activating the file recording (f6) utility and then pressing any key to prompt the unattended workstation to begin the transfer.

If the remote user's file recording utility does not use the CTRL-R and CTRL-T characters to open and close the file, then the remote user's recording utility must be turned off manually at the end of the file transfer. Clean up the file by using the Editor to remove the CTRL-R, the CTRL-T, the keystroke used to start the transfer (i.e., the response to *Press any key to start transfer*, and any other unwanted characters that were typed or sent during the file transfer. If the file transferred was a B20 Run or WRITEone file, some extra null characters may be found at the end of the file.

```
What file is to be transferred?
ATE>SALES.1984

File name: SALES.1984 Is this correct (Y/N)?
ATE>Y

EOL Mapping 1} Binary 2} Cr 3} Cr/Lf. Please pick the appropriate no.
ATE>3

File SALES.1984 ready to send.
Estimated time of transfer is :
Less than 1 minute.
Prepare your station to receive.

File transfer sequence is as follows:
1. Control-R (12h) - opens file.
2. Transfer ASCII file.
3. Control-T (14h) - closes file.

Strike any key to start transfer.

File transfer complete

ATE>
```

AREC

The AREC command tells unattended ATE to receive a file from the remote user by executing the Recording File utility (the F6 function in attended mode). AREC, unlike XREC, merely records each character as it is received, without requiring any positive confirmation that it is receiving the file correctly. In most cases, therefore, this command should be used only when the remote user's computer does not have a version of the XModem file transfer protocol.

What file is to be transferred?

File name: <filename> Is this correct (Y/N)?

ATE first requests the name of the file to be transferred, and echos it back to the remote user to make sure it is correct. If it isn't correct, ATE asks the remote user for another file name.

File <filename> already exists.

Would you like to append or overwrite the file (Y/N)?

If the name is correct but the file already exists, ATE asks the remote user if the file is to be appended or overwritten. If neither option is desirable, CTRL-x may be used to request an abort of the transmission.

File <filename> is ready to be received.

Prepare your station to send.

ATE uses the CTRL-R and CTRL-T characters to determine the beginning and end of the file being received. The recording is not activated until ATE has received a CTRL-R character, and the ATE> command prompt is not issued again until ATE receives a CTRL-T character and closes the recording file. All characters that occur between the CTRL-R and the CTRL-T are recorded to the recording file.

If the remote user's file transmitting utility does not automatically send CTRL-R before the file is sent and CTRL-T after the file is sent, these characters must be supplied by the remote user. This may be done by typing CTRL-R before transmitting the file and typing CTRL-T after transmitting the file. It may also be accomplished by inserting the control characters into the file to be sent, placing CTRL-R as the first character in the file and CTRL-T as the last character in the file.

If the remote user wishes to abort the transfer after *Prepare your station to send* is received but before the file is transmitted, CTRL-R and CTRL-T should be typed in succession. This tells ATE to open the recording file, and to close it again immediately. The remote user may then delete the resulting empty file from the <ATE> directory using the KILL command.

ATE>AREC

What file is to be transferred?

ATE>SALES.1985

File name: SALES.1985 Is this correct (Y/N)?

ATE>Y

EOL Mapping 1} Binary 2} New Line. Please pick the appropriate no.

ATE>2

File SALES.1985 is ready to be received.

Prepare your station to send.

File transfer sequence is as follows:

1. Control-R (12h) - opens file.
2. Transfer ASCII file.
3. Control-T (14h) - closes file.

You may proceed —

File Transmit

Filename: SALES.1984

[New line mapping mode (binary, CR, or CRLF; default = CRLF)]

[Line control mode (none, XON/XOFF or CTS; default = none)]

[Enable ASCII Buffer Control Codes? (default = No)] Y

File transfer complete

ATE>

Remote Commands

Remote commands are available only to the remote user. Each command is a single word. To invoke the commands, the remote user enters the command desired after receiving the ATE> prompt. The entire command must be typed in. If the remote user enters an unrecognizable command, an error message is displayed and the remote user is returned to the command prompt.

| | |
|------|---|
| Help | Displays the commands and definitions listed (following) |
| Dir | Displays a list of available files. |
| List | Displays the contents of a specified text file. |
| Copy | Copies a specified file from any directory to the default <ATE> directory. The remote user must supply both the path and the file name of the file to be copied. Files cannot be copied out of the <ATE> directory. |
| Kill | Deletes a specified file from the <ATE> directory. |
| Bye | Hangs up the data ccomm line and finishes the remote session. |
| XRec | Receives a file from the remote user via XModem. |
| XSen | Sends a file to the remote user via XModem. |
| ARec | Receives a file from the remote user via ASCII. |
| ASen | Sends a file to the remote user via ASCII. |

Command Prompt Controls

The following key combinations, available only to the remote user, are used when entering the preceding commands. When the remote user is using a BTOS workstation, the letters x and y must be entered in lowercase letters.

| | |
|--------|--|
| CTRL-y | Erases an entire command string. |
| CTRL-x | Aborts a utility when entered in response to any command prompt. |

The Auto-ATE Utility

Auto-ATE allows the ATE to accept and follow a specific set of instructions created by the user. Once a file of instructions is created, it can be implemented at a designated time without any further action by the user. Auto-ATE is capable of dialing the telephone, making contact with another computer, and performing virtually any operation that the user would normally be capable of with attended ATE. This includes file transfers between two unattended systems.

- Users may select the time of day ATE is to call the other computer. Other timing parameters include a time delay and a command that allows Auto-ATE to re-execute the current command string after a period of time if a bad connection is made or some other mistake occurs.
- Character strings from 1 to 255 characters in length can be transmitted and received.
- The new file command allows new command files to be opened during an Auto-ATE session. This enables the user to create a command file by stringing together several existing command files.
- The Auto-ATE syntax checker allows the user to test control files for errors without actually executing the file.
- Auto-ATE can perform most functions, such as changing baud parity, that are available with the attended mode ATE. auto-ATE may not be used in unattended mode, or with the type-ahead/DC1-wait feature.

Creating a Command File

An Auto-ATE command file is created using the Editor utility that comes with the BTOS operating system. Commands used in Auto-ATE are separated by the symbol (I) before and after the command characters (e.g., (IXTI), the *transmit* command). Any line that goes from a |xx| to another |xx| is called a *command string*. The sum of all the command strings, from the first start time (IST1) or from the beginning of the file, to the next start time or to the end of the file, is called a *command block*.

Auto-ATE Commands

RE (Retry)

Allows the user to set the number of times to retry a subsequent XT command before aborting on an error, up to a maximum of 254 tries. A specification of 255 will result in infinite retries. The `IREI` command may be set anywhere in the command file. The last `IREI` encountered before a given XT command will be the one used by that XT command.

TO (Time Out)

Allows the user to set the time to wait before retrying a subsequent XT command. The time out may be in minutes or seconds (e.g. `ITO|25s`, or `ITO|2m`). The default is seconds. The `ITO` command may be set anywhere in the command file. The last `ITO` encountered before a given XT command is the one used by that XT command.

ST (Start Time)

Used to tell Auto-ATE what time to execute the next command string. It also serves to separate one command block from the next. The command `IST|99:99` indicates an immediate start time.

DM (Delay Minutes)

Instructs Auto-ATE to insert a 1 to 100 minute delay before executing the next instruction in the command string.

DS (Delay Seconds)

Instructs Auto-ATE to insert a 1 to 60 second delay before executing the next instruction in the command string.

NF (New File)

Allows the user to close the current command file and open a new command file.

XT (Transmit)

The entire string of up to 255 characters following this command (ending with the next command or EOF) is transmitted through the keyboard driver. This allows Auto-ATE to act as if a user were typing in the commands, thereby allowing any series of available ATE features to be run without manual intervention.

OR (Override)

When a file name is specified after this command, the first 255 characters of that file is transmitted as if they were an XT string in the command file. This is especially useful when a new string (such as a dateline) must be inserted each time the command file is used. If [kbd] is entered as the file name, any number of characters (including any legal series of commands) is accepted from the keyboard until FINISH is pressed.

XR (Receive)

Auto-ATE waits until it receives a string identical to the receive string that follows the |XR| command. Although the receive string can be up to 255 characters long, it does not need to be longer than necessary to uniquely identify the string by its final characters.

If Auto-ATE does not see the receive string within the time allotted by the last |TO| command, it backs up to the last |XT| and reissues that command as many times as specified in the latest |RE| command. If the |XT| command is reissued more than the allotted number of times, and the receive string is still not received, Auto-ATE checks for further commands in an exit error string. If no exit error string is provided, Auto-ATE ignores all command strings up to the next |ST| or EOF.

Note: It may be convenient, when creating a new command file, to first record a session with the ATE file recording (F6) function as this furnishes exact duplicates of the expected receive strings, and avoids most errors in transcription that could cause the XR command to fail.

Exit Error Strings

An exit error string allows users to designate one or more command strings for use when an |XR| error occurs. The exit error string must be enclosed in braces, {}, and may contain as many command strings as the user finds necessary. The special character * may appear as the first character in the exit error string, immediately following the {. This character indicates that an error message is to be written into a designated file. The file name and error message are specified as follows:

```
{*[vol]<dir>filename Message. . . |xx|. . . }
```

A space must follow the file name. The message text consists of any characters between the space after the file name and the beginning of the next command string. This text may be written to a disk or sent to a spooler for printing. A time and date will be appended to the error message.

Warning: Watch out for braces in receive strings. A brace that is not intended as the beginning or end of an exit error string is still taken as one. This could easily cause problems that the syntax checker would not notice.

EI (End If Block)

Terminates a series of IF blocks.

IF (Begin IF Block)

A conditional |XR| command that acts as the beginning of an IF block structure. When an |IF| command is encountered, Auto-ATE accumulates all characters received during a period allotted by the latest |TO| command. The characters are stored in a 512 character buffer, and only the last 512 characters are retained.

When the `|TO|` period ends, Auto-ATE searches the buffer from beginning to end, attempting to match a set of characters in the buffer with the receive string immediately following the `|IF|` command. If no match is found, Auto-ATE proceeds to the next `|IF|` command (ignoring all intervening commands, including `|ST|`) and attempts to match its receive string to the buffer contents. This procedure continues until a match is found, an `|EI|` command is encountered, or EOF is encountered. When a match is found, the commands immediately following the matching `IF` string are executed until another `|IF|` command or an `|EI|` command is encountered. If another `|IF|` command is encountered before an `|EI|`, Auto-ATE skips to the next `|EI|`.

The following is an example of a typical `IF`-block structure:

```
|IF|String-1
|xx|(various other commands)
|IF|String-2
|xx|(various other commands)
|IF|String-3
|xx|(various other commands)
|EI|
```

Assuming that the contents of the buffer after the `TO` period are:

```
garbage.garbage.String-3.garbage.String-2...
```

the segment *String-2* is matched, since the attempt to match *String-1* fails, and Auto-ATE stops looking for a match when it successfully matches the second `IF` string. The commands following `|IF|String-2` are executed until `|IF|String-3` is encountered. At this point, all further commands in this command block are skipped until the `|EI|` command is encountered.

Special Characters

(-) Carriage Return

If an underline appears in the file, the ASCII code for a carriage return is sent in its place. This character may be used in `XT` and `XR` strings, and with soft keys.

(^) Carriage Return Line Feed

If a caret appears in the file, the ASCII codes for a carriage return and a line feed are sent in its place. This character may be used in XT and XR strings but may not be used with soft keys (the soft key function treats it as a normal character).

(~) ASCII Code Number

If a number appears in the file surrounded by two tilde characters, the ASCII character indicated by that number is transmitted. For example, the character sequences ~1bh~ and ~27~ indicate the ASCII numbers for GO. This character may be used in XT and XR strings, and soft keys. The following is a list of useful character codes:

| Key | Hex | Decimal | Key | Hex | Decimal |
|-----|-----|---------|----------|-----|---------|
| F1 | 15h | 21 | SHIFT-F1 | D5h | 213 |
| F2 | 16h | 22 | SHIFT-F2 | D6h | 214 |
| F3 | 17h | 23 | SHIFT-F3 | D7h | 215 |
| F4 | 18h | 24 | SHIFT-F4 | D8h | 216 |
| F5 | 19h | 25 | SHIFT-F5 | D9h | 217 |
| F6 | 1Ah | 26 | SHIFT-F6 | DAh | 218 |
| F7 | 1Ch | 28 | | | |
| F8 | 1Dh | 29 | | | |
| F9 | 1Eh | 30 | | | |
| F10 | Fh | 31 | | | |

| | | | | | |
|----|-----|----|--------|-----|---|
| GO | 1Bh | 27 | CANCEL | 07h | 7 |
|----|-----|----|--------|-----|---|

Note: A comment in an Auto-ATE command file must start with a left parenthesis (and end with a right parenthesis). Anything between the parentheses (unless they are characters in an XR command string) is ignored by Auto-ATE. Comments are not allowed inside an XR string, since it is possible for the response to be a string that includes parentheses. Any comments within an XR string would be incorrectly interpreted as part of the awaited response. Soft keys treat parentheses as normal printable characters.

Syntax Checker Error Messages

***ERROR: | expected**
***ERROR: } not found**
***ERROR: XT or XR expected**
***ERROR: DM or DS expected**
***ERROR: Unrecognized Command**
***ERROR: Bad Erc**
***ERROR: Numeric Char expected**
***ERROR: Number out of range**
***ERROR: ST expected**
***ERROR: Unclosed Comment?**
***ERROR: Bad Time Specification**
***ERROR: : expected**
***ERROR: NF expected**
***ERROR: Command String too long.**
***ERROR: RE expected**
***ERROR: TO expected**
***ERROR: ~ expected**
***ERROR: OR expected**
***ERROR: IF expected**
***ERROR: EI expected**
***ERROR: Misplaced IF**

Syntax Checker Warning Messages

***Warning: Exit Error String does not follow a XR command.**
***Warning: Auto-ATE OverRide file cannot be opened.**
***Warning: Auto-ATE NF file cannot be opened.**
***Warning: Command String too long.**
(This warning will not appear for a command string in an OR file at compile time, since the syntax checker tests only the existence of the OR file, not its contents.)

Using the NEXT Key During an Auto-ATE Session

NEXT may be used during an Auto-ATE session to abort a command and move on to the next one in the command file. Thus, a delay command could be bypassed in order to continue execution immediately, a bad XR command could be ignored, etc. NEXT is especially useful during command file debugging sessions.

Modem Configuration Settings

Hayes SmartModem 1200

| Switch # | Factory Setting | Function |
|----------|-----------------|---|
| 1 | Down* | Forces RS-232C data terminal ready lead (pin 20) TRUE; enables the SmartModem 1200 to execute commands. |
| 2 | Up | SmartModem 1200 will respond to commands with English word result codes. |
| 3 | Down | Result codes will be sent by the SmartModem 1200 to your terminal or computer. |
| 4 | Up | SmartModem 1200 will echo characters while in the command state. That is, commands you send to the SmartModem 1200 will be sent back (echoed) to your terminal for display. |
| 5 | Down | SmartModem will not automatically answer an incoming call. |
| 6 | Down* | Forces the RS-232C carrier detect lead (pin 8) TRUE; computer accepts locally echoed characters and result codes from the SmartModem 1200. |
| 7 | Up | Setting used for connection to an RJ11 modular telephone jack (single line connection). For multiline installation, refer to "Switch 7" in Chapter 8. |
| 8 | Down | Enables SmartModem 1200 command recognition. |

**To run the ATE program, these switches on the SmartModem 1200 must be set to Up.*

Chapter 8 of the Hayes SmartModem 1200 Hardware Reference manual contains further information on the configuration switches and typical settings for various modes of operation.

Note: This page is reproduced from the Hayes Manual for SmartModem 1200, pages 2-6, with the permission of Hayes Microcomputer Products, Inc., Norcross, GA, 30092

Hayes SmartModem 2400

On the Hayes SmartModem 2400 the commands AT&D1 and AT&C1 will reset the necessary parameters logically and the command AT&W will save them.

Chapter 4 of the Hayes SmartModem 2400 user's guide contains further information on the 2400 command language.

Racal-Vadic Maxwell Modem 2400V

Appendix E of the Maxwell Modem 2400V user's guide contains further information on the subset of the Hayes AT command set that is used.

On the Racal-Vadic Maxwell Modem 2400V, the W2 strap must be moved to the Enabled position to operate correctly.

Appendix B of the Maxwell Modem 2400V user's guide contains further information on the hardware settings.

File Transfer Protocols

ASCII and BINARY Shared Format

In both the ASCII and binary modes, the sender initiates file transfers. (The sender can be either a B20 System workstation or the other terminal or computer.) The sender repeatedly transmits an ASCII SOH (start-of-heading, 01h) character until the receiver responds with an ACK (acknowledgment, 06h) character.

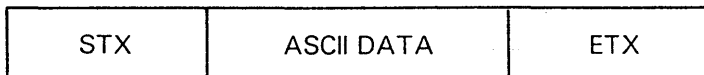
File transfer then proceeds with the sender transmitting a data block in the format specified below (different for ASCII and binary), and the receiver responding with either a positive or negative acknowledgment, indicated by an ASCII ACK (06h) or NAK (negative acknowledgment 15h) character, respectively. When the sender receives a negative acknowledgment, it retransmits the block. The sender signals the completion of transfer by transmitting an ASCII EOT (end-of-transmission, 04h) character.

In both ASCII and binary modes each received block can contain up to 254 data characters. In ASCII format, each transmitted block contains a line of ASCII data characters. (A line extends to the first encountered LF.) If no LF character is encountered, the block contains 128 bytes. In binary format, each transmitted block, except possibly the last one, contains 128 data characters.

ASCII Block Format

The format of a block using the ASCII file transfer mode is shown in Figure B-1. It consists of an ASCII STX (start of text, 02h) character, then the ASCII data to be transferred, and then an ASCII ETX (end of text, 03h) character.

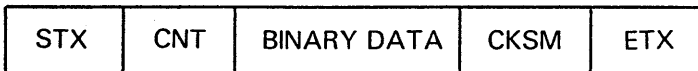
Figure B-1 ASCII Block Format



Binary Block Format

The format of a block using the binary file transfer mode is shown in Figure B-2. It consists of an ASCII STX (start of text, 02h) character, followed by a binary count of the number of characters in the block (including the data characters and the checksum character, but not including the STX count or ETX (end of text, 03h) characters). Next comes the actual data to be transferred, then a twos complement checksum and finally an ASCII ETX character. The checksum is computed such that the binary sum of all data characters (not including STX, count or ETX) and the checksum character is an integral multiple of 256. (That is, the checksum character is the twos complement of the low-order 8 bits of the arithmetic sum of the hex value of data characters).

Figure B-2 Binary Block Format



Xmodem File Transfer Protocol

XModem achieves reliability in its data transfer task by a combination of three characteristics:

- 1 A rigidly defined block structure containing a block number, the block number complement, 128 characters of data, and a checksum character.
- 2 The checksum character noted above is calculated by the sending device and appended to the block of data as the last character of the block. The checksum must be recalculated and confirmed by the receiving device.
- 3 The sending computer does not send another block of data until it receives an acknowledgment from the receiving device for each block transmitted.

These requirements allow the XModem protocol to identify whether a block of data has been correctly received and to resend a block of data for which an error was detected.

XModem Block Format

Each block of data transmitted by the XModem protocol contains exactly 132 bytes as follows:

| Position | Contents | |
|----------|---------------------------------|----------|
| 1 | Start of header | (/SOH/) |
| 2 | Block (transmission) number | (Blk#) |
| 3 | Ones complement of block number | (CBlk#) |
| 4 - 131 | 128 bytes of data | (<data>) |
| 132 | Checksum | (Cksum) |

Thus, the block to be transmitted has the following format:

| | | | | |
|-------|------|-------|-----------------------|-------|
| /SOH/ | Blk# | CBlk# | < 128 bytes of data > | Cksum |
|-------|------|-------|-----------------------|-------|

The XModem protocol requires a transparent mode of transmission. That is, it must not be sensitive to any control character values embedded in the data being transmitted. To achieve the required transparency, all of the data transmission is performed using 8 bits and no parity with character mapping turned off.

The block checksum character is a single byte whose initial value is zero (0) and whose final value is calculated using the formula:

$$\text{NewChecksumValue} := (\text{OldChecksumValue} + \text{CurrentChar}) \bmod 256$$

This protocol requires that compatible software be installed on both computer systems being used to transfer files. This restriction does not apply to a conversational or emulation mode of the software.

When the file transfer programs on both computers is executed, the sending program waits for a ready signal (called a handshake) from the receiving program. For this protocol, this ready signal is the negative acknowledgment character (NAK - 15h). Once the NAK is received by the sending program, block transfer of the file begins.

The sending routine calculates the checksum as each character is read from the file to be sent. The resultant value is then included as the last byte in the block being transmitted. The receiving routine accepts the entire block, calculates a checksum value, and compares the calculated checksum with the checksum provided by the sending routine.

If the received and calculated checksums match, the receiving routine responds to the sending routine with a positive acknowledgment (ACK - 06h) character. Otherwise, the receiving routine responds with a NAK. If the sending routine receives a response other than an ACK character, it attempts to resend the offending block up to ten times. If after ten tries the block is not properly received, the sender aborts the file transfer attempt and sends a cancel (CAN - 18h) character to the receiver.

When the entire file is sent and the receiving routine responds with an ACK character, the sending routine sends a single End-of-Transmission (EOT - 04h) character. This tells the receiving routine that the file transmission is completed. The normal response is an ACK character. When the sender receives an ACK response from the receiver, it goes to normal end-of-program.

If the receiver responds with anything other than an ACK, the sender retransmits the EOT up to ten times. If no ACK response is received after ten tries, the sending routine recognizes a time-out condition, displays an appropriate status message, and goes to abnormal end-of-program.

When the XModem protocol routines reach either normal or abnormal end-of-program status, they return to the ATE system emulation mode and restore the data comm line to bits and parity parameters which were in effect prior to calling the XModem file transfer subsystem.

OFISfile/ATE Interface

Invoking French and French/Canadian OFISfile/ATE Interface

When using the ATE for communicating with a French or French/Canadian OFISfile, special steps must be taken to establish communications. Prior to using the ATE for transferring data with the OFISfile, the user has to create an OFISfile configuration file. To create the OFISfile.config file the user invokes the ATE using the default configuration parameters and leaves the OFISfile Translations parameter blank ([OFISfile (FR, FC, None; default ? None)]). By using SHIFT-F1, the user is able to create the necessary configuration file for the ATE to OFISfile communications. For example:

```
[Recording File]
[Communications Channel default = B] A
[Baud Rate (20-9600) default = 1200] 9600
[Stop Bits (1 or 2) default = 1] 1
[Parity (none, even, odd, 0, or 1) default = Even] NONE
[Data Bits (5-8) default = 7] 7
[Display mode (fdx, hdx, echoplex, or hex) default = fdx] FDX
[Auto Line Feed? (yes or no) default = yes] YES
[Recognize Escape Code? (yes or no) default = no] YES
[Time Out (seconds) default = 10]
[Send XON/XOFF? (yes or no) default = no]
[After CR wait for Dc1? (yes or no) default = no]
[Program mode (attended or unattended) default = attended]
[Hello File (default = None)]
[Password (default = none)]
[Log Off Interval (1-360, default = 10 Min.)]
[Mapping On? (Yes/No) default = No]
[Mapping File (default = None)]
[AUTO-ATE File Name (default = None)]
[Enable AUTO-ATE? (Yes/No, default = No)]
[Save these parameters? (yes or no) default = no] YES
[Config File Name (def=<sys>ATE.config)] <SYS>OFISfile.CONFIG
[Make these parameters current? (yes or no) default = no] NO
```

After creating and saving the configuration file to use the OFISfile option the user must exit the ATE. When invoking the OFISfile option on the ATE, the user enters the name chosen for their OFISfile configuration file in the [Config File] parameter, and then enters the country code in the [OFISfile Translations] parameter (FR or FC).

When invoking the OFISfile/ATE option, some of the functionality found through the function keys of the ATE is no longer available. The function keys that do not work with the OFISfile option are:

Function Keys

| | |
|-----|--------------------------|
| F4 | File Transfer In |
| F5 | File Transfer Out |
| F9 | XModem File Transfer In |
| F10 | XModem File Transfer Out |

SHIFT-Function Keys (except SHIFT-F5)

| | |
|----------|------------------------------|
| SHIFT F1 | Configuration File Utilities |
| SHIFT F3 | Unattended Mode Parameters |
| SHIFT F4 | Character Mapping |

Partial Disabling

F3 Echoplex

These keys are disabled to reduce possible problems while communicating with an OFISfile. Character mapping is not allowed for inbound or outbound characters because of the strict mapping of characters already occurring between the ATE and a French or French/Canadian OFISfile.

Additional Keyboard Codes

Character Set: The set of valid characters that can be entered through the keyboard without being immediately modified by the ATE has been expanded from 00h through 7Fh to also include the 0A0h through 0B5h range. This is the international range. Using this range, you can generate some 8-bit characters that were formally remapped by the ATE into 7-bit characters. The following table identifies the keys that generate these codes on all keyboards.

| Hex | Keystroke | Hex | Keystroke |
|-----|----------------|-----|-----------------|
| A0 | = CODE-SPACE | AB | = CODE-SHIFT-== |
| A1 | = CODE-SHIFT-1 | AC | = CODE-, |
| A2 | = CODE-SHIFT-' | AD | = CODE-- |
| A3 | = CODE-SHIFT-3 | AE | = CODE-. |
| A4 | = CODE-SHIFT-4 | AF | = CODE-/ |
| A5 | = CODE-SHIFT-5 | B0 | = CODE-0 |
| A6 | = CODE-SHIFT-7 | B1 | = CODE-1 |
| A7 | = CODE-' | B2 | = CODE-2 |
| A8 | = CODE-SHIFT-9 | B3 | = CODE-3 |
| A9 | = CODE-SHIFT-0 | B4 | = CODE-4 |
| AA | = CODE-SHIFT-8 | B5 | = CODE-5 |

** See the B 20 Systems Operating System (BTOS) Vol. 2, pages A6-A7, for the standard USA characters generated by these keystrokes.*

ASCII Format Table

| Char | Dec | Hex | Char | Dec | Hex | Char | Dec | Hex |
|------|-----|-----|------|-----|-----|------|-----|-----|
| NUL | 000 | 00 | , | 044 | 2C | x | 088 | 58 |
| SOH | 001 | 01 | - | 045 | 2D | y | 089 | 59 |
| STX | 002 | 02 | . | 046 | 2E | z | 090 | 5A |
| ETX | 003 | 03 | / | 047 | 2F | [| 091 | 5B |
| EOT | 004 | 04 | 0 | 048 | 30 | \ | 092 | 5C |
| ENO | 005 | 05 | 1 | 049 | 31 |] | 093 | 5D |
| ACK | 006 | 06 | 2 | 050 | 32 | | 094 | 5E |
| BEL | 007 | 07 | 3 | 051 | 33 | - | 095 | 5F |
| BS | 008 | 08 | 4 | 052 | 34 | | 096 | 60 |
| HT | 009 | 09 | 5 | 053 | 35 | a | 097 | 61 |
| LF | 010 | 0A | 6 | 054 | 36 | b | 098 | 62 |
| VT | 011 | 0B | 7 | 055 | 37 | c | 099 | 63 |
| FF | 012 | 0C | 8 | 056 | 38 | d | 100 | 64 |
| CR | 013 | 0D | 9 | 057 | 39 | e | 101 | 65 |
| SO | 014 | 0E | : | 058 | 3A | f | 102 | 66 |
| SI | 015 | 0F | ; | 059 | 3B | g | 103 | 67 |
| DLF | 016 | 10 | < | 060 | 3C | h | 104 | 68 |
| DC1 | 017 | 11 | = | 061 | 3D | i | 105 | 69 |
| DC2 | 018 | 12 | > | 063 | 3E | j | 106 | 6A |
| DC3 | 019 | 13 | ? | 064 | 40 | k | 107 | 6B |
| DC4 | 020 | 14 | @ | 064 | 40 | l | 108 | 6C |
| NAK | 021 | 15 | A | 065 | 41 | m | 109 | 6D |
| SYN | 022 | 16 | B | 066 | 42 | n | 110 | 6E |
| ETB | 023 | 17 | C | 067 | 43 | o | 111 | 6F |
| CAN | 024 | 18 | D | 068 | 44 | p | 112 | 70 |
| EM | 025 | 19 | E | 069 | 45 | q | 113 | 71 |
| SUB | 026 | 1A | F | 070 | 46 | r | 114 | 72 |
| ESC | 027 | 1B | G | 071 | 47 | s | 115 | 73 |
| FS | 028 | 1C | H | 072 | 48 | t | 116 | 74 |
| GS | 029 | 1D | I | 073 | 49 | u | 117 | 75 |
| RS | 030 | 1E | J | 074 | 4A | v | 118 | 76 |
| US | 031 | 1F | K | 075 | 4B | w | 119 | 77 |
| SP | 032 | 20 | L | 076 | 4C | x | 120 | 78 |
| ! | 033 | 21 | M | 077 | 4D | y | 121 | 79 |
| " | 034 | 22 | N | 078 | 4E | z | 122 | 7A |
| # | 035 | 23 | O | 079 | 4F | | 123 | 7B |
| \$ | 036 | 24 | P | 080 | 50 | | 124 | 7C |
| % | 037 | 25 | Q | 081 | 51 | | 125 | 7D |
| & | 038 | 26 | R | 082 | 52 | | 126 | 7E |
| ' | 039 | 27 | S | 083 | 53 | DEL | 127 | 7F |
| (| 040 | 28 | T | 084 | 54 | | | |
|) | 041 | 29 | U | 085 | 55 | | | |
| * | 042 | 2A | V | 086 | 56 | | | |
| + | 043 | 2B | W | 087 | 57 | | | |

1. Abbreviations used in the column headings:

Char - Character
Dec - Decimal
Hex - Hexadecimal

2. Abbreviations and acronyms used for control characters:

NUL - Null string; all zeros
SOH - Start of heading
STX - Start of text
ETX - End of transmission
ENQ - Enquiry
ACK - Acknowledge
BEL - Bell
BS - Backspace
HT - Horizontal tab
LF - Line feed
VT - Vertical tab
FF - Form feed
CR - Carriage return
SO - Shift out
SI - Shift in
DLE - Data link escape
DC1 - Device control 1
DC2 - Device control 2
DC3 - Device control 3
DC4 - Device control 4
NAK - Negative acknowledge
SYN - Synchronous idle
ETB - End transmission block
CAN - Cancel
EM - End of medium
SUB - Substitute
ESC - Escape
FS - File separator
GS - Group separator
RS - Record separator
US - Unit separator
SP - Space
DEL - Delete

Status Codes

- 33 Service not available.
- 60 Invalid device specification for a communication line.
- 203 No such file.
- 220 File in use.
- 2343 Wrong configuration type.
- 2344 Invalid configuration file.
- 8401 Line in use.

- ACK, 2-5, 2-8, 2-9, B-1, B-4
- ACTION-CANCEL, 1-2, 2-9, 2-10, 2-13, 2-16, 2-35, 3-2, 3-4
- AREC, 3-3, 3-11, 3-12 3-15, 3-17
- ASCII:
 - binary block protocol, 1-3, B-2
 - block format protocol, 1-3, B-1
 - characters, 1-2, 2-12
 - control codes, 1-1, 2-11, 2-22, 4-5
 - data, 2-5
 - encoding, 2-7, 4-6
 - ETX, B-1, B-2
 - file, 3-13
 - SOH, B-1
 - STX, B-1, B-2
 - terminal, 1-1, 2-1, 2-17
 - transfer mode, 2-8, 3-14
- ASEN, 3-3, 3-13, 3-17
- ATE:
 - emulation mode, 2-16
 - utilities, 1-2, 2-6, 2-31
- ATEText1.Sys, 1-6
- ATEText2.Sys, 1-6
- Attended mode, 1-1, 1-4, 1-7, 2-1 to 2-36, 3-2, 3-15
- Auto-ATE mode, 1-1, 1-4, 1-7, 2-4, 2-19, 2-30, 2-33, 4-1 to 4-8
- Auto-ATE syntax checker, 4-1, 4-4

- Baud rate, 2-6, 2-18, 3-1
- Binary block protocol, 1-3. *See* ASCII.
- Binary transfer mode, 2-8, 3-10, 3-12
- BYE, 3-5, 3-9, 3-17

- Carrier tone, 3-5
- Change baud rate, 2-3, 2-6
- Change communications options, 2-3, 2-6
- Change display mode, 2-3, 2-6
- Change program mode, 2-24
- Character mapping mode utilities, 2-4, 2-6, 2-10, 2-12, 2-14, 2-26 to 2-29
- CODE COPY, 2-35
- CODE I, 2-35
- Command block, 4-2
- Command files, 4-1, 4-2
- Command string, 4-2, 4-4, 4-7
- Communications channel, 1-4, 2-18, 2-19, 3-3, 3-6
- Communications parameters, 2-4, 2-22
- Configuration file, 1-4, 1-5, 1-7, 2-3, 2-17, 2-18, 2-19, 2-20, 2-21, 2-22, 2-27, 2-34, C-1
- Context manager, 1-2, 1-4, 2-29, 2-33
- Control codes. *See* ASCII control codes.
- COPY, 3-3, 3-8, 3-17
- CTRL-Q, 3-8
- CTRL-R, 2-11, 2-12, 3-11, 3-14, 3-16
- CTRL-S, 3-8
- CTRL-T, 2-12, 3-11, 3-14, 3-16

- CTRL-x, 3-4, 3-8, 3-15, 3-17
- CTRL-y, 3-4, 3-8, 3-17
- CTS (Clear To Send), 2-12

- DC1, 2-3, 2-13, 2-18, 2-23, 4-1
- DIR, 3-3, 3-7, 3-17
- Display mode, 2-2, 2-3, 2-6, 2-18
- DM (Delay Minutes command), 4-2
- DS (Delay Seconds command), 4-2
- DTR (Data Terminal Ready), 3-5

- Echoplex, 2-2, 2-7 (parity error), C-1
- EI (End If block), 4-4
- Emulation frame, 2-2
- EOF (End Of File), 4-3, 4-5
- EOT (End Of Transmission), 2-10, B-4
- Error correction, 3-3
- ETX. *See* ASCII.

- File Copy, 2-4, 2-31
- File input mode, 2-15, 2-28
- File Recording, 2-5, 2-10
- File transfer, 2-1, 2-2, 2-5, 2-8, 2-9, 2-14, 3-1, 3-2, 3-4
- File Transfer In, 2-5, 2-8, 2-9, C-1
- File Transfer Out, 2-5, 2-9, 2-10, C-1
- File Transmit, 2-5, 2-9, 2-12, 3-10
- Full duplex, 2-3, 2-7, 2-7

- Half-duplex, 2-2, 2-3, 2-6, 2-10
- Handshaking, 2-8, 2-9
- Hard disk drive, 1-4
- Hayes AT command set, 3-3
- Hayes SmartModem, 1-5, 2-30, 3-5, 3-6, A-1
- Hello line, 2-3, 2-18, 2-19, 2-24, 2-25
- Help menu, 2-36, 3-6, 3-17
- Hexadecimal, 2-7, 2-25, 2-27
- Host computer, 2-9 *See also* Mainframe computer.

- IF (begin if block), 4-5

- Keyboard driver, 4-3
- KILL, 3-3, 3-4, 3-11, 3-16, 3-17

- Line monitor, 2-35, 2-36
- LIST, 3-3, 3-4, 3-7, 3-17

- Mainframe computer, 2-21. *See also* Host computer. Mapping. *See* Character mapping mode utilities. Modem, 3-1

- NAK, 2-4, 2-7, 2-8, B-1, B-4
- NEXT, 4-8
- NF (New File command), 4-3

- OFISfile, 1-7, C-1
- OR (Override command), 4-3
- Parity, 1-1, 2-2, 2-7, 2-18, 4-1
- Password. *See* Hello Line.
- Racal-Vadic modem, 1-5, 3-5, 3-6, A-2
- RE (Retry command), 4-2
- Remote logoff interval, 2-3, 2-18, 2-26
- Remote user, 1-3, 3-2, 3-3, 3-6, 3-13 to 3-15
- Ring detect, 3-3
- RJ11 telephone jack, A-1
- RS-232-C:
 - carrier detect lead, A-1
 - data terminal ready lead, A-1
 - serial communications port, 1-5
- SAM. *See* Sequential Access Method.
- Screen refresh, 2-32, 2-36, 3-2
- Sequential Access Method (SAM), 1-1
- Soft keys, 2-4, 2-27, 2-32, 2-33, 2-34, 4-6
- Software Installation command, 1-5
- SOH, *See* ASCII.
- ST (Start Time command), 4-2
- Status frame, 2-2, 2-30
- Timer activation utility, 2-4, 2-27, 2-31
- TO (Time Out command), 4-2, 4-5
- TTY, 1-1, 2-1
- Type ahead, 4-1
- Unattended mode, 1-1, 1-3, 1-7, 2-1, 2-24, 3-1 to 3-17, 4-1
- Video escape character, 1-2
- Wordstar, 2-15, 3-10
- WRITEone, 2-15, 2-17, 3-12, 3-14
- XE 520, 1-6
- XModem:
 - block format, B-3
 - file transfer subsystem, B-4
 - protocol, 2-13 to 2-16, 3-15
 - remote commands, 3-12, B-3, B-4
- XModem File Transfer In, 2-5, 2-13, 3-10, C-1
- XModem File Transfer Out, 2-5, 2-16, 3-12, C-1
- XON/XOFF, 2-3, 2-12, 2-16, 2-19, 2-22, 2-23
- XR (Receive command), 4-3, 4-5, 4-6, 4-7
- XREC, 3-3, 3-9, 3-13, 3-15, 3-17
- XSEN, 3-3, 3-9, 3-17
- XT (Transmit command), 4-2, 4-3, 4-6

Title: _____

Form Number: _____ Date: _____

Burroughs Corporation is interested in your comments and suggestions regarding this manual. We will use them to improve the quality of your Product Information.

Please check type of suggestion: Addition Deletion Revision
 Error

Comments: _____

Name _____

Title _____

Company _____

Address _____
Street City State Zip

Telephone Number () _____
Area Code

Title: _____

Form Number: _____ Date: _____

Burroughs Corporation is interested in your comments and suggestions regarding this manual. We will use them to improve the quality of your Product Information.

Please check type of suggestion: Addition Deletion Revision
 Error

Comments: _____

Name _____

Title _____

Company _____

Address _____
Street City State Zip

Telephone Number () _____
Area Code



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 817 DETROIT, MI 48232

POSTAGE WILL BE PAID BY ADDRESSEE

Burroughs Corporation
Production Services – East
209 W. Lancaster Avenue
Paoli, Pa 19301 USA

ATTN: Corporate Product Information



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 817 DETROIT, MI 48232

POSTAGE WILL BE PAID BY ADDRESSEE

Burroughs Corporation
Production Services – East
209 W. Lancaster Avenue
Paoli, Pa 19301 USA

ATTN: Corporate Product Information

