

REFERENCE MANUAL

**1500 TO 1500 (SQUIC) COMMUNICATIONS
GENERATOR**

**SERIES 1500
INTELLIGENT TERMINAL
SYSTEM**

SINGER

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PREFACE

1500-to-1500 (SQUIC) Communication Software is issued to the user in the form of two program generators: one program generator for maxi-tape and disc storage, and one for mini-tape storage. This manual contains information necessary to understand program generator options, create a customized program from the program generator, and operate the customized program in a live communication environment from a SINGER* Series 1500 Intelligent Terminal or Disc System.

Divided into eight sections and three appendices, the manual is organized as a reference document for performing such functions as operating a customized program to transmit data residing in disc storage, or preparing data files.

SECTION I provides a brief overview of the 1500-to-1500 (SQUIC) communication package and summarizes the two program generators.

SECTION II provides a list of hardware and software requirements necessary for SQUIC operation.

SECTION III provides an explanation of the options available, as well as a display-by-display operational description of option selection necessary to create a customized program for maxi-tape and/or disc storage (Maxi-Tape and Disc Program Generator).

SECTION IV provides an explanation of the options available, as well as a display-by-display operational description of option selection, necessary to create a customized program for mini-tape storage (Mini-Tape Program Generator).

SECTION V is required reading for operators using a previously-generated customized SQUIC Program to communicate data files. The first part of SECTION V provides preliminary operating instructions common to all 1500-to-1500 communication tasks. Operators must then read the text under the appropriate heading for the particular storage device used (e.g., if transmitting from maxi-tape storage, locate the heading: Maxi-Tape Transmission in the Table of Contents under SECTION V for the appropriate page number).

SECTION VI provides specific instructions for communicating with, or communicating from, a terminal operating in the unattended Automatic-Answer mode.

SECTION VII contains information related to preparing source data files, as well as an explanation of character code translation and valid character codes.

SECTION VIII contains information pertaining to SQUIC's unique dialogue and a description of the standard timeouts which eliminate the possibility of indefinite line tie-ups (e.g., an indefinite busy signal on a telephone line).

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APPENDIX A describes translate table preparation necessary for using a character code whose translate tables are not provided with the standard SQUIC Maxi-Tape and Disc Program Generator; such data usually must be communicated in transparency.

APPENDIX B provides a list of disc (DBM) error codes which may be encountered when using disc storage.

APPENDIX C contains a very useful glossary of terms used throughout this manual and in other communication publications.

The TABLE OF CONTENTS, LIST OF ILLUSTRATIONS, and LIST OF TABLES should be referenced frequently in order to locate page numbers of the specific information required.

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SECTION I

GENERAL INFORMATION

INTRODUCTION

SECTION I, divided into two parts, provides an overview of the SINGER 1500-to-1500 SQUIC package, and a summary of the characteristics associated with SQUIC Program Generators.

OVERVIEW

SQUIC, the acronym for Singer Qualified Utility for Interoffice Communication, is a high-speed point-to-point communications package that enables two SINGER Series 1500 Intelligent Terminals to communicate data using any combination of maxi-tape, mini-tape, or disc storage. Two terminals, each equipped with a previously-generated SQUIC Program, use telephone or leased lines to rapidly transfer data files from one location to another. This SQUIC package is issued to the user in the form of a program generator tape, from which any number of customized programs may easily be generated.

The unique communication dialogue between SINGER Series 1500 Intelligent Terminals results in a remarkably efficient data transfer. Other characteristics of SQUIC include data transmission rates up to 9600 baud, six character code translation tables provided in the maxi-tape and disc program generator, as well as disc, maxi-tape, and mini-tape storage capabilities. Translate tables are provided with the maxi-tape and disc program generator for the following character codes: EBCDIC, ASCII, HONEYWELL BCD, ICL BCD, IBM BCD, and SINGER Series 1500 code. EBCDIC is always the line code.

SQUIC's dialogue is unique, and can nearly double communication throughput in most applications. The prevalently used IBM BSC communications dialogue requires acknowledgement from the receive terminal after each data block is received. By reducing the frequency of required acknowledgements to every 128 blocks, the amount of data communicated is greatly increased, because it flows in a steady stream with minimal line delay. Data validation is ensured by inter-block characters encoded by the program at the transmit terminal, which are interpreted and checked for correctness by the receive terminal. In the case of error detection, the receive terminal indicates the error by making the secondary transmission channel inactive. The receive terminal then responds with the next block number needed, upon enquiry from the transmit terminal.

Because SQUIC software increases baud rate efficiency when compared to conventional communication software, desired data transfer rates are achieved using less expensive modems which operate at lower baud rates. Thus, SQUIC's unique dialogue is extremely cost-effective to all users.

OVERVIEW (cont'd)

SINGER Series 1500 Intelligent Terminals housing disc drives enable disc storage to be used as a data storage device. Any SINGER Series 1500 Intelligent Terminal may be used to access data stored on mini-tape (cartridges) or access data stored on maxi-tape using a SINGER Model 1511, 1512, 1513, or 1514 Maxi-Tape Drive.

PROGRAM GENERATOR SUMMARY

Customized programs are easily created from the program generator; however, the program generator itself is not an executable communications program.

A useable SQUIC program may be generated within a few minutes. Program generation requires information which applies to the site where the program will be used (that information which does not vary with each communications task). For example, the hardware addresses of maxi-tape drives and the modem baud rate are required by the program generator operator. This reduces the redundant keyboard entries required of the operator executing the previously generated customized program. By comparison, the executable customized SQUIC program allows its operator to select those options which may vary with each communication task, such as whether to transmit or receive, whether the unattended Automatic-Answer option will be used, and whether (EBCDIC) transparency should be implemented. The operator may be responsible for storage media to be used, and thus will be responsible for choosing the correct customized SQUIC Program.

There are two program generators: one for mini-tape storage, and one for maxi-tape and disc storage. SECTION III provides a description of maxi-tape and disc program generation, including a table (3-1) which summarizes the decisions to be made by the operator generating customized maxi-tape and disc programs. SECTION IV provides a description of mini-tape program generation, including a table (4-1) which summarizes the decisions to be made by the operator generating the mini-tape program tape.

SECTION II
REQUIREMENTS

HARDWARE REQUIREMENTS

Figure 2-1 indicates basic hardware requirements necessary for communication. Both the transmitting and receiving sites must be equipped with the following:

- SINGER Model 1535 Synchronous Communications Adapter (Revision 12 or later) installed in the SINGER Series 1500 Intelligent Terminal to be used.
- compatible modems* operating at equal baud. All Modems must be equipped with a dependent reverse channel, and must conform to CCITT V.24 or RS-232-C standards. Clocked Modems should not exceed 9600 baud and must use half-duplex (two wire) line handling. Non-clocked Modems may operate at 600, 900, 1200, or 1800 baud, and must use half-duplex line handling.
- SINGER Model 1535 Synchronous Communications Adapter cable, P/N 006-002012-XXX, must be at the appropriate tab level; e.g., 003 for Bell 202-C type modems, and 011 for all other type modems.
- for disc storage, a SINGER Series 1500 Intelligent Terminal which houses disc storage.
- for maxi-tape storage, any SINGER Series 1500 Intelligent Terminal connected to a SINGER Model 1511, 1512, 1513, or 1514 Maxi-Tape Drive. A SINGER Model 1511 Maxi-Tape Drive, however, will not accommodate 8-bit character codes such as EBCDIC or ASCII.
- for mini-tape storage, any SINGER Series 1500 Intelligent Terminal.

Modems compatible with the requirements of the SQUIC Communications Program include:

- Bell 202C Type - 1200/1800 baud
- ICC - 2400, 3600, or 4800 baud
- CODEX - 4800 baud

*When the unattended Automatic-Answer option is desired, the modem to be used at the unattended terminal site must be equipped with the Automatic-Answer feature.

PROGRAM GENERATOR SUMMARY (cont'd)

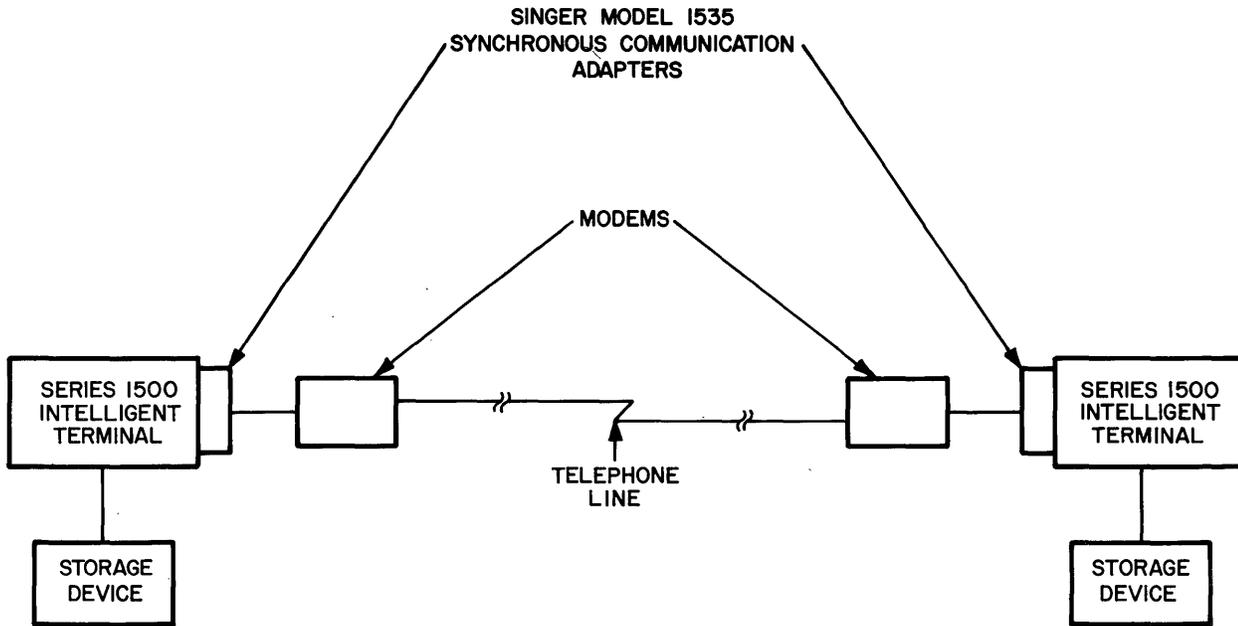


Figure 2-1. Hardware Requirements

SOFTWARE REQUIREMENTS

Both SINGER Series 1500 Intelligent Terminals used for communication must have the previously generated SQUIC customized program loaded into memory.

If disc storage will be used, there must be a system disc on-line, containing Data Base Manager System Software, Version B0 or later.

SECTION III

CUSTOMIZED PROGRAM GENERATION: MAXI-TAPE AND DISC

INTRODUCTION

Program generation is performed as follows:

- The user should familiarize himself with the selectable features of the program generator as outlined in Table 3-1.
- The user should select options that best meet his communication needs.
- More than one customized program may be required, depending on the character code used and other features necessary for each communication task.

NOTE

The tape-resident SQUIC program generator may be operated from any 8K SINGER Series 1500 Intelligent Terminal (8K minimum).

Table 3-1. Maxi-Tape and Disc Program Generator Summary

<u>DISPLAY</u>	<u>AVAILABLE OPTIONS</u>
01	Whether or not the standard selections are chosen (see Table 3-3).
02	Maxi-tape and disc storage, or maxi-tape only storage. Maxi-tape unit to be used: either SINGER Model (1) 1511, (2) 1512 and 1513, or (3) Model 1514 Maxi-Tape Drives. Maxi-tape and disc customized programs require 16K of memory. Maxi-tape only programs require 8K of memory.
03	Whether EBCDIC, ASCII, HONEYWELL BCD, ICL BCD, IBM BCD, SINGER Series 1500 code, or a code other than provided, will be used with the storage media to be accessed by this program.

(cont'd)

Table 3-1. Maxi-Tape and Disc Program Generator Summary (cont'd)

<u>DISPLAY</u>	<u>AVAILABLE OPTIONS</u>
04	Whether the modem used is equipped with a clock (external clock), or in the case of a modem not equipped with a clock, (internal clock) whether the baud rate will be 600, 900, 1200, or 1800 baud.
05	Whether the tape End-of-File (EOF) mark will be IBM-compatible or HONEYWELL-compatible. SINGER Series 1500 tape EOFs are IBM-compatible.
05	The retransmission limit may be entered or the suggested value of 015 accepted. The retransmission limit is the number of retries which will be attempted before the transmission is aborted and may range from 003 to 255.
05	For maxi-tape and disc programs only, the disc output record size must be entered, from 001 to 256 bytes (applies to disc receive operations). Records received which are greater or less than the disc output record length are subject to the rules of overflow and underflow. Records received which exceed the disc output record length (buffer overflow) are truncated; thus, the portion of the record exceeding the maximum record length is erased. Records received which are smaller than the output record length (buffer underflow) are zero-filled; thus, the absent portion of the record is filled with zeros up to the output record length.
06	In the case of files contained on more than one tape, up to six input and six output device hardware addresses of the maxi-tape drives to be used must be entered in the order they will be accessed. This applies to both transmit and receive storage devices (i.e., input and output devices).
06	If disc storage is used, the transmit and receive default disc file names may be entered.

FUNCTION KEYS

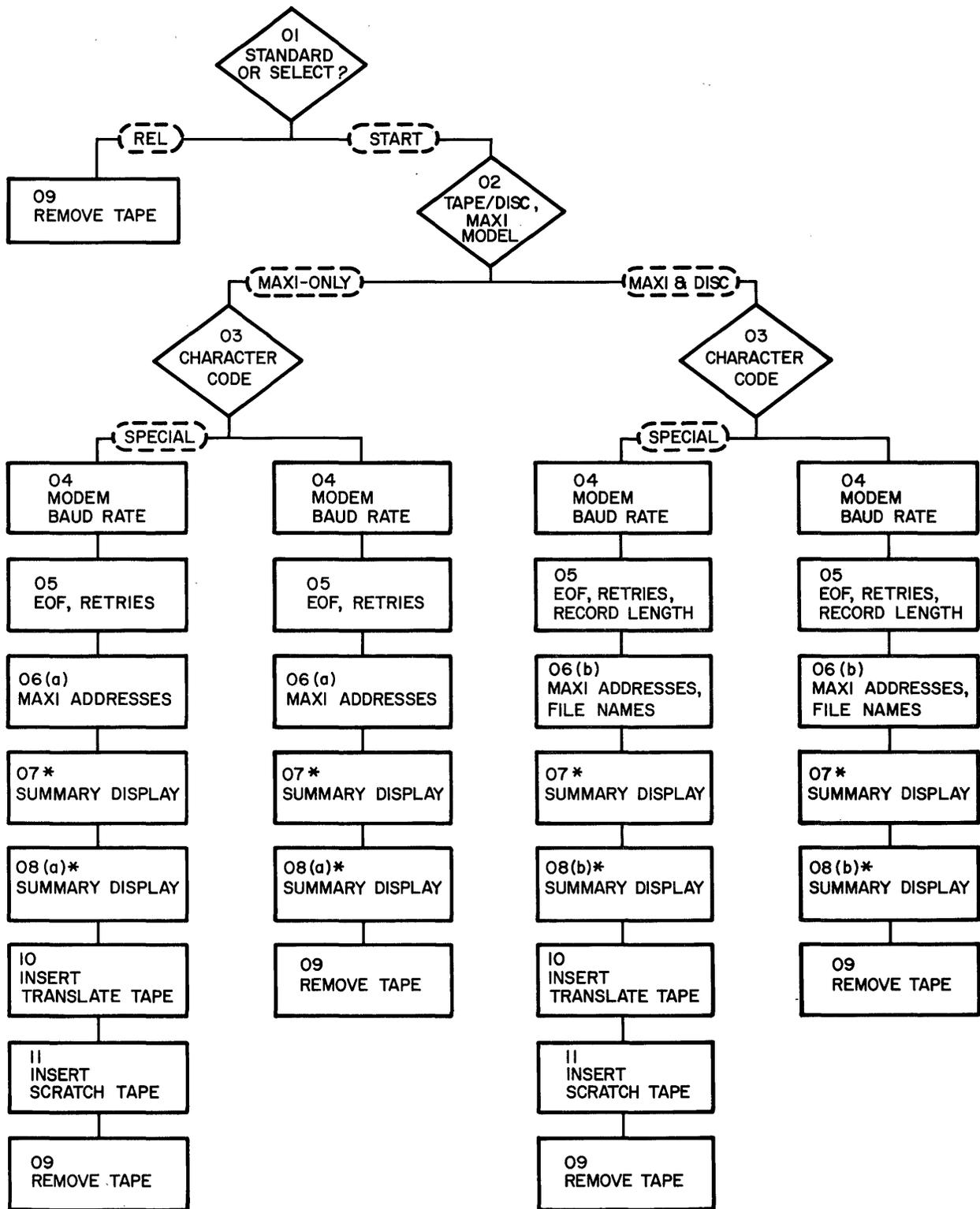
Function keys are listed below in Table 3-2.

Table 3-2. Maxi-Tape and Disc Program Generator Function Keys

<u>KEY</u>	<u>FUNCTION</u>
SKIP	Moves the asterisk vertically down one position. If the asterisk is at the lowest position, depression of the SKIP key will cause the asterisk to "wrap around" to the top-most position of that display option.
REL	Depression of the REL key will enter the currently displayed option as valid and advance the cursor to the next option, or cause the next display to appear.
DUP	Depression of the DUP key will move the cursor one character to the right.
CORR	Depression of the CORR key will move the cursor one character to the left.
SPACE BAR	Depression of the SPACE BAR will move the cursor one character to the right and place a blank in the vacated character.
HOM	Used with displays 07 and 08 to correct entered parameters. Returns display 02 to the screen.

OPERATION

The following examples of display flow should be read with frequent reference to Figure 3-1, which indicates the sequence of SQUIC maxi-tape and disc program generator displays that appear on the screen during operation.



* DEPRESSION OF THE HOM KEY WILL BRING DISPLAY 02 TO THE SCREEN, TO ENABLE CORRECTION (SEE TEXT UNDER DISPLAY 07 AND 08).

Figure 3-1. Maxi-Tape and Disc Program Generator Display Flowchart

Examples

Examples 1 and 2 below apply to tape-resident programs. To adapt the examples to disc-resident programs, a program name must be entered in reply to display 01(a) and the REL key must be depressed, causing display 01(b) to appear. As is the case with tape-resident programs, either the START or REL key must then be depressed.

Example 1, Installation Description

An installation is equipped with several 8K SINGER Model 1501 Intelligent Terminals. Data files are stored on two SINGER Model 1512 Maxi-Tape Drives, with hardware addresses of 013 and 014. Data is transmitted and received exclusively in EBCDIC character code at this site. Communication is accomplished by an externally clocked modem operating at 4800 baud. An IBM-compatible EOF mark is desired.

Program Generation:

After loading the program generator tape, display 01 appears on the screen. In reply to display 01, the START key is depressed because the standard selections do not apply (standard selections are listed in Table 3-3). Display 02 appears. In reply to display 02, a maxi-tape only system is selected, and the maxi-tape model type is chosen. Beginning with display 02, the REL key is depressed to bring the next display to the screen. In reply to display 03, EBCDIC character code is selected. An externally-clocked modem is chosen in reply to display 04. An IBM-compatible EOF mark is chosen, and the standard number of retries is accepted in reply to display 05. Maxi-tape hardware addresses are entered for input devices and output devices in reply to display 06(a). Display 07 summarizes the keyboard selections to displays 02, 03, 04, and 05 for operator verification. Similarly, display 08(a) summarizes the keyboard entries from display 06(a) for operator verification. Before depressing the REL key to release display 08(a), a write-enabled scratch tape is inserted into deck 1. Display 09 appears when the customized program tape has been successfully generated. The newly-created SQUIC Program tape is removed from deck 1, labeled, and write-protected.

Example 2, Installation Description

A SINGER Model 1503 Intelligent Terminal (Disc System) is used to transmit EBCDIC code data files residing in disc storage or maxi-tape. Data is received and written to disc storage in either EBCDIC or SINGER Series 1500 code. A non-clocked modem operating at 1200 baud is used. Disc output record size is 256 bytes.

Program Generation:

Because two character codes must be used, two customized programs must be generated. The generation of the second customized program would differ from the sequence explained below only in the character code selection in display 03.

Program Generation: (cont'd)

Display 01 appears after the program generator is loaded. The START key is depressed because the standard selections listed in Table 3-3 do not apply. In reply to display 02, a maxi-disc system is selected, and the maxi-tape model type is also selected. Beginning with display 02, the REL key is depressed to bring the next display to the screen. In reply to display 03, EBCDIC character code is selected. A non-clocked modem operating at 1200 baud is selected in reply to display 04. An IBM-compatible EOF mark is chosen, and the standard number of retries is accepted in reply to display 05. Maxi-tape hardware addresses are entered for both transmit and receive devices in reply to display 06(a). A summary of keyboard selections from displays 02, 03, 04, and 05 appear in display 07 for operator verification. Similarly display 08(a) summarizes the selections chosen in display 06. Before depressing the REL key to release display 08(a), a write-enabled scratch tape is inserted into deck 1. After the REL key is depressed, the customized program tape is generated and display 09 appears. The customized program tape is removed from deck 1, labeled, and write-protected.

Displays

Insert the SQUIC Library tape into deck 2 and load. The SQUIC menu display will appear on the screen for a tape-resident program. Display 01(a) will appear after a disc-resident program is loaded.

SQUIC MENU (tape-resident)

```
*SINGER 1500 SERIES*   XX/XX/XX
                        CAT. # 8XXXX-XX
**SINGER QUALIFIED UTILITY FOR**
***INTEROFFICE COMMUNICATIONS***
   ***S Q U I C ***

A. MAXI/DISC GENERATOR 7XXXX-XX
B. MINI GENERATOR      7XXXX-XX
```

Depress the A key to select the maxi-tape and disc program generator. Display 01 will appear.

Displays (cont'd)

01 - STANDARD OR SELECT? (tape-resident)

```
SINGER QUALIFIED UTILITY FOR  
INTER-OFFICE COMMUNICATIONS  
(SQUIC)SCRATCH ON DK#1(7XXXX-XX)  
'REL' STANDARD -- 'START' SELECT
```

Depress the START key if any of the standard selections listed in Table 3-3 do not apply. Display 02 will appear. However, if the standard selections listed in Table 3-3 are desired, insert a write-enabled scratch tape into deck 1. Depress the REL key to create a customized program tape with the standard selections.

01(a) - PROGRAM NAME (disc-resident)

```
SINGER QUALIFIED UTILITY FOR  
INTER-OFFICE COMMUNICATIONS  
  
(SQUIC) 'ENTER--NAME' (7XXXX-XX)
```

If the program is disc-resident, display 01(a) appears as the first display after loading the SQUIC Library tape. Enter a five-letter program name, by which the generated (output) program will be identified. Any five characters are valid, and the first character must not contain a blank. However, the program name entered here must be a unique program name or File ID. The CORR, DUP, SPACE BAR, and REL function keys are valid, as described in Table 3-2. Depress the red write-PROTECT switchlight if it is illuminated (applies to SINGER Model 1543 Disc Drives only). Display 01(b) will appear after the REL key is depressed. If a disc error is encountered, Special Display B will appear.

Displays (cont'd)

01(b) - STANDARD OR SELECT (disc-resident)

```
SINGER QUALIFIED UTILITY FOR
INTER-OFFICE COMMUNICATIONS
START 'SELECT'----REL 'STANDARD'
(XXXXX) 'ENTER--NAME' (7XXXX-XX)
```

Depress the START key if any of the standard selections listed in Table 3-3 do not apply. Display 02 will appear. However, if the standard selections listed in Table 3-3 are desired, depress the REL key to create the customized program (disc file) with the standard selections in disc storage. Display 09 (a or b), disc-resident, will appear.

Table 3-3. Standard Selections for Maxi/Disc Program Generator

<u>STANDARD SELECTIONS</u>
Maxi-tape only system (i.e., no disc) using either a Model 1512 or 1513 tape drive (both are 9-track/800 B.P.I.).
Both line and storage device (maxi/disc) character codes are EBCDIC.
Clocked modem (external clock).
IBM-compatible EOF marker (also SINGER Series 1500 compatible).
Up to 15 retries.
One input tape drive with a hardware address of 01 (i.e., 201 in display 06).
One output tape drive with a hardware address of 01 (i.e., 201 in display 06).

Displays (cont'd)

02 - TAPE/DISC ?

SYSTEM TO BE GENERATED	
(*)	A TAPE ONLY SYSTEM
(-)	B TAPE/DISC SYSTEM
MAXI TAPE UNIT	
(*)	A 9 TRACK, 800 BPI
(-)	B 7 TRACK, 556 BPI
()	C 9 TRACK, 1600 BPI

Display 02 appears if the START key is depressed in reply to display 01.

NOTE

If the TAPE/DISC option (B) is selected, the previously generated customized program must be operated from a 16K SINGER Series 1500 Intelligent Terminal.

The asterisk indicates which choice will be selected and may be moved vertically by depressing the SKIP key, as explained in Table 3-2. When the asterisk is in the appropriate position, depress the REL key. The cursor will move to the asterisk in the MAXI-TAPE UNIT group (after REL is depressed once). Move the asterisk to the desired maxi-tape unit and depress the REL key. Display 03 will appear.

03 - CHARACTER CODE

LINE 'TRANSLATE' TAPE/DISC			
(*)	A	EBCDIC	----- EBCDIC
(-)	B	"	----- ASCII
()	C	"	----- HNYWL BCD
()	D	"	----- ICL BCD
()	E	"	----- IBM BCD
()	F	"	----- 1500
()	G	"	----- SPECIAL

The asterisk may be moved vertically by depressing the SKIP key for the character code selection. Line code is always EBCDIC. Maxi-tape and disc character codes may be EBCDIC, ASCII, HONEYWELL BCD, ICL BCD, IBM BCD, SINGER Series 1500 code, or a SPECIAL code not listed in display 03. Depress the REL key when the asterisk is in the position corresponding to the desired character code. If the SPECIAL code is selected, that code's translate tables must be entered from mini-tape, as described in the text explaining display 10.

Displays (cont'd)

Display 04 will appear next.

04 - MODEM BAUD RATE

BAUD RATE CONTROL	
(*)A	EXTERNAL CLOCK
(-)B	600 BAUD
()C	900 BAUD
()D	1200 BAUD
()E	1800 BAUD

If the modem being used is equipped with a clock (external clock), do not depress the SKIP key. Otherwise, depress the SKIP key as required to indicate the desired baud rate with the non-clocked modem (internal clock).

Depress the REL key when the asterisk is in the appropriate position.

05 - EOF, RETRIES, (RECORD LENGTH)

TAPE EOF MARK REQUIRED	
(*)A	IBM COMPATIBLE
(-)B	HONEYWELL COMPATIBLE
(015)RETRANSMISSION LIMIT	
(256)DISC OUTPUT RECORD LENGTH	

The asterisk may be moved vertically by depressing the SKIP key for the required TAPE EOF MARK entry. An IBM-compatible EOF mark is also Singer-compatible. Depress the REL key when the asterisk is in the appropriate position. The cursor will move to the first position of the next field.

The RETRANSMISSION LIMIT is the number of retries per block or operation that will be performed (retransmitted) by the program before aborting transmission. A retry is an error detected by the CRC (cyclic redundancy check) with a data block or a communications control character. The retransmission limit may range from 003 to 255.

Displays (cont'd)

The CORR, DUP, and REL function keys are applicable to this display field, and are explained in Table 3-2. Depress the REL key when the appropriate retransmission limit appears on the screen. With a maxi-tape only customized program, display 06 will appear. The cursor will move to the first position of the DISC OUTPUT RECORD LENGTH field if a maxi-tape and disc customized program is being generated. Disc output record length may range from 001 to 256.

Records received which are greater or less than the disc output record length are subject to the rules of overflow and underflow. Records received which exceed the output record length (buffer overflow) are truncated; thus, the portion of the record exceeding the maximum record length is not written. Records received which are smaller than the output record length (buffer underflow) are space-filled; thus, the absent portion of the record is filled with zeros up to the output record length.

Depress the REL key when the desired record length appears on the screen. Display 06 (a or b) will appear.

06(a) MAXI ADDRESSES

INPUT DEVICE ADDRESSES 201-000-000-000-000-000 OUTPUT DEVICE ADDRESSES 201-000-000-000-000-000

06(b) MAXI ADDRESSES, FILE NAMES

INPUT DEVICE ADDRESSES 201-000-000-000-000-000 OUTPUT DEVICE ADDRESSES 201-000-000-000-000-000 TRANSMIT FILE NAME () RECEIVE FILE NAME ()
--

When operating the customized program now being generated, the operator may have up to six maxi-tape drives online for input and up to six for output. Valid hardware addresses for maxi-tape drives must contain a 2 in the first digit of the three digit number (for each hardware address entered). The second and third digits of each hardware address must contain a number from zero (0) to seven (7). Valid maxi-tape addresses range from 201 to 264.

Enter the hardware addresses for the maxi-tape drives which will be used, in the sequential order desired. Valid function keys include the DUP, CORR, and REL keys, as explained in Table 3-2.

After entering the hardware addresses in their order of use as INPUT DEVICES, depress the REL key; the cursor will move to the first position of the next field. Enter the hardware addresses for OUTPUT DEVICES, in the sequential order desired. Depress the REL key; the cursor will move to the first position of the TRANSMIT FILE NAME field if the customized program being generated is a maxi-tape and disc program. If a maxi-tape only program is being generated, display 07 will appear.

Displays (cont'd)

Both transmit and receive file names (File ID) must not contain a blank in the first position. If (unattended) Auto-Answer may be used, a maximum of 20 characters are allowed for the RECEIVE FILE NAME. If Auto-Answer will not be used, up to 24 characters are allowed. Any keyboard character is a valid entry. Valid function keys for the two disc file name fields include the DUP, CORR, REL, and SPACE BAR keys, which are described in Table 3-2. After entering the TRANSMIT FILE NAME correctly, depress the REL key. Enter the RECEIVE FILE NAME correctly, and depress the REL key. The file names entered will be the default file names which may be used by the operator.

Display 07 will appear after both file names have been entered and released (REL key).

07 - SUMMARY DISPLAY

(A) SYSTEM	(A) MAXI UNIT
(A) XLATE	(A) BAUD RATE
(A) TAPE MARK	(015) RETRIES
(256) DISC SIZE	

The entries from display 02, 03, 04, and 05 will appear in display 07 for operator verification.

If the entries appearing in display 07 are not correct, depress the HOM key. Displays 02 through 06 will reappear, thus allowing any mistake to be corrected.

If the entries appearing in display 07 are correct, depress the REL key. Display 08 (a or b) will appear.

08(a)

INPUT DEVICE ADDRESSES 201-000-000-000-000-000 OUTPUT DEVICE ADDRESSES 201-000-000-000-000-000

08(b)

INPUT DEVICE ADDRESSES 201-000-000-000-000-000 OUTPUT DEVICE ADDRESSES 201-000-000-000-000-000 TRANSMIT FILE NAME () RECEIVE FILE NAME ()
--

Displays (cont'd)

The entries from display 06(a or b) will appear in display 08(a or b) for operator verification.

If the entries appearing in display 08(a or b) are not correct, depress the HOM key. Displays 02 through 07 will reappear, thus allowing any mistake to be corrected.

If the entries appearing in display 08(a or b) are correct, insert a write-enabled tape into deck 1 (tape-resident), or depress the red write-PROTECT switchlight if it is illuminated (applies to SINGER Model 1543 Disc Drives only). Depress the REL key to create the customized program. Display 09 will appear, unless a SPECIAL code was selected in reply to display 03, in which case display 10 will appear.

NOTE

For tape-resident programs, display 09(a) will appear; for disc-resident programs display 09(b) will appear when the REL key is depressed in reply to display 08(a or b).

09(a) - REMOVE TAPE (tape-resident)

LABEL AND PROTECT LOAD TAPE ON
DRIVE #1

Display 09(a) (tape-resident) appears after the customized program tape has been generated successfully on deck 1. As indicated in display 09(a), the tape should be labeled and marked to enable later identification. The red WRITE-ENABLE pin should be placed into the write-PROTECT position on top of the tape cartridge.

At this time, if additional customized programs are to be generated, reload the program generator tape after it has fully rewound. Display 01 will appear.

Displays (cont'd)

09)b) - COMPLETION (disc-resident)

```
XXXXX CUSTOM GENERATED PROGRAM  
ON UNIT ZERO   PRESS 'EOJ'
```

Display 09(b) (disc-resident) appears upon completion of program generation. Note that the disc program name appears as XXXXX above. Depress the EOJ key to bring the disc library Menu (Disc Menu) to the screen.

10 - INSERT TRANSLATE TAPE

```
MOUNT TABLE ON DECK 1 'START'
```

If the SPECIAL character code is selected in reply to display 03, display 10 will appear if the REL key is depressed in reply to display 08(a or b). Refer to APPENDIX A for information necessary to generate the translate table tape.

NOTE

If the SINGER Series 1500 Intelligent Terminal is equipped with only one tape deck, display 10 and display 11 will pertain to deck 2 instead of deck 1. Also, depress the REL instead of the START key in reply to display 10. Should a tape error occur, this will be indicated in SPECIAL DISPLAY A.

Displays (cont'd)

Depress the START key when the tape cartridge containing the required translation tables has been inserted into deck 1. The data will briefly appear on the screen as it is read from tape. Display 11 will appear upon completion.

11 - INSERT SCRATCH TAPE (tape-resident)

MOUNT BLANK ON DECK 1 'START'

Remove the tape containing the translate tables from deck 1 and store it for future use.

Insert a write-enabled scratch tape into deck 1 (tape-resident programs only). Depress the START key to create the customized program. Display 09 will appear after data flashes across the screen as it is written.

Special Displays

SPECIAL DISPLAY A - TAPE ERROR

*****TAPE ERROR*****
*****RELOAD PROGRAM*****

Special Display A will appear if a tape error is encountered, accompanied by a continuous keyboard tone.

Depress the red rewind button in the middle of each tape deck. After the tapes have fully rewound, reload the program. It is recommended that the tape decks be cleaned after this error is encountered. Special Display A also appears if a write-enabled mini-tape cartridge was not inserted in tape deck 1 for tape-resident programs.

Special Displays (cont'd)

SPECIAL DISPLAY B

DISC ERROR XXX

A. REGENERATE

B. PURGE FILE

C. RETRY

Special Display B appears when a disc error is encountered after entering a program name in reply to disc-resident display 01(a). Refer to APPENDIX B for error codes other than those listed below in Table 3-4 (program names are File IDs).

Depress A to enter a different program name. Display 01(a) will appear.

Depress B to purge the old file which has the same program name entered in display 01(a).

Depress C to retry this operation.

Depress EOJ to obtain the disc library Menu (Disc Menu).

Special Displays (cont'd)

Table 3-4. Program Name Disc Error Codes

<u>ERROP CODE</u>	<u>DESCRIPTION</u>	<u>SOLUTION</u>
102	The chosen program name already exists on disc unit zero.	Enter a different program name (depress A) or purge the file whose program name is already in disc storage (depress B).
105	The first position of the entered program name contains a blank	Enter the program name with a character in the first position (depress A).
110	There is not enough disc space available to create this program in disc storage.	Copy or purge some files from unit zero. Retry.
125	Attempted to purge or create a program residing in a write-protected disc drive.	Depress the red write-PROTECT switchlight if it is illuminated. Retry (depress C).

SPECIAL DISPLAY C

DISC ERROR XXX PRESS EOJ

Special Display C appears if a disc error is encountered during program generation and Special Display B does not appear. Depress the EOJ key to obtain display 01 and retry. Disc error codes are listed in APPENDIX B.

SECTION IV

CUSTOMIZED PROGRAM GENERATION: MINI-TAPE

INTRODUCTION

Program generation is performed as follows:

- The user should familiarize himself with the selectable features of the program generator as outlined in Table 4-1.
- The user should select those options that best meet his communication needs.
- More than one customized program may be required, depending on the features necessary for each communication task.

NOTE

The tape-resident SQUIC program generator may be operated from any SINGER Series 1500 Intelligent Terminal (8K minimum).

Table 4-1. Mini-Tape Program Generator Summary

<u>DISPLAY</u>	<u>AVAILABLE OPTIONS</u>
01	Whether or not the standard selections are chosen (see Table 4-3).
02	Whether the modem used is equipped with a clock (external clock), or in the case of a modem not equipped with a clock (internal clock) whether the baud rate will be 600, 900, 1200, or 1800 baud.
03	The retransmission limit may be entered or the suggested value of 015 accepted. The retransmission limit is the number of retries that will be attempted before the transmission is aborted and may range from 003 to 255.

(cont'd)

Table 4-1. Mini-Tape Program Generator Summary (cont'd)

<u>DISPLAY</u>	<u>AVAILABLE OPTIONS</u>
03	Input record size is the record length of the mini-tape file(s) to be transmitted and may range from 001 to 136. The suggested value of the 128 bytes may be accepted.
04	In the case of a file contained on more than one mini-tape cartridge, up to six input and six output device hardware addresses may be entered, in the order the tape decks will be accessed. This applies to both transmit and receive storage devices (input and output devices).

FUNCTION KEYS

Function keys are listed below in Table 4-2.

Table 4-2. Mini-Tape Program Generator Function Keys

<u>KEY</u>	<u>FUNCTION</u>
SKIP	Moves the asterisk vertically down one position. If the asterisk is at the lowest position, depression of the SKIP key will cause the asterisk to "wrap-around" to the top-most position of that display option.
REL	Depression of the REL key will enter the currently-displayed option as valid and advance the cursor to the next option, or cause the next display to appear.
DUP	Depression of the DUP key will move the cursor one character to the right.
CORR	Depression of the CORR key will move the cursor one character to the left.
HOM	Used with display 05 to correct an entered parameter. Returns display 02 to the screen.

OPERATION

The following examples of display flow should be read with frequent reference to Figure 4-1, which indicates the sequence of SQUIC mini-tape program generator displays that appear on the CRT during operation.

Examples

Examples 1, 2, and 3 below apply to tape-resident programs. To adapt the examples to disc-resident programs, a program name must be entered in reply to display 01(a) and the REL key must be depressed, causing display 01(b) to appear. As is the case with tape-resident programs, either the START or REL key must then be depressed.

Example 1

A customized program tape must be generated with the following requirements:

Installation Description:

A SINGER Model 1501 Intelligent Terminal is used to communicate data tapes. Record length is 128 bytes. Communication is accomplished by a clocked modem. Input data for transmission is read from deck 1. Output data received is written to deck 2.

Program Generation:

The standard selections in Table 4-3 are acceptable. After loading the program generator tape, display 01 appears. A write-enabled scratch tape is inserted into deck 1. Because the standard selections apply, the REL key is depressed in reply to display 01. Display 06(a) appears after the customized program tape has been generated.

Example 2

A customized program tape must be generated with the following requirements:

Installation Description:

A SINGER Model 1502 Intelligent Terminal equipped with four tape decks is used to transmit data contained on mini-tapes to another installation where it will be written to disc. Transmission is accomplished by a non-clocked modem operating at 1800 baud. Both input and output use decks 1, 3, and 4, respectively. Record lengths are 128 bytes for both receive and transmit functions.

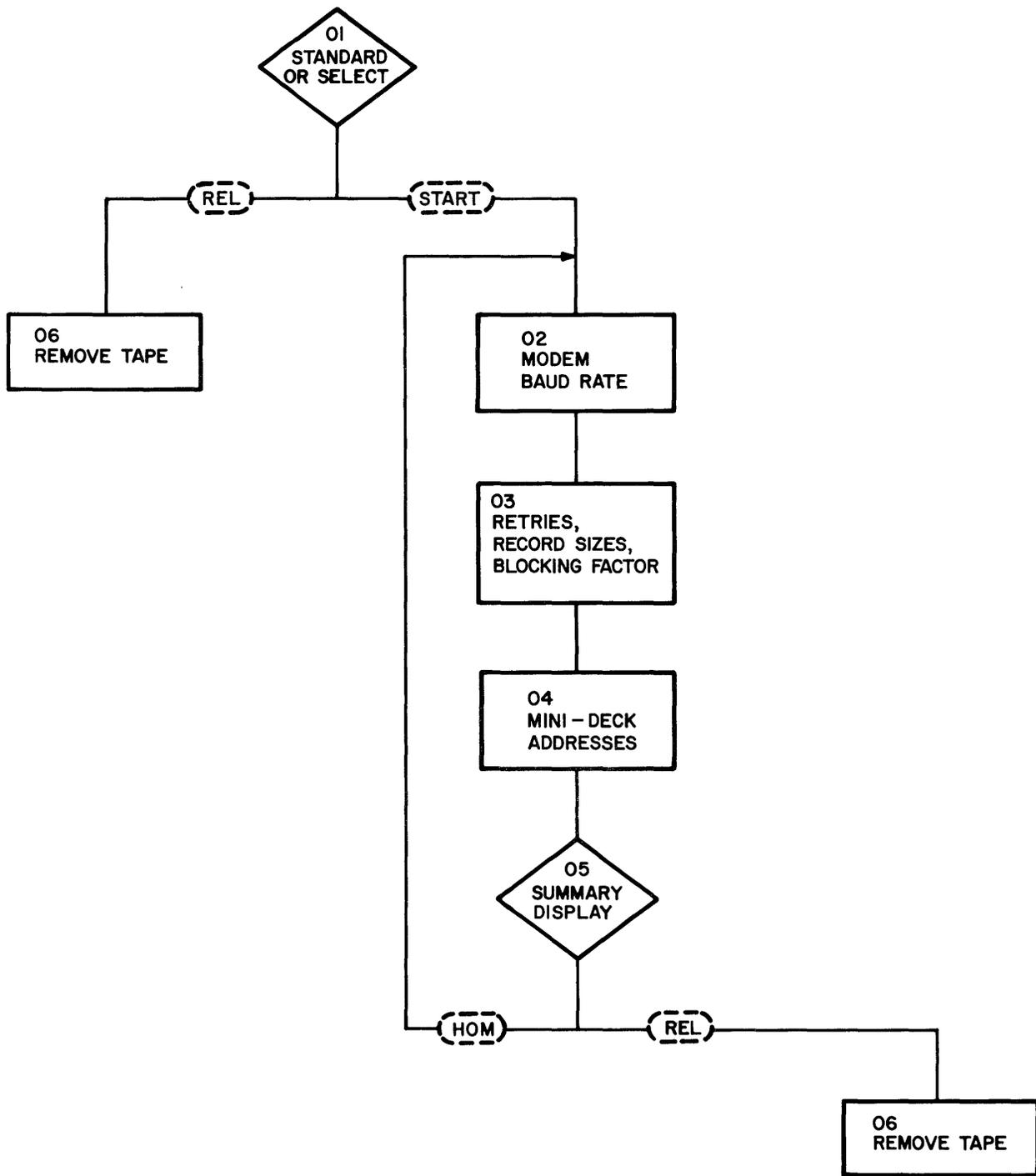


Figure 4-1. Mini-Tape Program Generator Display Flowchart

Program Generation:

After the program generator tape is loaded, the START key is depressed in reply to display 01. In reply to display 02, the SKIP key is depressed four times to move the asterisk to the desired position. The REL key is then depressed, and display 03 appears. The retransmission limit is acceptable; thus, the REL key is immediately depressed. The input record size is 128 bytes; thus, the REL key is depressed. Because the desired output record length for disc storage is 128 bytes, the blocking factor of 001 is entered before the REL key is depressed. Display 04 appears. For both the input device and output device addresses, the following is entered before the REL key is depressed: 101-103-104, which indicates tape deck 1, 3, and 4 will be accessed, respectively. In reply to display 05, the operator verifies the parameters entered in displays 02, 03, and 04: if the selections shown in display 05 are not correct, display 02 reappears after depression of the HOM key; if the selections summarized in display 05 are correct, a write-enabled scratch tape is inserted into deck 1 and the REL key is depressed. Display 06(a) appears when the customized program tape has been successfully generated.

Example 3

A customized program tape must be generated with the following requirements:

Installation Description:

A SINGER Model 1501 Intelligent Terminal is used to communicate object program tapes. A non-clocked modem operating at 1200 baud is used. Because a program tape (not a data tape) is being transmitted, record length must be specified at 136 bytes. Input is read from deck 1. Output is written to deck 2.

Program Generation:

Because the standard selections listed in Table 4-3 do not apply, the START key is depressed in reply to display 01. The modem baud rate of 1200 baud is selected in reply to display 02. A retransmission limit of 015, and the input record size of 136 is entered in reply to display 03. (Object program tapes must have a record size of 136 bytes.) Display 04 requires the acceptance of the suggested input and output device addresses of the mini-tape decks. Display 05 shows the selections made in displays 02, 03, and 04 for operator verification. If the selections summarized in display 05 are correct, a write-enabled scratch tape is inserted into deck 1 and the REL key is depressed. Display 06(a) appears when the SQUIC program tape has been successfully created. If the selections summarized in display 05 are not correct, the HOM key is depressed to allow the entry of the correct parameters in displays 02, 03, and 04.

Displays

Insert the SQUIC Library tape into deck 2 and load. The SQUIC Menu display will appear on the screen for tape-resident programs. Display 01(a) will appear after a disc-resident program is loaded.

SQUIC MENU (tape-resident)

```
*SINGER 1500 SERIES*   XX/XX/XX
                        CAT. # 8XXXX-XX
**SINGER QUALIFIED UTILITY FOR**
***INTEROFFICE COMMUNICATIONS***
    *** S Q U I C ***

A. MAXI/DISC GENERATOR 7XXXX-XX
B. MINI GENERATOR      XXXXX-XX
```

Depress the B key to select the mini-tape program generator. Display 01 will appear.

01 - STANDARD OR SELECT (tape-resident)

```
SINGER QUALIFIED UTILITY FOR
INTER-OFFICE COMMUNICATIONS
(SQUIC)SCRATCH ON DK#1(7XXXX-XX)
'REL' STANDARD -- 'START' SELECT
```

Depress the START key if any of the standard selections listed in Table 4-3 do not apply. Display 02 will appear. However, if the standard selections listed in Table 4-3 are desired, insert a write-enabled scratch tape into deck 1. Depress the REL key to create a customized program tape with the standard selections.

Displays (cont'd)

01(a) - PROGRAM NAME (disc-resident)

```
SINGER QUALIFIED UTILITY FOR
INTER-OFFICE COMMUNICATIONS

(SQUIC) 'ENTER--NAME' (7XXXX-XX)
```

If the program is disc-resident display 01(a) will be the first display that appears after loading the SQUIC Library tape. Enter a five-letter program name, by which the generated (output) program will be identified. Any five characters are valid, and the first character must not contain a blank. However, the program name entered here must be a unique program name or File ID. The CORR, DUP, and REL function keys are valid, as described in Table 4-2. Depress the red write PROTECT switchlight if it is illuminated (applies to SINGER Model 1543 Disc Drives only). Display 01(b) will appear after the REL key is depressed. If a disc error is encountered, Special Display B will appear.

01(b) - STANDARD OR SELECT (disc-resident)

```
SINGER QUALIFIED UTILITY FOR
INTER-OFFICE COMMUNICATIONS

START 'SELECT'----REL 'STANDARD'
(XXXXX) 'ENTER--NAME' (7XXXX-XX)
```

Depress the START key if any of the standard selections listed in Table 4-3 do not apply. Display 02 will appear. However, if the standard selections listed in Table 4-3 are desired, depress the REL key to create the customized program with the standard selections in disc storage. Display 06(b) (disc-resident) will appear.

Displays (cont'd)

02 - MODEM BAUD RATE

BAUD RATE CONTROL	
(*)	A EXTERNAL CLOCK
(-)	B 600 BAUD
()	C 900
()	D 1200
()	D 1800

Table 4-3. Standard Selections for Mini-Tape Program Generator

<u>STANDARD SELECTIONS</u>
A clocked Modem is used (i.e., external clock).
One input tape deck is used, deck 1 only.
One output tape deck is used, deck 2 only.
RETRANSMISSION LIMIT of 015.
INPUT RECORD SIZE is 128 bytes

Display 02 appears if the START key is depressed in reply to display 01.

The asterisk indicates which choice will be selected and may be moved vertically by depressing the SKIP key, as explained in Table 4-2. When the asterisk is in the appropriate position, depress the REL key. Display 03 will appear.

Displays (cont'd)

03 - RETRIES, RECORD SIZE

(015) RETRANSMISSION LIMIT
(128) INPUT RECORD SIZE

The RETRANSMISSION LIMIT is the number of retries per block or operation that will be performed (retransmitted) by the program before aborting transmission. A retry is an error detected by the CRC (cyclic redundancy check) with a data block or a communications control character. The retransmission limit may range from 003 to 255.

Enter the desired number of retries if the suggested number of 015 is not acceptable. The CORR and DUP function keys may be used, as explained in Table 4-2. Depress the REL key when the appropriate number of retries appears on the screen.

Enter the desired INPUT RECORD SIZE (i.e., the record length of files to be transmitted) if the suggested value of 128 is not acceptable. Input record size may range from 001 to 136 bytes.

Records received which exceed 136 bytes (buffer overflow) are truncated; thus, the portion of the record exceeding the maximum record length of 136 bytes is erased. Records received which are smaller than 136 bytes (buffer underflow) are space-filled; thus, the absent portion of the record is filled with zeros up to 136 bytes. Program tapes must be transmitted with an input record size of 136 bytes. Depress the REL key when the desired input record size appears on the screen. Display 04 will appear.

04 - MINI-DECK ADDRESSES

INPUT DEVICE ADDRESSES
101-000-000-000-000-000
OUTPUT DEVICE ADDRESSES
102-000-000-000-000-000

Displays (cont'd)

When operating the customized program now being generated, the operator may have up to six mini-tape decks defined. Valid hardware addresses for mini-tape decks must contain a 1 in the first digit of the three digit number (for each hardware address entered). Valid tape deck addresses include 101 for deck 1, 102 for deck 2, 103 for deck 3, 104 for deck 4, 105 for deck 5, 106 for deck 6, 107 for deck 7, and 110 for deck 8. It is important to note that the sequence in which mini-tape deck addresses are entered here entirely determines the accessing sequence of tape decks when operating the customized program now being generated. Input applies to transmit storage devices; output applies to receive storage devices.

Enter the hardware addresses in the desired sequence for the INPUT DEVICE ADDRESSES field. The CORR and DUP function keys are valid, as explained in Table 4-2. After verifying on the screen that the correct input device addresses have been entered, depress the REL key. The cursor will move to the first position of the next field.

Enter the hardware addresses in the desired sequence for the OUTPUT DEVICE ADDRESSES. The CORR and DUP function keys are valid, as explained in Table 4-2. After verifying on the screen that the correct output device addresses have been entered, depress the REL key. Display 05 will appear.

05 - SUMMARY DISPLAY

```
(A) BAUD RATE
(015) RETRIES (128) IN SIZE

INPUT DEVICE ADDRESSES
101-XXX-XXX-XXX-XXX-XXX
OUTPUT DEVICE ADDRESSES
102-XXX-XXX-XXX-XXX-XXX
```

The entries from displays 02, 03, and 04 will appear in display 05 for operator verification. Display 05 is interpreted as follows:

BAUD RATE may be letters A, B, C, D, or E within the parentheses, as indicated below:

- A. clocked modem (i.e., external clock)
- B. non-clocked modem at 600 baud
- C. non-clocked modem at 900 baud
- D. non-clocked modem at 1200 baud
- E. non-clocked modem at 1800 baud

Displays (cont'd)

RETRIES (retransmission limit) is the number indicated within the parentheses, from 003 to 255.

IN SIZE (input record size) is the number indicated within the parentheses, from 001 to 136 bytes.

INPUT DEVICE ADDRESSES indicate the order in which tape decks will be accessed for transmission, if on-line, according to the device numbers entered here.

INPUT DEVICE ADDRESSES

XXX-XXX-XXX-XXX-XXX-XXX

↑ ↑ ↑ ↑ ↑ ↑
1st 2nd 3rd 4th 5th 6th

Device addresses for mini-tape decks 1 through 8 are as follows: 101 for tape deck 1, 102 for tape deck 2, 103 for deck 3, 104 for deck 4, 105 for deck 5, 106 for deck 6, 107 for deck 7, and 110 for deck 8. When using the customized SQUIC Program, the first, second, third, fourth, fifth, and sixth tape deck numbers entered here correspond to the accessing sequence below, which appears in the Operator's Display, SECTION V, Figure 5-2.

IN (123456)

OUTPUT DEVICE ADDRESSES indicate the order in which tape decks will be accessed for reception, if on-line, according to the device numbers entered here.

OUTPUT DEVICE ADDRESSES

XXX-XXX-XXX-XXX-XXX-XXX

↑ ↑ ↑ ↑ ↑ ↑
1st 2nd 3rd 4th 5th 6th

Displays (cont'd)

Device addresses for mini-tape decks 1 through 8 are 101, 102, 103, 104, 105, 106, 107, and 110 respectively. When using the customized SQUIC Program, the first, second, third, fourth, fifth and sixth tape deck numbers entered here correspond to the accessing sequence (123456) below, which appears in the Operator's Display, SECTION V, Figure 5-2.

OUT (123456)

Insert a write-enabled scratch tape into deck 1 (tape-resident programs only). If any of the entries appearing in this summary display are not correct, depress the HOM key; display 02 will appear. If the selections are correct, depress the REL key. Display 06 will appear after the customized program has been created successfully.

06(a) - REMOVE TAPE (tape-resident)

LABEL AND PROTECT LOAD TAPE ON DRIVE #1
--

Display 06(a) appears after a customized program has been generated successfully.

Remove the program tape from deck 1. Label the cartridge and insert the red WRITE-ENABLE pin into the write PROTECT position on the top of the cartridge.

If additional customized program tapes are to be generated, reload the program generator tape after it has fully rewound. Display 01 will appear.

Displays (cont'd)

06(b) - COMPLETION (disc-resident)

```
XXXXX CUSTOM GENERATED PROGRAM  
ON UNIT ZERO   PRESS 'EOJ'
```

Display 06(b) (disc-resident) appears upon completion of program generation. Note that the disc program name appears as XXXXX above. Depress the EOJ key to bring the disc library Menu (Disc Menu) to the screen.

Special Displays

SPECIAL DISPLAY A - TAPE ERROR

```
*****TAPE ERROR*****  
  
*****RELOAD PROGRAM*****
```

Special Display A will appear if a tape error is encountered, accompanied by a continuous keyboard tone.

Depress the red rewind button in the middle of each tape deck. After the tapes have fully rewound, reload the program. It is recommended that the tape decks be cleaned after this error is encountered. Special Display A also appears if a write-enabled mini-tape cartridge was not inserted into tape deck 1 for tape-resident programs.

Special Displays (cont'd)

SPECIAL DISPLAY B

DISC ERROR XXX
A. REGENERATE
B. PURGE FILE
C. RETRY

Special Display B appears when a disc error is encountered after entering a program name in reply to disc-resident display 01(a). Refer to APPENDIX B for error codes other than those listed below in Table 4-4 (program names are File IDs).

Depress A to enter a different program name. Display 01(a) will appear.

Depress B to purge the old file which has the same program name entered in display 01(a).

Depress C to retry this operation.

Depress EOJ to obtain the disc library Menu (Disc Menu).

Special Displays (cont'd)

Table 4-4. Program Name Disc Error Codes

<u>ERROR CODE</u>		<u>SOLUTION</u>
102	The chosen program name already exists on disc unit zero.	Enter a different program name (depress A) or purge the file whose program name is already in disc storage (depress B).
105	The first position of the entered program name contains a blank.	Enter the program name with a character in the first position (depress A).
110	There is not enough disc space available to create this program in disc storage.	Copy or purge some files from unit zero. Retry.
125	Attempted to purge or create a program residing in a write-protected disc drive.	Depress the red write PROTECT switchlight if it is illuminated. Retry (depress C).

SPECIAL DISPLAY C

DISC ERROR XXX PRESS EOJ

Special Display C appears if a disc error is encountered during program generation and Special Display B does not appear. Depress the EOJ key to obtain display 01 and retry. Disc error codes are listed in APPENDIX B.

SECTION V

OPERATION

OVERVIEW

Communication refers to the transfer of data from one location to another. With the 1500-to-1500 Communications package (SQUIC), line handling is strictly half-duplex, and only point-to-point communication is possible. In other words, only two SINGER Series 1500 Intelligent Terminals (or computers simulating SQUIC dialogue) may communicate, and data flows in only one direction at any one time. Therefore, the terminal transmitting data is referred to as the transmit terminal, and the terminal receiving data is referred to as the receive terminal for the duration of a file transmission.

As shown in Figure 5-1, either disc, maxi-tape, or mini-tape may be used to store data with the SQUIC communication system. Modems are used to convert the data from computer code form to telephone code form, and back again, between terminals. The communication channel may be telephone lines, or a private cable network.

It is recommended that the glossary (APPENDIX C) be referenced when unfamiliar terms are encountered.

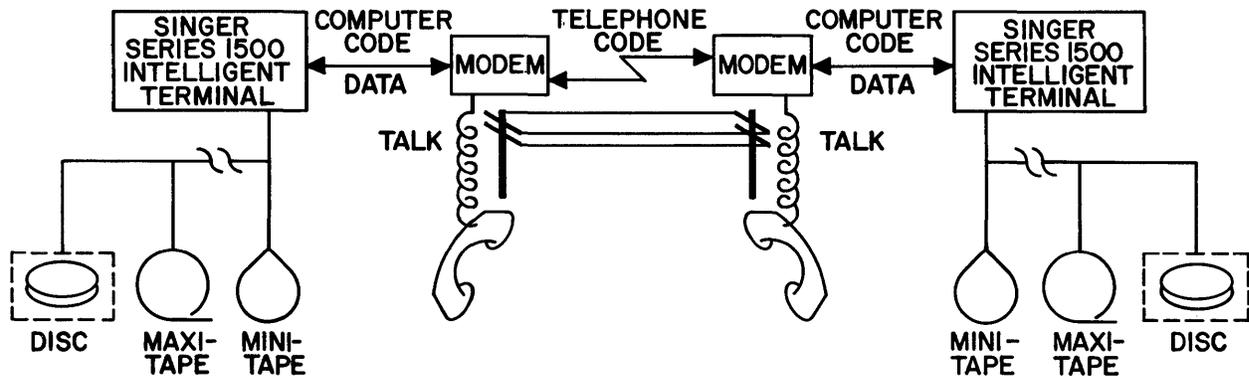


Figure 5-1. SQUIC Telecommunications

Customized Programs

The SQUIC package provides for the use of customized programs for specific applications. For example, two different customized programs are required for mini-tape and maxi-tape storage. If different character codes are used with disc or maxi-tape storage, different customized programs are required unless transparency is selected. It is the operator's responsibility to use the correct customized program for each communication task.

Character Codes and Transparency

Transparency is a communication mode where no character code translation occurs. Whether or not transparency is selected by the transmit terminal operator depends on (1) the data to be transmitted, and (2) what character code is desired at the receive terminal (i.e., which customized SQUIC program is selected). The use of transparency is further explained in SECTION VII and APPENDIX C.

OPERATING PROCEDURES

Transmit and receive operating procedures differ with any communication program.

It should be noted that the transmit terminal operator usually initiates the telephone call, has the most amount of control, and begins transmission.

Topics related to all SQUIC communication storage devices are discussed below under the headings Display Explanation, Delay Option, and Previous File Transmitted With Delay Option. Specific operational procedures for each storage device follow general information, including individual tables listing applicable function keys.

NOTE

All function keys in this manual are depressed while holding down the CTRL key, excluding the REL, SKIP, DUP, CORR, and BKSP FIELD functions, unless indicated otherwise.

Display Explanation

There is one major display which always appears after loading the customized program into memory. This display, referred to as the Operator's Display, is shown in Figure 5-2. Three other displays may appear: (1) If the G key is depressed in reply to the Operator's Display (Figure 5-2) when using mini-tape as a storage device, a display will appear which summarizes the choices made when creating the customized program (see Figure 5-7); (2) when receiving data, depression of the L key in reply to the Operator's Display (Figure 5-2) causes the buffer, in which the received data is placed, to appear on the display screen; and (3) when using disc as a storage device, if X, P, or F keys are depressed in reply to the Operator's Display (Figure 5-2) a display showing disc file names will appear (see Figure 5-4), as explained under the headings Disc Transmission and Disc Reception below.

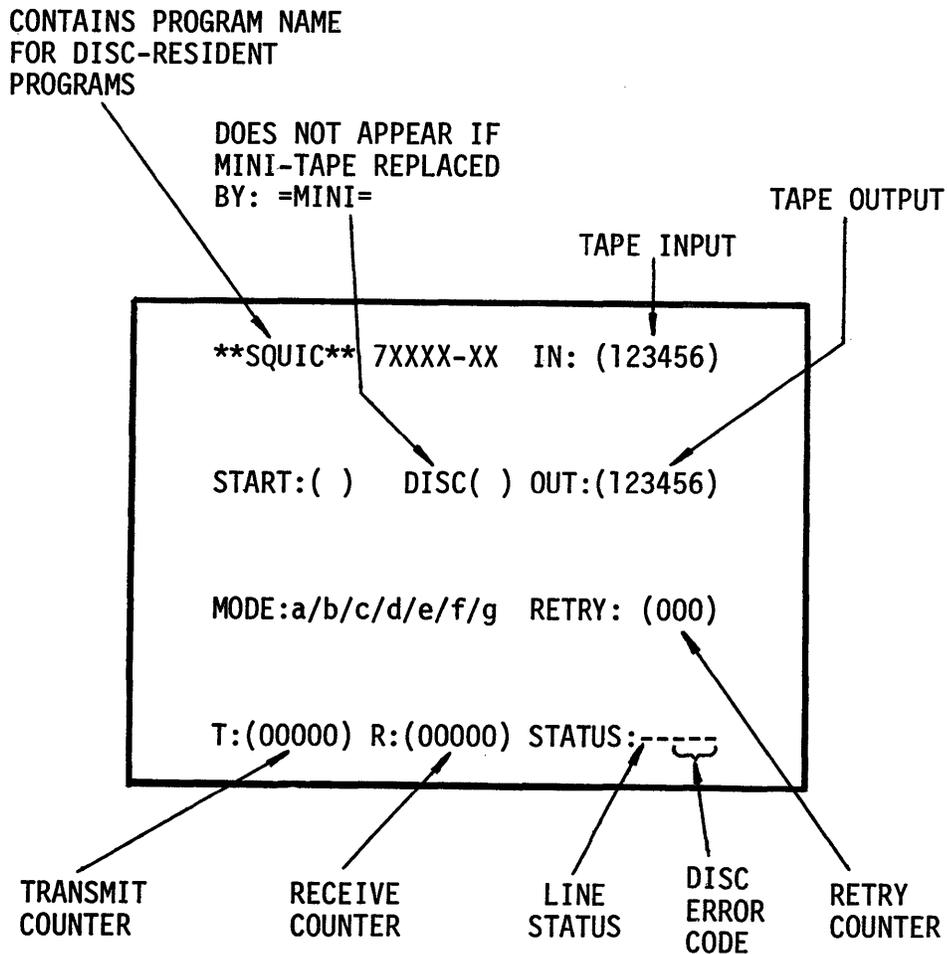


Figure 5-2. SQUIC Operator's Display

Display Explanation (cont'd)

In reference to the Operator's Display:

TAPE INPUT - The cursor indicates that a tape drive or tape deck is on-line. Maxi-tape drives must be on-line with a maxi-tape reel mounted. Mini-tape decks must have a tape cartridge inserted and ready. Which maxi-tape drives or mini-tape decks are to be used are determined when the customized program tape is generated for either mini-tape or maxi-tape data storage; i.e., IN:(123456) indicates the first tape deck defined at generation time is ready, regardless of its device number.

TAPE OUTPUT - The same conditions which apply to tape input apply to tape output. However, output tapes must be write-enabled, although this does not influence the presence of a cursor indicating an on-line device.

START:() - T within the parentheses indicates transmission has begun. An R indicates reception has begun.

DISC:() - If disc storage is used after the file names have been entered, an X within the parentheses indicates disc storage. Also see the X key explanation in Tables 5-3 and 5-6.

MODE:a/b/c/d/e/f/g - Position (not the actual letters) a,b,c,d,e,f, and g correspond to the following:

- Position a - T indicates transparency. Caused by depressing the T key.
- Position b - M indicates multi-tape input. Caused by depressing the END FILE key.
- Position c - A indicates that this terminal is in unattended Automatic-Answer mode. Caused by depressing the A key.
- Position d - T or R indicates the End of Transmission for the transmit or receive site, respectively.
- Position e - T or R indicates the bell (keyboard tone) was transmitted or received respectively. Caused by depressing the B key.
- Position f - For disc storage operation, an I or S indicates an Indexed Sequential or Sequential file is being read from disc. For mini-tape transmit operations, an R indicates the R key was depressed, which rewinds all input tapes after transmission ceases (i.e., the End of Transmission character is transmitted).

Display Explanation (cont'd)

Position g - D indicates a manual delay has been activated. Caused by depressing the D key. When transmitting a file from mini-tape after depressing the D and START keys, if the D disappears from the screen, do not depress the D key again for this file unless the delay factor must be maximized, as explained under the heading Delay Option below.

RETRY:(000) - Indicates the total number of retries for this transmission or since the C key was last depressed.

T:(00000) - Indicates the number of records transmitted at the transmitting site.

R:(00000) - Indicates the number of records received at the receiving site.

STATUS:----- - The first position (hyphen) indicates a line error. Line status letters are listed in Table 5-1. Some indicators are recoverable, others are not. If two status line errors occur, the letter indicating the condition most recently encountered will appear on the screen. The last three positions (hyphens) indicate a disc error (disc error codes appear in APPENDIX B). Disc errors are not recoverable; the file must be retransmitted.

Table 5-1. SQUIC Line Status Indicators

NOTE

The line is never abandoned for all status indicators except as noted. However, if the terminal is in the unattended Automatic-Answer mode, the line will be abandoned after 20 seconds.

<u>LETTER</u>	<u>DESCRIPTION</u>
A	Indicates an abnormal End of Transmission.
D	Indicates temporary text delay at the transmit site. Characters are being sent, causing a keyboard tone every half second. Caused by an End of File being detected on multiple tape input transmissions.
E	Indicates line error (i.e., lost telephone contact). The line is abandoned.
O	Indicates the record received for disc output is larger than the maximum record length (specified upon customized program tape generation). The truncated record will be written to disc. Processing continues automatically.
P	Indicates the transmission was abandoned due to an input device error at the transmit site.
T	Indicates the line was abandoned due to a prolonged time out. May indicate line equipment failure. Possible reasons include: a. a specific response has not been received. b. a prolonged lapse in receiving data has been encountered. c. if transmitting, there may be a malfunction in the SINGER Model 1535 Synchronous Communication Adapter.
W	Indicates a temporary delay at the receive terminal (WACK). Characters are being sent, causing a keyboard tone every half second. Causes include tape write error and end of tape being sensed.

Troubleshooting

Table 5-2 provides an explanation of some problems that could possibly occur when operating a SQUIC communication program.

Table 5-2. Troubleshooting Guide

<u>INDICATOR</u>	<u>ERROR DESCRIPTION AND RECOVERY PROCEDURES</u>
Line status indicator appears in the form of one letter in the Operator's Display (see Figure 5-2 for the location of line status).	Refer to Table 5-1 for line status indicators.
Disc error status indicator appears in the form of three numbers in the Operator's Display (see Figure 5-2 for the location of disc error status).	Refer to APPENDIX B, DBMSS Disc Error Codes.
After loading the customized SQUIC program the screen remains blank. The Operator's Display (Figure 5-2) does not appear.	Either (1) the wrong program tape was selected, or (2) the SINGER Model 1535 Synchronous Communications Adapter is not properly installed in the SINGER Series 1500 Intelligent Terminal in use. Load the correct tape. Use a terminal with the SINGER Model 1535 SCA installed.
When attempting to receive, nothing happens for an abnormal amount of time. The Operator's Display (Figure 5-2) is unchanged as if transmission had not yet begun.	Indicates longer than anticipated delay, or line equipment failure. Check modem connection to the intelligent terminal. Check if the modem's power is ON. If unsuccessful, activate talk mode check for dial tone.

Delay Option

A delay option is provided with SQUIC software to compensate for input/output transfer rate incompatibility. As indicated in Tables 5-3, 5-4, and 5-5, the transmit terminal may select the delay option by depressing the D key.

The use of the delay option depends on the results of previous experimentation based on the following factors: (1) the modem baud rate used, and (2) the storage devices employed by the transmit and receive terminals. Additionally, the format of the data being transmitted may slightly influence the input/output transfer rate compatibility between the two terminals.

Generally, baud rates above 4,800 baud usually require the delay option with some exceptions. In contrast, maxi-tape to maxi-tape transmissions do not require the delay option, regardless of the baud rate used. Experimentation with the delay is suggested for each communication task to determine how to maximize throughput.

Delay Factor

A delay factor (e.g., from 000 times X, to 100 times X) is used by SQUIC software to provide a limited self-correcting delay. During transmission, the delay factor will increase with each retransmission caused by input/output transfer rate incompatibility (receive register overflow), until a certain number of retries occurs, at which time the delay factor will remain at a fixed value for this file and for subsequently-transmitted files, unless the program is reloaded or the S or D key is depressed.

The software delay technique incorporated within the maxi/disc SQUIC Program (input is either disc or maxi-tape) differs slightly from that used by the mini SQUIC Program (input is mini-tape). For both programs, if the manual delay option is not selected before transmission, the software delay factor is automatically increased with each block retransmitted due to receive register overflow. The transmit terminal is made aware of this condition by line control characters sent by the receive terminal's request for retransmission. As the delay is increased, few retransmissions will occur due to the overflow condition, until none occur. The ability to activate and deactivate the manual delay before or during transmission is also a feature of both programs. This is the point at which the programs differ in delay operation.

Maxi Disc Program:

When the manual delay option is activated before transmission begins, a fixed delay is instituted. This delay is great enough that retransmissions due to overflow conditions are not likely to occur, but if they do, the delay is further increased until the overflow conditions do not occur.

Maxi Disc Program: (cont'd)

If the manual delay is activated during transmission, the same fixed value is instituted and processing continues in the same manner. When the manual delay is deactivated during transmission, the factor returns to the factor previously in effect when the delay was activated; or, to \emptyset if the delay was selected before transmission began.

Mini Program:

When the manual delay option is activated before transmission begins, a fixed delay is instituted. This delay is great enough that retransmissions due to overflow conditions are not likely to occur. The delay factor is then decreased with each successful data transmission. This continues until the delay reaches a factor of zero (\emptyset) or an overflow condition occurs. If an overflow condition occurs, the process is reversed and the D which appears in the Operator's Display (position g after the word MODE) will disappear. At this point the delay factor is altered only by subsequent overflow conditions. If the manual delay option is activated or reactivated during transmission, the decreasing process begins with the delay factor currently being used.

When the manual delay option is deactivated during transmission, the delay factor currently being used remains enacted. This delay may only be altered by subsequent overflow conditions.

Previous File Transmitted Without Delay Option:

If the delay option is not selected for the previously transmitted file, in most cases where the modem baud rate, storage devices used, and direction of transmission are the same, the delay factor will have reached a value suitable for the next file to be transmitted, and should not be altered by reloading the program or depressing the S or D keys. However, if an excessive number of retries occur after the delay factor reaches a fixed value, the delay factor value should be reset by depressing the S key. This will reset the delay factor and allow the program to obtain a different fixed delay factor value which will hopefully reduce the frequency of retries and increase throughput.

Previous File Transmitted With Delay Option:

If the delay option is selected for the previously transmitted file, the action taken by the operator for subsequently transmitted files depends on the transmit storage device being used. When transmitting from maxi-tape or disc storage, the delay factor never changes if the delay option is selected; thus, depression of the D key again is never required to reset the delay factor. Depress the S key to transmit a file without the delay option.

However, if the delay option is selected when transmitting from mini-tape, the delay factor will decrement and reach a fixed value, at which time the D which appears in the Operator's Display (position g after the word MODE) will disappear. In most cases where the modem baud rate and the storage devices used at the transmit and receive terminals are the same, the delay factor will have reached a value suitable for the next file transmission and should not be altered (i.e., do not reload the program or depress the S or D keys). However, if an excessive number of retries occurs after the delay factor reaches a fixed value, the delay factor should be reset by depressing the D key. This will reset the delay factor and allow the program to obtain a different fixed delay factor which will hopefully reduce the frequency of retries and increase throughput. If a file must be transmitted without the delay option, depress the S key.

TRANSMISSION

Transmission may be accomplished by first preparing data files stored on disc maxi-tape or mini-tape and having the selected input device on-line. Operational procedures differ for each input storage device.

Disc Transmission

Switch the power ON for the following:

- the SINGER Series 1500 Intelligent Terminal housing disc storage;
- modem; and
- any other communication equipment to be used.

Make sure the line equipment is ready. Check the telephone for a dial tone.

Disc Transmission (cont'd)

NOTE

All files to be transmitted must reside on disc Unit zero (Ø). With the SINGER Model 1540 Disc Drive, Unit zero is located in the first on-line disc drive. With the SINGER Model 1543 Disc Drive, Unit zero is the removable disc in the first on-line disc drive. To copy a disc file to Unit zero if it does not presently reside there, use the File Copy Disc Utility Program. All disc files are transmitted and received as Sequential files.

If any files presently residing in disc storage will be purged, depress the red write PROTECT switchlight before attempting to purge any files. After the READY light illuminates (on the SINGER Model 1543 Disc Drive only), insert the appropriate customized SQUIC Program tape into deck 2 (tape-resident programs) and load. The display shown in Figure 5-3 will appear on the screen:

```
**XXXXX** 7XXXX-XX IN: (123456)
START:( ) DISC:( ) OUT: (123456)
MODE: / / / / / / RETRY: (000)
T:(00000) R:(00000) STATUS:-----
```

Figure 5-3. Operator's Display: Disc

At this time the selection of options should be accomplished by depressing the necessary function keys, while holding down the CTRL key. Refer to Table 5-3 for the function keys which may be used. (Table 5-3 should also be referenced frequently to ensure, by verification on the screen, that the proper function keys have been depressed.)

NOTE

When a SINGER Series 1500 Intelligent Terminal will communicate negative numbers or object programs, the data communicated must be transmitted in transparency.

Disc Transmission (cont'd)

When transmitting a series of disc files, the X function key must be depressed and a new transmit file name entered after transmitting each file unless the same file must be transmitted repeatedly. When the X key is depressed, the file names display will appear, as follows:

TRANSMIT FILE NAME	
()
RECEIVE FILE NAME	
()

Figure 5-4. Disc File Names Display

The following function keys are applicable to the disc file names display:

- the DUP key moves the cursor one character to the right;
- the CORR key moves the cursor one character to the left;
- the SKIP key, if depressed when the cursor is at the first position of a field, enters the default file name into that field. This file name is assigned when generating the customized program;
- the SKIP key, if depressed when the cursor is not at the first position of a field, places blanks in the remainder of the field and moves the cursor to the first position of or past, the next field;
- the BKSP FIELD key moves the cursor to the first position of the current field. If depressed again, or if the cursor is presently at the first position of a field, the cursor will move to the first position of the previous field;
- the REL key returns the Operator's Display to the screen after the file names have been entered; and
- instead of depressing the REL key to obtain the Operator's Display, the CTRL/REL keys may be depressed to activate the collective disc file receive option. Deactivation procedures, however, must be carefully obeyed as explained under the heading Collective Disc-File-Receive Option below in this section.

Disc Transmission (cont'd)

Enter the TRANSMIT FILE NAME and the RECEIVE FILE NAME in 24 characters or less. With unattended Auto-Answer terminals, the RECEIVE FILE NAME must be 20 characters or less. Any displayable characters are valid excluding question marks, but the first position must not contain a blank.

Depress the REL key to obtain the Operator's Display (shown in Figure 5-2). Check the display to verify that the correct selections have been made.

Check the storage device to verify that it is ready. Activate the TALK button on the modem. Either contact the receive site by making the necessary call, or wait to be contacted. After the receive site reports that it is ready, activate the DATA button on the modem.

Depress the START key to begin transmission, unless the unattended Automatic-Answer option has been selected, in which case transmission is not activated by depressing the START key. (Be sure all input and output devices are on-line before leaving an Auto-Answer terminal unattended.)

As each data block is transmitted, a series of keyboard tones will be heard. If a retry occurs (i.e., if a record must be retransmitted), there will be a temporary pause in the keyboard tones, and the retry counter (as indicated in Figure 5-2) will increment. When the last block has been transmitted, the letter T will appear in the d position after the word MODE: (as indicated in Figure 5-2). If the receive terminal is using tape as an output device, the transmit terminal may temporarily stop transmitting records (without retries) and a keyboard tone will consistently occur every half second. This condition occurs when additional tapes must be prepared at the receive terminal in order to receive the remainder of the file (WACK communication control character).

Table 5-3. Disc Transmit Function Keys

Directions:

All keys must be depressed while the CTRL key is held down. Depress the keys in the order listed below. For example, if the T and A keys are necessary for this communication task, depress the T key before the A key. During transmission, if a line status of D should appear in the Operator's Display (Figure 5-3), the END FILE, START, and EOJ keys are valid entries, as described below. Those keys indicated by an asterisk (*) may be depressed whenever communication is not presently occurring (i.e., either before or after this file is communicated).

When transmitting a series of disc files, the X key must be depressed after each file and a different transmit file name entered, unless the same file must be transmitted repeatedly. This avoids retransmission of the same file.

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
T*	Enables EBCDIC transparency.	Optional	A T appears after the word MODE (Position a).	Depress the T key again.
D	Implements inter-block delay. Refer to Delay Option above for explanation.	Conditional	D appears after the word MODE (position g).	Depress the D key again or depress the S key to re-initialize delay (The S key may disconnect line).
A	Enters terminal into the Automatic-Answer mode.	Optional	An A appears after the word MODE (position c).	Depress the A key again.

(cont'd)

Table 5-3. Disc Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
X*	Enables disc as input instead of maxi-tape; enables entry of disc file names.	Required	Causes file names display to appear which enables entry of transmit and receive file names. See Figure 5-4 and accompanying text for operation of this display. When the Operator's Display reappears, an X will appear in the parentheses after the word DISC.	Depress the S key if disc storage will not be used.
F*	Enables operator to verify current transmit and receive file names. May also be depressed before the X key.	Optional	Brings to the screen the current transmit and receive file names.	Depress the F key again to obtain the Operator's Display, or the X key to change current file names.
START	Begins transmission. START must <u>not</u> be depressed if this terminal is in the Automatic-Answer mode.	Required	T or R appears within the parentheses after the word START at transmit terminal (T) and receive terminal (R), respectively.	Depress the EOJ key to abort transmission.

(cont'd)

Table 5-3. Disc Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
EOJ	Aborts Transmission, does not disconnect line.	Error Recovery (During Transmission)	An A appears in the line status position. T or R appears after the word MODE (position d), if the EOJ key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress the C key.
B*	Transmits continuous keyboard tone, which indicates the TALK mode should be activated by both receive and transmit sites.	Conditional (After Completion)	T or R appears after the word MODE (position e) if the B key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress either the B or C key.
S*	<u>Disconnects line if the modem is in the Data or Auto-Answer modes.</u> Line remains connected if depressed while modem is in TALK mode. Also enables maxi-tape as storage device, reinitializes the interblock delay, restarts program.	Conditional (After Completion)	Removes X after DISC, which enables maxi-tape as input service.	
C*	Clears Operator's Displays; may be used after each file is transmitted.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d, e, and f.	

(cont'd)

Table 5-3. Disc Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
HOM*	Applies only to disc-resident program storage (as opposed to tape-resident program storage). Enables a different program to be loaded into memory.		Causes the disc library Menu (Disc Menu) to appear.	

Maxi-Tape Transmission

Switch the power ON for the following:

- the SINGER Series 1500 Intelligent Terminal to be used;
- maxi-tape drive(s);
- modem; and
- any other communications equipment to be used.

Make sure the line equipment is ready. Check the telephone for a dial tone.

NOTE

A SINGER Model 1511 Maxi-Tape Drive (7-track) must not be used to store data in EBCDIC or ASCII character codes, or any other 8-bit codes.

Mount the maxi-tape reel(s) containing the data to be transmitted on the appropriate tape drive(s) to be used. Advance the tape(s) to the load pointer, or to the position where the data to be transmitted should begin (i.e., use the REL, SKIP, and BKSP RECORD function keys). Depress (illuminate) the ON LINE switchlight for each maxi-tape drive to be used.

Maxi-Tape Transmission (cont'd)

Insert the appropriate customized SQUIC Program tape into deck 2 (tape-resident only). Load the program. The display shown in Figure 5-5 will appear on the screen:

```
  **XXXXX** 7XXXX-XX IN: (123456)
  START:( ) DISC:( ) OUT: (123456)
  MODE: / / / / / / RETRY: (000)
  T:(00000) R:(00000) STATUS:-----
```

Figure 5-5. Operator's Display: Maxi-Tape

At this time the selection of options should be accomplished by depressing the necessary function keys, while holding down the CTRL key. Refer to Table 5-4 for the function keys which may be used. (Table 5-4 should also be referenced frequently to ensure, by verification on the screen, that the proper keys have been depressed.)

NOTE

When a SINGER Series 1500 Intelligent Terminal will communicate negative numbers or object programs, the data communicated must be transmitted in transparency.

The END FILE key is necessary only when the number of maxi-tape reels to be transmitted exceeds the number of available input tape drives (up to six) defined when the customized SQUIC Program was generated. Maxi-tape drives will be accessed in the sequence defined when the customized SQUIC Program was generated if the tape drives are on-line (if not on-line, that maxi-tape drive will be bypassed).

If the END FILE key is not depressed, on-line maxi-tape drives will be accessed without interruption in the defined order until the EOF mark on the last on-line tape drive is read, at which time transmission ceases. Also, all maxi-tape reels must be readied before beginning transmission, and only one tape reel will be transmitted from each tape drive.

Maxi-Tape transmission (cont'd)

If the END FILE key is depressed, on-line maxi-tape drives will be accessed without interruption in the defined order until the last maxi-tape drive has been read, at which time a D appears in the line status position. Each time the D appears the operator must remove all previously transmitted tape reels and replace them (in the correct sequential order) with the next tape reels to be transmitted. The maxi-tape drives must be placed on-line before the START key is depressed, which restarts transmission. The END FILE key must be depressed while the last tape is being transmitted (to erase the M after MODE).

Check the Operator's Display (Figure 5-2) to verify that the correct selections have been made. Check the storage devices to verify that they are on-line and ready.

Activate the TALK button on the modem. Either wait to be contacted by the transmit site, or contact the transmit site by making the necessary call. After the transmit site reports it is ready, activate the DATA button on the modem.

Depress the START key to begin transmission, unless the unattended Auto-Answer option has been selected, in which case transmission is not activated by depressing the START key. (Be sure all input and output devices are on-line before leaving an Auto-Answer terminal unattended.)

As each data block is transmitted, a series of keyboard tones will be heard. If a retry occurs (i.e., if a record must be retransmitted), there will be a temporary pause in the keyboard tones, and the retry counter (shown in Figure 5-2) will increment. When the last record has been transmitted, the letter T will appear in the d position after the word MODE: (shown in Figure 5-2).

If the receive terminal is using tape as an output device, the transmit terminal may temporarily stop transmitting records (without retries) and a keyboard tone will occur consistently every half second. This condition occurs when additional tapes must be prepared at the receive terminal in order to receive the remainder of the file. (WACK communication control character).

Refer to Table 5-4 for those keys which may be depressed after transmission ceases.

Table 5-4. Maxi-Tape Transmit Function Keys

Directions:

All keys must be depressed while the CTRL key is held down. Depress the keys in the order listed below. For example, if the T and A keys are necessary for this communication task, depress the T key before the A key. During transmission, if a line status of D should appear in the Operator's Display (Figure 5-5) START, and EOJ keys are valid, as described below. The END FILE key must be depressed while the last tape is being transmitted, if previously activated for this file transmission.

Those keys indicated by an asterisk (*) may be depressed whenever communication is not presently occurring (i.e., either before or after this file is communicated).

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
I*	Immediately rewinds all input tape drives with interlock (i.e., tape is positioned at load point off-line).	Optional Utility	Input tapes will not be underscored on Operator's Display.	
REL*	Reads current input tape to next End of File (EOF) mark.	Optional Utility	No change.	
SKIP*	Advances input tape one record and increments T-counter. The bypassed record is not transmitted.	Optional Utility	The T-Counter on Operator's Display is incremented by one.	
BKSP* RECORD	Backspaces the input tape one record.	Optional Utility	The T-Counter on the Operator's display is decremented by one.	
T*	Enables EBCDIC transparency	Optional	T appears after the word MODE (position a).	Depress the T key again.

(cont'd)

Table 5-4. Maxi-Tape Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
D	Implements inter-block delay. Refer to <u>Delay Option</u> above for explanation.	Conditional	D appears after the word MODE (position g).	Depress the D key again, or depress the S key to reinitialize delay (the S key may disconnect line).
END FILE	Indicates multiple tape input which allows two or more tape reels to be transmitted from the same tape drive. END FILE is necessary only when the number of input tape reels is greater than the number of available tape drives.	Optional	An M appears after the word MODE (position b). This <u>must</u> be erased before the transmission ends, by depressing the END FILE key (again) <u>while</u> the last tape is being transmitted.	Depress the END FILE key again. Also valid if D appears in line status position during transmission.
A*	Enters terminal into Automatic-Answer mode.	Optional	An A will appear after the word MODE (position c).	Depress the A key again.
START	Begins transmission. START <u>must not</u> be depressed <u>if</u> this terminal is in the Automatic-Answer mode.	Required	T or R appears within the parentheses after the word START at transmit terminal (T) and receive terminal (R), respectively.	Depress the EOJ key to abort transmission.

(cont'd)

Table 5-4. Maxi-Tape Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
EOJ	Aborts transmission, does not disconnect line.	Error Recovery (During Transmission)	An A appears in the line status position. T or R appears after the word MODE (position d), if the EOJ key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress the C key.
B*	Transmits continuous keyboard tone, which indicates the Talk mode should be activated by both receive and transmit sites.	Conditional (After Completion)	T or R will appear after the word MODE (position e), if the B key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress either the B or C key.
S*	<u>Disconnects line</u> if the modem is in the Data or Auto-Answer modes. Line remains connected if depressed while modem is in Talk mode. Also enables maxi-tape as input device, reinitializes the interblock delay, restarts program.	Conditional (After Completion)	Removes X after disc, which enables maxi-tape as input device.	
C*	Clears Operator's Display; may be used after each file is transmitted.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d and e (and f if disc).	

(cont'd)

Table 5-4. Maxi-Tape Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
HOM*	Applies only to disc-resident program storage (as opposed to tape-resident program storage). Enables a different program to be loaded into memory.		Causes the disc library Menu (Disc Menu) to appear.	

Mini-Tape Transmission

Switch the power ON for the following:

- the SINGER Series 1500 Intelligent Terminal to be used;
- modem; and
- any other communications equipment to be used.

Make sure line equipment is ready. Check the telephone for a dial tone.

Insert the appropriate customized SQUIC Program tape into deck 2 (tape-resident programs). Load the program. The following will appear on the screen:

```

**XXXXX** 7XXXX-XX IN: (123456)
START:( ) ==MINI== OUT: (123456)
MODE: / / / / / / RETRY: (000)
T:(00000) R:(00000) STATUS:-----
    
```

Figure 5-6. Operator's Display: Mini-Tape

Remove the program tape from deck 2.

Mini-Tape Transmission (cont'd)

At this time the selection of options should be accomplished by depressing the necessary function keys, while holding down the CTRL key. Refer to Table 5-5 for the function keys which may be used. (Table 5-5 should also be referenced frequently to ensure, by verification on the screen, that the proper function keys have been depressed.)

NOTE

When a SINGER Series 1500 Intelligent Terminal will communicate negative numbers or object programs, the data communicated must be transmitted in transparency.

Insert the first tape volume to be transmitted into the tape deck defined as the first on-line input tape deck when this customized SQUIC Program was generated. Note that the numbers 123456 on the screen does not apply to tape decks 1, 2, 3, 4, 5, and 6. See Figure 5-7 and the accompanying text.

The END FILE key is necessary only when the number of mini-tape cartridges to be transmitted exceeds the number of available input tape drives (up to six) defined when the customized SQUIC Program was generated. The mini-tape decks will be accessed in the sequence defined when the customized SQUIC Program was generated if the tape decks are on-line (if not on-line, that mini-tape deck will be bypassed).

If the END FILE key is not depressed, on-line mini-tape decks will be accessed without interruption in the defined order until the EOF mark on the last on-line tape deck is read, at which time transmission ceases. Also, all mini-tape cartridges must be readied before beginning transmission, and only one tape cartridge will be transmitted from each tape deck.

If the END FILE key is depressed, on-line mini-tape decks will be accessed without interruption in the defined order until the last mini-tape deck has been read, at which time a D appears in the line status position.

Each time the D appears the operator must remove all previously transmitted mini-tape cartridges and replace them (in the correct sequential order) with the next tape cartridges to be transmitted. The mini-tape decks must be on-line before the START key is depressed, which restarts transmission. The END FILE key must be depressed while the last tape is being transmitted (to erase the M after MODE).

Mini-Tape Transmission (cont'd)

NOTE

To retain the maximum delay for mini-tape transmissions, depress the D key before transmission begins. This will establish the maximum delay. Then depress the D key again after actual data transmission begins.

Check the Operator's Display shown in Figure 5-2 to verify that the correct selections have been made. Check the storage devices to verify that they are on-line and ready.

Activate the TALK button on the modem. Either contact the receive site by making the necessary call, or wait to be contacted. After the receive site reports that it is ready, activate the DATA button on the modem.

Depress the START key while holding down the CTRL key to begin transmission, unless the unattended Auto-Answer option has been selected, in which case transmission is not activated by depressing the START key. (Be sure all input and output devices are on-line before leaving an Auto-Answer terminal unattended.)

As each data block is transmitted, a keyboard tone will be heard. If a retry occurs (i.e., if a record must be retransmitted), there will be a temporary pause in the keyboard tones, and the retry counter (shown in Figure 5-2) will increment. When the last record has been transmitted, the letter T will appear in the d position after the word MODE: (shown in Figure 5-2).

If the receive terminal is using tape as an output device, the transmit terminal may temporarily stop transmitting records (without retries) and a keyboard tone will occur consistently every half second. This condition occurs when additional tapes must be prepared at the receive terminal in order to receive the remainder of the file (WACK communication control character).

Refer to Table 5-5 for those keys which may be depressed when transmission ceases.

Mini-Tape Summary Display

When the G key is depressed in reply to Operator's Display, the mini-tape summary display shown in Figure 5-7 will appear.

Mini-Tape Summary Display (cont'd)

```
(A) BAUD RATE
(015) RETRIES      (064) IN SIZE

INPUT DEVICE ADDRESSES
XXX-XXX-XXX-XXX-XXX-XXX
OUTPUT DEVICE ADDRESSES
XXX-XXX-XXX-XXX-XXX-XXX
```

Figure 5-7. Summary Display: Mini-Tape

Figure 5-7 is interpreted as follows:

BAUD RATE may be letters A, B, C, D, or E within the parentheses, explained as:

- A. clocked modem (i.e., external clock)
- B. non-clocked modem at 600 baud
- C. non-clocked modem at 900 baud
- D. non-clocked modem at 1200 baud
- E. non-clocked modem at 1800 baud

RETRIES (retransmission limit) is the number indicated within the parentheses, from 003 to 255.

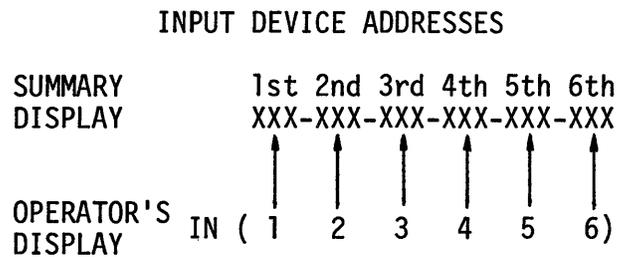
IN SIZE (input record size) is the number indicated within the parentheses, from 001 to 136 bytes.

INPUT DEVICE ADDRESSES indicate the order in which tape decks will be accessed for transmission, if on-line.

As indicated below, the device numbers entered when this customized SQUIC Program tape was generated determine which tape deck will be accessed first, second, third, etc. The input device addresses which appear below as three digits (XXX) indicates which tape deck applies to the Operator's Display (Figure 5-2) in the upper right corner, as illustrated below:

Mini-Tape Summary Display (cont'd)

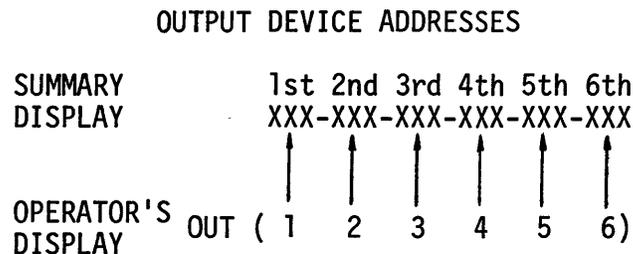
As indicated below, the device numbers entered when this customized SQUIC Program tape was generated determine which tape deck will be accessed first, second, third, etc. The input device addresses which appear below as three digits (XXX) indicates which tape deck applies to the Operator's Display (Figure 5-2) in the upper right corner, as illustrated below:



An input device address of 101 corresponds with tape deck 1, 102 with deck 2, 103 with deck 3, 104 with deck 4, 105 with deck 5, 106 with deck 6, 107 with deck 7, and 110 with deck 8. For example, if the input device addresses in the summary display appeared on the screen as 102-103-104-000-000-000, deck 2 would be accessed first, deck 3 would be accessed second, and deck 4 accessed third (if the tape decks were on-line).

OUTPUT DEVICE ADDRESSES indicate the order in which tape decks will be accessed for reception, if on-line.

As indicated below, the device numbers entered when this customized SQUIC Program tape was generated determine which tape deck will be accessed first, second, third, etc. The output device addresses which appear below as three digits (XXX) indicate which tape deck applies to the Operator's Display (Figure 5-2) in the upper right corner, as illustrated below:



Mini-Tape Summary Display (cont'd)

An output device address of 101 corresponds with tape deck 1, 102 with deck 2, 103 with deck 3, 104 with deck 4, 105 with deck 5, 106 with deck 6, 107 with deck 7, and 110 corresponds with deck 8. For example, if the output device addresses appeared in the summary display as 102-104-103-000-000-000, deck 2 would be accessed first, deck 4 would be accessed second, and deck 3 would be accessed third (if the tape decks were on-line).

NOTE

When a SINGER Series 1500 Intelligent Terminal will communicate negative numbers or object programs, the data communicated must be transmitted in transparency.

Table 5-5. Mini-Tape Transmit Function Keys

Directions:

All keys must be depressed while the CTRL key is held down. Depress the keys in the order listed below. For example, if the T and A keys are necessary for this communication task, depress the T key before the A key. During transmission, if a line status of D should appear in the Operator's Display (Figure 5-6), the START, and EOJ keys are valid, as described below. The END FILE key must be depressed while the last tape is being transmitted, if activated for this file transmission.

Those keys indicated by an asterisk (*) may be depressed whenever communication is not presently occurring (i.e., either before or after this file is communicated).

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
G*	Brings to the screen the summary display (Figure 5-7) for operator verification. This display enables the operator to determine which tape decks are accessed during transmission, as defined when this program was generated. Also, see Figure 5-7 and the accompanying text.	Optional	Brings to the screen the summary display (Figure 5-7) for operator verification.	Depress the G key again to obtain Operator's Display.
I*	Immediately rewinds all input tape decks.	Optional Utility	No change.	
REL*	Reads current input tape to next End of File (EOF) mark.	Optional Utility	No change.	

(cont'd)

Table 5-5. Mini-Tape Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
SKIP*	Advances input tape one record and increments T-counter. The bypassed record is not transmitted.	Optional Utility	The T-Counter on Operator's Display is incremented by one.	
BKSP* RECORD	Backspaces input tape one record	Optional Utility	The T-Counter on the Operator's Display is decremented by one.	
R*	Rewinds all input tape decks when the transmission ends.	Optional Utility	An R appears after the word MODE (position f).	Depress the R key again.
T*	Enables EBCDIC transparency	Optional	T appears after the word MODE (position a).	Depress the T key again.
D	Implements inter-block delay. Refer to <u>Delay Option</u> above.	Conditional	D appears after the word MODE (position g), and will automatically disappear when delay factor reaches fixed value.	Depress the D key again, or depress the S key to reinitialize delay (the S key may disconnect line).
END FILE	Indicates multiple tape input, which allows two or more tape reels to be transmitted from the same tape deck. END FILE is necessary only when the number of input tapes is greater than the number of available input tape decks.	Optional	An M appears after the word MODE (position b). This <u>must</u> be erased before the transmission ends, by depressing the END FILE key (again) <u>while</u> the last tape is being transmitted.	Depress the END FILE key again. Valid if D appears in line status position during transmission.

(cont'd)

Table 5-5. Mini-Tape Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
A*	Enters terminal into Automatic-Answer mode.	Optional	An A will appear after the word MODE (position c).	Depress the A key again.
START	Begins transmission. START must not be depressed if this terminal is in the Auto-Answer mode.	Required	T or R appears within the parentheses after the word START at transmit and receive terminal, respectively.	Depress the EOJ key to abort transmission.
EOJ	Aborts transmission, does not disconnect line.	Error Recovery (During Transmission)	An A appears in the line status position. T or R appears after the word MODE (position d) if the EOJ key was depressed at this terminal (T) or at the other terminal (R), respectively.	Depress the C key.
B*	Transmits a continuous keyboard tone, which indicates the Talk mode should be activated by both transmit and receive sites.	Conditional (After Completion)	T or R will appear after the word MODE (position e), if the B key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress either the B or C key.

(cont'd)

Table 5-5. Mini-Tape Transmit Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
S*	<u>Disconnects line</u> if the modem is in the DATA or Auto-Answer modes. Line remains connected if depressed while modem is in Talk mode. Also, reinitializes interblock delay, and restarts program.	Conditional (After Completion)	No Change.	
C*	Clears Operator's Display: may be used after each file is transmitted.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d, e, and f.	
HOM*	Applies only to disc-resident program storage (as opposed to tape-resident program storage). Enables a different program to be loaded into memory.		Causes the disc library Menu (Disc Menu) to appear.	

RECEPTION

Reception may be accomplished by preparing the necessary output device(s), write-enabling the output device(s), and waiting for the transmitting site to begin transmission. Operational procedures differ for each output storage device.

Disc Reception

Switch the power ON for the following:

- the SINGER Series 1500 Intelligent Terminal housing disc storage;
- modem; and
- any other communications equipment to be used.

Make sure the line equipment is ready. Check the telephone for a dial tone.

NOTE

All files received will be written to Unit zero (\emptyset), which is in the first on-line disc drive. With the Model 1540 Disc Drive, Unit zero is the disc in the first on-line disc drive. With the SINGER Model 1543, Unit zero is the removable disc in the first on-line disc drive. All files are received as Sequential files. The File Copy Disc Utility Program may be used to re-load a Sequential file as an Indexed Sequential file using the disc-to-disc copy functions, or to transfer files to different on-line discs, using the disc-to-disc copy function.

Disc Reception (cont'd)

Depress the red write PROTECT switchlight on the first on-line disc drive (SINGER Model 1543 Disc Drives only) if it is illuminated before attempting to receive or purge any files. After the READY light illuminates (on the SINGER Model 1543 Disc Drive only), insert the appropriate customized SQUIC Program tape into deck 2 (tape-resident programs only). Load the program. The following will appear on the screen:

```
**XXXXX** 7XXXX-XX IN: (123456)
START:( ) DISC:( ) OUT: (123456)
MODE: / / / / / / REPLY: (000)
T:(00000) R:(00000) STATUS:-----
```

Figure 5-8. Operator's Display: Disc

At this time the selection of options should be accomplished by depressing the necessary function keys, while holding down the CTRL key. Refer to Table 5-6 for the function keys which may be used. (Table 5-6 should also be referenced frequently to ensure, by verification on the screen, that the proper keys have been depressed.)

When receiving a series of disc files, the X key must be depressed and a new RECEIVE FILE NAME entered after each file is received. This avoids duplicate file names which result in a 102 disc error status code. When the X key is depressed, the disc file names display, shown in Figure 5-9, will appear.

```
TRANSMIT FILE NAME
( _ )
RECEIVE FILE NAME
( )
```

Figure 5-9. Disc File Names Display

Disc Reception (cont'd)

The following function keys are applicable to the disc file names display:

- the DUP key moves the cursor one character to the right;
- the CORR key moves the cursor one character to the left;
- the SKIP key, if depressed when the cursor is at the first position of a field, enters the default FILE NAME into that field. This FIELD NAME was assigned when the customized program was generated;
- the SKIP key, if depressed when the cursor is not at the first position of a field, places blanks in the remainder of the field and moves the cursor to the first position of the next field;
- the BKSP FIELD key moves the cursor to the first position of the current field. If depressed again, or if the cursor is presently at the first position of a field, the cursor will move to the first position of the previous field; and
- the REL key returns the Operator's Display to the screen after the FILE NAMES have been entered.
- instead of depressing the REL key to obtain the Operator's Display, the CTRL/REL keys may be depressed to activate the collective disc-file-receive option. Deactivation procedures, however, must be carefully obeyed as explained under the heading Collective Disc File Receive Option, below.

Enter the TRANSMIT FILE NAME and the RECEIVE FILE NAME in 24 characters or less. Any displayable characters are valid, but the first position must not contain a blank. With unattended Auto-Answer terminals, the receive file name must be 20 characters or less. This is because the last three characters (i.e., positions 22, 23, and 24) contain a counter which is incremented after each file is received. This avoids duplicate file names.

Depress the REL key to obtain the Operator's Display (shown in Figure 5-2). Check the display to verify that the correct selections have been made.

Check the storage device to verify that it is ready. Activate the TALK button on the modem. Either wait to be contacted by the transmit site, or contact the transmit site by making the necessary call. After the transmit site reports it is ready, activate the DATA button on the modem.

As each record is received, a series of keyboard tones will be heard. If a retry occurs (i.e., if a record must be retransmitted), there will be a temporary pause in the keyboard tones, and the retry counter (as shown in Figure 5-2) will increment. When the last record has been received, an R will appear in the d position after the word: MODE (as shown in Figure 5-2).

Disc Reception (cont'd)

If the transmit terminal is using tape as an input device, the receive terminal may stop receiving records and a keyboard tone will occur consistently every half second. This condition occurs when additional tapes must be placed on-line in order to transmit the remainder of this file at the transmit terminal (TTD communication control character).

Refer to Table 5-6 for those keys which may be depressed after reception ceases.

Collective Disc-File-Receive Option

For disc receive operations SQUIC provides the option of receiving any number of data files and writing the multiple-file data as one file in disc storage. Thus, all data received during the time the collective disc-file-receive option remains activated is identified by one file name (the RECEIVE FILE NAME).

NOTE

References to CTRL/X, CTRL/REL, etc., indicate that the CTRL key must be held down while the X key, REL key, etc., is depressed.

The collective disc-file-receive option is activated by performing the following after loading the program:

1. Depress the CTRL/X keys, or the CTRL/P keys to initiate disc operation.
2. Enter the appropriate file names in reply to the disc file names display (see Figure 5-9).
3. Depress the CTRL/REL keys to activate the collective file receive option, the Operator's Display returns to the screen (instead of depressing the REL key).

To deactivate the collective disc-file-receive option, and receive and write data files to maxi-tape only (or use other programs), depress the CTRL/S keys or reload the program.

Collective Disc-File-Receive Option (cont'd)

To deactivate the collective disc-file-receive option, and receive and write data to disc storage as individual disc files, perform the following steps:

1. Depress the CTRL/X keys.
2. Enter a different RECEIVE FILE NAME.
3. Depress the REL to obtain the Operator's Display.

If a 102 disc error code status occurs after depressing CTRL/REL, the operator must determine whether the existing file is to be added to, or if the name entered is erroneous (see CTRL/F in Table 5-6).

Table 5-6. Disc Receive Function Keys

Directions:

All keys must be depressed while the CTRL key is held down. Depress the keys in the order listed below. For example, if the X and A keys are necessary for this communication task, the A key must be depressed before the X key. Those keys indicated by an asterisk (*) may be depressed whenever communication is not presently occurring (i.e., either before or after this file is communicated). When receiving a series of disc files, the X key must be depressed after each file and a different RECEIVE FILE NAME entered, unless the previously-received file has been purged, or the collective disc-file-receive option is activated. This avoids duplicate file names which result in a 102 disc error status code.

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
A*	Enters terminal into Automatic-Answer mode.	Optional	An A appears after the word MODE (position c).	Depress the A key again.
X*	Enables disc as output device instead of maxi-tape; enables entry of disc file names.	Required	Causes file names display to appear (Figure 5-9), which enables entry of transmit and receive file names. See Figure 5-9 and the accompanying text for operation of this display. When the Operator's Display reappears, an X will appear in the parentheses after the word DISC.	Depress the S key if disc storage will not be used.

(cont'd)

Table 5-6. Disc Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
F*	Enables operator to verify current transmit and receive file names. May also be depressed before the X key is depressed.	Optional	Brings to the screen the current transmit and receive file names.	Depress the F key again to obtain the Operator's Display, or the X key to change current file names.
L	Displays data characters as they are received.	Optional (After Reception Begins)	Removes Operator's Display (Figure 5-8); displays data characters as they are received. These EBCDIC characters may not be intelligible.	Depress the L key again to obtain Operator's Display.
EOJ	Aborts transmission; does not disconnect line	Error Recovery (During Reception)	An A appears in the line status position. T or R appears after the word MODE (position d), if the EOJ key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress the C key.

(cont'd)

Table 5-6. Disc Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
P*	Used to purge (erase) a disc file (e.g., a partially-received disc file) so the same file names may be used, without encountering a 102 disc error status.	Conditional (After Completion)	Causes file names display (Figure 5-9) to appear. Enter the correct receive file name to be purged. Depress the SKIP key to remove the cursor and the REL key to purge the file and obtain the Operator's Display. Check the disc error status to ensure the file was purged.	
B*	Transmits continuous keyboard tone, which indicates the Talk mode should be activated by both receive and transmit sites.	Conditional (After Completion)	T or R appears after the word MODE (position e), if the B key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress either the B or C key.
S*	<u>Disconnects line</u> if that modem is in the Data or Auto-Answer modes. Line remains connected if depressed while modem is in Talk mode. Also enables maxi-tape as output device, reinitializes interblock delay, restarts program.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d, e, and f.	

(cont'd)

Table 5-6. Disc Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
C*	Clears Operator's Display; may be used after each file is received.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d, e, and f.	
HOM*	Applies only to disc-resident program storage (as opposed to tape-resident program storage). Enables a different program to be loaded into memory.		Causes the disc library Menu (Disc Menu) to appear.	

Maxi-Tape Reception

Switch the power ON for the following:

- the SINGER Series 1500 Intelligent Terminal to be used;
- maxi-tape drives;
- modem; and
- any other communications equipment to be used.

Make sure the line equipment is ready. Check the telephone for a dial tone.

NOTE

A SINGER Model 1511 Maxi-Tape Drive (7-track) must not be used to store data in EBCDIC and ASCII character codes, or any other 8-bit character code.

Maxi-Tape Reception (cont'd)

Mount the blank (scratch) maxi-tape reel(s) on the proper tape drive(s). Make sure the write ring is inserted in the back of each reel to be written to. Advance the tape(s) to the load point. Depress the ON LINE switchlight for each maxi-tape drive to be used.

Insert the appropriate customized SQUIC Program tape into deck 2 (tape-resident programs). Load the program. The display shown in Figure 5-10 will appear on the screen:

```
***XXXXX** 7XXXX-XX IN: (123456)
START:( ) DISC:( ) OUT: (123456)
MODE: / / / / / / RETRY: (000)
T:(00000) R:(00000) STATUS:-----
```

Figure 5-10. Operator's Display: Maxi-Tape

At this time the selection of options should be accomplished by depressing the necessary function keys, while holding down the CTRL key. Refer to Table 5-7 for the function keys which may be used. (Table 5-7 should also be referenced frequently to ensure, by verification on the screen, that the proper keys have been depressed.)

Check the display to verify that the correct selections have been made. Check the storage devices to verify that they are on-line and ready.

Activate the TALK button on the modem. Either wait to be contacted by the transmit site, or contact the transmit site by making the necessary call. After the transmit site reports it is ready, activate the DATA button on the modem.

As each record is received, a series of keyboard tones will be heard. If a retry occurs (i.e., if a record must be retransmitted) there will be a temporary pause in the keyboard tones, and the retry counter (as shown in Figure 5-2) will increment. When the last record has been received, an R will appear in the d position after the word MODE: (as shown in Figure 5-2).

If the transmit terminal is using tape as an input device, the receive terminal may stop receiving records and a keyboard tone will occur consistently every half second. This condition occurs when additional tapes must be placed on-line in order to transmit the remainder of this file at the transmit terminal (TTD communication control character).

Refer to Table 5-7 for those keys which may be depressed after reception ceases.

Table 5-7. Maxi-Tape Receive Function Keys

Directions:

All keys must be depressed while the CTRL key is held down. Depress the keys in the order listed below. For example, if the O and A keys are necessary for this communication task, the A key must be depressed before reception begins, and the O key must be depressed after the entire file has been received. During reception, if a line status of W should appear on the screen, START and EOJ keys are valid, as described below. Those keys indicated by an asterisk (*) may be depressed whenever communication is not presently occurring (i.e., either before or after this file is communicated).

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
A*	Enters terminal into the Automatic-Answer mode.	Optional	An A appears after the word MODE (position c).	Depress the A key again.
L	Displays data characters as they are received.	Optional (During Reception)	Removes Operator's Display; displays data character as they are received. These EBCDIC characters may not be intelligible.	Depress the L key again to obtain Operator's Display.
EOJ	Aborts transmission, does not disconnect line.	Error Recovery (During Reception)	An A appears in the line status position. T or R appears after the word MODE (position d) if the EOJ key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress the C key.

(cont'd)

Table 5-7. Maxi-Tape Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
O*	Writes End of File (EOF) mark, and rewinds output maxi-tape drives with interlock (i.e., tape is positioned at Load point, off-line).	Optional Utility (After Completion)	Tape output numbers on the Operator's Display will not be underscored.	
B*	Transmits continuous keyboard tone, which indicates the Talk mode should be activated by both receive and transmit sites.	Conditional (After Completion)	T or R will appear after the word MODE (position e), if the B key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress either the B or C key.
S*	<u>Disconnects line</u> if the modem is in the Data or Auto-Answer modes. Line remains connected if depressed while modem is in Talk mode. Also enables maxi-tape as output device, reinitializes interblock delay, restarts program.	Conditional (After Completion)	Removes X after DISC, which enables maxi-tape as output device.	

(cont'd)

Table 5-7. Maxi-Tape Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
C*	Clears Operator's Display, may be used after each file is received.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d, and e (and f if disc).	
HOM*	Applies only to disc-resident program storage (as opposed to tape-resident program storage). Enables a different program to be loaded into memory.		Causes the disc library Menu (Disc Menu) to appear.	

Mini-Tape Reception

Switch the power ON for the following:

- the SINGER Series 1500 Intelligent Terminal to be used;
- modem; and
- any other communication equipment to be used.

Make sure the line equipment is ready. Check the telephone for a dial tone.

Mini-Tape Reception (cont'd)

Insert the appropriate customized SQUIC Program tape into deck 2 (tape-resident programs). Load the program. The display shown in Figure 5-11 will appear on the screen.

```
  **XXXXX** 7XXXX-XX IN: (123456)
  START:( ) ==MINI== OUT: (123456)
  MODE: / / / / / /  RETRY: (000)
  T:(00000) R:(00000) STATUS:-----
```

Figure 5-11. Operator's Display: Mini-Tape

When the program rewinds, remove the program tape from deck 2.

At this time the selection of options should be accomplished by depressing the necessary function keys, while holding down the CTRL key. Refer to Table 5-8 for the function keys which may be used. (Table 5-8 should be referenced frequently to ensure, by verification on the screen, that the proper keys have been depressed.)

Insert a blank scratch tape into the tape deck defined as the first on-line output tape deck when this customized SQUIC Program was generated.

It is important to verify that the tape cartridge is on-line by checking for the cursor on the display (i.e., TAPE OUTPUT in Figure 5-2). It is also important to label all tape volumes.

Check the display to verify that the correct selections have been made. Check the storage devices to verify that they are on-line and ready.

Depress the TALK button on the modem. Either wait to be contacted by the transmit site, or contact the transmit site by making the necessary call. After the transmit site reports it is ready, depress the DATA button on the modem.

As each record is received, a keyboard tone will be heard. If a retry occurs (i.e., if a record must be retransmitted), there will be a temporary pause in the keyboard tones, and the retry counter (as shown in Figure 5-2) will increment. When the last record has been received, an R will appear in the d position after the word MODE: (as shown in Figure 5-2).

If the transmit terminal is using tape as an input device, the receive terminal may stop receiving records and a keyboard tone will occur consistently every half second. This condition occurs when additional tapes must be placed on-line in order to transmit the remainder of this file at the transmit terminal (TTD communication control character).

Table 5-8. Mini-Tape Receive Function Keys

Directions:

All keys must be depressed while the CTRL key is held down. Depress the keys in the order listed below. For example, if the O and A keys are necessary for this communication task, depress the A key before reception begins, and the O key after the entire file has been received. During reception if a line status of W should appear on the screen, the START and EOJ keys are valid, as described below. Those keys indicated by an asterisk (*) may be depressed whenever communication is not presently occurring (i.e., either before or after this file is communicated).

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
G*	Brings to the screen the summary display (Figure 5-6) for operator verification. This display enables the operator to determine which tape decks are accessed during reception, as defined when this program was generated. Also see Figure 5-6 and the accompanying text.	Optional	Brings to the screen the summary display (Figure 5-6) for operator verification.	Depress the G key again to obtain Operator's Display.
A*	Enters terminal into Automatic-Answer mode.	Optional	An A appears after the word MODE (position c).	Depress the A key again.
L	Displays data characters as they are received.	Optional (During Reception)	Removes Operator's Display; displays data characters as they are received.	Depress the L key again to obtain Operator's Display.

(cont'd)

Table 5-8. Mini-Tape Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
EOJ	Aborts transmission, does not disconnect line.	Error Recovery (during reception)	An A appears in the line status position A. T or R appears after the word MODE (position d), if the EOJ was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress the C key.
O*	Writes End of File (EOF) mark, and rewinds output mini-tape decks.	Optional Utility (After Completion)		
B*	Transmits continuous keyboard tone, which indicates the Talk mode should be activated by both receive and transmit sites.	Conditional (After Completion)	A T or R will appear after the word MODE (position e), if the B key was depressed at this terminal (T), or at the other terminal (R), respectively.	Depress either the B or C key.
S*	<u>Disconnects line if the modem is in the Data or Auto-Answer modes.</u> Line remains connected if depressed while modem is in Talk mode. Also, reinitializes inter-block delay, and restart program.	Conditional (After Completion)	No Change.	

(cont'd)

Table 5-8. Mini-Tape Receive Function Keys (cont'd)

<u>KEY</u>	<u>FUNCTION</u>	<u>TYPE OF KEY</u>	<u>DISPLAY APPEARANCE</u>	<u>TO ERASE</u>
C*	Clears Operator's Display; may be used after each file is received.	Recommended (After Completion)	Clears status, T-counter, R-counter, retries counter, and MODE positions d, e, and f.	
HOM*	Applies only to disc-resident program storage (as opposed to tape-resident program storage). Enables a different program to be loaded into memory.		Causes the disc library Menu (Disc Menu) to appear.	

SECTION VI

UNATTENDED AUTOMATIC-ANSWER OPERATION

INTRODUCTION

At least one of the terminals used for communication must be attended. The unattended Automatic-Answer terminal may transmit only one file, and receive up to two files, per telephone call. The unattended (Auto-Answer) terminal is completely controlled by the actions of the attended terminal's operator, unless required input or output devices are not on-line and ready.

The unattended terminal must have the input and output devices to be used on-line and ready before the operator leaves the terminal. Also the modem must be placed in the Auto-Answer mode. If the unattended terminal is not powered ON, any incoming telephone calls will not be answered. For unattended Auto-Answer terminals using maxi-tape or disc as a storage device, if the unattended terminal is ready, but the storage devices are not ready, any incoming telephone calls will be answered but no data will be communicated. When the attended terminal operator calls the unattended Automatic-Answer terminal, a high-pitched tone indicates the unattended terminal has answered. The attended terminal operator should activate the DATA button.

Only the six sequences of file transmissions can occur, as viewed from the attended terminal. These sequences are listed in Table 6-1.

Table 6-1. Attended Terminal Transmission Sequences

1. T1, 20, LD
2. T1, T2, LD
3. T1, R1, 20, LD
4. T1, R1, T2, LD
5. 20, R1, 20, LD
6. 20, R1, T1, LD

Listed in the above box are the six possible file combinations for SQUIC Automatic-Answer communications for each telephone call, from the viewpoint of the attended terminal's operator. The symbols used are interpreted as follows:

- T1 - the first file transmitted by the attended terminal
- T2 - the second file transmitted by the attended terminal
- R1 - the first and only file received by the attended terminal
- 20 - indicates 20 seconds elapse without the attended terminal transmitting a file
- LD - line disconnect occurs

OPERATION: ATTENDED TERMINAL

The attended terminal has the responsibility of initiating transmission at the appropriate time by depressing the CTRL/START keys. As summarized in Table 6-1, only six possible transmission sequences are possible if the unattended Auto-Answer terminal has a file to transmit. Transmission must be initiated (CTRL/START) within 20 seconds after a file was received or the line will disconnect. In addition, if transmission is not initiated (CTRL/START) within 20 seconds after the telephone is answered by the unattended Auto-Answer terminal (1) the line will disconnect if the unattended terminal does not have a file to transmit, or (2) a file transmission will begin from the unattended terminal. Additional telephone calls may be necessary for the attended terminal to transmit more than two files or receive more than one file.

OPERATION: UNATTENDED TERMINAL DISC STORAGE

When using disc storage in unattended Automatic-Answer operation, each file is identified by a file name. Before leaving the unattended terminal, the operator must enter a transmit file name and a receive file name by depressing the X key. The last three positions of the receive file name (positions 22, 23, and 24) will contain a counter beginning with 000, then 001, 002, etc. A counter number occupies positions 22, 23, and 24 of each receive file name; position 21 contains a blank. All disc files must reside on disc Unit zero (Ø).

The maximum number of files which may be contained on Unit Ø are subject to limitations in disc space available, or the number of files. Approximately 9,216 sectors are available for data storage on the disc Unit Ø. The VTOC Print/Display Disc Utility Program may be used to determine how many sectors are available, prior to loading the customized SQUIC Program tape. Files may be transferred to other discs by using the disc-to-disc copy function of the File Copy Disc Utility Program.

Disc Reception

After entering the desired receive file name and performing other necessary tasks, the operator leaves the terminal unattended. The first file received would be given the file name and the counter of 000, the second file received would have the same file name except the counter will be 001 instead of 000. After the operator returns to the unattended terminal, it is recommended that the VTOC Print/Display Disc Utility Program be executed to ascertain what files (if any) have been received and what their assigned file names are. The VTOC Print/Display Program, of course, must not be executed (i.e., loaded while transmission or reception is occurring).

Disc Transmission

Only one disc file may be transmitted during unattended Automatic-Answer operation. If the transmit file name is correctly entered, that disc file will be transmitted according to the sequences appearing in Table 6-1 for the first and subsequent callers. Subsequent callers who do not desire to receive the file intended for other callers may create a customized program in which no output devices are defined for the attended terminal.

OPERATION: UNATTENDED TERMINAL TAPE STORAGE

Because the terminal must operate without human intervention, only as many tape reels as there are defined maxi-tape drives may be used; and only as many tape cartridges as there are defined tape decks may be used. After each tape drive (or deck) has been accessed and the tape is exhausted, the drive (or deck) will be placed off-line. With mini-tape, an asterisk will replace the number of the tape deck in the Operator's Display when it is placed off-line by the program.

SECTION VII

SOURCE DATA PREPARATION

OVERVIEW

A possible danger exists when data is translated from one character code to another in non-transparent communication. Characters which are included in one code set may not be contained in another code set, and thus are invalid characters. In transparent communication, however, character code translation does not occur.

When data is communicated in non-transparency, two code translations may occur, as illustrated in Figure 7-1 and Figure 7-2. The first translation occurs (if the input code is not EBCDIC) when translating from the input code to the line code (EBCDIC). The second translation occurs (if the output code is not EBCDIC) when translating from the line code (EBCDIC) to the output code. The SQUIC maxi-disc program generator provides translate tables for the codes shown in Figure 7-1. ASCII and EBCDIC codes are eight-bit codes, whereas 1500 and the various BCD codes are six-bit codes. It should be noted that processing operations (e.g., Disc Sort) done on SINGER Series 1500 Intelligent Terminals are not recommended for codes other than 1500 code.

NOTE

SQUIC handles 1500 code in translation as a six-bit code, using octal values between 000 and 077. However, negative numbers entered using Data Entry Software may contain octal values above 100, thereby necessitating the transmission of such data in transparency. Object programs must also be transmitted in transparency.

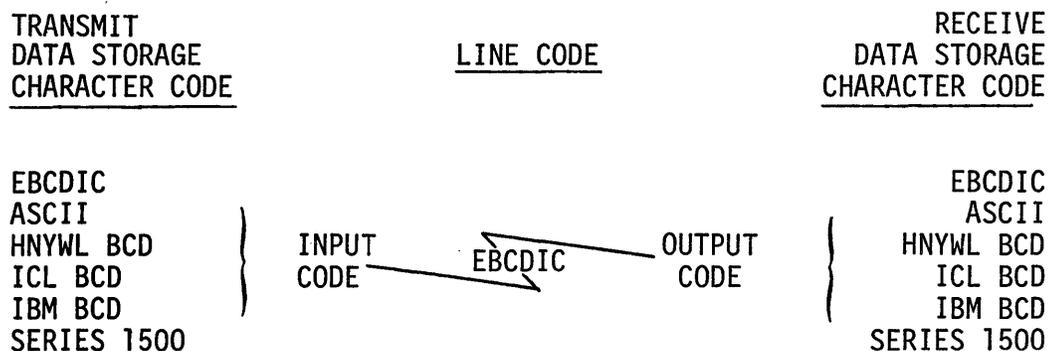


Figure 7-1. Character Code Translation

NON-TRANSPARENT SOURCE DATA

To determine if invalid characters are contained in source data, a knowledge of the input code and output code to be used for each specific communication task is a prerequisite. Character code translation occurs as shown in Figure 7-2.

Input Code to Line Code Translation

Character code translation will occur if the input character code is not EBCDIC. All input code characters other than lower-case letters which do not have equivalent EBCDIC characters will be changed to an at sign (@), EBCDIC code 174, after translation. For example, if data was prepared in ICL BCD code which contains an upward arrow character (↑), all arrow characters will be changed to an at sign (@) upon translation. Table 7-1 lists valid EBCDIC characters in the two left-most columns. The only 1500 character excluding negative numbers and object codes which will be changed to an at sign (@) after translation is a MINUS character (1500 code 052), which is generated by depressing the MINUS function key.

Line Code to Output Code Translation

Character code translation will occur if the output character code is not EBCDIC. Any output code characters which do not have equivalent EBCDIC characters will be changed to the characters indicated by an asterisk in Table 7-1 after translation. It is important to note that after translation to any output code other than ASCII (e.g., six-bit codes), lower-case letters will be changed to their upper-case equivalents.

NOTE

Graphic characters in EBCDIC include only octal values of 100 or above.

For 1500 output code translation from EBCDIC, all graphic characters are valid except for lower-case (EBCDIC) letters, which are changed to their upper-case (1500) equivalents. For IBM BCD output code translation from EBCDIC, all characters are valid excluding a colon (:), which is changed to an at sign (@); lower-case (EBCDIC) letters are changed to their upper-case (IBM BCD) equivalents.

For ICL BCD output code the following graphic characters are invalid, and are changed as shown in Table 7-1: cents sign (¢), vertical bar (|), logical not (¬); underscore hyphen (_), and lower-case letters. For Honeywell BCD output code, the following characters are invalid and are changed as shown in Table 7-1: at sign (@), vertical bar (|), and logical not (¬); lower-case EBCDIC letters are changed to their upper-case equivalents. For ASCII output code the following characters are invalid, and are changed as shown in Table 7-1: cents sign (¢) and vertical bar (|).

Data files may be copied with or without character code translation to or from disc storage and maxi-tape using the File Copy Disc Utility Program.

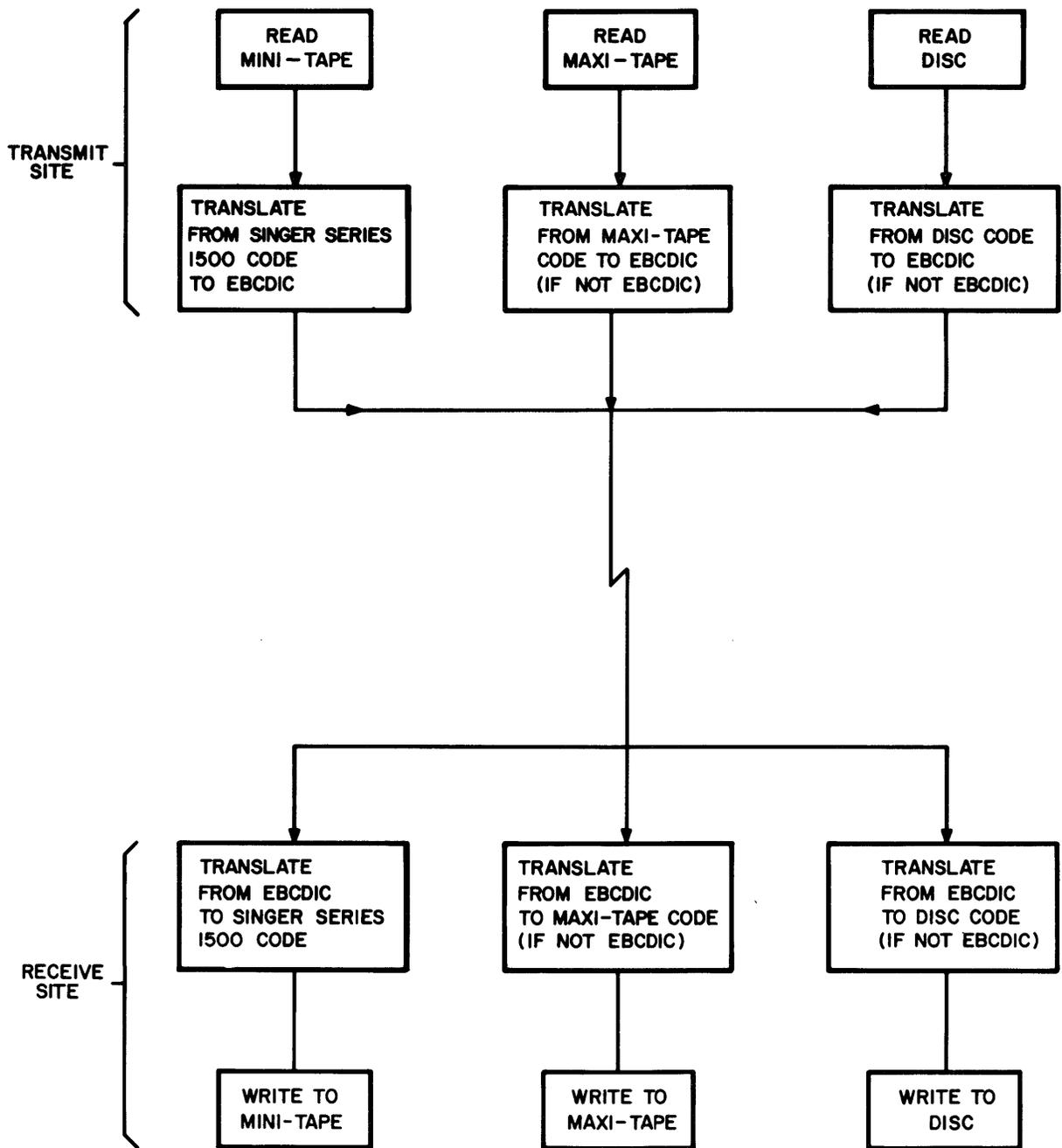


Figure 7-2. SQUIC Character Code Translation

TRANSPARENT SOURCE DATA

Transparent communication differs from non-transparent communication in one major respect: all possible bit combinations of data (256) are valid; and character code translation does not occur, as indicated in Figure 7-3. Non-transparent communication allows only valid graphic EBCDIC characters to be transmitted, because character code translation occurs. When transparency is selected by the transmit terminal's operator, graphically-displayable characters and all other possibilities are valid, including communication control characters and undefined bit-patterns. Transparency thus enables the communication of object-language (software) programs and routines, as well as other uses.

Data files may be copied with or without character code translation to or from disc storage and mini or maxi-tape using the File Copy Disc Utility Program. However, character code translation may, in some cases, be necessary at the receive site before the data received may be further processed.

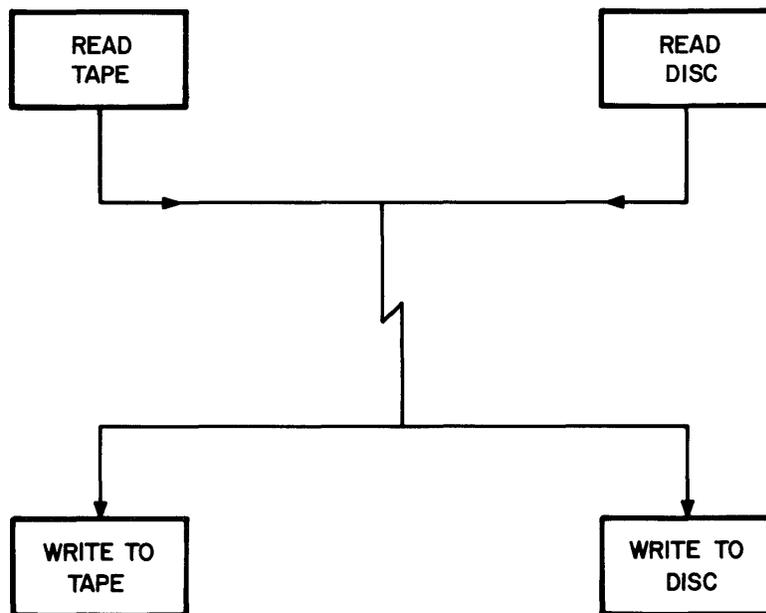


Figure 7-3. SQUIC Transparency

TAPE EOF MARKS

It may be necessary to know what and where to place the End-of-File (EOF) mark. The EOF mark is usually software-generated.

With mini-tape, the EOF mark is an octal 377, which is placed in the second byte of the label area associated with the record which follows the last record in the file (i.e., the second byte of the following record).

With maxi-tape, the person generating the customized program must specify whether an IBM-compatible or Honeywell-compatible EOF mark will be used. The IBM-compatible mark is also compatible with SINGER Series 1500 code for maxi-tape. For the 7-track Model 1511 Maxi-Tape Drive, an octal 017 is required. For any 9-track maxi-tape drive, an octal 023 is required. These EOF marks are placed as a one-byte record following the last record in the file. A one (1) EOF denotes the EOF mark for Honeywell-compatible systems. This EOF mark occupies the first four bytes of the 80-byte EOF record. The one (1) EOF is encoded in the character code used by the file, whereas the IBM-compatible EOF mark is always the aforementioned octal digits.

Table 7-1. Character Code List

<u>CHARACTER NAME</u>	<u>CH</u>	<u>EBCDIC</u>	<u>ASCII</u>	<u>HNYWL BCD</u>	<u>IBM BCD</u>	<u>ICL BCD</u>	<u>1500</u>
SPACE	SPACE	100	040	015	020	054	000
CENTS SIGN	¢	112	[*	076	072	]*	065
PERIOD	.	113	056	033	073	042	056
LESS THAN	<	114	074	060	074	060	057
OPEN PARENTHESIS	(	115	050	074	075	044	062
PLUS SIGN	+	116	053	020	076	047	002
VERTICAL BAR	|	117	]*	@*	077	*↑	077
AND SIGN	&	120	046	017	060	052	076
EXCLAMATION SIGN	!	132	041	057	052	055	070
DOLLAR SIGN	\$	133	044	053	053	000	054
ASTERISK	*	134	052	054	054	046	055
CLOSE PARENTHESIS	)	135	051	034	055	045	063
SEMI COLON	;	136	073	032	056	067	073
LOGICAL NOT	¬	137	136	@*	057	*←	075
HYPHEN	-	140	055	040	040	041	001
SLANT BAR	/	141	057	061	021	043	061
COMMA	,	153	054	073	033	053	047
PERCENT SIGN	%	154	045	035	034	051	053
UNDERSCORE	_	155	137	075	035	T*	074
GREATER THAN	>	156	076	016	036	062	060
QUESTION MARK	?	157	077	037	037	063	064
COLON	:	172	072	014	@*	066	072
NUMBER SIGN	#	173	043	052	013	057	050
AT SIGN	@	174	100	072	014	034	051
ACCENT SIGN	'	175	047	012	015	040	071
EQUAL SIGN	=	176	075	013	016	061	066
QUOTATION MARKS	"	177	042	055	017	056	067

(cont'd)

Table 7-1. Character Code List (cont'd)

<u>CHARACTER NAME</u>	<u>CH</u>	<u>EBCDIC</u>	<u>ASCII</u>	<u>HNYWL BCD</u>	<u>IBM BCD</u>	<u>ICL BCD</u>	<u>1500</u>
SMALL A	a	201	141	A	A	A	A
SMALL B	b	202	142	B	B	B	B
SMALL C	c	203	143	C	C	C	C
SMALL D	d	204	144	D	D	D	D
SMALL E	e	205	145	E	E	E	E
SMALL F	f	206	146	F	F	F	F
SMALL G	g	207	147	G	G	G	G
SMALL H	h	210	150	H	H	H	H
SMALL I	i	211	151	I	I	I	I
SMALL J	j	221	152	J	J	J	J
SMALL K	k	222	153	K	K	K	K
SMALL L	l	223	154	L	L	L	L
SMALL M	m	224	155	M	M	M	M
SMALL N	n	225	156	N	N	N	N
SMALL O	o	226	157	O	O	O	O
SMALL P	p	227	160	P	P	P	P
SMALL Q	q	230	161	Q	Q	Q	Q
SMALL R	r	231	162	R	R	R	R
SMALL S	s	242	163	S	S	S	S
SMALL T	t	243	164	T	T	T	T
SMALL U	u	244	165	U	U	U	U
SMALL V	v	245	166	V	V	V	V
SMALL W	w	246	167	W	W	W	W
SMALL X	x	247	170	X	X	X	X
SMALL Y	y	250	171	Y	Y	Y	Y
SMALL Z	z	251	172	Z	Z	Z	Z

(cont'd)

Table 7-1. Character Code List (cont'd)

<u>CHARACTER NAME</u>	<u>CH</u>	<u>EBCDIC</u>	<u>ASCII</u>	<u>HNYWL BCD</u>	<u>IBM BCD</u>	<u>ICL BCD</u>	<u>1500</u>
CAPITAL A	A	301	101	021	061	035	015
CAPITAL B	B	302	102	022	062	036	016
CAPITAL C	C	303	103	023	063	037	017
CAPITAL D	D	304	104	024	064	030	020
CAPITAL E	E	305	105	025	065	031	021
CAPITAL F	F	306	106	026	066	032	022
CAPITAL G	G	307	107	027	067	033	023
CAPITAL H	H	310	110	030	070	024	024
CAPITAL I	I	311	111	031	071	025	025
CAPITAL J	J	321	112	041	041	026	026
CAPITAL K	K	322	113	042	042	027	027
CAPITAL L	L	323	114	043	043	020	030
CAPITAL M	M	324	115	044	044	021	031
CAPITAL N	N	325	116	045	045	022	032
CAPITAL O	O	326	117	046	046	023	033
CAPITAL P	P	327	120	047	047	014	034
CAPITAL Q	Q	330	121	050	050	015	035
CAPITAL R	R	331	122	051	051	016	036
CAPITAL S	S	342	123	062	022	017	037
CAPITAL T	T	343	124	063	023	007	040
CAPITAL U	U	344	125	064	024	011	041
CAPITAL V	V	345	126	065	025	012	042
CAPITAL W	W	346	127	066	026	013	043
CAPITAL X	X	347	130	067	027	004	044
CAPITAL Y	Y	350	131	070	030	005	045
CAPITAL Z	Z	351	132	071	031	006	046
ZERO	Ø	360	060	000	012	074	003

(cont'd)

Table 7-1. Character Code List (cont'd)

<u>CHARACTER NAME</u>	<u>CH</u>	<u>EBCDIC</u>	<u>ASCII</u>	<u>HNYWL BCD</u>	<u>IBM BCD</u>	<u>ICL BCD</u>	<u>1500</u>
ONE	1	361	061	001	001	102	004
TWO	2	362	062	002	002	103	005
THREE	3	363	063	003	003	104	006
FOUR	4	364	064	004	004	070	007
FIVE	5	365	065	005	005	071	010
SIX	6	366	066	006	006	072	011
SEVEN	7	367	067	007	007	073	012
EIGHT	8	370	070	010	010	064	013
NINE	9	371	071	011	011	065	014

SECTION VIII

SQUIC DIALOGUE

OVERVIEW

SQUIC's unique dialogue allows an uninterrupted stream of data records which eliminates the frequency of line turnaround, and thus SQUIC's line throughput is extremely efficient. This cost-effective dialogue is made possible partially through the use of the secondary channel. When made inactive by the receive site, the inactive secondary channel indicates that the receive terminal has either encountered a line error, or must temporarily delay transmission to change tapes (i.e., WAK). Line blocks detected as erroneous by the receive terminal are retransmitted by the transmit terminal, after the receive terminal provides the block number requiring retransmission (line turnaround).

Communications control characters are used to control the data flow. In this manual, three letter characters (e.g., STX, CRC) are used to identify communication control characters, which perform such necessary tasks as: request a response from the receiver terminal, signify the beginning or ending of a data block, end transmission, and perform checking features.

When transmitting a data file there are three logical phases:

1. Establishing Communication;
2. Sending the Message; and
3. Terminating Communication.

Before discussing the three phases of transmission, the two control characters which occur in all three phases are explained as follows:

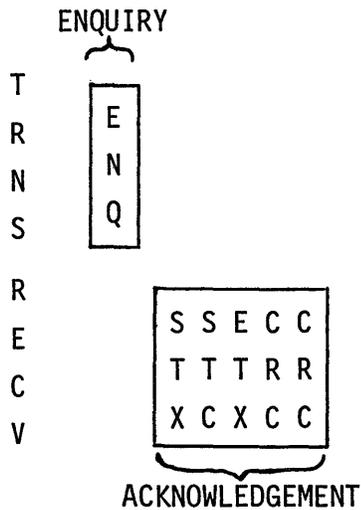
The first control character is the synchronization character, denoted vertically by the letters SYN. SYN control characters precede the transmission of other control characters, as well as control characters beginning a line block. This synchronization signal pattern enables the receiving terminal to align itself to the characters which follow the SYN characters, thus eliminating the possibility of the receiver interpreting the ending and beginning portion of two characters as one character (i.e., character phase). A series of seven SYN characters precede each line block or control character transmission.

The second control character is the PAD character, which indicates a line turnaround or the end of a line block or communication character. Line turnaround means that the terminal presently transmitting temporarily becomes the receiver, and the terminal presently receiving temporarily becomes the transmitter. A series of three PAD characters follow each line block or control character transmission.

ESTABLISHING COMMUNICATION

After contacting the receive site to verify that both the transmit and receive terminals are ready, the operator at the transmit terminal depresses the START key (CTRL/START), which initiates transmission. The procedure for establishing the communication line ("handshake") consists of two actions: the transmit terminal asks if it can transmit, and the receive terminal invites the other terminal to transmit, acknowledging its readiness to receive. The communications control characters used are shown in Figure 8-1.

Example: successful attempt to establish communication



Example: unsuccessful attempt to establish communication

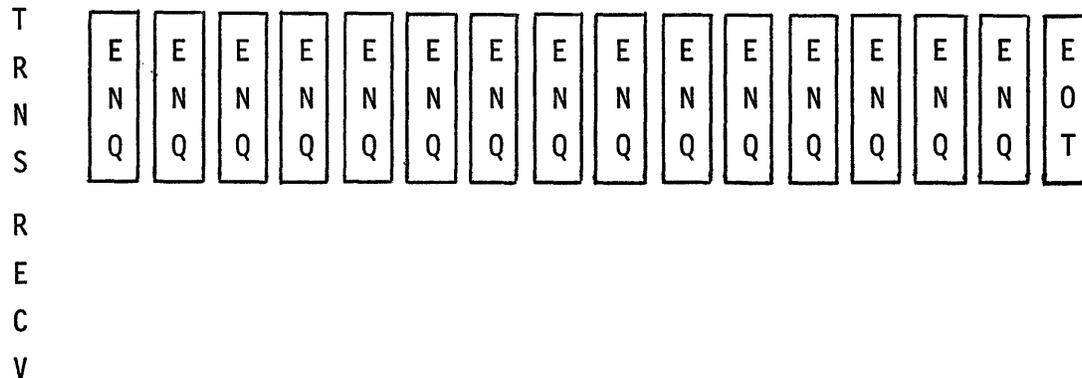


Figure 8-1. Establishing Communication Dialogue

ESTABLISHING COMMUNICATION (cont'd)

Figure 8-1 communication control characters are explained as follows:

Enquiry

The ENQ control character requests a response from the other terminal. In this case the response requested is an acknowledgement that the other terminal is ready to receive.

Acknowledgement

The STX control character, which precedes the STC character, indicates Start of Text.

The STC control character, which represents an octal number beginning with 200 that signifies the record count, indicates Sequential Text Counter.

The ETX control character, which follows the STC character in the acknowledgement block, indicates the End of Text.

The ETB character (indicating End of Transmission Block) or ETX character always precedes the two CRC characters.

Two bytes, represented by two CRC characters, follow any ETX or ETB control characters transmitted. The function of the CRC bytes is to indicate the product of the Cyclic Redundancy Check polynomial as calculated by the transmit terminal, which must exactly match the value calculated by the receive terminal. If the two values do not correspond, the secondary channel would be made inactive. The CRC calculation is initiated by the SOH (Start Of Heading) or STX characters, but does not include these characters. The CRC calculation is performed on all data characters following SOH or STX characters, including the ETX or ETB characters which terminate the calculation.

Should the transmit terminal not receive the initial response from the receive terminal, the transmit terminal will retransmit an ENQ every two seconds, until the maximum number of retries (RETRANSMISSION LIMIT) is reached, or the receive terminal responds to the ENQs. Figure 8-1 shows both the successful establishment of communication and an unsuccessful attempt to establish communication. In the unsuccessful attempt, an EOT follows the fifteenth ENQ for a retransmission limit of 15. The EOT indicates End Of Transmission.

NOTE

In the following examples of communication dialogue, the SYN and PAD characters are excluded for purposes of clarity.

SENDING THE MESSAGE

Line blocks will be sent when the transmit terminal has received a positive acknowledgement from the receive terminal, and the secondary channel is active.

The first block of data is transmitted, then the second block, etc., until one of the three situations listed below occurs:

1. 128 line blocks are transmitted;
2. the receive CRC calculations, or line block counter (STC), or receive register overflow indicate an error; and
3. the last record is sensed on input storage.

In case 2, the secondary channel is made inactive by the receive terminal, which causes the transmit terminal to respond with an ENQ. In cases 1 and 3, the STX, STC, ETX sequence is requested by the transmit terminal to obtain the status of the receive site.

Normal Data Transmission

Normal data communication is occurring when the secondary channel remains active. The transmission of data remains uninterrupted until the secondary channel goes inactive indicating an error, or after the 128th line block (or a multiple thereof) is sent. An example of normal data transmission appears in Figure 8-2. As illustrated in Figure 8-2, the line dialogue has just occurred. The SYN and PAD characters have been omitted for purposes of clarity.

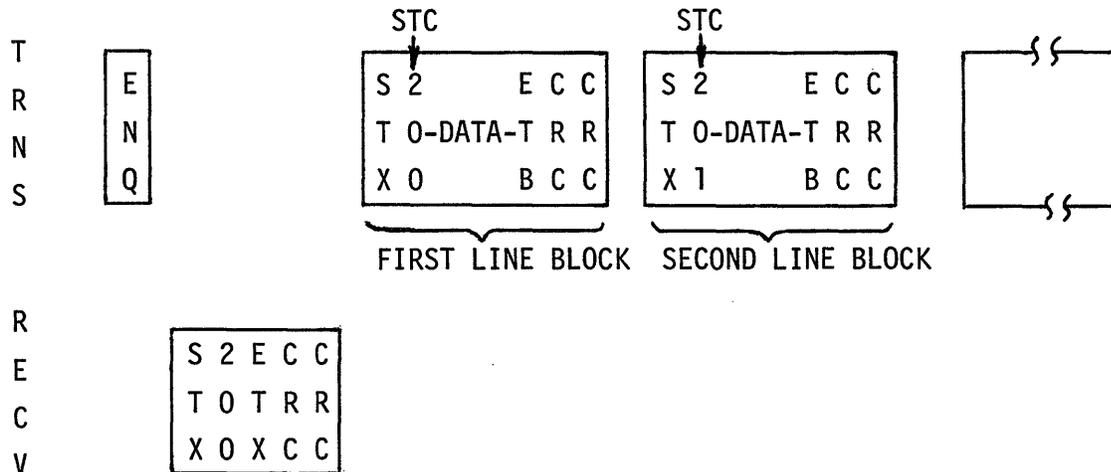


Figure 8-2. Normal Data Transmission

Normal Data Transmission (cont'd)

Note that in Figure 8-2 the STC character is replaced by the number it actually represents, which indicates the line block number being transmitted. The STC character is incremented as each successive line block is transmitted. Reference ESTABLISHING COMMUNICATION above for an explanation of the STX, STC, ETX, and CRC characters.

Data Compression (IGS Character)

When a line block of data is being transmitted, series of four or more like characters are grouped into a three character sequence. The first character is the character to be compressed. The second is the EBCDIC IGS (037₈) character. The third character is the number of characters to be compressed, added to a base of 200 octal. The maximum number of characters which may be compressed is 128 per IGS sequence. Strings of 132 or more like characters cause the use of two or more IGS sequences. Examples are:

$$130 \text{ } \emptyset\text{s} = \emptyset \begin{array}{c} \text{I } 3 \\ \text{G } 7 \emptyset \emptyset \\ \text{S } 7 \end{array}$$
$$200 \text{ } \emptyset\text{s} = \emptyset \begin{array}{c} \text{I } 3 \\ \text{G } 7 \emptyset \text{G } 0 \\ \text{S } 7 \quad \text{S } 7 \end{array}$$

Data Retransmission

If the receive terminal's CRC calculations reveal a value other than the transmitted CRC bytes, the receive terminal causes the secondary channel to be inactive. The transmit terminal will retransmit the erroneous line block requested by the receive terminal.

Similarly, if the receive terminal receives an STC line block count which is not the expected number (i.e., a block may have been missed), the receive terminal causes the secondary channel to be inactive. The transmit terminal will then retransmit the line block requested by the receive site, and continue sequentially to transmit the successive line blocks.

The transmit terminal checks the secondary channel after each data character is transmitted. Upon discovering the inactive secondary channel, the transmitter sends an ENQ character and allows the receive terminal to transmit the STC acknowledgement sequence to indicate the line block to be retransmitted. This is shown in Figure 8-3.

Data Retransmission (cont'd)

As illustrated in Figure 8-3, several data records have been previously transmitted and successfully received. The transmitter has just detected an inactive secondary channel while transmitting the line block identified as 206. The receiver wishes to receive line blocks beginning with 205.

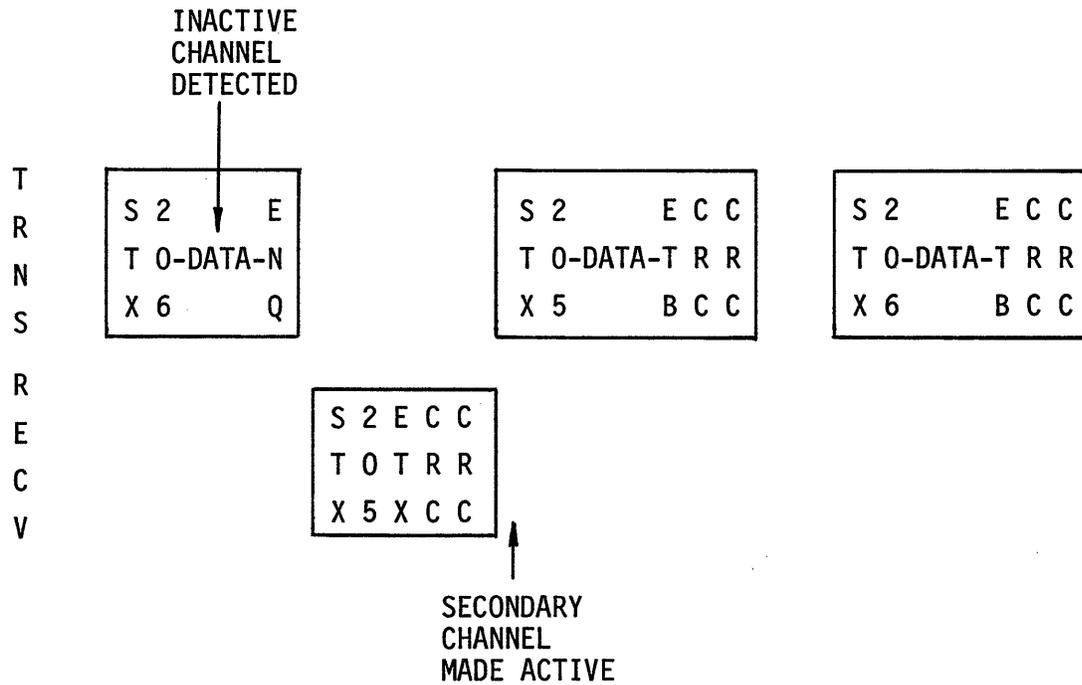


Figure 8-3. Data Retransmission

Transmission of line blocks 205, 206, etc., would then proceed as shown in Figure 8-2, Normal Data Transmission. Note that the ENQ character may appear anywhere within the data to ask the receive terminal, "You have an error; which line block should retransmission begin at?"

Receive Terminal Overflow

If data is received by the hardware faster than the output device can write the data, a register overflow condition may occur at the receive terminal. This overflow occurs within the hardware-software interface: the SINGER Model 1535 Synchronous Communication Adapter (SCA board). Upon detecting the overflow error, the receive terminal causes the secondary channel to be inactive. After enquiry, it responds with an SOH character replacing the STX character to inform the transmit terminal of the overflow condition: e.g., SOH, 205, ETX, CRC, CRC. The SOH character will increment the delay factor being used by the transmit terminal. The delay factor is further explained in SECTION V, Delay Option, Delay Factor.

Acknowledgement After 128 Line Blocks

A line turnaround for acknowledgement from the receiver occurs after 128 line blocks have been transmitted without a retry occurring. The secondary channel remains active throughout. As illustrated in Figure 8-4, the transmit terminal has just transmitted the 128th line block. The dialogue is similar to Figure 8-1, Establishing Communication. If the receive terminal is unable to acknowledge the STC=377 line block, the receive terminal will request retransmission for the erroneous block.

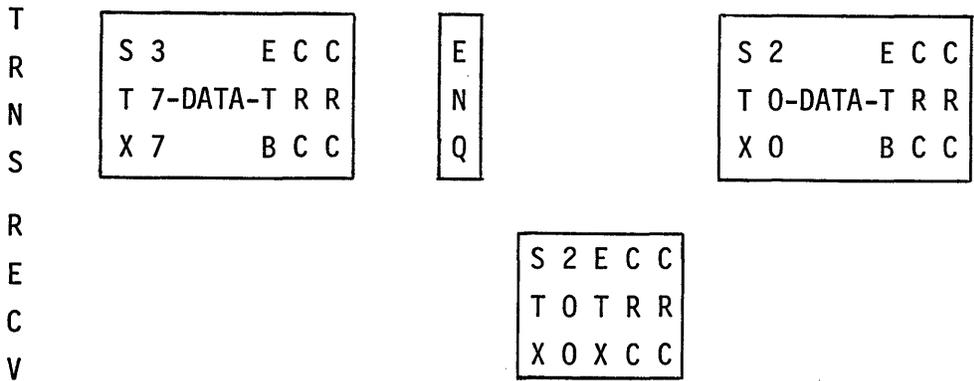


Figure 8-4. Acknowledgement After 128 Line Blocks

Temporary Delay Sequences

There are two types of temporary delay sequences: one is caused by a tape output delay at the receive site; the other is caused by a tape input delay at the transmit site.

Tape Output Temporary Delay (WAK)

When a STATUS condition occurs relating to output tape error, the temporary delay sequence is initiated. The cause of the STATUS condition might be, for instance, that an additional tape is required (see SECTION V, Table 5-1).

The receive terminal makes the secondary channel inactive when the status condition is sensed.

The transmit terminal sends an ENQ, to which the receive terminal responds with a WAK. The WAK control character indicates to the transmitter that it should wait for acknowledgement. The ENQ and WAK dialogue continues every one second until the proper tape drive (deck) is on-line. At this time the transmit terminal's ENQ is answered by an STX, STC, ETX sequence indicating which STC line block should be transmitted next, and the secondary channel is made active. Line dialogue then returns to normal data transmission sequences. The dialogue for the temporary delay sequence appears in Figure 8-5. Note that the WAK control character does not increment the number of retries.

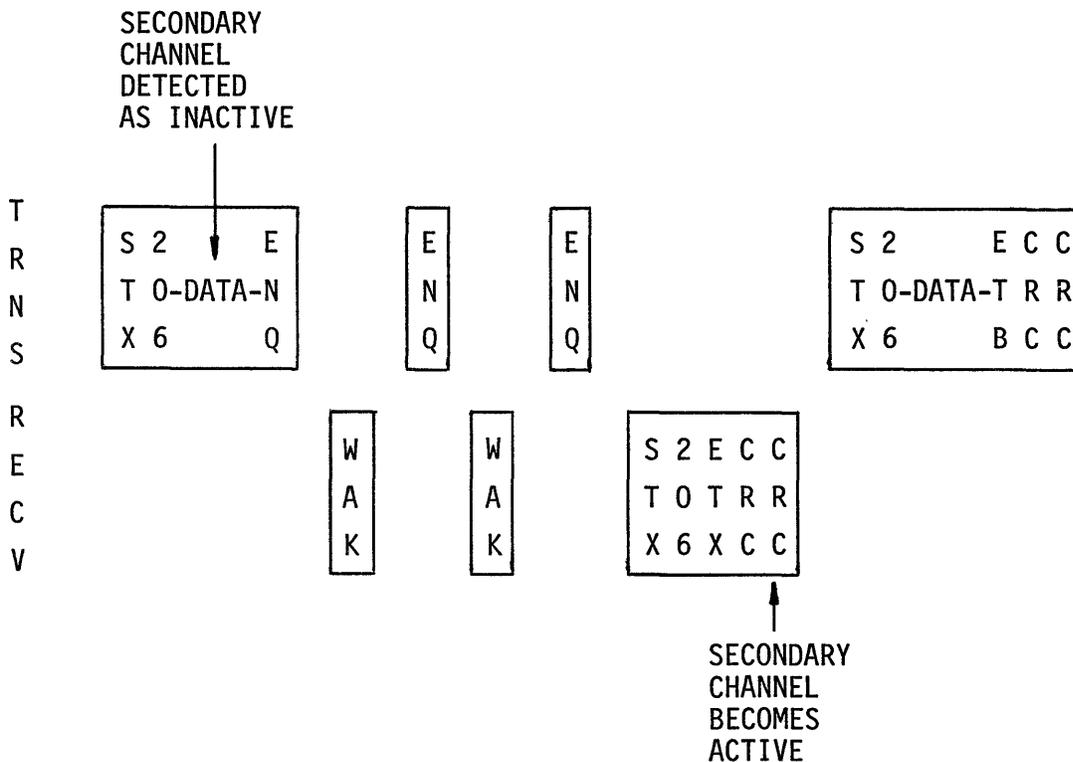


Figure 8-5. Temporary Output Delay Dialogue

Tape Input Temporary Delay (TTD)

There are two causes of temporary delay due to tape input. The first case is a multiple tape input where a delay is required while additional tapes are readied, which is referred to as Temporary Text Delay. The second case is when a line block must be retransmitted, which causes the input tape to back-up. In both cases the message sent by the transmitter prevents the receiver from aborting transmission due to inactivity time-out. Twenty seconds without line activity from the transmit terminal causes the receive terminal to abort the line.

As illustrated in Figure 8-6, the transmit terminal finishes sending line block 205, and senses the end of tape (end of volume). The transmit terminal then sends the STX ENQ (TTD) sequence until it is ready to transmit the first line block on the next input tape. The transmit terminal will then transmit the line block whose STC is 206 and transmission proceeds normally.

EBCDIC Transparency

As discussed in SECTION VII, the SQUIC system provides for the use of EBCDIC code transparency. Character code translation does not occur in transparent communication; thus, the data storage transmit code, line code, and the data storage receive code are all the same.

One advantage of transparent communication is that all possible bit combinations (256) may be transmitted. With mini-tape, only punctuation marks (EBCDIC codes 100 through 177), upper case letters, and numbers (EBCDIC codes 301 through 371) are allowed. With maxi-tape and disc, however, all EBCDIC codes above 100 are valid. This includes upper and lower case letters, punctuation marks, and numbers. When transmitting from mini-tape to any other storage device, lower case letters are not allowed. When transmitting from disc or maxi-tape where the receive is mini-tape, any lower case letters are translated to their upper case equivalents.

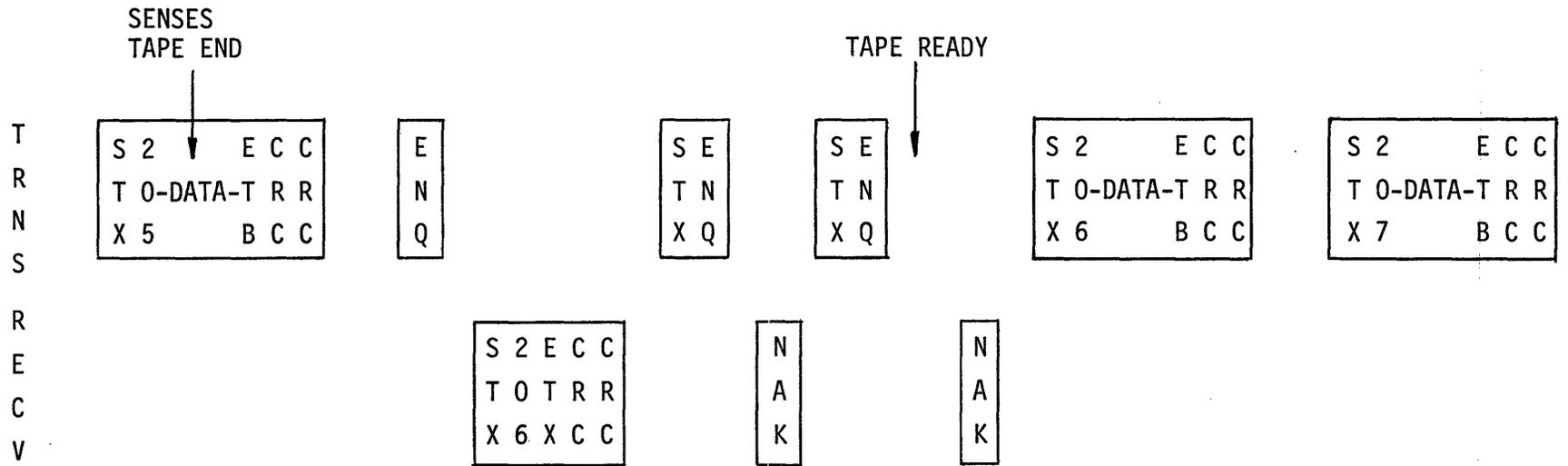


Figure 8-6. Temporary Input Delay Dialogue

EBCDIC Transparency (cont'd)

When the operator specifies transparency, all characters are valid. Thus, communication control characters may be transmitted as part of the text without special handling, with one exception as explained below:

A DLE (Data Link Escape, EBCDIC 020 octal) control character must precede any character in a two-character sequence which is meant to be interpreted as a control character. Should the transmit terminal desire to transmit a DLE character as data, two DLE characters must be transmitted. The first DLE character is discarded by the receive terminal; the second DLE character is processed as data. An example of a line block in the transparent mode is as follows:

```
D S S      D E C C
L T T-DATA-L T R R
E X C      E B C C
```

At the receive terminal, upon detecting a DLE, it is deleted from the data stream and is not included in the Cyclic Redundancy Check (CRC) accumulation.

If the next character is:

- a. another DLE character, it is treated as any other data character and included in the CRC accumulation. If the character following the second DLE is a control character, it is not interpreted as such, because it is not part of a two-character DLE sequence.
- b. any ETB or ETX character, it is interpreted normally in a non-transparent transmission. It is included in any CRC calculation, and terminates transparent operation for that line block.
- c. a SYN character, it is deleted from the data stream and is not calculated in the CRC accumulation.
- d. an STX character, it initiates transparent operation for that line block.
- e. none of the above characters, the unknown character is included in the CRC accumulation and data buffer.

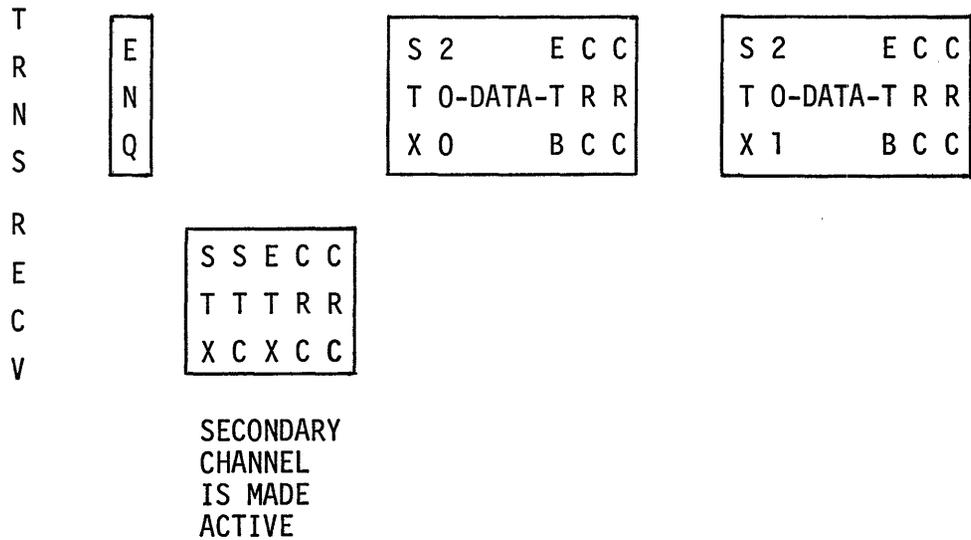
With EBCDIC transparency, data compression does not occur.

Automatic-Answer

Automatic-Answer operation applies to one attended terminal, and one unattended (Auto-Answer) terminal. Rules applicable to unattended Auto-Answer use are discussed in SECTION VI. Line dialogue is subject to the same rules in Auto-Answer use as with regular data transmission and reception, as shown in Figure 8-7.

Unattended Terminal Receives

within 20 seconds



Unattended Terminal Transmits First

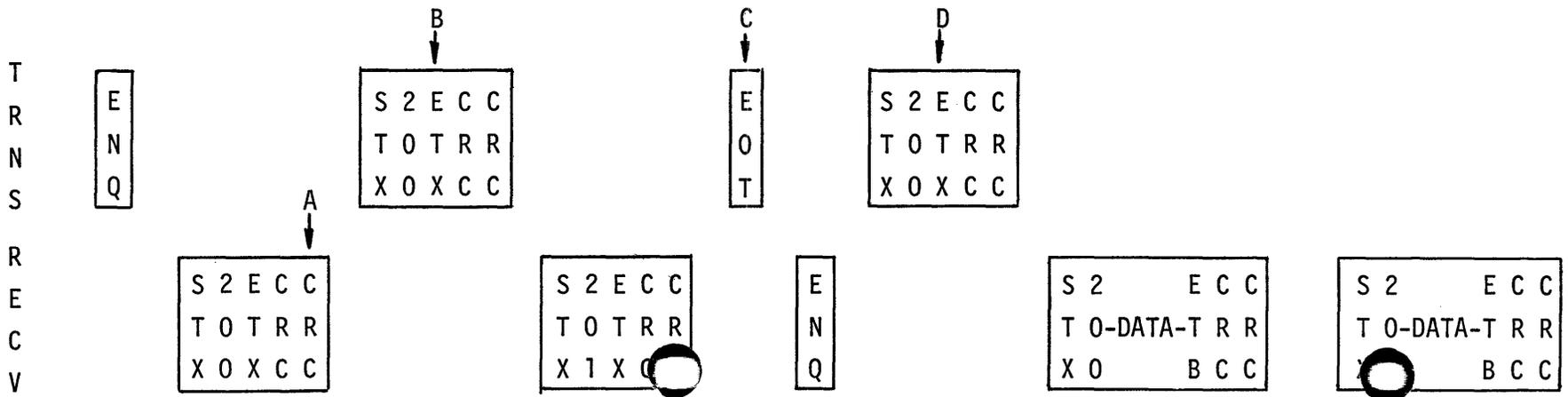


Figure 8-7 Auto-Answer Dialogue

Automatic-Answer (cont'd)

In reference to Figure 8-7, letters A, B, C, and D represent the following:

- A - At this time, the unattended terminal makes the secondary channel active, as if to receive.
- B - At this time, an STX, ETX two-character sequence indicates the EOF has been read.
- C - At this time, the presence of the EOT causes a line turnaround to occur. Also at this time, the secondary channel is made inactive by the unattended terminal. Note that the EOT may either be in the form of a 20-second time delay or an End of File (EOF) marker as the first block on the tape.
- D - Upon sending this response, the line turnaround is complete. Also at this time, the attended terminal makes the secondary channel active because it is now the receive terminal.

Timeouts

Timeouts are used as aids in recovery procedures when recognition of specific control characters does not occur. Their primary purpose is to ensure efficient utilization of the line by preventing indefinite data-line tie-ups. This is accomplished by providing a limited time in which any particular operation must occur. Some specific timers, most without absolute time limits, are defined below.

Synchronous Character Timeout

In synchronous operations, the transmit terminal inserts SYN sequences (or DLE SYN if transparent) at one second time intervals. SYN characters are inserted in the message for timing purposes only, and have no effect on message format. The transmit terminal sends SYN sequences every second; the receiver terminal must receive SYN sequences every three seconds or else the secondary channel is made inactive and an inactivity timeout may occur.

Once communication has been established, if a terminal does not receive a character for two seconds, an error will be assumed and error recovery procedures will be initiated.

Receive/Response Timeout

This three-second timeout (disconnect) is used as follows:

- a. Limits the waiting time tolerated for a transmitting terminal to receive a reply.
- b. Permits any receiving terminal to check the line for SYN character sequences. SYN character sequences indicate that the transmission is continuing; thus, this timeout is reset and restarted each time a SYN sequence is detected.

Inactivity Timeout

After the DATA switch is activated at the receive terminal, if the transmit terminal's SYN sequences are not detected after twenty seconds, the receive terminal will disconnect the line.

BEL (Bell) Character

The BEL character is sent in order to signal the operator at the other terminal that voice communication is desired. Depressing the B key while holding down the CTRL key (CTRL/B) will transmit the BEL character to the other terminal, if communication is not presently occurring.

TERMINATING COMMUNICATION

When the End of File marker (EOF) is read, the transmit terminal sends an ENQ to the receive terminal. The receive terminal responds with the next record number expected. The transmit terminal then responds with an ETX instead of an ETB. The receive terminal responds requesting the next record, to which the transmit terminal replies with an EOT character which terminates transmission. The secondary channel is active until the receive terminal receives the EOT. The dialogue for terminating communication is shown in Figure 8-8.

The line block with the STC of 204, below, is the last data block transmitted.

TERMINATING COMMUNICATION (cont'd)

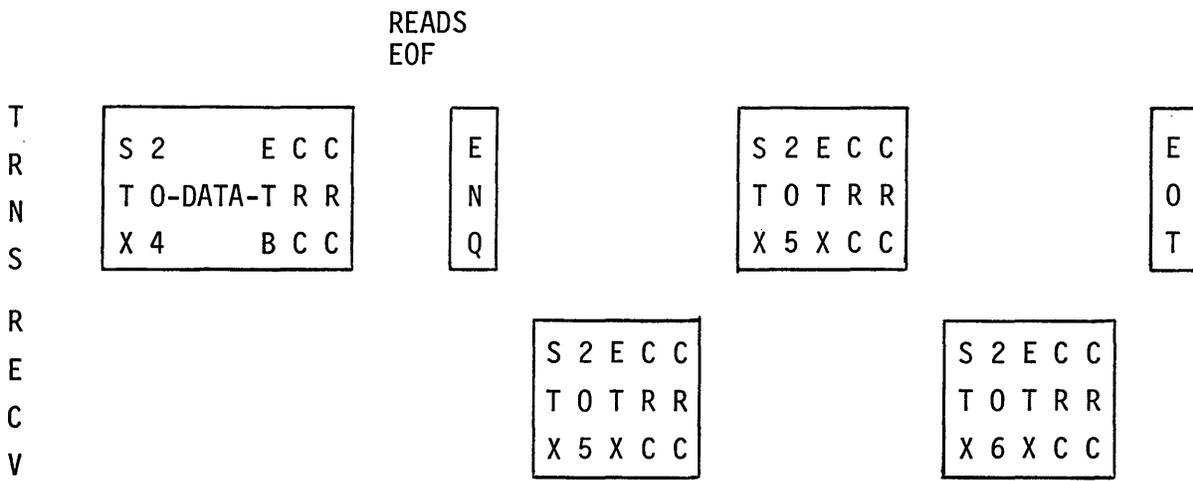


Figure 8-8. Terminating Communication

EXAMPLE: 200 RECORD TRANSMISSION

The example of a 200 record file transmission below should be read with frequent reference to Table 8-1.

Transmission is initiated when the CTRL/START keys are depressed at the transmit terminal. The receive terminal responds to the ENQ by an STX, 200, ETX sequence acknowledgement; also, the secondary channel is made active. The transmit terminal begins transmission with line blocks (STC-counter) 200, 201, 202, etc., until the secondary channel is made inactive by the CRC checking at the receive terminal. The receive terminal indicates that the error was detected on line block 270. The transmit terminal realigns the input device (e.g., backs up the input tape) and begins transmission with line block 270.

Data transmission continues until the line block requiring acknowledgement (STC=377) is transmitted. The transmit terminal sends an ENQ, to which the receive terminal replies with an STX, 200, ETX sequence, indicating "ready to receive." Data transmission continues until the EOF mark is read from the input device which causes the transmit terminal to send an ENQ to check the status of the receive terminal. After the receive terminal responds, the transmit terminal sends an STX, 310, ETX sequence which causes the receive terminal to write the EOF mark. The transmit terminal sends the EOT which causes the secondary channel to be inactive.

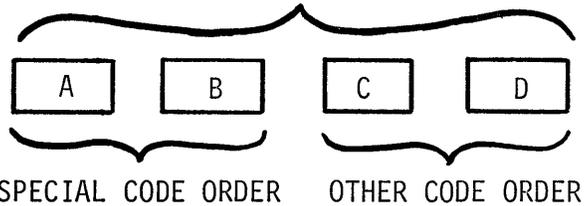
Table 8-1. Example, 200 Record Transmission

<u>INPUT DEVICE</u>	<u>TRANSMIT 1500</u>	<u>COMMENTS: LINE ACTIVITY</u>	<u>SECONDARY CHANNEL</u>	<u>RECEIVE 1500</u>	<u>OUTPUT DEVICE</u>
CTRL/START	ENQ	HANDSHAKE	INACTIVE		
			ACTIVE	200	
READ	200	DATA TRANSMISSION	"	200	WRITE
READ	201	" "	"	201	WRITE
READ	202	" "	"	202	WRITE
READ	203	" "	"	203	WRITE
READ	...	" "	"	...	WRITE
READ	271	ERROR DETECTED	INACTIVE		
	ENQ		"		
		RETRY	ACTIVE	270	
REALIGN INPUT			"		
READ	270	DATA TRANSMISSION	"	270	WRITE
READ	271	" "	"	271	WRITE
READ	...	" "	"	...	WRITE
READ	377	" "	"	377	WRITE
	ENQ	ACKNOWLEDGEMENT	"		
			"	200	
READ	200	DATA TRANSMISSION	"	200	WRITE
READ	201	" "	"	201	WRITE
READ	...	" "	"	...	WRITE
READ	306	" "	"	306	WRITE
READ	307	" "	"	307	WRITE
READ EOF	ENQ	CHECK STATUS	"		
			"	310	
	310 ETX	END OF DATA	"	310 ETX	WRITE EOF
			"	311	
	EOT	TERMINATOR SENT	"	EOT	
			INACTIVE		

APPENDIX A

SPECIAL CHARACTER CODE ENTRY

FIRST CODE TRANSLATE TABLE



TAPE BLOCKS A, B - The SPECIAL character code (specified in display 03) is placed in accordance with ascending EBCDIC code order, beginning with the first byte being the other code octal equivalent of EBCDIC 000, the second byte the equivalent of EBCDIC 001, etc.

TAPE BLOCKS C, D - EBCDIC code entries which correspond to the other code's ascending sequence, beginning with the first byte being the EBCDIC octal equivalent of the other code's 000, the second byte being the EBCDIC equivalent of the other code's 001.

APPENDIX B

DISC ERROR CODES

Disc error codes appear to the right of the word STATUS in the Operator's Display (see SECTION V, Figure 5-2). Common disc error codes include 101, 102, 105, 110, 117, 120, and 125. The probable causes and suggested recovery procedures are listed in the table below. In most cases a partially received file should be purged and retransmitted.

Table B-1. Disc Errors and Recovery Procedures

<u>ERROR CODE</u>	<u>ERROR DESCRIPTION</u>	<u>PROBABLE CAUSE AND RECOVERY PROCEDURE</u>
006	At least one of the disc extents of the file being transmitted or received could not be found.	Indicates disc hardware error. Dump the files on the disc in use and execute hardware diagnostic programs.
011	The attempted hardware Read operation is incomplete.	Indicates disc hardware error. Try again, or skip the record. If this error recurs, dump the files on the disc in use and execute hardware diagnostic programs.
012	The attempted hardware Write operation is incomplete.	Indicates disc hardware error. Try again. If this error recurs, dump the files on the disc in use and execute hardware diagnostic programs.
014	System overlays cannot be loaded.	Is a system disc on-line? If not, put a system disc on-line. If yes, reload Data Base Manager System Software by using the System Load/Dump Disc Utility Program. Retry.
101	In attempting to transmit a file, the requested transmit file name could not be located on disc unit zero.	Is this file on a different disc volume? Is this the proper file name? Use the VTOC Print/Display Disc Utility Program to determine if the file is located on disc unit zero. Depress the X key and enter the correct file name, or copy the file to unit zero (use File Copy Disc Utility Program).

(cont'd)

Table B-1. Disc Errors and Recovery Procedures (cont'd)

<u>ERROR CODE</u>	<u>ERROR DESCRIPTION</u>	<u>PROBABLE CAUSE AND RECOVERY PROCEDURE</u>
102	In attempting to receive a file, the chosen receive file name already exists on unit zero.	Depress the X key and enter a different file name. Retry.
105	The first position of the entered file name contains a blank.	Depress the X key and enter a correct file name.
106	When attempting to receive a Sequential file, unit zero already has 256 disc files on it.	Purge some files (depress the P key), or copy some files to a different disc (use File Copy Disc Utility Program). Retry.
110	There is not enough space on unit zero to receive this Sequential file.	Purge some files (depress the P key), or copy some files to a different disc (use File Copy Disc Utility Program). If the file is partially received, purge it before retrying.
113	Unrecoverable disc I/O error.	Indicates hardware problem. Retry or skip this operation. Also see error codes 011, 012.
114	Unable to read a system overlay from disc unit zero (system disc).	(Same as 014)
117	The file name specified in the attempted purge operation could not be located on disc unit zero.	Is the proper disc on-line? Was the proper file name entered? Has the file already been purged?
120	Attempted to purge a file whose file name was not on disc unit zero.	(Same as 117)
125	Attempted to receive or purge a file on a write-protected disc drive.	Depress the red write PROTECT switchlight. Retry.

(cont'd)

Table B-1. Disc Errors and Recovery Procedures (cont'd)

<u>ERROR CODE</u>	<u>ERROR DESCRIPTION</u>	<u>PROBABLE CAUSE AND RECOVERY PROCEDURE</u>
133	The requested number of extents has exceeded 96.	Receive this file on maxi-tape or mini-tape for temporary storage. Copy the file from tape to disc with allocations of at least 00200 (use File Copy Disc Utility Program).
137	Cannot read the allocation map of the disc in use.	Indicates hardware error. See error code 011.
145	The file being accessed has only one extent packet.	Recreate the file (use File Copy Disc Utility Program, disc-to-disc copy) and purge original file. This may indicate hardware error.
211	Read error encountered during ISAM search.	Indicates hardware error. If this error persists, dump the files on this disc and execute Hardware Diagnostic Programs.

APPENDIX C

GLOSSARY

AUTOMATIC-ANSWER - A mode in which communication between terminals occurs where one of the terminals operates without human intervention (unattended). With SQUIC, Automatic-Answer is an operator-selectable mode.

BAUD RATE - The number of bits transmitted per second in a communication network. The baud rate is determined by the modem.

BLOCK, LINE - A collection of associated consecutive characters treated as a unit during data transmission. Error detection (checking) occurs for each line block upon reception.

BLOCK, TAPE - A group of consecutive records or record portions considered and transferred to or from tape as a unit.

CHARACTER CODE - A system of rules which specify the representation of data. Signals representing data characters can be formed, transmitted, received, and processed according to the rules adopted for the character code used. Included among the character codes compatible with SQUIC software are EBCDIC, ASCII, SINGER Series 1500, and forms of BCD code.

CHECK - See CYCLIC REDUNDANCY CHECK (CRC).

COMMUNICATION - Transmission of the representation of data between points of origin and reception without changing the sequence or composition of the information communicated.

COMMUNICATION CONTROL CHARACTERS - Characters essential to the control of a communication network. Characters which begin, stop, ensure the validity of, and otherwise facilitate data communication; e.g., ENQ, STX, IGS, CRC, EOT. Usually denoted by three vertical letters.

CYCLIC REDUNDANCY CHECK (CRC) - A method of ensuring the validity of data performed at both the transmit and receive terminals in a communication system. The accumulation of the polynomial multiplication of each transmitted data character is sent by the transmit terminal as block check characters (CRC) which are compared with the polynomial multiplication of each received data character accumulated at the receive terminal. Also used to ensure data validity of tape, disc, and other I/O devices.

DATA COMPRESSION - A means of reducing the number of characters to be transmitted by identifying strings of like (redundant) characters before transmission. Strings of like characters are encoded by the transmit terminal using the IGS communication control character, and decoded by the receive terminal.

DIALOGUE - The exchange of communication control characters and data between communicating terminals.

FIELD - One blank or character, or a group of adjacent blanks or characters, appearing on a display screen which enable an operator to view keystrokes depressed on the keyboard and accepted by the computer. Also, may be considered part of a record.

FILE - A collection of associated records which are handled as a unit. Files are separated by an End Of File (EOF) mark on tape and are usually transmitted or received as a whole unit.

HALF DUPLEX - Refers to communication systems where data may be transmitted in both directions, though not simultaneously. A characteristic of SQUIC line handling.

HARDWARE - Physical equipment including the mechanical, electrical, and magnetic parts of a computer and computer peripherals; that part of a computer which can be seen or touched. Contrast with software.

INPUT - The representation of data which is transferred from an external storage device (e.g., tape) to internal computer storage. In a communications system, input data is transmitted after it is read from external storage by the transmit terminal.

INTELLIGENT TERMINAL - A versatile, completely programmable computer that is operator-oriented. Keyboard entry errors are reduced through the use of keyboard interaction with an operator-verifiable CRT. In addition, the number of keystrokes required in data entry is greatly reduced due to the inherent software flexibility of intelligent terminal systems.

LINE CODE - The representation of data which is transmitted and received; i.e., character code. If the character code used as input differs from the line code, then translation of the data from one code form to another may be necessary.

LINE DISCIPLINE - See DIALOGUE.

MESSAGE - A collection of data communicated as a unit with beginning and end clearly defined. Usually each message consists of one data file.

MODEM - A data conversion device which transposes data useable with computers to a form which is useable with transmission equipment such as telephone lines, and vice-versa. Modems usually have two operating modes: talk and data. When in the talk mode, normal telephone conversation occurs. Only when the modem is in the data mode can data be communicated. Instructions on modem operation are provided by the modem's manufacturer.

OUTPUT - The representation of data which is transferred from internal computer storage to an external storage device (e.g., tape). In a communication system, output data is written to external storage after it is received by the receive terminal.

PROGRAM GENERATOR - A master program which enables the creation of any number of executable programs customized to the requirements of an end-user. The operation of a program generator simply requires the selection of options in reply to operator-prompting displays.

RECORD - A collection of associated fields of data handled as a unit. A record is usually a part of a file. One or more records are often consecutively stored on a tape block.

SOFTWARE - The necessary programs and procedures which control the operation of the associated computer hardware. Each program or routine consists of computer instructions (code) in various sequences and patterns necessary to perform the desired task. Software, as opposed to hardware, does not physically exist. Only the storage device where the software resides (e.g., mini-tape cartridges, disc, computer memory) may be seen or touched.

STANDARD SELECTIONS - The commonly-selected options in a program generator which, if applicable, allow the operator to create a customized program by responding to a minimum number of displays.

TRANSLATION, CHARACTER CODE - A conversion from one form of representing data to another without affecting the sequence or meaning of the data. For example, if data received in EBCDIC code must be processed in SINGER Series 1500 code, it must be translated. In SQUIC systems, there are two translation steps which may occur: (1) The transmit terminal translates from the character code used as the line code (SQUIC uses EBCDIC as a line code); and (2) The receive terminal translates from the character code used as the line code to the character code used for output data storage.

TRANSMISSION RATE - See BAUD RATE.

TRANSPARENCY - The transparent mode of communication permits greater versatility in the range of data which can be communicated. All possible 256-bit combinations of data are valid only in the transparent mode. Translation between character codes does not occur. Unrestricted coding of data is allowable because all data, including normally-invalid communication control characters, are handled only as specific patterns of bits. Transparency is thus especially useful for special characters added to a character code set and Assembler language programs. With SQUIC, this is an operator-selectable option.

UNATTENDED OPERATION - See AUTOMATIC-ANSWER.