

Honeywell



LEVEL 6

SOFTWARE

**LEVEL 6/
BSC 2780/3780
FILE
TRANSMISSION
FACILITY**

SERIES 60 (LEVEL 6)
LEVEL 6/BSC 2780/3780
FILE TRANSMISSION FACILITY
USER'S GUIDE

SUBJECT

A Detailed Description of the Series 60 (Level 6) File Transmission Facility Between Honeywell Level 6 and Non-Honeywell Processors Using BSC 2780/3780 Protocol

SPECIAL INSTRUCTIONS

This revision supersedes Revision 0 of the manual dated January 1978. Change bars in the margin indicate additions and changes; asterisks indicate deletions.

SOFTWARE SUPPORTED

This publication supports Release 0110 of the Series 60 (Level 6) GCOS 6 MOD 400 Operating System. See the Manual Directory of the latest *GCOS 6 MOD 400 System Concepts* manual (Order No. CB20) for information as to later releases supported by this manual.

ORDER NUMBER

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PREFACE

This manual describes the GCOS 6 File Transmission Facility for transmitting data between the Honeywell Level 6 and non-Honeywell host computer systems. Unless stated otherwise, the term GCOS refers to GCOS 6 software; the term Level 6 refers to Series 60 (Level 6) hardware on which the GCOS software executes.

GCOS 6 configuration information for the File Transmission Facility is explained in the System Building manual.

Section 1 of this manual is an introduction to the Level 6/BSC 2780/3780 File Transmission Facility.

Section 2 is a detailed description of file transmission functionality, while Section 3 details file transmission operation.

Appendix A contains a listing of file transmission messages. Appendix B describes the ASCII and EBCDIC character sets.

Each section/appendix of this document is structured according to the heading hierarchy shown below. Each heading indicates the relative level of the text that follows it.

<u>Level</u>	<u>Heading Format</u>
1 (highest)	<u>ALL CAPITAL LETTERS, UNDERLINED</u>
2	<u>Initial Capital Letters, Underlined</u>
3	ALL CAPITAL LETTERS, NOT UNDERLINED
4	Initial Capital Letters, Not Underlined
5 (lowest)	ALL CAPITAL LETTERS FOLLOWED BY COLON: Text begins on the same line.

MANUAL DIRECTORY

The following publications comprise the GCOS 6 manual set. The Manual Directory in the latest GCOS 6 MOD 400 System Concepts manual lists the current revision number and addenda (if any) for each manual in the set.

<u>Order No.</u>	<u>Manual Title</u>
CB01	GCOS 6 Program Preparation
CB02	GCOS 6 Commands
CB03	GCOS 6 Communications Processing
CB04	GCOS 6 Sort/Merge
CB05	GCOS 6 Data File Organizations and Formats
CB06	GCOS 6 System Messages
CB07	GCOS 6 Assembly Language Reference
CB08	GCOS 6 System Service Macro Calls
CB09	GCOS 6 RPG Reference
CB10	GCOS 6 Intermediate COBOL Reference
CB20	GCOS 6 MOD 400 System Concepts
CB21	GCOS 6 MOD 400 Program Execution and Checkout
CB22	GCOS 6 MOD 400 Programmer's Guide
CB23	GCOS 6 MOD 400 System Building
CB24	GCOS 6 MOD 400 Operator's Guide
CB25	GCOS 6 MOD 400 FORTRAN Reference
CB26	GCOS 6 MOD 400 Entry-Level COBOL Reference
CB27	GCOS 6 MOD 400 Programmer's Pocket Index
CB28	GCOS 6 MOD 400 Master Index
CB30	Remote Batch Facility User's Guide
CB31	Data Entry Facility User's Guide
CB32	Data Entry Facility Operator's Quick Reference Guide
CB33	Level 6/Level 6 File Transmission Facility User's Guide
CB34	Level 6/Level 62 File Transmission Facility User's Guide
CB35	Level 6/Level 64 (Native) File Transmission Facility User's Guide
CB36	Level 6/Level 66 File Transmission Facility User's Guide
CB37	Level 6/Series 200/2000 File Transmission Facility User's Guide
CB38	Level 6/BSC 2780/3780 File Transmission Facility User's Guide
CB39	Level 6/Level 64 (Emulator) File Transmission Facility User's Guide
CB40	IBM 2780/3780 Workstation Facility User's Guide
CB41	HASP Workstation Facility User's Guide
CB42	Level 66 Host Resident Facility User's Guide
CB43	Terminal Concentration Facility User's Guide

In addition, the following documents provide general hardware information:

AS22	Honeywell Level 6 Minicomputer Handbook
AT04	Level 6 System and Peripherals Operation Manual
AT97	MLCP Programmer's Reference Manual

Also, the following host document is useful:

<u>Order No.</u>	<u>Manual Title</u>
GC28- 6704-4	IBM System/360 Operating System: Job Control Language Reference

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SECTION 1

INTRODUCTION

File transmission provides the capability of transmitting files between a Level 6 processor and a remotely located IBM host processor using a binary synchronous (BSC) line discipline (see Figure 1-1). The Level 6 converts data from its native ASCII code to the IBM EBCDIC code for transmission to the host.

File transmission is controlled through the use of a standard operating system command. A versatile and extendable command line format provides a multifunctional transmission repertoire with default options available to allow shorter command lines.



Figure 1-1. Level 6/BSC 2780/3780 File Transmission

FILE TRANSMISSION UTILITY PROGRAM (TRANB)

The file transmission utility program (TRANB) operating on the Level 6 provides data file transmission and performs a series of communications functions, as follows:

- o Multiple concurrent transmissions over separate communications lines

- o Error reporting (error messages are described in Appendix A)
- o Extensive pre-/post-analysis and processing, including:
 - Command statement and parameter validity checking
 - Level 6 to host connection validation
 - Memory allocation and size determination
 - File interrogation and buffer allocation
 - Host dialog for file verification and/or creation
 - Buffer and record size monitoring for oversize transmissions
 - Termination reporting including error information and final record number
 - Conversion of data to EBCDIC

The TRANB file transmission utility program is described in detail in Sections 2 and 3.

FILE ORGANIZATION

Disk files are transferred between the Level 6 and the host. The files transmitted can contain records of any length, since the TRANB "cut and paste" facilities (see Section 3) appropriately process the file records for transmission.

LINE PROTOCOL

The Level 6 processor transmits files to/from a host processor that uses the BSC 2780 or 3780 line protocol to control data interchange. For details, see the Communications Processing manual.

Line Characteristics

- o Synchronous
- o Half/full duplex
- o Support of a BSC 2780/3780 line protocol

- o Dedicated/switched (dialup; see Section 3)
- o 2000 to 9600 baud line speed

CODE CONVERSION

The Level 6 converts data from its native ASCII code to the IBM EBCDIC code for transmission to the host. Received files are converted from EBCDIC to ASCII.

RESOURCE REQUIREMENTS

The Level 6 system must have the following resources to perform file transmission.

- o Level 6 central processor
- o Multiline communications processor
- o Synchronous communications line adapter(s)
- o Communications resources:
 1. Data set(s) - Bell system 201A, 201C, 208B, modem bypass, or equivalent
 2. Electrical characteristics - standard RS-232-C
 3. Transmission mode - synchronous, two-way alternate
 4. Code set - EBCDIC
- o Configuration Load Manager with communications extensions
- o Communications subsystem configured with BSC 2780 or 3780 line discipline
- o GCOS 6 MOD 400 Operating System with File Manager
- o TRANB file transmission utility program (8K memory)

For each concurrently active file transmission, the minimum memory for one stream is as follows:

- BSC 2780 protocol:

8K (8192 words)	TRANB
.625K (640 words)	buffer and work areas
.125K (128 words)	one file record buffer (default)
<u>8.75K (8960 words)</u>	<u>minimum memory for one stream</u>

- BSC 3780 protocol:

8K (8192 words)	TRANB
1.33K (1360 words)	buffer and work areas
.125K (128 words)	<u>one file record buffer (default)</u>
9.45K (9680 words)	<u>minimum memory for one stream</u>

IBM HOST CONFIGURATION REQUIREMENT

The BSC 2780 communications line must be configured without horizontal tab, transparency, or multibuffering on the host. Alternately, when utilizing the BSC 3780 protocol, the communications line must be configured without transparency or multibuffering on the host. For configuration information see the System Building manual.

SECTION 2

FILE TRANSMISSION FUNCTIONALITY

ACTIVATING FILE TRANSMISSION

Prior to the initial connection between the Level 6 and the host, perform the following actions:

1. Mount the appropriate disk files (packs).
2. Initialize the GCOS 6 operating system as prescribed in the System Building manual.
3. Invoke the file transmission utility program (TRANB) at the Level 6 end of the communications network. (The invocation of TRANB is described in Section 3.)

NOTE: A task group is required for each transmission in order to execute simultaneous file transfers (see the System Building manual).

Once these steps are taken, begin the communications accessing procedure (see Section 3).

INITIATING TRANSMISSION

The Level 6 operator specifies directives for the transmission of files to and from the host by issuing the TRANB command (see Section 3). TRANB can also be called directly from a user program by the Command Line Process (\$CMDLN) macro call. (For details, see the System Service Macro Calls manual.)

In the context of file transmission, the Level 6 is called the "initiator", while the host is called the "acceptor"; either can send or receive data.

FUNCTIONAL DESCRIPTION

Figures 2-1 through 2-3 illustrate the logical protocol sequence involved in the transmission (send/receive) of files between the Level 6 and the IBM host processor.

Once the TRANB command has been invoked, the message TRAN yddd (yddd is the Julian date (year, day) of the software revision) is sent to the user-out file. The initiator's file (Level 6 file) is then opened and the host connection established. After connection, the signon card (if required) is transferred to the host and the Level 6 is readied for reception of any host status or informational messages. Any transmission received from the host at this time (normally job status) is directed to the user-out file. Next the file transfer takes place. This is indicated by the TRAN ESTABLISHED message.

Termination processing is performed at the conclusion of the data transfer process. The line is physically disconnected if D is specified in the TRANB command. The files are closed, the termination message nnnnn RECORDS TRANSFERRED is displayed, and TRANB terminates.

TERMINATING COMMUNICATION

Termination of transmission can occur as follows:

1. Logical termination of communications is initiated by TRANB at the completion of the file transmission session (see Section 3).
2. Error conditions result in the abnormal termination of file transmission (see below).

Error Messages

When either the Level 6 utility or the host detects an error, an error message is displayed on the user-out file at the Level 6.

When TRANB detects or is informed of an error, it disconnects the Level 6 from the communications line and terminates. Error messages are described in Appendix A.

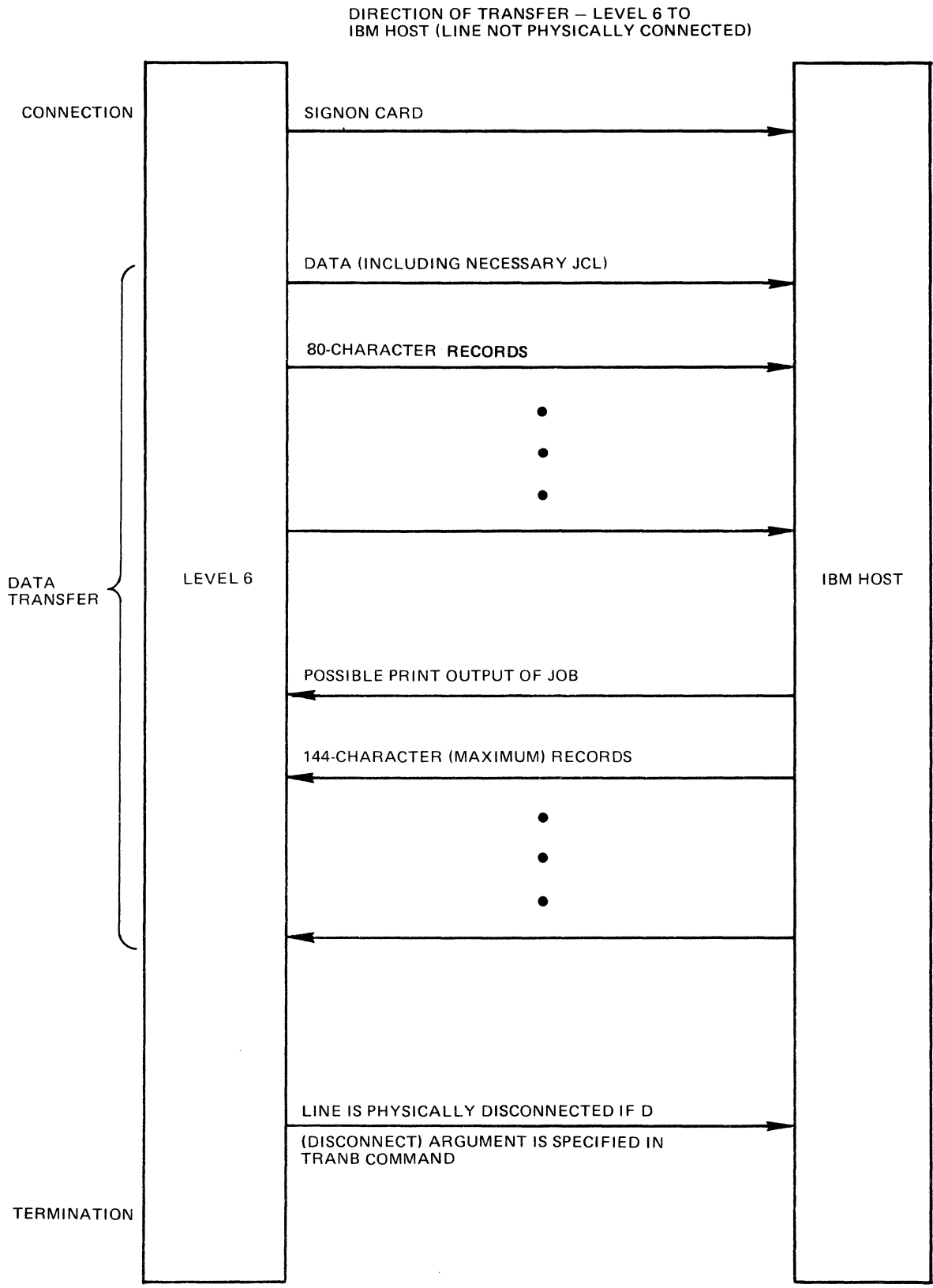


Figure 2-1. File Transfer Protocol One
2-3

DIRECTION OF TRANSFER – LEVEL 6 TO
IBM HOST (LINE ALREADY PHYSICALLY
CONNECTED)

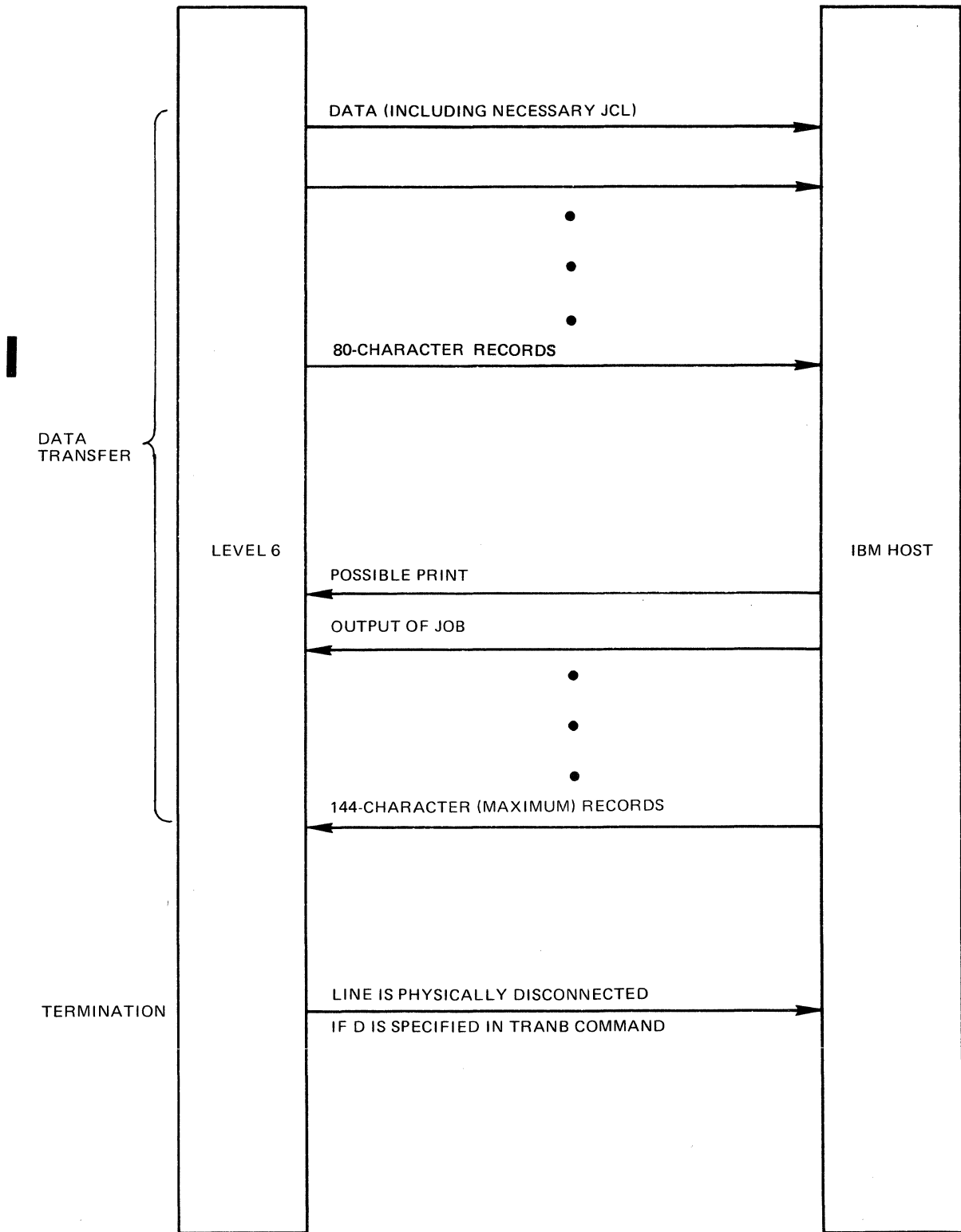


Figure 2-2. File Transfer Protocol Two
2-4

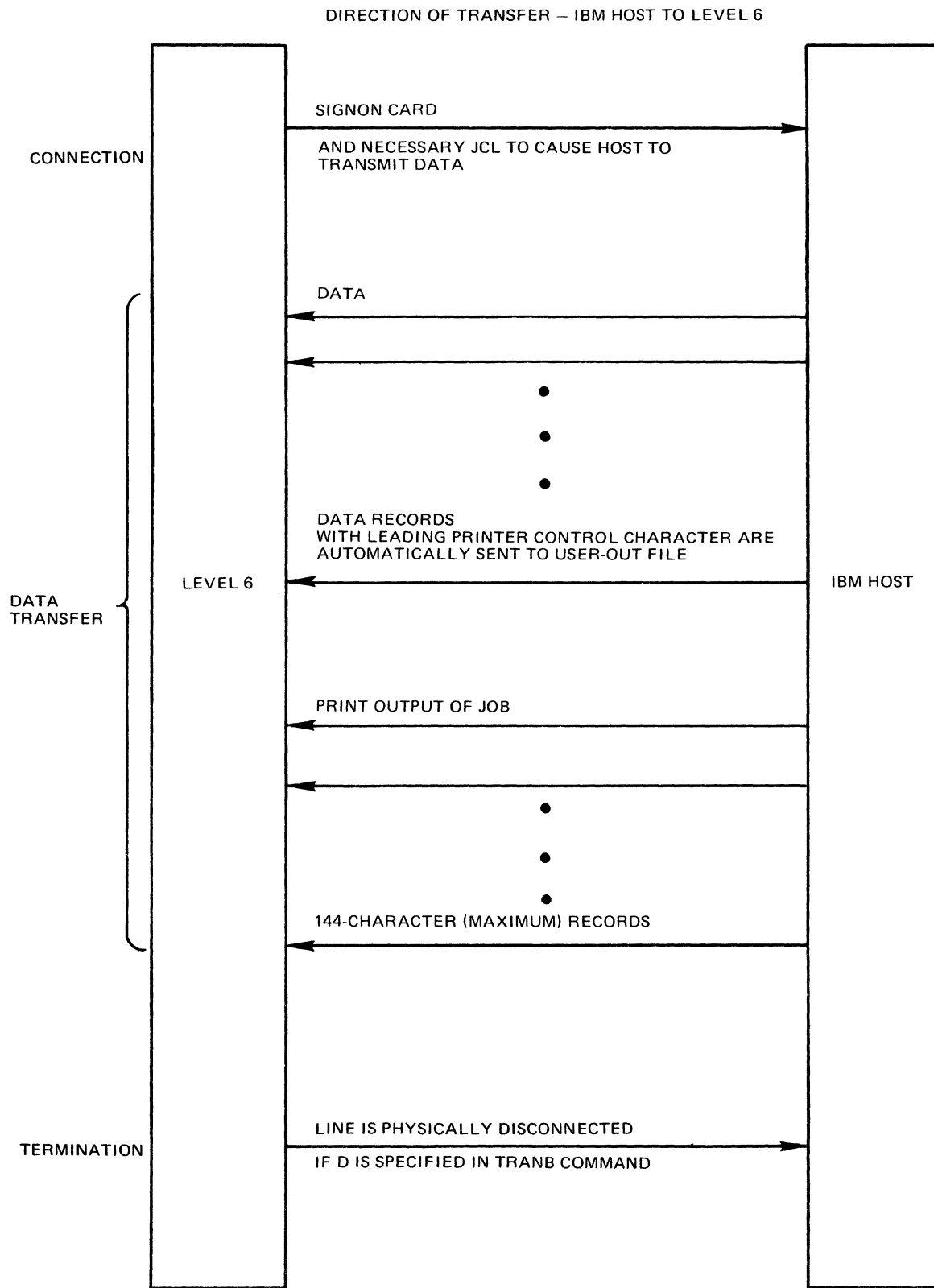


Figure 2-3. File Transfer Protocol Three
2-5



SECTION 3

OPERATING PROCEDURES

The TRANB program runs on the Level 6 system and is designed to establish access connection with the host through a communications procedure. The Level 6, which specifies all directives for transmission of files in the TRANB command (see below), is called the initiator while the host is called the acceptor; either can send or receive data.

Once the connection is complete, the TRANB program transfers files in accordance with the calling arguments specified in the TRANB command. After a file transfer has been performed, TRANB maintains the logical connection with the host if continue (C) is specified in the TRANB command; connection is broken if disconnect (D) is specified.

TRANB COMMAND

The operator typein for invoking TRANB is described below. The arguments for the TRANB command can be specified in any order but must be separated by spaces, as shown below. If you are transferring a number of files, you must enter the TRANB command for each file. Do not specify the continuation argument (C) before the last file being sent. In the following format description, brackets ([]) enclose optional arguments and underlined arguments are the default values. The delta characters signify mandatory spaces.

$$\text{TRANB} \Delta \left[\begin{array}{c} \underline{S} \\ \underline{R} \end{array} \right] \left[\begin{array}{c} \underline{C} \\ \underline{D} \end{array} \right] \Delta \left[-L \left\{ \begin{array}{c} 278 \\ 378 \end{array} \right\} \right] \Delta \left[\text{pathname} \right] \Delta \left[-N \Delta \left\{ \begin{array}{c} \text{lrn} \\ \text{pathname} \end{array} \right\} \right] \Delta \\ \left[-I \left[\begin{array}{c} \underline{C} \\ \underline{P} \end{array} \right] \Delta \text{pathname} \right]$$

Argument Descriptions

S

The Level 6 is to send data

R

The Level 6 is to receive data from the host (default value)

C

Communications line is to remain connected at the end of a file transfer in anticipation of another TRANB command issued by the operator indicating additional file transfers

D

Disconnect communications line at the end of the file transfer (default value)

-L $\left. \begin{array}{l} \{278\} \\ \{378\} \end{array} \right\} \Delta \text{pathname}$

Specifies the IBM host using BSC 2780 or 3780 protocol. The pathname, if used, identifies the preliminary transfer file that is used to initiate the file transfer. This file is unnecessary for sending data to the host if the Level 6 is already connected to the host or can contain only the signon card (see below). If a file is to be received from the host, this file contains, in addition to the signon card if necessary, the appropriate job control language to activate the file transfer

-N $\left. \begin{array}{l} \{lrn\} \\ \{\text{pathname}\} \end{array} \right\} \Delta$

Either logical resource number (LRN) used to access the communications line or a pathname in the form >SPD>xxxx which is used by the file system to generate an LRN (see the System Concepts manual). (xxxx must have been identified in the Configuration Load Manager (CLM) file)

-I $\left[\begin{array}{l} \text{C} \\ \text{P} \end{array} \right] \Delta \text{pathname}$

Initiator's pathname identifying the file being sent/received (see the System Concepts manual)

Format: -I $\left[\text{^volname>directory[>directory...]} \right] > \text{filename}$

ADDITIONAL VALUES:

- C - Invokes the "cut" facility for file transmission from the Level 6 to the host; splits the file records into 80-character transmission blocks. See "Sending a File to Host (Cut Option)", later in this section.
- P - Invokes the "paste" facility for file transmission from the host to the Level 6; combines the 80-character reception blocks from the host to form fixed-length records. See "Receiving a File from Host (Paste Option)", later in this section.

Once the TRANB command is entered, and the TRAN yddd message appears on the user-out file, perform the necessary communication procedures to establish connection with the host.

ESTABLISHING COMMUNICATION WITH HOST

A Level 6 communicates with an IBM host over a communications line. The line can be either dedicated or nondedicated (dialup). The following procedure establishes the connection with the host:

- o For a dedicated line:

Communication is automatically initiated by the TRANB program

- o For a dialup line, with the Level 6 running:
 1. Press the TALK button on the data set.
 2. Lift the handset and wait for the dial tone.
 3. Dial the assigned number for the host. If a busy signal is received, try another number or try again later. If no answer is received after several rings, the host is not accepting calls. Try later or contact the operator for a status report.
 4. When the high-pitched tone is received, press the DATA button on the data set and replace the handset. If a data connection is successfully made, the DATA button will light and remain lighted. Loss of the light on the DATA button indicates loss of the connection and the ability to send or receive data.

JOB CONTROL LANGUAGE REQUIREMENTS

The job control language (JCL) required to exchange data files with an IBM host is described below. Note that the specific parameters and values used may vary with different IBM instal-

lations and may have to be modified. For a complete description of IBM job control language, see the IBM System/360 Operating System: Job Control Language Reference manual.

JCL for Level 6 to IBM Host File Transfer

The following example shows the job control language required to create a new file on an appropriate IBM host to receive data from a Level 6:

```
// jobname JOB      (job card)
// A EXEC  PGM=IEBGENER,REGION=70K
//SYSPRINT DD  SYSOUT=A
//SYSIN   DD  DUMMY
//SYSUT2  DD  DSN=filename,DISP=(,CATLG,DELETE),UNIT=SYSTS,
//          SPACE=(TRK,(1,1)),DCB=(RECFM=FB,LRECL=80,
//          BLKSIZE=12960)
//SYSUT1  DD  *
      .
      .
      .
      Data cards
      .
      .
      .
/*
//
```

JCL for IBM Host to Level 6 File Transfer

The following example shows the job control language required to identify the file on an appropriate IBM host that is to send data to a Level 6:

```
//jobname JOB      (job card)
//A EXEC  PGM=IEBGENER
//SYSPRINT DD  SYSOUT=A
//SYSIN   DD  DUMMY
//SYSUT2  DD  SYSOUT=B,DCB=(RECFM=FB,LRECL=80,BLKSIZE=4240)
//SYSUT1  DD  DSN=filename,DISP=SHR
//
```

Signon Card

A signon card is required for file transmission with an IBM host whenever the communications line is initially dialed. The card format is:

/*SIGNON REMOTExx

xx

Specific remote number obtained for the IBM host

SENDING A FILE TO HOST (NEW CONNECTION)

To send a file to the host when a connection has not been established, the TRANB command must contain the following arguments:

TRANB S $\left\{ \begin{array}{l} C \\ D \end{array} \right\}$ -L $\left\{ \begin{array}{l} 278 \\ 378 \end{array} \right\}$ pathname -N nn -I pathname

The preliminary file identified by -Lxxx pathname must contain the signon card, while the file identified by -I pathname must contain both the JCL required to create a file at the host and the data to be transferred.

SENDING A FILE TO HOST (CONNECTION ESTABLISHED)

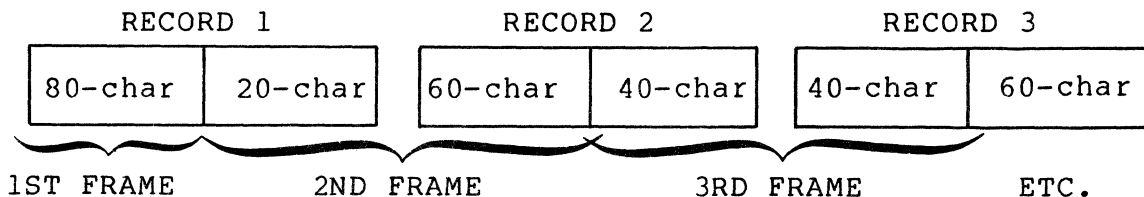
To send a file to the host when a connection already exists, the TRANB command must contain the following arguments:

TRANB S $\left\{ \begin{array}{l} C \\ D \end{array} \right\}$ -L $\left\{ \begin{array}{l} 278 \\ 378 \end{array} \right\}$ -N nn -I pathname

The file identified by -I pathname must contain the JCL required to create a file at the host, as well as the data to be transferred. A preliminary file containing a signon card is not required.

SENDING A FILE TO HOST (CUT OPTION)

To transfer a Level 6 file that has record lengths greater than 80 characters, the "cut" option is provided. For example, if the Level 6 file contains records of 100 characters in length, TRANB will "cut" and combine the records to produce 80 character frames for transmission to the host, as follows:



The first three frames above are packed on the host processor as the first three records in the IBM host file.

To invoke the "cut" facility, you must include the C argument in the TRANB command, as follows:

```
TRANB S {C} {278}
        {D} -L {378} pathname -N nn -IC pathname
```

RECEIVING A FILE FROM HOST

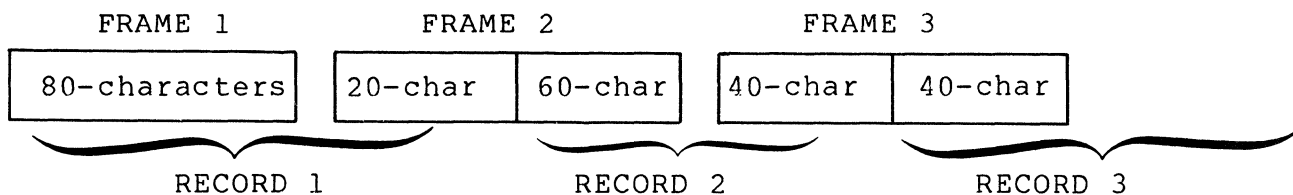
To receive a file from the host, the TRANB command must contain the following arguments:

```
TRANB R {C} {278}
        {D} -L {378} pathname -N nn -I pathname
```

The preliminary file identified by -Lxxx pathname must contain the JCL that identifies the host file to be sent to the Level 6 and, if a connection has not been established, the signon card. The file identified by -I pathname is the Level 6 file in which the data received from the host is to be stored. When receiving data, the Level 6 overwrites an existing file if one with the proper name (that specified in -I pathname) is found. If none is found, a new file with a record size of 256 characters is opened.

RECEIVING A FILE FROM HOST (PASTE OPTION)

The "paste" option is provided for reception of an IBM host file onto a Level 6 file containing records of more than 80 characters in length. When the Level 6 receives 80-character transmission frames from the host, TRANB slices and pastes the frames into the allocated record size of the Level 6 file. For example, if the Level 6 allocated record size is 100 characters, the following results:



To invoke the "paste" facility, you must include the P argument in the TRANB command, as follows:

```
TRANB R {C} {278}
        {D} -L {378} pathname -N nn -IP pathname
```

TERMINATING COMMUNICATION

Termination processing is performed at the conclusion of the data transfer sequence. The line is physically disconnected if the TRANB command line specifies the disconnect (D) argument. C in the command line indicates that the line remains connected.

ABNORMAL TERMINATION

If an error condition arises during any phase of file transmission, TRANB issues an error message to the user-out file indicating a transmission failure and physically disconnects the line if the disconnect argument was specified in the TRANB command. If the error was caused by a communications failure, the line is physically disconnected regardless of whether C or D was specified in the TRANB command. The error message identifies the cause of the problem (see Appendix A).

RESTART AFTER ABNORMAL TERMINATION

Restart after abnormal termination is performed from the Level 6 and must be at the file level.

File transmission is accomplished in a remote batch manner. That is, the file is not created at the IBM host until the submitted job has been executed. Therefore, you should check with the host operator to determine if the job terminated successfully even if TRANB terminated abnormally, as in the case of the line going down after the job was transmitted but before print output was returned to the Level 6. In this case, the print output can be retrieved by transmitting a signon card:

1. If the aborted job was being sent to the host, enter:

```
TRANB SD -Lxxx (signon) -N nn -I pathname
```

2. If the aborted job was being received at the Level 6, enter:

```
TRANB RD -Lxxx (signon, no JCL) -N nn -I pathname
```



APPENDIX A

MESSAGES

LEVEL 6 INFORMATION MESSAGES

The messages described in Table A-1 are issued to the Level 6 user-out file during TRANB operation.

Table A-1. Information Messages

Message	Description
TRAN yddd	TRANB is executing. yddd is the Julian date (year, day) of the software revision.
TRAN ESTABLISHED	The logical connection between TRANB and the host has been established.
nnnnn RECORDS TRANSFERRED	The file transfer is complete. nnnnn is the number of records transferred. For a file sent to the host, this count includes the JCL records sent as well as the data records. For a received file, nnnnn is the number of <u>data</u> records received.

LEVEL 6 ERROR MESSAGES

File transmission errors are displayed on the user-out file as coded messages containing six hexadecimal digits beginning with the code number 22:

22nnnn

nnnn is the message code; see Table A-2.

For additional information see the System Messages manual.

Table A-2. Error Messages

Message Code	Description
2200	General command or argument error
2201	Specific command error - individual operator error
2202	Invalid argument in the TRANB command. Check command line and replace incorrect value
2203	Specific command error - level (-L) argument incorrect
2204	Specific command error - wrong initiator (-I) pathname detected
2205	Specific command error - wrong acceptor (-A) identifier detected
2206	Specific command error - start record number (-SR) argument error
2207	Transmission error on initiate request record
2208	Transmission error on acceptor's answer
2240	Illegal character received from IBM host
2241	Illegal message received from IBM host
* 22C0	General connection failure
22C4	Level 6/BSC 2780/3780 connection failure

APPENDIX B

ASCII AND EBCDIC CHARACTER SETS

Tables B-1 and B-2 illustrate the ASCII and EBCDIC character sets, respectively. In addition to the ASCII characters, Table B-1 shows the hexadecimal equivalents; Table B-2 shows the binary and hexadecimal equivalents of the EBCDIC character set.

*

Table B-1. ASCII/Hexadecimal Equivalents

		H1						
H2	0	1	2	3	4	5	6	7
0		JLE	SP	0	@	P	'	p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3			#	3	C	S	c	s
4			\$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A			*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	!
D			-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	.

Table B-2. EBCDIC/Hexadecimal/Binary Equivalents

} Bit Positions 4, 5, 6, 7 } Second Hexadecimal Digit	00				01				10				11				} Bit Positions 0,1 } Bit Positions 2,3 } First Hexadecimal Digit
	00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0000	0		DS		SP	&	-						{ ^a	{ ^a	\ ^a	0	
0001	1		DC1	SOS			/		a	i	~ ^a		A	J		1	
0010	2		DC2	FS					b	k	s		B	K	S	2	
0011	3		TM						c	l	t		C	L	T	3	
0100	4	PF	RES	BYP	PN				d	m	u		D	M	U	4	
0101	5	HT	NL	LF	RS				e	n	v		E	N	V	5	
0110	6	LC	BS		UC				f	o	w		F	O	W	6	
0111	7		IL	ESC					g	p	x		G	P	X	7	
1000	8								h	q	y		H	Q	Y	8	
1001	9							\ ^a	i	r	z		I	R	Z	9	
1010	A	SMM	CC	SM	‡	!	; ^a	:								{ ^a	
1011	B	VT			.	\$,	#									
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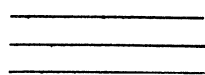
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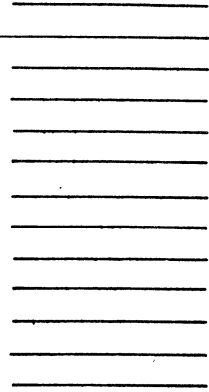


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