

2780 Remote Computer Systems

Installation Notes

Order No. DEC-11-CCDNA-A-D

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PREFACE

This manual is intended to assist the Digital Software Specialist and the customer's systems programmer in the installation of the 2780 Remote Computer System software package. The following documents are to be used in conjunction with this publication.

PDP-11 Option Bulletin for D11 Synchronous Line Interface

2780 Remote Computer System Operator's Guide
DEC-11-CRCSA-A-D

PDP-11 Peripherals and Interfacing Handbook
112-01071-1855

IBM POWER II/RJE: Program Description and Operations Manual
GH20-0761-1

IBM System/360 Operating System: Basic Telecommunications
Access Method
GC30-2004

IBM System/360 and System/370 ASP. Version 3 Asymmetric
Multiprocessing System Programming Guide
GH20-1292-0

IBM System/360 Operating System Remote Job Entry
GC30-2006

IBM System/360 Attached Support Processor (ASP) Version 2
System Programmer's Manual
GH20-0323

Chapters 1 and 2 are a brief introduction to RCS and the control computer requirements. Chapter 3 describes the operating system hardware and how to check it for correct functioning. Chapter 4 describes OS/RJE generation and Chapter 5, OS/RJE commands. Chapters 6 and 7 contain the HASP system generation and command information. Chapters 8 and 9 present information on ASP system generation and commands. Finally, Chapters 10 and 11 give the same types of information for DOS/Power.

Because the operation of the various IBM operating systems varies, the information contained in this manual is intended solely as a guide. Its applicability varies from version to version and from operating system to operating system. The user must supply his operators with the applicable IBM documentation for the operating systems associated with his particular installation.

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CHAPTER 1

INTRODUCTION TO THE 2780 RCS

1.1 INTRODUCTION

The Remote Computer System (RCS) is designed to provide remote users of IBM 360 and 370 system with both on-site processing and remote job entry compatible with the IBM 2780 Model 1. The Remote Computer System is available in two forms.

1. A core-only PDP-11 2780 system for conventional card reader input and line printer output.
2. A DOS-11 PDP-11 2780 system for transmission directly to and from mass storage devices as well as card reader input and line printer output.

Both versions are built around the 16-bit PDP-11 computer family and COMTEX-11 software. Each RCS may include any PDP-11 family processor and can be expanded with the full range of the PDP-11 peripherals to support a wide range of local processing applications.

CHAPTER 2

CENTRAL COMPUTER REQUIREMENTS

2.1 The central computer must be an IBM 360 or 370 that is running OS/RJE, DOS/Power, MASP/RJE, or ASP/RJP. The central computer communications adapter must be one of the following types.

2701 with an SDA II synchronous interface, with or without the transparency feature. *

2703 with a synchronous data adapter, with or without the transparency feature. * 3704 or 3705 programmable communications interface running in Emulation mode.

* OS/RJE operation requires the transparency feature.

Suitable replacements can be selected if the user wishes; however, it is the user's responsibility to ensure compatibility with the IBM adapter.

It is recommended that private line modems being used on a full duplex channel (4-wire) be strapped with continuous carrier to minimize turnaround delays.

CHAPTER 3

OPERATING SYSTEM HARDWARE REQUIREMENTS

3.1 CORE 2780 RCS HARDWARE CONFIGURATION

The core version of the 2780 RCS supports the following required hardware.

- * PDP-11/10, PDP-11/20, PDP-11/40, or PDP-11/50 central processor with a minimum of 8K words of core memory
- * Console DECwriter
- * KW11-L or KW11-P system line or real-time clock
- * DP11 synchronous line interface
- * Bell System 201A modem, or equivalent (user-supplied)
- * KG11 communications arithmetic element for error detection
- * LP11 132-column line printer
- * CR11 80-column punched card reader
- * PR11 high-speed paper tape reader, magnetic tape cassette, or PC11 high-speed paper tape reader/punch, for program loading only

3.2 DOS 2780 RCS HARDWARE CONFIGURATION

The DOS 2780 RCS is offered in three binary load module versions: one with COMTEX-11 support of the CR11 card reader and the LP11 line printer, one with only the LP11, and one with no support of the CR11 or LP11. A list of the minimum system components is listed below.

- * PDP-11/10, PDP-11/40, or PDP-11/50 central processor with a minimum of 16K words of memory
- * RK11/RK05 removable disk memory
- * RF or RP disk devices
- * Console DECwriter
- * KW11-L or KW11-P system line or real-time clock
- * DP11 synchronous line interface
- * Bell System 201A modem, or equivalent (user-supplied)
- * KG11 communications arithmetic element for error detection
- * LP11 or LS11 132-column line printer
- * CR11 80-column punched card reader (optional)

In addition, a system can include any of the following devices, at least one of which must be used for program loading.

- * TU10 magnetic tape drive
- * TU56 DECTape device
- * PR11 high-speed paper tape reader, or PC11 high-speed paper tape reader/punch

To run the system described in this manual, the user requires DOS/BATCH-11 Version 8.08, or BATCH-11 Version 9.09, or later.

3.3 CHECKING THE HARDWARE CONFIGURATION

To check that the hardware configuration is working, insure that the following hardware is properly installed.

1. One of the following system clocks:
KW11-L with a device address of 177546 and a vector address of 100 or KW11-P with a device address of 172540 and a vector address of 104
2. One of the following console terminals:
KL11 or DL11 A or B with a device address of 177560 and a vector address of 60; with a Model 33 or 35 Teletype or a Digital LA30-S at 110 or 150 baud or a Digital VT05-A or -B at 110, 150, or 300 baud; or with a Digital LA30-P console with a device address of 177560 and a vector address of 60

NOTE

Console terminal speed restrictions only apply to the CORE package.

3. One of the following line printers:
LP11 with a device address of 177514 and a vector address of 200 or an LS11 with a device address of 177514 and a vector address of 200.

NOTE

Only 132-column line printers are supported.

4. CR11 with a device address of 177160 and a vector address of 230.

NOTE

The card reader is optional for the DOS 2780 RCS. If not present, ensure that the correct load module is used.

5. One of the following synchronous serial line adapters:
DP11 with a device address of 174770 and a vector address in the range 300 through 376; or DUL1 with correct device address for the system configuration and a vector address in the range of 300 through 476.

DUL1 with a correct device register assignment in the float-address space as defined in the DUL1 maintenance manual. If no DJ11, DH11, or DQ11 is present in the system configuration, this address is 160050. The first DUL1, if multiple DUL1's are present, should be utilized with the 2780 RCS.

6. KG11-A Communications Arithmetic Unit installed at device address 170700.

If the synchronous device vector address used is not in the specified range, it may be patched by loading the contents of addresses 300, 302, 304, 306 into the vector addresses of the devices. Patching must occur after loading the system, but before typing ONLI.

If any of these are not installed correctly, call field service because the RCS will not perform as expected.

3.4 CHECKING THE COMMUNICATIONS DATA-LINK

Check that the modem (or dataset) is one of the following (i.e., one that DEC knows is compatible with the 2780 RCS).

Bell System 201A3
Bell System 201B
ICC 2200/20
ICC 4400/48

If the modem is not one of these, and you encounter communication problems, try the following tests and then contact Software Product Support to find out if we know of problems interfacing with this modem. If the modem is one of those listed and you encounter problems, try the following tests and then contact the modem manufacturer support people.

3.4.1 Modem Testing

The following procedures apply to the testing of all modems and require reference to the synchronous device (i.e., DP11 or DU11) Maintenance Manual or Product Bulletins.

1. Load the 2780 RCS binary program, select the transmission code, and type ONLINE.

Use the following procedures to test a modem connected to a private line.

2. Halt the computer and examine the synchronous device registers for the presence of Terminal Ready, Dataset Ready, and Carrier (if the modem is strapped for continuous carrier. The Lead should be on. If not, the problem may be an incorrect address assignment (see Section 3.3) or a device malfunction.
3. Proceed with steps 4 and 5 listed for dial-up modem testing (below).

Use the following procedures to test a modem connected to a dial-up line.

4. Halt the computer and examine the synchronous device registers for the presence of Terminal Ready. The Lead should be on. If not, the problem may be an incorrect address assignment (see section 3.3) or a device malfunction.
5. If the Terminal Ready is on, resume program operation by pressing the "Continue" button, and try to establish a data connection with the remote modem. If no answer tone is received from the remote modem, the problem probably lies in that modem or modem interface. If an audible answer tone is detected, but the modem does not stay in data mode (i.e., the data light remains off after the DATA button is pressed), the problem may lie in the modem or the device/modem cable.

NOTE

Dial-up 2780 device installation or maintenance can make use of the PDP-11 configuration in Maynard which is equipped with 201A modems and an operational configuration. Software Product Support must be contacted to arrange for an on-line test.

3.4.2 Modem Transmission Testing

If the modem data connection is established (dial-up) or verified (leased line), you can perform another simple test before proceeding with on-line operation.

With the 2780 RCS program in ONLINE mode and the proper transmission code selected, typing the TERM command should result in two on-line responses being printed on the console (i.e., * * CR LF * * CR LF). Output of both asterisks indicates the successful transmission of the EOT control message, thus verifying the correct modem transmit operation (i.e., Transmit Clock, Clear To Send).

NOTE

A quick check of the modem's transmit signals can be made by halting the 2780 RCS program after the data connection has been established and causing the 2780 RCS to "Idle Sync". Examining the registers should verify the presence of "Request To Send", "Clear To Send", and "Modem Ready" (in addition to "Terminal Ready", and "Idle Sync").

For the DP11, set "Terminal Ready" and "Idle Sync". For the DU11, set "Terminal Ready", "Idle Sync", "Send", "Request To Send", and deposit a character in the transmit data buffer. If the data-link

is 2-wire (i.e., a 201A), set "Strip Sync" and reset "Half Duplex". The SYN characters being transmitted should be detected by the device receiver causing "Receive Active" to be set in the Receive Register of the device. The SYN character should be observable in the device Receive Data Buffer.

If the checks, listed above, indicate normal modem operation, proceed to on-line RCS operation.

If the modem is not one of those listed in section 3.4, and no communication problems are encountered, please send the information to Software Product Support so that the list can be updated.

CHAPTER 4

OS/RJE OPERATION

4.1 OS/RJE OPERATION

4.1.1 Normal Operation

Sending Input -- Code should be selected as EBCDIC transparency after going on-line. RJSTART card is placed in the card reader. If additional input is to be sent, a LOGON card and the additional input follow the RJSTART.

Special Forms Output -- Output requiring special forms or cards is automatically discontinued by the central system before it is transmitted, and a message giving the required form or card number is sent from the central system to the 2780.

Printer -- For printed output, the required forms must be placed in the printer and a CONTINUE command must be transmitted from the 2780 reader. Upon receipt of this command the central system transmits the output.

Preparing More Input -- While output is being written on the printer, the operator may load and ready the reader to send more input. Since the terminal is already in the active or processing state, no RJSTART command is submitted. Unless the terminal is in the processing state and a new user desires access to the system, no LOGON command is required. When the output to the printer is finished, the 2780 may send input. On a switched line the reader must be readied within approximately three minutes to prevent the central system from disconnecting the line.

4.1.2 Error Recovery Procedure

In general, the detection of any permanent line I/O error at the central system will cause the terminal to be disconnected. When this happens, the line connection must be reestablished (for a switched line) and the RJSTART and LOGON commands must be resubmitted along with the last unacknowledged input. A line error message will be returned along with the RJSTART accepted message. Other errors, and their associated recovery procedures, are described below.

4.1.3 Failure During Input

When the 2780 RCS card reader fails (jams, etc.), the condition should be corrected and the card reader and printer brought to the ready status. On a switched line, recovery must be made within

approximately three minutes for input to be resumed according to the error recovery procedures defined in the 2780 manual. If the time required to ready the reader exceeds three minutes on a switched line, an RJSTART and a LOGON command are required to resume input operations, and the entire job must be resubmitted.

4.1.4 Time-Outs

The user has the responsibility for disconnecting the 2780 RCS from the RJE system. If he wishes to remain connected, he does nothing to continue input operations even if he has completed submitting jobs. Otherwise, the user must submit an RJEND statement at the end of his input to allow the RCS 2780 to be disconnected from the system. After the RJEND ACCEPTED message is received, the data set phone must be manually hung up to physically break the connection. If the Auto Answer feature is active for the terminal, the time limit for switched line connection recovery is 21 seconds. For this reason, Auto Answer should normally be off while operating RJE.

4.1.5 Failure While Receiving Output

Unit Failure -- When the printer or punch fails, the condition should be corrected. On a switched line, if the problem can be brought to ready status within three minutes, a CONTINUE command may be transmitted, and the output will resume according to the option specified in the CONTINUE command. If recovery requires more than three minutes, the connection must be reestablished and an RJSTART command must be transmitted. The interrupted data can then be transmitted from the point of interruption. On a nonswitched line there is no time limit, and the output may be requested via a CONTINUE command.

NOTE

If punched output is to be received, blank cards must follow the CONTINUE command to trigger the Auto Turnaround feature.

Central Failure -- If the central system fails while output is in progress, the terminal is placed in an inactive status. When the central system comes back on line, submit an RJSTART command. The message ABNORMAL CENTRAL CLOSEDOWN is returned with the RJSTART acknowledgement message. After these messages, output that was in progress at the time of the failure is resumed from the beginning. If a remotely submitted job of a higher priority than the partially returned job completes after the central system is reactivated, but before RJE is reactivated, immediate output from the higher priority job will be returned before the interrupted output is transmitted.

4.1.6 Recommended Operating Suggestions

To minimize the recovery effort in case of an error, the following procedures are recommended to the 2780 operator.

1. The RJSTART and LOGON commands may be submitted separately to insure that they are correct.
2. Job input streams should be limited to a few jobs in order to reduce the number that must be resubmitted in case of an input error that requires the central system to flush the entire input stream.
3. Remote Job Entry operations on the 2780 are in EBCDIC transparency mode at all times.
4. For a 2780 terminal on a switched line to be disconnected after normal operation has completed, an RJEND statement should be submitted immediately after all input has been entered. After the RJEND ACCEPTED message is received, the dataset phone must be manually hung up to physically break the connection.
5. Unattended operation of the 2780 on a switched line is not recommended. On a switched line, the operator must correct input failures (card jam, etc.) within three minutes or the entire job must be resubmitted. Although no recovery time exists for terminal failures on a multi-point line, the line remains logically attached to the terminal until the error is corrected. During this period other terminals on the line are denied access to the system.

CHAPTER 5

OS/RJE GENERATION

The contents of the RJE system to be generated are specified by the RJE macro instructions. The coding conventions and formats of the macros are the same as those for normal assembly macro instructions.

NOTE

Erroneous assemblies may result if extraneous cards have been inserted into the macro instruction deck or if an END statement has been omitted as the last card in the macro deck.

Table 5-1 provides a summary of RJE macro instructions.

Table 5-1
Summary of RJE Macro Instructions

Name	Operation	Operand
name	RJELINE	$\left\{ \begin{array}{l} \text{DDLIN}=\text{ddname} \\ \text{DDSYSIN}=\text{ddname} \end{array} \right\}$ $\left[\text{,RLN}=\underline{1} \right] \left[\text{,MSGQEB}=\underline{4} \right] \left[\text{,JOBQEB}=\underline{1\emptyset} \right]$ $\left[\text{,RLN}=\text{integer} \right] \left[\text{,MSGQEB}=\text{integer} \right] \left[\text{,JOBQEB}=\text{integer} \right]$ $\left[\text{,LERB}=\left(\left[\text{integer (1)} \right] \left[\text{integer (2)} \right] \left[\text{integer (3)} \right] \left[\text{integer (4)} \right] \right) \right]$ $\left[\text{,LERB}=\left(\left[\underline{255} \right] \left[\underline{1\emptyset} \right] \left[\underline{5} \right] \left[\underline{5} \right] \right) \right]$ $\left[\text{,ID}=(\text{type},\{\text{chars},\text{termid}\}\dots) \right]$ $\left[\text{,MODE}=\left(\left[\text{IBC} \right] \left[\begin{array}{c} \text{A} \\ \text{.B} \end{array} \right] \left[\begin{array}{c} \text{A} \\ \text{.B} \end{array} \right] \right) \right] \left[\text{,IDVER}=(\text{integer},\text{chars}) \right]$ $\left[\text{,CP}=\text{MVT} \right] \left[\text{,ONLNT}=\text{NO} \right] \left[\text{,MODEM}=\text{STANDARD} \right]$ $\left[\text{,CP}=\text{MFT} \right] \left[\text{,ONLNT}=\text{YES} \right]$
name	RJETERM	$\left[\text{,TYPE}=\underline{278\emptyset} \right] \left[\text{,PACK}=\text{NO} \right]$ $\left[\text{,PUNCH}=\text{NO} \right] \left[\text{,FEATURE}=\underline{278\emptyset}\text{MR} \right]$ $\left[\text{,PRTSZ}=\underline{12\emptyset} \right]$ $\left[\text{,PRTSZ}=\underline{132} \right]$
[name]	RJEUSER	integer ,{ (userid,key)....}
[name]	RJETABL	JOB=integer ,SYSPRT=char ,SYSPCH=char ,SYSUSER=char ,SYSRJE=char [,JOB CARD=routine name] [,JOB BACK=routine name] [,COMMERR=routine name] $\left[\text{,BUFNO}=\underline{1} \right]$ $\left[\text{,BUFNO}=\text{integer} \right]$

5.1 RJE MACRO COMMANDS

5.1.1 RJELINE - Description Of The Communications Line

The RJELINE macro instruction designates characteristics that are required by RJE to service the communications line and attached terminals. One macro is specified for each line that RJE must support. The RJELINE macros must appear first in the macro deck. In addition, when line groups are used, they must be grouped by relative line numbers in ascending order. Line group denotes a logical grouping of communication lines. This grouping is done by concatenation of DD statements in the cataloged procedure, or with the UNITNAME macro during system generation. If lines are to be grouped, three conditions must be met.

1. All line connections must be the same, either switched or nonswitched.
2. All terminals within the line group must be of the same type.
3. All lines must be attached to the same type of control unit.

Table 5-2 summarizes the RJELINE command.

Table 5-2
RJELINE Command

Name	Operation	Operand
name	RJELINE	DDLINE=ddname .DDSYSIN=ddname [<u>.RLN=1</u> <u>.RLN=integer</u>] [<u>.MSGQEB=4</u> <u>.MSGQEB=integer</u>] [<u>.JOBQEB=10</u> <u>.JOBQEB=integer</u>] [<u>.LERB=</u> ([integer (1) 255] [integer (2) 10] [integer (3) 5] [integer (4) 5])] [<u>.ID=</u> (type, {chars, termid}....)] [<u>.MODE=</u> ([IBC] [<u>.A</u> B] [<u>.A</u> B])]

Table 5-2 (Cont.)
RJELINE Command

Name	Operation	Operand
		[.IDVER=(integer,chars)] [.CP=MVT] [.ONLNT=NO] [.CP=MFT] [.ONLNT=YES] [.MODEM=STANDARD] [.MODEM=CC3977] [.MODEM=PTT]

Additional explanation of line groups is provided in the publication IBM System/360 Operating System: Basic Telecommunications Access Method, GC30-2004. The information supplied by this macro provides:

1. Access to line information specified at system generation.
2. Identification of line groups, to avoid a need for additional control blocks.
3. Threshold values for error counters that cause an error message to be displayed to the central operator when any of the values is reached.
4. The polling list for multidrop lines, giving the polling characters of the terminals.
5. A description of optional features available on the communications control unit to which the line is attached.
6. The OS control program under which RJE is to operate.

Name Field

name

Specifies the name of the line. This name is used as a parameter in the SHOW command to request error information about the line.

Operand Field

DDLIN=ddname

Is the name specified in the DD statement defining the line (or line group). The DD statement defining the line must be included in the cataloged procedure required for RJE (see Cataloged Procedures for RJE).

NOTE

Except in the case of line groups, the ddname must be unique.

DDSYSIN=ddname

Is the name of the DD statement defining the SYSIN data set for the line. This DD statement must also be part of the cataloged procedure for RJE.

RLN=1

RLN=integer

Specifies the relative line number of this line within the line

group. If this keyword parameter is omitted, RLN=1 is assumed.

MSGQEB=4

MSGQEB=integer

Specifies the number of messages that can be queued for a terminal at any given time.

JOBQEB=10

JOBQEB=integer

Specifies the number of jobs that can be queued for a terminal at any given time.

NOTE

It is recommended that the number of QEB's specified be greater than or equal to the number of jobs being submitted on any given line at any given time in the system.

LERB= $\left[\begin{array}{c} \text{integer (1)} \\ \underline{255} \end{array} \right] . \left[\begin{array}{c} \text{integer (2)} \\ \underline{10} \end{array} \right]$
 $\left[\begin{array}{c} \text{integer (3)} \\ \underline{5} \end{array} \right] . \left[\begin{array}{c} \text{integer (4)} \\ \underline{5} \end{array} \right]$

Specifies the various threshold values. If an error threshold is reached before the transmission threshold, a message containing line error information is displayed to the central operator. If no error counter reaches its threshold value before this number of transmissions have occurred, the current values of all counters are added to their respective accumulators, and the counters are reset to zero. These accumulator values may be displayed with the command: SHOW LERB, linename (see Central Commands). The allowable values are integers 1-255 inclusive. The underlined value is assumed for any parameter omitted.

Integer(1) -- transmission threshold
integer(2) -- data check threshold
Integer(3) -- lost data threshold
Integer(4) -- nontext time-out threshold

ID=(type, {chars,termid....})

Specifies the type of terminals attached to the RJE system via a multipoint line. This parameter must be omitted.

MODE=([IBC] $\left[\begin{array}{cc} \text{A} & \text{A} \\ \text{.B} & \text{.B} \end{array} \right]$)

IBC (Intermediate Block Check) specifies that the transmission control unit will recognize the intermediate block-check character and perform block checking without turning the line around. If this suboperand is omitted, intermediate block checking is not performed. The parameter IBC is required for 2780.

A

Specifies that communications are to be through the Dual Communications Interface A of the 2701 Data Adapter Unit.

B Specifies that communications are to be through the Dual Communications Interface B of the 2701 Data Adapter Unit. The 2701 must have the dual interface feature in order to code B. If this suboperand is omitted, A is assumed.

A Specifies that transmission will be in code A for 2701 Data Adapter Unit Dual Code Feature.

B Specifies that transmission will be in code B for 2701 Data Adapter Unit Dual Code Feature.

If this suboperand is omitted, A is assumed. The code selected must be in EBCDIC.

Programmer's Note:

If the transmission control unit is a 2703, the last two suboperands must be omitted.

IDVER=(integer,chars)
This parameter must be omitted.

CP=MVT
Specifies the RJE system is to operate in an MVT system. The MVT system is assumed if the CP keyword is omitted.

CP=MFT
Specifies the RJE system is to operate in an MFT system.

ONLNT=NO
ONLNT=YES
Specifies whether the option ERROPT=T is set in the BTAM DCB macro instruction for RJE. If the parameter ONLNT=YES is specified, ERROPT=T is set and the BTAM on-line test facility is included in the central program. This allows on-line test to be invoked without discontinuing RJE at the central computer. For information on using the on-line test feature see IBM System/360 Operating System Basic Telecommunications Access Method, GC30-2004. If the parameter is omitted, on-line test is not included.

MODEM=STANDARD
Specifies the type of data set to perform the modulation-demodulation and control functions necessary to provide compatibility between remote terminals and the central installation.

STANDARD specifies that a standard data set is present. If this operand is specified, the line connection to the central system can be either switched or nonswitched. If the MODEM parameter is omitted, a standard data set is assumed.

5.1.2 RJETERM - Description of Terminals

The RJETERM macro is used to describe each terminal to the RJE system. One macro instruction must be specified for each terminal to be supported by RJE.

Table 5-3 summarizes the RJETERM command.

Table 5-3
RJETERM Command

Name	Operation	Operand
name	RJETERM	[<u>TYPE=2780</u>] [<u>.PACK=NO</u>] [<u>.PUNCH=YES*</u>] [<u>.PUNCH=NO</u>] [<u>.FEATURE=2780MR</u>] . <u>PRTSZ=120</u> . <u>PRTSZ=132</u>

Name Field

name

Assigns the RJE symbolic name to the terminal. This name, called the termid, identifies the terminal to RJE. The terminal is referred to by the termid rather than by its machine address. The termid is used in logically attaching the terminal to the RJE system, in routing messages to the terminal, and in retrieving information for the terminal.

Operand Field

TYPE=2780

Identifies the type terminal as:

An IBM Data Transmission Terminal (TYPE=2780).

If this parameter is omitted, the terminal is assumed to be 2780.

PUNCH=NO

Specifies NO card punch is available at the 2780 RCS

PRTSZ=120

PRTSZ=132

Specifies the length of the print line at the terminal. A print line of 120 characters is assumed if the parameter is omitted. The 2780 RCS does not support print lines greater than 132 characters.

(*Applies only if selective receive feature is used. Not supported by Code 2780 RCS

PACK=NO

Specifies whether or not the terminal uses the compress/expand option. If the parameter is omitted, NO is assumed.

FEATURE=2780MR

Identifies a 2780 terminal with the multiple record feature.

5.1.3 RJEUSER - Define The User Directory

The RJEUSER macro allows each installation to tailor the RJE user directory to its own needs. When the central system is assembled, each installation must indicate the maximum number of users with access to the RJE system. In addition, RJE user identification (userid) and protection (key) assignments may be made at this time. If the userid and key assignments are incomplete, the central operator can add to them dynamically by command if space is available in the directory. A new assembly is not necessary to add users unless the directory is full. If a projected figure is used, rather than one which satisfies only immediate requirements, unnecessary RJE assemblies can be avoided.

Name	Operation	Operand
[name]	RJEUSER	integer [,({userid,key})....]

Name Field

name

Any valid directory name

Operand Field

integer

Specifies the maximum number of userid-protection key assignments to be made. This number should be the projected number of such assignments for the system. The integer value specified must be from 1 to 999 inclusive.

userid,key

Designates the user identification (userid) and protection (key) assigned. The userid and key are specified as a pair and are entered in the user directory during the macro expansion. These must be three characters each and the userid must begin with an alphabetic character.

Programmer's Note:

The userid and protection key must contain only alphameric characters. These are A-Z, 0-9, \$, , and @. Also, each must be three characters long.

Example:

The projected number of userid-key assignments for the system is 20, but only 5 userid-key pairs have been specified. The following macro may be specified.

```
RJEUSER 20,HYE,123,AND,12$,LOW,  
1@ ,PDQ,444,LRM,111
```

5.1.4 RJETABL - Furnish Exit, Sysout, And Remote Job Information

The RJETABL macro is used to specify:

1. The maximum number of remote jobs that may reside in the central system at a given time;
2. The SYSOUT class assignments for remote job output and the class reserved for RJE at the central installation;
3. Whether the provided user exits are desired.

The macro creates the necessary control blocks to handle the remote jobs and provides the desired exits.

Name	Operation	Operand
[name]	RJETABL	JOB=integer .SYSPRT=char .SYSPCH=char .SYSUSER=char .SYSRJE=char [.JOBCARD=routine name] [.JOBACK=routine name] [.COMMERR=routine name] .BUFNO=1 .BUFNO=integer

Name Field

name

Any valid directory name

Operand Field

JOB=integer

Specifies the maximum number of remote jobs that may reside in the central system concurrently. When this value is reached, no more remote jobs are admitted to the system. The integer value specified must be from 1 to 999 inclusive.

SYSPRT=char

Identifies a SYSOUT class for printed output at the central installation. All SYSOUT data sets of remotely submitted jobs must use this character for printed output.

SYSPCH=char

Identifies a SYSOUT class for punched output at the central installation. All SYSOUT data sets of remotely submitted jobs must use this character for punched output.

SYSUSER=char

Identifies the SYSOUT class for output to be passed to a user-written output routine for processing. If the terminal supports a user-written output routine, it receives all output in this data set for processing. If the terminal supports the user exit, but the option is not exercised, or the terminal does not support a user exit, (e.g., the 2780) output identified with this output class is printed at the remote terminal.

SYSRJE=char

Identifies the SYSOUT class assigned to RJE at the central installation. This class must be reserved for the use of RJE only. If locally submitted jobs place output in this class, the output is deleted. It is recommended that the user assign the RJE SYSOUT class in the range of 0-9.

Programmer's Note:

If a user specifies SYSOUT data sets other than those for printed, punched or user-exit output, the data set returned to the terminal is printed. If the user-exit output is returned to a terminal with no user exit, the output is printed.

JOB CARD=routine name

Is the name of the user-written routine that examines a remotely submitted JOB statement, including continuation cards. This routine name identifies the entry point of the routine given control when a JOB statement is received.

JOBACK=routine name

Is the name of the user-written routine that may examine and modify the job acknowledgment message. This routine name identifies the entry point of the routine given control before the job acknowledgment is sent.

COMMERR=routine name

Is the name of the user's routine that examines communications errors encountered during RJE operation. The routine name identifies the entry point of the routine given control after the error is found.

BUFNO=1

BUFNO=integer

Specifies the maximum number of central commands that may be queued for processing at one time. If this value is exceeded, all additional central commands are rejected and must be resubmitted after the pending commands are processed. The integer specified must be from 1 to 100 inclusive. If this parameter is omitted 1 is assumed.

Central command queuing is desirable for installations entering multiple RJE central commands from the card reader, for example, to initialize a broadcast data set.

5.2 OS/RJE COMMANDS

Command statements provide a convenient means of requesting RJE system facilities for the remote environment. Terminal commands allow users at the remote terminals to communicate with the RJE system and request RJE facilities.

Terminal commands are interspersed between job entries in the input stream. They must not be included within a job entry since collection of the job entry stops when a JECL statement is encountered.

The command statement contains the identifying characters (..) in columns 1 and 2, the command and, in most cases, an operand field. In addition, the sequence field may be used for statement identification. RJE returns this field with all responses and diagnostics pertaining to the statement. Any comments appear after the operand field, separated from it by at least one blank. If the operand field is not present, and comments are desired, the user codes a comma to indicate that the operand field is absent and that the information specified is a comment. The user must follow the comma with a least one blank before his comment. No comma is required if the command has no operand.

NOTE

A command statement cannot be continued.
It must be coded on one card or card image.

5.2.1 Functions of Terminal Commands

The commands available to RJE users and operators at remote terminals provide a number of capabilities.

1. Commands used to define the state of the terminal:

RJSTART
RJEND
LOGON
LOGOFF

2. Commands used to manipulate job output:

OUTPUT
CONTINUE
DELETE

3. Commands used to provide job and system information:

ALERT
 STATUS
 BRDCSTR

4. Command used to communicate among RJE users:

MSGR

A complete description of the terminal commands and their operands follows. These commands are summarized in Table 5-4.

Table 5-4
 Summary of Terminal Commands

ID	Operation	Operand
..	RJSTART	termid [.BRDCST=NO . BRDCST=YES [.call=integer]
..	RJEND	(no operand)
..	LOGON	userid,key
..	LOGOFF	(no operand)
..	OUTPUT	[J=jobname U=userid *]
..	CONTINUE	[BEGIN NO]
..	DELETE	J=jobname
..	ALERT	[J=jobname * /]
..	STATUS	[J=JOBNAME U=userid * T]
..	BRDCSTR	(no operand)
..	MSGR	M='text' [.U=userid] [.T=termid]

5.3 RJE COMMANDS

5.3.1 RJSTART -- Attach a Terminal to the RJE System

The RJSTART command logically attaches a terminal to the RJE system. The RJSTART command must be the first statement received from an inactive terminal (one not currently attached to the system). This command identifies the terminal to RJE. It also allows the terminal to request broadcast messages before continuing RJE processing. Communication proceeds between the central system and the terminal when a valid RJSTART command is received. Once the terminal is logically attached, it can monitor the RJE system for output directed to it, and users may again access to the central system by logging on at the terminal. If the terminal has the Auto Call special feature installed, the user can give a telephone number of the central system as a parameter. If the user codes this parameter, the terminal calls the number specified.

In addition, the RJSTART command implies continuation of interrupted or discontinued output on a restart condition. If there was no central closedown in the interim, RJSTART causes resumption of the discontinued output from the point at which the output was discontinued. If there was a central closedown while output was discontinued for the terminal, output transmission resumes at the beginning of the interrupted data set.

Operation	Operand
RJSTART	termid .BRDCST=YES .BRDCST=NO

termid

Specifies the RJE name of the terminal that is supplied to RJE by the installation when the program for the central system is assembled. It may consist of one to eight alphameric (alphabetic and numeric) characters, the first of which must be alphabetic. If the termid specified is not recognized as a valid name, RJE rejects the command, and a corrected statement must be submitted.

BRDCST=YES

Specifies that a copy of the broadcast messages is desired before the terminal continues RJE processing.

BRDCST=NO

Specifies that a copy of the broadcast messages is not desired at the terminal. This option is assumed by RJE if the parameter is omitted.

NOTE

The RJSTART command must be the first statement submitted at an inactive terminal. If the terminal desires to resume RJE activity after it has been logically detached from the system (after an RJEND command or a system failure), it must resubmit the RJSTART

command. In a restart condition, the RJSTART also implies a CONTINUE command with no operand (see the CONTINUE command).

5.3.2 RJEND -- Detach a Terminal From the RJE System

The RJEND command allows an RJE user to logically detach his terminal from the system. When the RJEND command is received by the central system, shutdown activities are initiated for the terminal. Shutdown activities involve transmission of all available messages directed to the terminal. No job output is returned to the terminal after the RJEND command is received. The last message sent to the terminal indicates that the RJEND command was received and that the terminal is now logically detached from the system.

If the terminal is connected to the central system via a switched connection, the connection is broken. The operator should not take his terminal off-line before he has received the message indicating that the RJEND command was accepted, because the central system will note an error condition that will have to be resolved at the next terminal startup. No further communication occurs until the terminal resumes RJE activity with an RJSTART command.

Operation Operand

RJEND (no operand)

5.3.3 LOGON -- Begin Session in RJE

A user at a terminal logically attached to the RJE system issues a LOGON command to start his session. The command identifies the user to RJE and allows him access to the system. By checking the userid and key specified in the LOGON command, RJE guarantees that only valid users can submit input or request output from the system. The LOGON command remains in effect until another LOGON, a LOGOFF, or an RJEND command is issued.

Operation Operand

LOGON userid,key

userid

Specifies the RJE name assigned to the user by the installation (userid). If the userid specified in this parameter is not valid, RJE rejects the command, and a corrected statement must be submitted.

key

Specifies the valid protection key assigned with the userid. If the key specified in this parameter is not the key that was assigned with the userid, the LOGON command is rejected. The RJE

system never prints a protection key at a terminal.

1. Only two statements other than the LOGON command may follow the RJSTART command: RJEND or CONTINUE.
2. The userid-key pair assignments are specified either at RJE assembly time or dynamically by the central operator with the USERID command.

Programmer's Note:

A user cannot be logged on at more than one terminal at a time. If a user desires to change terminals, he must log off at his old terminal. If a user who is logged on at one terminal submits a LOGON command at another terminal, the second LOGON command is rejected.

5.3.4 LOGOFF -- End a Session

With a LOGOFF command, the user indicates that he has completed his session. After receiving a LOGOFF command, RJE refuses input from the terminal until another LOGON command is submitted. However, the operator can continue to monitor the system for output directed to the terminal, or he can issue an RJEND command to logically detach the terminal from the system.

Operation Operand

LOGOFF (no operand)

NOTE

If the central system receives a valid LOGON command from a terminal with a session in progress, the central system logs off the current user and logs on the user identified in the LOGON command. If the central system receives an RJEND command from a terminal with a session in progress, it logs off the user and logically detaches the terminal.

5.3.5 OUTPUT -- Request Job Output

Deferred job output is retrieved with the OUTPUT command. If the user is a valid recipient and output is available, RJE returns the output to the user. If the job is not complete when its output is requested, RJE returns a message indicating this. The OUTPUT command must be resubmitted after the job has completed. The OUTPUT command provides three capabilities:

1. The user may request (in a specific request) the deferred output of a specific job in the system.
2. The user may request (in a minor request) all deferred output created by jobs submitted by a specified user and naming the requestor as a valid recipient.
3. The user may request (in a major request) all deferred output naming the requestor as a valid recipient.

If the user is not a valid recipient of the output, an invalid request response is returned. If output is requested for a job that is not in the system or is already enqueued for delivery, notification also is returned to the user.

Operation Operand

OUTPUT [J=jobname
 U=userid
 *]

J=jobname

Indicates that the request is for the deferred output of the job named in the parameter (specific request). The user receives the output if he originated the job or is named as a valid recipient for the output.

U=userid

Indicates that the request is for deferred output from all jobs, submitted by the name user, designating the requesting user as a valid recipient (a minor request). If the user gives his own userid, or omits the operand, he receives all available output from jobs submitted by him.

The coded value * (asterisk), indicates that the request is for all deferred output in the system for which the user is a valid recipient (a major request). The user receives all available deferred output of jobs submitted by him and of jobs submitted by other user naming him as a valid recipient.

no operand

If the operand field is left blank, RJE returns to the user all the available deferred output created by jobs that the user, identified in the current LOGON command, has submitted. In effect, RJE assumes U=userid with the requesting user designated as recipient.

NOTE

A user cannot receive deferred job output from another user's job unless he is named as a valid recipient. A user is automatically a valid recipient of job output if he submits the job.

5.3.6 CONTINUE -- Request Discontinued Job Output

The user or operator at a terminal specifies the disposition of discontinued output with the CONTINUE command. Output may be discontinued under one of the following conditions:

1. A forms requirement message, indicating a change in the form number specified for the output, is sent to the terminal.
2. Operator intervention at the terminal causes output to be discontinued.
3. Equipment failure during an output operation causes an interruption in output.

When interrupted output is held for an active terminal, no output is returned to the terminal until a CONTINUE command is received by the central system. RJE continues to accept input from the terminal, however. If the remote operator submits an RJEND command while output is discontinued, continuation of discontinued output is implied when the remote operator submits his next RJSTART command. If there was no central closedown before the RJSTART was received, transmission of the discontinued output data resumes from the point it was discontinued. If there was a central closedown, the output transmission resumes at the beginning of the interrupted data set upon receipt of the RJSTART command. If the discontinue state was the result of a transmission failure, the remote terminal must first send an RJSTART. Any other input will cause the message RJSTART REQUIRED to be sent back to the remote terminal and the discontinue state will still exist. Other than this response, no output is returned to the terminal until an RJSTART command is received.

If the interrupted output is from a SYSOUT data, the CONTINUE command provides three capabilities:

1. The user can request the transmission of the entire interrupted output data.
2. The user can specify that transmission of the data be resumed with the first record of the SYSOUT block that was being written when the output was discontinued.
3. The user can specify that he does not desire the output data and can direct RJE to delete it. Output transmission resumes with the next data created in the job step or with the deallocation messages for that step.

Operation	Operand
CONTINUE	[BEGIN NO]

BEGIN

Specifies that the user desires transmission of the entire data.

NO

Indicates that the user desires RJE to delete the data and resume output transmission with the next output data or deallocation message.

no operand

Specifies that transmission of the data is to be resumed with the first record of the SYSOUT block that was being written when the output was discontinued. With blocked records there is a possibility of duplicate records since transmission is resumed at the beginning of a block rather than with a specific record.

If the interrupted output is a series of BRDCST messages, any one of the above three types of CONTINUE commands will cause the entire series of BRDCST messages to be transmitted from the beginning.

If the interrupted output is anything other than SYSOUT data or BRDCST messages, any one of the above three types of CONTINUE commands will resume transmission with the line of text that was stopped. Attempting to continue allocation or deallocation messages may cause the last several lines to be repeated. The amount of overlap varies from 0 to 5 duplicate lines.

The only time the three options of the CONTINUE command have individual effects is when a SYSOUT data was discontinued.

5.3.7 DELETE -- Remove a Job From the RJE System

With the DELETE command, the user may remove jobs from the RJE system, without receiving a copy of the job output. This command directs RJE to remove all references to the job. It does not remove named data created by the job or output data directed to the central installation. The DELETE command is not necessary to remove job output that already has been returned to the user. All references to the job in the RJE system are normally removed after the job output is returned to the user. A job can only be deleted if it is on the input queue, is executing, or has not been placed on an output queue for delivery. The DELETE command provides two capabilities:

1. The user can delete a specific job previously submitted by himself.
2. The user can delete all jobs previously submitted by himself.

NOTE

The job is not deleted from the system until the message "IHK1071 JOB DELETED jobname userid" is issued. No job with the same jobname can be entered until this message is received.

Operation	Operand
DELETE	[J=jobname]

J=jobname

Specifies the name of the job that the user desires to remove from the system. The command is rejected if the user requesting the removal is not the user who originated the job.

no operand

Specifies that all jobs currently in the system submitted under the userid in the current LOGON command are to be removed from the system. This format is useful for avoiding duplicate jobnames by clearing the system of forgotten jobs. Caution must be exercised when using this optional format. A user should not use this format if he is sharing a userid since it deletes all jobs submitted under the userid.

5.3.8 ALERT -- Request Notification of Availability of Deferred Output

The user issues the ALERT command if he wants to be alerted when deferred job output becomes available for him. The user may request to be alerted:

1. When the output of a specific job is available (specific alert);
2. When output from any job submitted by him is available (minor alert);
3. When any output for which he is a valid recipient is available (major alert).

The immediate response to the command indicates all currently available output of the job, or jobs, involved. If the command involves any job in the system not currently available, the command waits in the system and returns additional responses as job output becomes available. If the command specifies a job that is not in the system, a message indicating that no such job exists is returned to the terminal and the command is cancelled.

The response to the ALERT command contains the information necessary to retrieve the output with the OUTPUT command. It also includes any user information specified in the JED NOTIFY parameter. A valid ALERT command remains waiting in the system until:

1. It is cancelled with an ALERT / command issued by that user.
2. An RJEND command is issued at the terminal, or
3. The ALERT command response for a job, specified by jobname in the operand, is sent.

Alert command responses are sent to the terminal associated with the user who submitted the command, that is, the terminal where that user is or last was logged on. If the terminal is logically attached to the system, the response is sent regardless of who is logged on or

whether or not anyone is logged on.

Operation	Operand
ALERT	[J=jobname * /]

J=jobname

Identifies a particular job for which the user desires to be alerted. If the job addressed is in the system but not complete, the request remains pending in the system until the job is completed. If the job requested is not in the system, a message indicating this fact is returned, and the command is rejected.

*

The coded value * (asterisk) is used if the user wants to be alerted when any job output is available for him. It is especially useful if the user expects job output from other users who have specified him as an alternate recipient. The ALERT * remains pending in the system under the conditions previously described.

/

The coded value / (slash) indicates that the user desires to cancel all ALERT commands previously issued by himself. All impending ALERT commands issued by the user are cancelled when RJE receives the ALERT / command. There is no selective cancelling of ALERT commands.

no operand

If the operand field is left blank, RJE alerts the user when any job that he has submitted has output available. The command remains pending in the system under the conditions previously described.

NOTE

The user receives only one alert response for each job regardless of the number of ALERT commands issued by the user (except for a specific alert for which he will be notified each time it is submitted). For example, if the user issues an ALERT * and is alerted that two jobs have output available for him, no additional alerts for those two jobs are returned, regardless of the number of subsequent ALERT commands issued by the user. Information about the jobs, however, is always available with the STATUS command.

5.3.9 STATUS -- Determine the Status of a Job

The STATUS command allows a user to determine the status of one or more remotely submitted jobs. RJE returns the status of only those jobs, addressed by this command, that are currently in the system and for which the requester is a valid recipient. The STATUS command provides the following capabilities:

1. The user can request the status of a specific job (a specific request).
2. The user can request the status of jobs submitted by a particular user for which he is a valid recipient (a minor request).
3. The user can request the status of all jobs in the system for which he is a valid recipient (a major request).
4. The user can request the status of all jobs that are currently associated with the terminal (a terminal request).

The user receives a response for each job that satisfies the command. Each response contains the jobname and an indication of its status:

1. Scheduled (with queue position in its job class).
2. Executing.
3. Complete (normal or abnormal termination).

In addition to these responses, if the command addresses a specific job, one of two responses may be returned:

4. Not in the system.
5. Invalid request (the user is not a valid recipient).

The STATUS command does not wait in the RJE system. RJE returns the status of only those jobs in the system at the time the command is received. It does not automatically return the new status of a job when a change of status occurs. The user, however, may request notification of job completion with the ALERT command.

Operation	Operand
STATUS	J=jobname U=userid * T

J=jobname

Indicates that the request is for the status of a specific job identified by the jobname. If the user issuing the command is not a valid recipient of the job, or this job is not in the system, the status request is denied. A message is returned to the user indicating the reason.

U=userid

Indicates that the request is for the status of all current jobs submitted by the user identified with the userid for which the requesting user is a valid recipient. If the user specifies his own userid or omits the operand, he receives the status of only his own jobs currently in the system.

*

The coded value * (asterisk) indicates that the user desires the status of all jobs currently in the system for which he is a valid recipient.

T

The coded value T is used to receive the status of all jobs in the system currently associated with the terminal. A job is associated with a terminal if the user who submitted the job is or last was logged on at the terminal. This format is useful just before the terminal initiates closedown.

no operand

RJE assumes that the user issuing the command desires the status of all jobs submitted by him. In effect, it assumes U=userid with the requesting user designated.

When a user requests the status of a job submitted to and acknowledged by the RJE system, and the status response specifies that the job is not in the system, one of the following conditions has occurred:

1. If the output was specified as immediate, the output has already been returned to the terminal associated with the job.
2. If the output was specified as deferred and an alternate recipient was specified, the alternate has retrieved the copy of job output with an OUTPUT command.
3. If the userid is shared, another individual sharing the userid may have received the output.
4. The job was deleted by the user or by another user sharing his userid.
5. The central operator retrieved the job with a CENOUT command.

5.3.10 BRDCSTR -- Request the Broadcast Messages

The remote user requests a copy of the broadcast messages with the BRDCSTR command. RJE responds to this command by returning a copy of the system broadcast messages to the terminal. These messages contain information of general interest to the entire RJE system. They may include any information considered desirable by the installation and are sent only on request from a terminal. The information might include:

1. The next schedules RJE shutdown at the central system and the various terminals.
2. The next scheduled RJE startup at the central system and various terminals.
3. The installation equipment configuration and its status at the central system and various terminals.

The broadcast messages are created and maintained by the central operator.

Operation	Operand
BRDCSTR	(no operand)

5.3.11 MSGR -- Communicate Within RJE

The RJE user sends messages to other points in the RJE system with the MSGR command. Messages may be sent to the central operator, to terminals attached to the RJE system, and the RJE users. Messages sent to the central operator are displayed on his printer-keyboard when they are received. Messages are sent to a terminal if it is logically attached to the system. If the terminal is not active when RJE receives the command, the message is kept in the system until it can be delivered. This facility allows the user to "leave word" if a terminal is inactive when the command is received. RJE informs the sender of whether or not the message has been sent. Messages directed to an RJE user are sent only to the terminal where the user is currently logged on. If the user is not logged on, the command is rejected, and a response informs the sender.

If the user specifies that a message is to be sent to both a user and a terminal, RJE first tries to send the message to the specified user. If the user is not currently logged on, the message is sent to the specified terminal or remains in the system until it can be sent to the terminal.

Message text is limited to 40 characters. The MSGR command cannot be continued. Any messages requiring more than 40 characters of text must be sent by multiple commands.

Operation	Operand
MSGR	M='text'[,U=userid][,T=termid]

M='text'

Specifies the message text to be sent. The message text must be framed by apostrophes. The text itself may include as many as 40 printable characters and blanks. Apostrophes contained within the message text must be paired; each pair counts as one text

character. If the U and T key-word parameters are omitted, the message is sent to the central operator.

NOTE

The message text must be entered in uppercase from the remote printer-keyboard.

U=userid

Indicates that the message is to be sent to the user specified by the userid. The message is sent to the terminal where the specified user is logged on. If he is not currently logged on and the T keyword parameter is not included, or if the userid is not valid, the command is rejected and a response is returned to the sender. If the user specifies his own userid, when RJE receives the command it sends the message to the terminal where he is logged on. This format is useful if the user desires to have a message returned to the terminal when his input is being sent to the central system. To do this the user places the MSGR command, with the desired message, after his LOGON command.

T=termid

Indicates that the message is to be sent to the terminal specified by termid. If the message cannot be sent after it is received by the central system, it is kept until it can be delivered. If no space is available in the data reserved for deferred messages, or if the termid specified does not correspond to a terminal in the RJE system, the command is rejected, and a response is returned to the sender. The message is formatted for the central operator or another terminal as follows:

RJE MSG { *C* } FR userid(1) text

C - message by default goes to central

userid(1) - the U option is used

userid(2) - submitter

5.4 ADDITIONAL REFERENCES

Additional information on OS/RJE may be found in the following document: IBM Systems Reference Library, IBM System/360 Operating System Remote Job Entry (GC30-2006).

CHAPTER 6

HASP SYSTEM GENERATION

The remote number characteristics are defined when a central system "HASPGEN" is performed. The parameter "RMTnn" is specified with a 14-character string (explained in Figure 6-1), and defines the characteristics of remote terminals to be used with HASP Remote Job Entry.

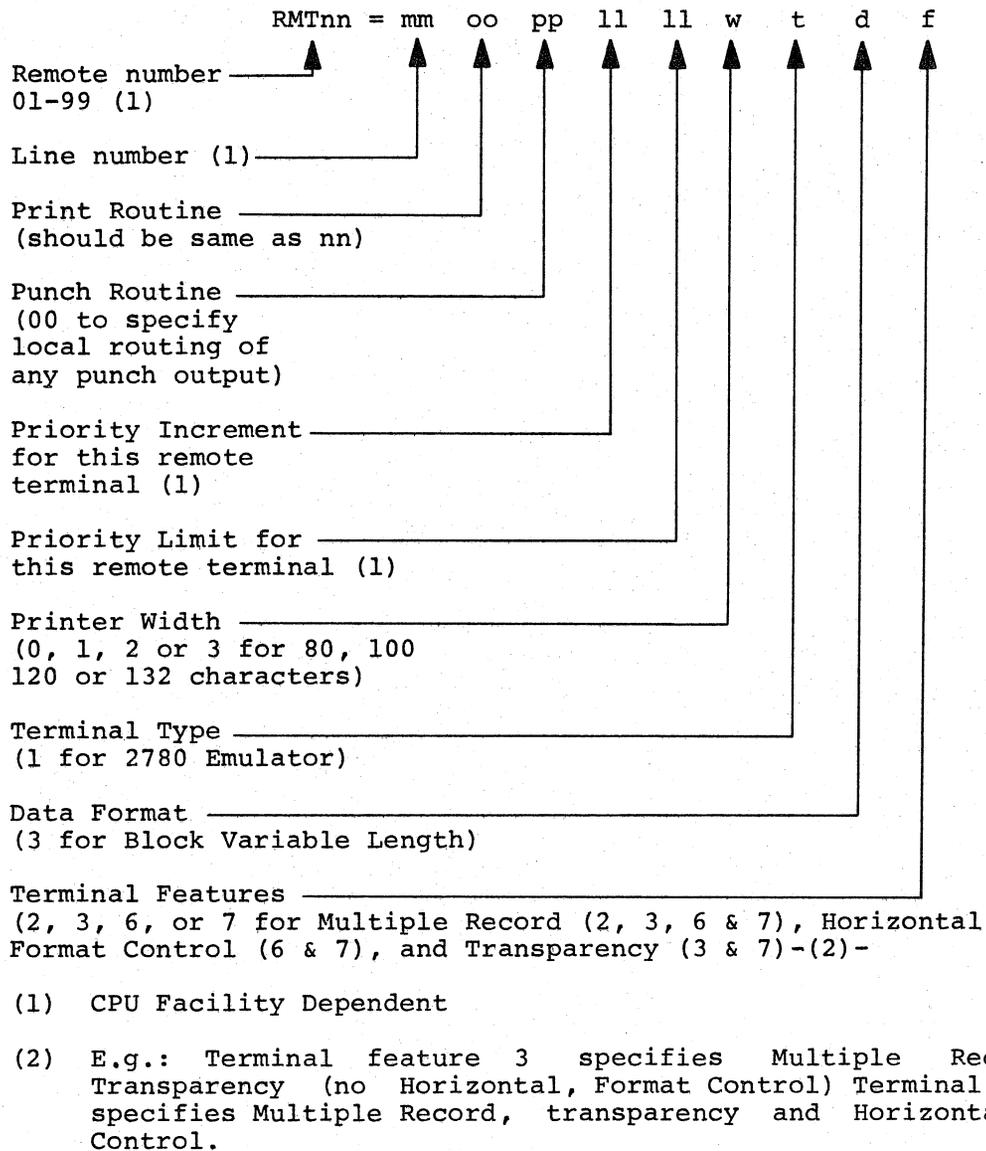


Figure 6-1
HASP/RJE Remote Terminal Characteristics

CHAPTER 7

HASP TERMINAL COMMANDS

7.1 HASP COMMANDS FROM THE 2780 RCS

The HASP System has a standard set of commands that can be issued from the remote terminal. However, in any installation, some of these commands may be absent and others substituted by user modifications to the HASP System.

The commands that HASP accepts from remote terminals are summarized below. Additional information about the commands can be obtained from the publication: The HASP System, IBM Corporation (program Number 360D051014). Information can also be obtained from the system programmer for the HASP System at the central computer site.

7.2 SIGNON AND SIGNOFF

Before the operator can issue console commands, the remote terminal must sign on to the central HASP system. Once all the desired work is completed, the operator must sign off to disconnect the terminal from the central system.

7.2.1 SIGNON Card

The first card placed in the card reader after the 2780 RCS is loaded must be a SIGNON card if one is required by the central HASP system. The card has the following format.

Col.

1 16 25

/*SIGNON REMOTEnn password (optional)

nn indicates the terminal number.

7.2.2 SIGNOFF Card

A remote job entry session is terminated by the reading of a SIGNOFF card. When it is received, the HASP system disconnects the 2780 RCS from the central system at the completion of the current print data stream. The SIGNOFF card has the following format.

Col.

1

/*SIGNOFF

7.3 HASP TERMINAL COMMANDS

To assist the terminal operator in controlling the jobstream, several HASP commands have been made available to him. The selection of commands available to the terminal operator is restricted to those affecting jobs submitted at the terminal and to those needed to control the output. These commands are punched on cards and read in through the card reader.

To use these commands efficiently, the operator needs to understand job flow through the HASP system. The normal flow of a job through the system consists of the following steps.

1. HASP reads jobstreams from terminals and/or a local card reader for queues on the disk (a special HASP spool disk).
2. Jobs are selected from the queues and delivered to OS for processing.
3. The operating system controls all phases of the job execution except card reader input and printer/punch output.
4. HASP receives the output of a job from OS and queues it on the disk.
5. If the job requires special forms for output, HASP handles the situation in one of the following ways:
 - a. By asking the operator to change forms during the print phase,
 - b. By queuing the output on a special forms queue and leaving it there until the operator chooses to print it. The system messages for the job are printed before the data when the special forms queue is used.
6. HASP reads the job output from disk and writes it using the specified printer or punch. The output device selected can be controlled by using a ROUTE card or operator commands. Data submitted from one terminal can be routed to the submitting terminal, to another terminal, or printed at the central computer site.

Each job entering the HASP system is assigned a HASP job number. This number must be used when referring to the job with HASP commands.

7.3.1 Display Job Information Command

The Display Job Information command extracts information about a particular job or jobs. When used from a terminal, the command produces information about jobs originating from that terminal only. The command has the following format.

Col.

1

```
/*$D { 'jobname'
      JOBx-x,x }
```

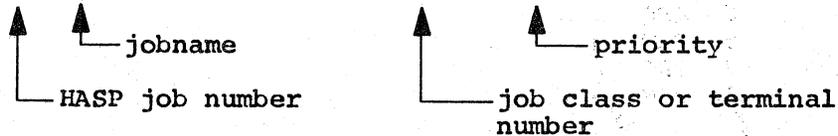
'jobname' = The name of the job for which status information is desired. The jobname always must be enclosed in single quotation marks (').

JOBx-x,x = The number of the job for which status information is desired. JOBx requests information about one job. JOBx-x requests information about a set of jobs with sequential job numbers. JOBx,x requests information about two jobs.

The following examples illustrate system response to a job information request.

```
JOB 3 TESTJOB AWAITING EXEC B PRIO 6
```

```
JOB 5 NEXTJOB AWAITING PRINT 2 PRIO 9
```



7.3.2 Displaying Status of Jobs on the HASP Queue Command

The /*\$DN command displays information about the jobs on the various HASP queues. It has the following formats.

Col.

1

```
/*$DN          List all jobs in the system.
/*$DN,nn       List all jobs associated with terminal nn.
               nn = terminal number.
/*$DN,XEQ      List all jobs awaiting execution.
/*$DN,PRT      List all jobs waiting to be printed.
/*$DN,PUN      List all jobs waiting to be punched.
/*$DN,nn,PRT   List all jobs associated with terminal nn,
               that are waiting to be printed. The same
               format is used for XEQ and PUN.
```


7.3.5 Cancel Command

The Cancel command allows the operator to terminate jobs or activities in the system. If a job is cancelled while awaiting execution, the job control cards are printed. If a job is cancelled while executing under OS control, the command takes effect after the execution. The Cancel command has the following format.

```
Col.  
1  
/*$CJOB x
```

Once a job is canceled at a terminal, the next job on the output queue is selected.

The following is an example of the system response to the Cancel command.

```
JOB & TESTJOB AWAITING PRINT 2 PRIO 3 PURGE
```

7.3.6 Messages to the Operator of the HASP System Command

Messages to the HASP operator or to another terminal operator are sent using the \$DM command. It has the following format.

```
Col.  
1  
/*$DMnn, 'message to the operator'
```

nn indicates the number of the terminal for which the message is intended. The HASP system is terminal 0.

When the message is received, it has the following format.

```
nn 'message to the operator'
```

nn is the number of the sending terminal. Messages which originate at the HASP system are indicated with a 0.

7.3.7 Routing the Output Command

If a terminal job generates a lot of output, it may be practical to print it at the HASP system. The terminal operator routes the output to the HASP system printer by using the \$R command. It has the following format.

```
Col.  
1  
/*$R { ALL  
      PRT  
      PUN } JOBx, LOCAL
```

The output of job x is to be printed on the local (HASP) printer. All output (ALL), only the printing (PRT), or only the punching (PUN) can be specified for local output.

7.4 HASP CONSOLE ERROR MESSAGES

Often, when attempting to diagnose communications problems, it is necessary to have an understanding of the symptoms of those problems on both sides of the line. The following is the form of the HASP console message:

I/O ERROR ON LINE n uu,cc,ssss,llrr,xyee

Explanation: An error has been detected on the indicated HASP RJE line or on a device attached to that line where:

- n = HASP RJE line number
- uuu = line adapter address
- cc = CCW opcode used at time of error
- ssss = CSW status code
 - exception - for multi-leaving work station
 - 0000 = indicator for normal channel and with block sequence check at central CPU
 - FFFF = indicator for normal channel and with a block sequence check at remote terminal
- ll = sense information is ssss = 0E00
 - = last character received if sss = 0C00 and xy = 94 or B4
- rr = remote device first response character
 - x = HASP CCW internal sequence identification
 - y = HASP CCW internal sequence command-type
- ee = expected response

The appropriate IBM Component Description manual describes the status and sense information in detail.

7.5 IBM 2701 COMMAND, STATUS AND SENSE INFORMATION

CCW - 02 READ
01 WRITE

CSW - These masks are most common values of the CSW. Additional information may be found on the "green card (i.e., System/360 Reference Data Card)".

- 0800 = Channel end
- 0400 = Device end
- 0200 = Unit check
- 0100 = Unit Exception

7.5.1 Channel End and Device End (0C00)

This status is set by the 2701 when each of the valid SDA-II commands reaches its "normal" ending status:

WRITE - The data has been sent.
ETB or ETX followed by a bcc has sent. The command is ended with this condition after the "pad" is transmitted.

READ - The record has been received without a detected error.

7.5.2 Channel End, Device End, and Unit Check (0E00)

Set when ending any valid SDA = II CCW with error or other unusual conditions outstanding. Further clarification or error in sense byte.

7.5.3 Channel End, Device End, Unit Exception (0D00)

WRITE - The write command has been ended because the hardware was still "in sync" and receiving or the hardware went into sync following the completion of the last read command.

READ - An EOT pad has been detected outside of text mode.

7.5.4 Sense Byte

Bit	Assignments
0	Command Reject
1	Intervention Required
2	Bus Out Check
3	Equipment Check
4	Data Check
5	Overrun
6	Lost Data
7	Time Out

Command reject - Set with unit check when a command is not accepted by the SDA-II; may occur if the 2701 SDA-II is not turned on. If a second write command is not received when the SDA-II is in transparent - write mode this will be set.

Intervention Required - Dataset or ACU is not operational.

Equipment Check - Set along with unit check when the SDA-II detects an internal error.

Data Check - Set along with unit check status when a parity or bcc error is detected on read. Set during transparent read when a DLE is not followed by ETB, ETX, ITB, EMD, DLE or SYN characters.

Overrun - This bit is set with unit Check Status when the CPU channel is not maintaining the speed of the incoming data.

Lost Data - Set when data is lost due to the lack of the read command in the adapter.

Time Out - Set when one of the adapter timeout sequences occurs. During read indicates no data for 3 seconds, or 3 seconds of syn or double syn has not been seen in test over 3 seconds. On write command it indicates that the clear to send signal did not reach the adapter within 3 seconds.

CHAPTER 8

ASP SYSTEM GENERATION

8.1 ASP SYSTEM GENERATION PARAMETERS

In order for 2780 RCS to operate under control of ASP, the ASP system must be generated using specified parameters. The required generation information is specified in the RJPLINE and RJPTERM cards, described below.

Additional information on ASP generation is contained in the following publications:

IBM System/360 and System/370 ASP, Version 3
Asymmetric Multiprocessing System Programmer's
Manual (GH20-1292-0),

IBM System/360 Attached Support Processor (ASP)
(360A-CX-15X) Version 2 System Programmer's Manual
(GH20-0323).

8.1.1 RJPLINE Card

The RJPLINE card identifies the characteristics of a line that is to be used for RJP transmission to the Attached Support Processor (ASP). The card has the following format.

RJPLINE,N=ddname	} Required
,A=line-adapter-address	
,I={A B}	} Optional
,P=password	
,S={2000 line speed}	
,F=DIAL	
,F=NTRS	
,G=Line-group-name	
,T=terminal-name	
,O=AUTO	

N= Line ddname, up to eight alphanumeric characters. The name cannot be the same as the terminal name specified on the RJPTERM card.

A= Line adapter address, three alphanumeric characters.

I= A|B Line interface, one alphabetic character. A is the default.

P= Line password, up to eight alphabetic characters. The default is eight blanks; i.e., no password protection.

S= Line baud rating, up to six numeric characters. The default is 2000 baud. 4800 is the maximum for 2780 RCS.

F=DIAL When specified, DIAL indicates a switched line. Otherwise, a dedicated or leased line is assumed.

F=NTRS No transparency. If omitted, the transparency feature is assumed.

G= The line group name, up to eight alphabetic characters. The default is eight blanks; i.e., no group name.

T= Preassignment of a given terminal name (five characters) that is associated with a line.

O=AUTO When specified, AUTO indicates that the RJP line is to be started automatically; no operator START command is required.

RJPLINE examples:

RJPLINE,N=LINE001,A=050

RJPLINE,N=001,A=050,I=B,P=SECRET,S=4800,F=DIAL

8.1.2 RJPTERM Card

The RJPTERM card defines a remote RJP terminal to the Attached Support Processor (ASP). Without this definition, a terminal attempting to sign on is not accepted. The RJPTERM card has the following format.

RJPTERM,N=terminal-ddname	}	Required
,T= 2780		
,RD={0 n}	}	Optional
,PU={0 n}		
,PR={0 n}		
,B={400 nnnn}		
,C={0 nn}		
,PRW={132 nnnn}		
,F=HTAB		
,F=NTRS		
,O=BFIX		
,G={terminal-ddname group name}		
,F=XBUF		
,O=AUTR		

RJPTERM,keyword-parameters

N= Terminal ddname, must be five alphanumeric characters. The name may not be the same as the line name, RJPLINE card.

T= Terminal description type as follows:
2780 terminal

RD=1 Number of remote reader devices

PU=0

PR=1 Number of remote printer devices.

B=400 Terminal buffer size.

C={0|nn} Remote terminal console command support authority level. The value for nn may be 0 to 15. RJP converts the value supplied to one of the following four levels:

C = 15	converts to level 15
C = 14-10	converts to level 10
C = 9-5	converts to level 5
C = 4-0	converts to level 0

Levels:

0 - no remote terminal console support (not recommended)

5 - INQUIRY (*I) and MESSAGE (*Z), CANCEL (*C), START (*S), or RESTART (*R) facility.

10 - INQUIRY (*I), MESSAGE (*Z), CALL (*X), START (*S), CANCEL (*C), VARY (*V), MODIFY (*F), or RESTART (*R) facility for jobs submitted by this terminal or devices attached to this terminal.

15 - All

PRW= Maximum print record size, up to terminal buffer size. The default is 132-byte print record.

O=BFIX Terminal option, when specified, indicates the output buffers used by RJP are dedicated and are not swapped.

G= Groupname, eight characters or less. The default is the terminal ddname.

O=AUTR Terminal option, when specified provides the automatic call ASP reader function in the local system.

RJPTERM,N=NEWYK, T=2780, RD=1, PU=0, PR=1, B=400, C=2, PRW=132, O=BFIX, G=SECRET

CHAPTER 9

ASP COMMANDS FROM THE 2780 RCS

9.1 ASP TERMINAL COMMANDS

When the systems programmer generates the ASP System for the central computer, he can designate the levels of authority for each 2780 RCS. The levels of authority and a summary of commands are presented in this chapter. Console commands are entered by being punched on cards.

For additional information, refer to the following publications:

IBM System/360 Attached Support Processor System
(ASP) (360A-CX-15X) Version 2, Console Operator's
Manual, IBM Corporation (GH20-0323),

IBM System/360 and System/370 ASP Version 3,
Asymmetric Multiprocessing System, Operator's
Manual (360A-CX-15X), IBM Corporation (GH20-1289).

9.2 ASP LEVELS OF AUTHORITY

The ASP levels of authority follow.

Level 0-4: No remote console command support is permitted.

Level 5-9: Remote console support is limited to the following commands:

```
/**START (*S)  
/**RESTART (*R)  
/**CANCEL (*C)  
/**INQUIRY (*I)  
/**MESSAGE (*Z)
```

The above commands are restricted as follows:

The START, RESTART and CANCEL commands must specify a remote terminal device name which is part of the remote terminal. For example, the operator at a remote terminal named REMOT can enter *S REMOTPR1.

Level 10-14: The remote console can be used to enter the following commands:

```
/**CALL (*X)  
/**START (*S)
```

```
/**RESTART (*R)
/**CANCEL (*C)
/**VARY (*V)
/**MODIFY (*F)
/**INQUIRY (*I)
/**MESSAGE (*Z)
```

The above commands are restricted as follows:

The CALL command can be used to invoke the following DSP's:

```
Card-to-Card (CC)
Card-to-Print (CP)
Card-to-Tape (CT)
Card Reader (CR)
Tape-to-Card (TC)
Tape-to-Print (TP)
Printer Resource Updata Utility (PRUT)
```

The input (IN=) and output (OUT=) parameters specified in the CALL command must be devices associated with the remote terminal. They can be given in long form (that is, IN=REMOTRD1) or short form (that is, IN=RD1). In the latter case the parameter is expanded internally to the long form. If neither input nor output parameters are given in a CALL for a DSP in which card input is expected (that is, /**X CR), the remote card reader is used.

The START, RESTART, and CANCEL commands must specify a terminal device, as discussed under Level 5-9. This is also true of the VARY command.

Two MODIFY commands are permitted: MODIFY JOB (**F J=...) and MODIFY RJP (**FT,...). The MODIFY JOB command allows the remote operator to modify jobs submitted by his terminal group. If the T=group name is not included by the operator, ASP inserts the parameter into the message. ASP also inserts T=terminal-name into MODIFY RJP commands, if the operator omits the parameter.

Level 15: All valid commands can be entered from the remote terminal with the exception of the following:

```
/**SWITCH
/**DUMP
/**RETURN /**ENABLE
/**DISABLE
```

No further checking is done and no default parameters are supplied.

9.3 SIGNON AND SIGNOFF

Before the operator can issue console commands, the remote terminal must sign on to the central ASP system. Once all the desired work is completed, the operator must sign off to disconnect the 2780 RCS from the central system.

9.3.1 SIGNON Card

The first card placed in the card reader after 2780 RCS is loaded must be a SIGNON card, if one is required by the central ASP system. The card has one of the following formats.

ASP2 format:

Col.	16	22	25
1	terminal-name	H	password (optional)

ASP3 Format:

Col.	16	22	25
1	terminal-name	A	password (optional)

9.3.2 SIGNOFF Card

A remote job entry session is terminated by the reading of a SIGNOFF card. When it is received, the ASP system disconnects the terminal from the central system at the completion of the current print data stream. The SIGNOFF card has the following format.

Col.
1

/*SIGNOFF

9.4 ASP COMMAND SUMMARY

Table 9-1 summarizes the ASP commands.

Table 9-1
ASP Terminal Commands

COMMAND	PARAMETERS	COMMENTS
/** CALL X	.dspname [.message-text]	Call a dynamic support function into execution.
/** CANCEL C	. dsp-name device-name device address line-name main-processor-name [.message-text]	Cancel a support function.
/** DELAY D	. 0 1/4 1/2 1 2 ... 20	Change time interval between messages displayed on graphic consoles. A time interval of 00 specified for the 3277 initiates page mode operation.
/** DISABLE II	.console-name	Terminate I/O operations on the specified console.
/** ENABLE N	.console-name	Reinitialize I/O operations on the specified console.
/** ERASE E		Erase contents of graphic display screen and reposition cursor.
FREE		Terminate all messages queued to this console.
/** INQUIRY I	.A .system-name .D-dsp-name .D=ALL blank	Display jobs currently on the named Main Processor. Display jobs being processed by the designated DSP. Display jobs active on the Support Processor. Display jobs currently active on all Main processors.
	.B .M .G= (group-name,...) .system-name blank	Display jobs in the Resident Job Queue of Main Processor. Display jobs in queue of specified group. Display jobs scheduled for specified Main Processor. Display backlog of all jobs.

Table 9-1 (Cont.)
ASP Terminal Commands

COMMAND	PARAMETERS	COMMENTS
//** INQUIRY (cont.)	.C .C .A blank	Display status of console buffer pool or the ASP buffer pool. Display status of ASP1 BUFFER POOL AND MINCORE/MARGCORE/CURR values.
	.D .A .A= device-name,...) (group-name...) .D= (device-name,...) .L= (line-name,...) ALL .T= (terminal-name,...) ALL . (system-name,...) .V=(volume-serial-number,...) blank	Display status of all devices reassigned via *MODIFY ,ASSIGN. Display reassignment status of specified I/O or RJP terminal device or group. Display status of specified device. Display status of named line or all RJP communication lines. Display status of named RJP terminal or all RJP terminals. Display status of devices on the named Main Processor(s). Display status of device on which specified volume is mounted. Display status of devices on the Support Processor.
	J= (job-name,...) .E (job-number,...) blank	Display programmer estimates for line and card counts for named job. Display status of named job.
	.K .K=nn	Display predefined messages for all 3270 program function keys. Display messages for specified key (01-12).
	.L .T=(type,...) blank	Display type(s) of deadline as defined in DEADLINE card. Display all deadline types defined to the system.
	.N .ID=(net-id,...) .J= (job-name,...) (job-number,...) .LIST BLANK	Display limited statistics for specified DJC network. With ID=, display full statistics for one job in specified network. With ID=, display full statistics for all jobs in specified DJC NETWORK\ Display limited statistics for each defined DJC network active in the system.
	.O .O=(console-name,...)	Display status of all ASP consoles. Display status of specified console.
	.P=priority .N= nn 10 ALL .n=ALL blank	Display 01-99 jobs of the specified priority. Display all jobs of the specified priority. Display 10 jobs of the specified priority.

Table 9-1 (Cont.)
ASP Terminal Commands

COMMAND	PARAMETERS	COMMENTS
<pre>/** INQUIRY (cont.)</pre>	<pre>,Q ,n=nn ,D-dsp-name ,H ,S ,C=job-class-name ,G=job-group-name ,J=job-number ,T=device-group-name blank ,R , dspanme , SETUP s ,J=job-number ,C=SDEST-console blank ,S , A ,U ,M[,J=job-number] ,V ,B blank ,T ,L= line-name ALL ,P ,L= line-name ALL ,START[,R]</pre>	<p>Display nn,10 or all jobs in the ASP queue. Display status of all jobs queqed for the named DSP. Display jobs in hold status. Display amount of space left as track amount and percentage. Display jobs of the specified class. The N=parameters applies. Display jobs in the specified group. The N=parameter applies. Display jobs beginning at the designated job. The N=parameter applies. Display jobs whose origin was the designated group. The N=parameter applies. Display status of first 10 jobs in ASP queue.</p> <p>Display action messages issued by named DSP. Display action messages issued for SETUP. With SETUP, display Setup messages for named job. With SETUP, display Setup messages for named SDEST console. Display all outstanding action messages.</p> <p>Display jobs in SETUP allocation. Display jobs with unavailable Setup resources. Display jobs currently mounted. Inquiry may be directed to a specific job. Display jobs waiting to be verified via SETUP. Display jobs currently in breakdown. Display all jobs currently in SETUP.</p> <p>Display the password of the designated line(s). Display the errors of the designated line(s). R specifies reset the errors.</p>
<pre>/** MESSAGE Z</pre>	<pre>,console-name ,text ,destination-class ,ALL</pre>	<p>Send a message (the text) to a specified console. Send a message to all consoles in the designated class. Send a message to all consoles in the system except DEST=NONE.</p>

Table 9-1 (Cont.)
ASP Terminal Commands

COMMAND	PARAMETERS	COMMENTS
/** MODIFY F	,A ,ACCOUNT ,C ,J=job-number ,L,T=type ,N,ID=network-id ,O,M= ON OFF ,O=console-name ,Q	,device-name,device-name ,group-name,group-name,G ,CARDS=NO ,PUNCH= (PUN) device ,MIN=nnnK,MARG=nnnK ,H ,R ,P=nn , C CP ,PRTY= +n priority-number ,LEAD= nnH nnnnM hhmm ,PINC= +n priority-number ,INT= nnH nnnnM hhmm ,ALL ,J=(job-number,...) , I D , H R C MLOG console is to be suspended from receiving messages or reinstated. The level to which the specified console is to have authority (15 is default). Add destination to classes assigned to console. Delete destination from classes assigned to console. Limits hold or release of ASP job queue to specified priority level. Hold or release entire job queue or specified priority level.
		Reassign output for a device to another device. Reassign output for a group of devices to another group. Terminate job accounting. Switch accounting data output to the named punch. Alter the minimal and marginal free storage amounts. Withhold the named job from further scheduling. Release the named job from hold status. Alter the priority of a job to the specified level. Cancel, or cancel with print, the named job. Priority increased by or to this value when lead time occurs. Amount of lead time in hours or minutes or actual time. Priority increased by or to this value at intervals specified by INT=. Interval of time at which PINC=is applied. Change applies to jobs already in system. Specifies which jobs in the network are to be affected; if omitted, entire network is affected. NHOLD count is incremented or decremented by one. Jobs are to be placed in DJC hold, released for scheduling, or cancelled.

Table 9-1 (Cont.)
ASP Terminal Commands

COMMAND	PARAMETERS	COMMENTS
/** RESTART R	,dsp-name ,device-name ,device-address [,message-text] ,main-processor-name	Restart a support function.
/** SEND T	,Main-processor-name,OS-console-message	Send an OS console message to a Main Processor.
/** START S	,dsp-name ,device-name [,message-text] ,device-address ,main-processor-name	Start a support function.
/** SWITCH	from-console-name,to-console-name	Switch to routing of messages.
/** VARY V	,(device-name,...) ,(device-address,...) ,device-addr - device-addr ,control unit x ,namn-processor-name ,ALL ,ONLINE ,ON [,main-processor-name] ,OFFLINE ,OFF	Make units unavailable or return units to availability status.

Table 9-1 (Cont.)
ASP Terminal Commands

COMMAND	PARAMETERS	COMMENTS
<p>**MODIFY (cont.)</p>	<p>, SETUP S ,VU=(T D -serial, T D -serial,...) ,VA=(T D -serial, T D -serial,...) ,M=device-address,system-name[,serial[,ND]] ,U=device-address,system-name ,AL= A M J=,jobnumber,V ,T= terminal ALL ,H ,R ,B=nn ,JOB= R C ,T,L= line-name ALL ,H ,R ,P= password NONE , A M SNAPON SNAPOFF ,main-processor-name ,SELECT-card keyword=value ,SELECT-card keyword , SELECT S =job-selection mode ,SELALL , CLASS C =job-class-name ON OFF [,ALL] , GROUP G =group-name, ON OFF [,ALL] ,G=group-name,INIT=n</p>	<p>Tape or disk volume is now unavailable. Tape or disk volume is now available. Device to remain mounted until *F,S,U=command received. Device is to be unloaded and available to further allocation. Set automatic or manual device allocation. Cause specified job to enter verification processing immediately. Hold subsequent jobs from named terminal from scheduling Reset conditions established by H (no further jobs into hold). Release specified number of batches from hold. Specified action if remote printer is not ready. C=cancel. R=reset cancel. Hold subsequent jobs from named line. Reset condition established by H (no further jobs onto hold). Assign the specified password (8-character max). NONE=no password. A = auto restart. M = reset the auto condition. SNAPON = enable SNAP. SNAPOFF = reset SNAP. Change the specification on the SELECT card for the named Main Processor. Display the current value of the specified parameter. Change the job selection mode for the named Main Processor. Display all job selection parameters. Enable or disable Setup and Main Scheduling for all jobs in named class. Enable or disable Setup and Main Scheduling for all jobs in named job class group. Assign n initiators to the named group.</p>

CHAPTER 10

DOS/POWER RJE COMPONENTS GENERATION

The POWER/RJE system generation is divided into five basic components:

1. The POWER program generation,
2. The special BTMOD generation,
3. The generation of the RJE blocks,
4. The RJE block name list generation, and
5. The userid list generation.

These components must be placed in the DOS relocatable library prior to link-editing the POWER/RJE system.

The POWER program is generated by specifying the RJE operands in addition to central system requirements in the POWER macro. Each macro is assembled separately. Note that no embedded blanks are permitted in any operand or operand sublist.

10.1 BTMOD GENERATION

The special BTMOD may be generated by assembling the macro RJBTMOD, which may not be labeled. RJBTMOD has two operands:

SWITCH = YES	YES indicates that logic for switched networks
NO	is to be included in the BTAM module. NO indicates that it is not.
BSCTEST= YES	YES specifies that logic for the BSC on-line
NO	terminal test is to be included in the BTAM module. NO specifies that it is not.

A YES specification to both operands causes BTMOD to be assembled with the name RJBTMOD, and with the following explicitly declared operands: ERLOGIC=NC, BSCTEST=YES, SWITCH=YES, CANCEL=NO, BSCS=YES, DECBEXT=NO, and SEPASMB=YES. In addition, the RJBTMOD macro causes the label "IJLMWAIT to be declared as an external symbol. A NO specification to both operands causes BTMOD to be assembled with the same characteristics except SWITCH=NO and BSCTEST=NO.

A sample job to generate the special BTMOD follows:

```
//JOB GENERATE RJE BTMOD
//EXEC ASSEMBLY
RJBTMOD BSCTEST=NO
END
/*
/&
```

The object deck produced by the assembler will contain the proper CATALR statement for placing the RJE BTMOD in the relocatable library. A sample job to place the object deck into the relocatable library follows:

```
//JOB CATALOG RJE BTMOD
//EXEC MAINT
    punched output from RJBTMOD assembly
/*
/&
```

10.2 RJE BLOCK GENERATION

The RJE block defines the device-dependent characteristics of a terminal type for a line and contains the DECB, DTFBT, I/O area, and additional device-dependent characteristics required to access that terminal type on that line. The name for each RJE block will be created in the following format:

Dcuutype, where

cuu is the line address at the central installation

type specifies the terminal type

Example:

D0302780 is the RJE blockname when the line address is 030 and the terminal type is 2780.

The RJE system dynamically determines whether a 2770 or 2780 is being used and if the MRT (2780) or Buffer Expansion (2770) feature is available. As a result, an RJE block generated for a 2770 may be used for a 2780 terminal or a 2780 RJE block for a 2770 terminal.

During RJE task initiation, the DTFBT will be assigned a logical unit number by the POWER system and LUB will be dynamically assigned to the PUB representing the specified line. Therefore, DOS ASSGN statements are not required and line groups are not permitted.

The RJE block is generated by assembling the macro RJEBLK, which may not be labeled. RJEBLK is specified with the following operands:

CHAN = cuu cuu is the line address at central installation and is specified as three numeric characters.

SWITCH = YES YES indicates the terminal is on a switched line. NO indicates the terminal is on a leased line.

DEVICE = 2780 DEVICE specifies the type of terminal the RJE block is to support. This parameter has no meaning for switched lines.

TERMTST = YES YES specifies that the DTFBT will contain the test activation code facility in determining if a test request has been made. NO

The following RJEBLK operands are required for completion of the DTFBT in the RJEBLK. (See Basic Telecommunications Access Method for information regarding these parameters.)

```
CU = 2701      as specified for the DTFBT
    2703

MODELST = 4    (see note below)
         5
         6
         7

RETRY = 7      as specified for the DTFBT. n may be
         n      any number from 0 through 15.
```

Each RJE block must be assembled separately to avoid duplicate labels.

A sample assembly job follows:

```
//JOB ASSEMBLE JOB BLOCK FOR 023,2780
//EXEC ASSEMBLY
RJEBLK CHAN=023,SWITCH=NO,MODELST=(4)
END
/*
/ &
```

The object deck which contains the proper CATALR and phase statements may be link-edited and catalogued using the following job:

```
//JOB LINK D0232780
//OPTION CATAL

INCLUDE

punched output from RJEBLK assembly

/*
//EXEC LNKEDT
/ &
```

NOTE

Each RJEBLK must be linkedited separately. The two unresolved EXTRN's RJBMOD and IJLBTIH will be resolved when the RJEBLK is initiated at task startup.

10.3 RJE BLOCK NAME LIST GENERATION

The RJE block name must contain the name of each RJE block to be used. It is generated by assembling the macro RJBLKLST, which may not be labeled. RJBLKLST is specified with the following operands:

```
BNLSTn = (blockname[,blockname,blockname,...,blockname])
```

where

blockname is the 8-character name generated for each RJE block and n is a numeric character from 1 through 8, for example, BNLST1, BNLST3, etc. The BNLSTn parameter may be specified in any order. (Blockname format is Dcuu2780.)

See "RJE Block Generation (Section 10.11.2) for the exact format of the RJE block name. The maximum number of block names per parameter is 14. The maximum number of block names is 100. At least one BNLSTn parameter must be specified. If only one block name is specified, the parentheses are optional.

Each entry in the RJE block list will generate an external reference to the specified RJE block. If the external reference is not resolved by the linkage editor, no attempt will be made to load that RJE block during initiation of an RJE task requiring that RJE block. Duplicate RJE block names are not checked. Only the first of duplicate names is used during POWER program execution.

An example of a job to assemble an RJBKLIST follows:

```
//JOB ASSEMBLE RJBKLIST NAMES
//EXEC ASSEMBLY
  RJBKLIST  BNLST1=(D0312770),BNLST5=(D0312780,D0332780), x
           BNLST4=(D0302780,D0322780,D0342780)
END
/*
/&
```

The object deck produced by assembling RJBKLIST will contain the proper CATALR statement for placing the RJBKLIST in the relocatable library:

```
//JOB CATALOG RJE BLOCK NAMES
//EXEC MAINT
  punched output for RJBKLIST assembly
/*
/&
```

10.4 USERID LIST GENERATION

The userid list contains the user identification for all valid RJE users. Termids are also contained in this list. Termids and userids are not distinguished in the list. The userid list is generated by assembling the macro RJUSERS, which may not be labeled. RJUSERS is specified with the following operands:

```
LISTn = (userid[,userid,userid,...,userid])
```

where

n is a numeric character from 1 through 8, for example, LIST2, LIST4, etc.

userid may be from 1 to 8 alphanumeric characters; embedded blanks are not permitted. Use of "ALL" or "ALLUSERS" as a userid is not permitted.

The number of userids specified in a LISTn keyword parameter sublist is determined by the DOS assembler restriction of 128 characters per sublist. The number of characters includes parentheses and commas. The maximum number of userids is 100 per RUSERS generation. Duplicate userids will not be checked, and only the first of duplicate userids will be used during POWER program execution.

The LISTn keyword parameters may be specified in any order. At least one LISTN keyword parameter must be specified.

An example of a job to assemble a user list follows:

```
//JOB ASSEMBLE LIST OF VALID RJE USERS
//EXEC ASSEMBLY
RUSERS LIST1=(NEWYORK,CHICAGO,TULSA,ATLANTA,    x
          LIST5=(PAYROLL,TAXDEPT,ENGR),        x
          LIST7=(SALES,HQ,FINANCE,DP),         x
          LIST8=(WAREHS1,WAREHS2,WAREHS3),     x
          LIST3=(DIST1,DIST2,DIST3,DIST4)
END
/*
/&
```

The object deck produced by assembling RUSERS will contain the proper CATALR statement for placing the RUSERS in the relocatable library:

```
//JOB CATALOG RUSERS
//EXEC MAINT

punched output from RUSERS assembly
/*
/&
```


CHAPTER 11

2780 RCS OPERATION WITH DOS/POWER RJE

11.1 NORMAL OPERATIONS

This chapter provides the information necessary to operate the COMTEX 2780/DOS 2780 RCS EAP with DOS/POWER RJE. For additional information see the IBM manual, POWER II/RJE: Program Description and Operations Manual (Program Number 360D-0.5-2.006.GH20-0761-1).

11.1.1 Transmitting Input

After powering up the 2780 RCS according to procedures in the 2780 RCS Operator's Manual, an RJSTART card is placed in the card reader. A LOGON card and input follow the RJSTART.

When the input has been placed in the reader, the mode switch is set to "EBCDIC" or "EBCDIC transparent", and the printer should be readied. If the connection is via a switched line, the number must be dialed at this time. After the line connection is made, the start key must be pressed to transmit the data.

11.1.2 Discontinuing Output

Output in progress may be discontinued at any time by typing TERM. After output has been discontinued, the central system will write a message, and read a card. If this card is not a CONTINUE command the central system will flush the reader and write a message stating that the job stream has been flushed. The CONTINUE command allows six options, so that discontinued output may be:

1. Restarted from the beginning.
2. Continued with the output data block containing the last block transmitted.
3. Deleted by the NO option specified in the CONTINUE command.

4. Held in the output queue until requested via an OUTPUT command.
5. Placed in the output queue and printed or punched at a local output terminal.
6. Restarted from a page backward or forward from the interrupted page or from the beginning of the job (print only).

11.2 SPECIAL FORMS OUTPUT

Output requiring special forms or cards is automatically held by the central system before it is transmitted, and a message giving the required form or card number is sent from the central system to the 2780 RCS. Special forms requests are part of JECL statements.

11.2.1 Printer

For printed output, the required forms must be placed in the printer and a CONTINUE command must be transmitted from the 2780 RCS reader. Upon receipt of this command the central system transmits the output.

11.3 PREPARING MORE INPUT

While output is being written on the printer, the operator may load and ready the reader to send more input. Since the 2780 RCS terminal is already in the processing state, no RJSTART command is submitted. Unless the terminal is in the active state, or unless the terminal is in the processing state and a new user desires access to the system, no LOGON command is required. When the output to the printer is finished, the 2780 RCS may send input. The reader must be readied within approximately 28 seconds * the RETRY generation option to prevent the central system from disconnecting the line.

11.4 ERROR RECOVERY PROCEDURES

In general, the detection of any permanent line I/O error at the central system will cause the terminal to be disconnected. When this happens, the line connection must be reestablished (for a switched line) and the RJSTART and LOGON commands must be resubmitted along with the last unacknowledged input. Input is acknowledged in response to the STATUS command. Other errors and their associated recovery procedures are described below.

11.5 READ OR WRITE TIME-OUT RETRY CAPABILITIES

When a 2780 RCS stops transmitting input for any reason (for example, all input transmitted, card jam, etc.), a time-out occurs after 28 seconds have elapsed. The system will retry the read operation for the number of retries specified in the RETRY generation option feature. The default is six retries (approximately 180 seconds).

When the printer on a 2780 is not ready, a three-second time-out occurs. The system retries the operation RETRY * 10 times. The default is 60 times (180 seconds). If no further transmission occurs in either direction during this period, the user session is terminated, the terminal enters the inactive state, the user must reestablish the connection (for a switched line), and an RJSTART card must be transmitted to resume RJE activity.

11.6 FAILURE DURING INPUT

When the 2780 RCS card reader fails (jams, etc.), the condition should be corrected and the card reader and printer brought to ready status. Recovery must be made within approximately RETRY * 28 seconds for input to be resumed according to the error recovery procedures defined in the 2780 RCS manual. If the number of 28 second timeouts required to ready the reader exceeds RETRY on a switched line, the user must redial. A RJSTART and a LOGON command are required to resume input operations, and all unacknowledged input must be resubmitted.

11.6.1 Input Stream Flushed

When an error causes the central system to flush the entire input stream being transmitted from the terminal, one of the following messages will be returned to the 2780 RCS:

INVALID/MISSING TERMID/USERID

INVALID RJE WORK STATION COMMAND

INVALID RJE WORK STATION COMMAND - NO USER LOGGED ON

TWO userid USERS ARE ALREADY LOGGED ON

If a CONTINUE command is not read in response to the following messages, the central system will flush the entire input stream being transmitted for the terminal:

CARD FORMS formsid NEEDED FOR JOB jobname - CONTINUE COMMAND
REQUIRED

CONTINUE COMMAND REQUIRED FOR PRINTER

PRINT FORMS formsid NEEDED FOR JOB jobname - CONTINUE COMMAND
REQUIRED

In addition, after a job stream has been flushed, the following message will be printed at the 2780 RCS:

JOB STREAM FLUSHED

The recovery procedures for each of these messages are described in the section "Messages to the Remote Terminal Operator" (Section 10.9).

11.7 FAILURE WHILE RECEIVING OUTPUT

11.7.1 Unit Failure

When the printer or punch fails, the condition should be corrected. If the problem can be corrected and the 2780 RCS can be brought to ready status within `RETRY * 30` seconds, a `CONTINUE` command may be transmitted, and the output will resume according to the option specified in the `CONTINUE` command. If the `RETRY` count is exhausted before recovery can be made, the connection must be reestablished and an `RJSTART` command must be transmitted. The interrupted data can then be transmitted from the point of interruption. If the failure causes an unrecoverable error, the output is placed in the hold state. Output in the hold state may be returned to the terminal user or may be processed at the central system. The terminal user must submit an `OUTPUT` command to retrieve the output. The central system operator may use the `O (OUTPUT)` command to change the designation of the output from a remote to a local device.

11.7.2 Carriage Control Limitation

The range of carriage control functions for the 2780 RCS is less than that provided for local printers. Specifically, the 2780 RCS does not provide skips past channel 8, nor space suppression. When the 2780 RCS is used for remote output, these carriage control functions should be avoided.

11.7.3 Central Failure

If the central system fails while output is in progress, the terminal is placed in an inactive status. When the central system comes back online, submit an `RJSTART` command followed by a `LOGON` command, and retrieve the output, using an `OUTPUT` command. If the central system fails while input is in progress, the terminal is placed in an inactive status. The terminal operator should begin the interrupted user session with a `STATUS` command to obtain acknowledgment of jobs entered prior to the central system failure. When a failure occurs, the central system will attempt to notify the terminal by sending the message "ABNORMAL CENTRAL SHUTDOWN".

11.8 RECOMMENDED OPERATING SUGGESTIONS

To minimize the recovery effort in case of an error, the following procedures are recommended to the 2780 RCS operator:

1. The RJSTART and LOGON commands may be submitted separately to ensure that they are correct.
2. Job input streams should be limited to a few jobs in order to reduce the number that must be resubmitted in case of an input error that requires the central system to flush the entire input stream. The RJE system will acknowledge job entries only in response to a STATUS command.
3. Remote Job Entry operations on the 2780 RCS may be in "EBCDIC" or "EBCDIC transparency" mode.
4. Unattended 2780 RCS operation is not recommended. The operator must correct an input failure (card jam, etc.) within RETRY * 30 seconds or the entire job must be resubmitted.

11.9 MESSAGES TO THE REMOTE TERMINAL OPERATOR

Messages are returned to the terminal operator when an invalid command has been detected, in response to the broadcast function, in response to the status function, and when intervention-required or line problems have been detected. Messages referring to invalid terminal commands will return columns 73-80 of the command as part of the diagnostic message.

The messages are listed below in alphabetical order.

11.9.1 ABNORMAL CENTRAL SHUTDOWN

Cause: While the terminal was in the active or processing state, the central installation operator issued a stop command to the RJE task. If the RJE task was processing job output, the output is preserved in the output queue. If the RJE task was processing input, the job entry must be retransmitted.

Action: The terminal operator must wait until the central system is active before attempting to attach the terminal to the RJE system.

Default: None.

11.9.2 BROADCAST MESSAGES FOR `termid` `userid`

`termid`
`userid` depends upon the requester and the terminal status.

Cause: This message appears as the heading of a list of broadcast messages requested by the terminal operator in the RJSTART command or the BRDCSTR command.

Action: The messages will be printed after the heading and will contain four fields: First, the originator of the message. If the message originates at the central system, CENT SYS will be indicated. Second, the date at the central system when the message was placed in the RJE message queue. Third, the time at the central system when the message was placed in the RJE message queue. Fourth, the message text.

Default: None.

11.9.3 CONTINUE COMMAND IS REQUIRED FOR printer punch

Cause: A CONTINUE command is required to reactivate the RJE task. The appropriate operand depends on terminal operation considerations.

Action: See the description of the CONTINUE command, under "Terminal Commands" (Section 10.10.1.6) for the operand options, and reply with a CONTINUE command.

Default: The RJE task is placed in the wait state until a response to this message is received. A significant delay in responding may cause a time-out condition in the telecommunications system.

11.9.4 DELETE xxyyy, zzzzzzzz SUCCESSFUL

xx =	BG	yyy =	RDR	zzzzzzzz =	jobname
	F2		PRT		ALL
			PUN		

Cause: The requested delete function was executed successfully.

Action: None.

Default: None.

11.9.5 EOT NOT EXPECTED

Cause: An EOT signal or intervention-required signal from the terminal reader was received prior to receipt of the end of the job entry in process. The terminal state is preserved.

Action: Refill and activate terminal reader with more RJE input.

Default: The RJE task is placed in the wait state until the terminal reader is activated. A significant delay in activating the

reader may cause a time-out condition in the telecommunications system. If a time-out does occur, the job entry in process must be retransmitted. The STATUS command should be used to acknowledge previous job entries.

11.9.6 EXCEEDS AAAA PAGES OF JOB - CONTINUE COMMAND IS REQUIRED

aaaa = number of printed pages in the current job

Cause: The terminal operator specified a page count greater than the last page of the job being processed when using the PAGE, count option of the CONTINUE terminal command.

Action: See the description of the CONTINUE command under "Terminal Commands" (Section 10.10.1.6) for the operand options and reply with a CONTINUE command.

Default: The RJE task is placed in the wait state until one of the action options is selected. A significant delay in responding may cause a time-out condition in the telecommunications system.

11.9.7 INTERVENTION REQUIRED ON READER

Cause: An end-of-file condition at the terminal reader was detected by the RJE system before detection of the end of the job entry in process.

Action: Refill the terminal reader with the balance of the job entry, other job entries, and terminal commands. Ready the reader to begin transmission.

Default: The RJE task is placed in the wait state until a response to this message is received. A significant delay in responding may cause a time-out condition in the telecommunications system. If a time-out does occur, the job entry in process must be retransmitted. The STATUS command should be used to acknowledge job entries.

11.9.8 INVALID RJ DELETE COMMAND sequence-field

Cause: A DELETE command was incorrect.

Action: Resubmit a corrected DELETE command.

Default: None.

11.9.9 INVALID RJ MSGR COMMAND sequence-field

Cause: A MSGR command was incorrect.

Action: Resubmit a corrected MSGR command.

Default: None.

11.9.10 INVALID RJ OUTPUT COMMAND sequence-field

Cause: An OUTPUT command was incorrect.

Action: Resubmit a corrected OUTPUT command.

Default: None.

11.9.11 INVALID RJ STATUS COMMAND sequence-field

Cause: A STATUS command was incorrect.

Action: Resubmit a corrected STATUS command.

Default: None.

11.9.12 INVALID RJE WORK STATION COMMAND sequence-field

Cause: The terminal command, indicated by the sequence field in the command, was not valid. This message may apply to any terminal command which is invalid. Input from the terminal card reader is flushed. The terminal state is preserved.

Action: 1. The invalid command should be corrected. The corrected command and the input following the invalid command should be resubmitted.

2. If the terminal was in the active or processing state, an RJEND command may be transmitted to detach the terminal.

Default: The RJE task is placed in the wait state until the terminal reader is activated. A significant delay in activating the reader may cause a time-out condition in the telecommunications system.

11.9.13 INVALID RJE WORK STATION COMMAND - NO USER LOGGED ON sequence-field

Cause: A terminal command, indicated by the sequence field in the command, was transmitted which may be received only when a user is logged on. The input stream is flushed. The terminal remains in the active state.

Action: 1. A valid LOGON command must be transmitted preceding the invalid command. All input beginning with the invalid command should be retransmitted.

2. An RJEND command may be transmitted to detach the terminal.

Default: The RJE task is placed in the wait state until the reader is activated. A significant delay in activating the reader may cause a time-out condition in the telecommunications system.

11.9.14 INVALID/MISSING TERMD/USERID sequence-field

Cause: The RJSTART or LOGON command indicated by the sequence field of the command did not contain the proper identification. The input stream is flushed. The terminal is preserved.

Action: 1. The invalid RJSTART or LOGON should be corrected. The corrected command and all input following it should be resubmitted.

2. If the command was a LOGON command, an RJEND command may be used to detach the terminal.

Default: The RJE task is placed in the wait state until the terminal reader is activated. A significant delay in activating the reader may cause a time-out condition in the telecommunications system.

11.9.15 JOB jobname NOT FOUND sequence-field

Cause: A DELETE, OUTPUT, or STATUS command referenced a job entry by name which was not found in the queue or queues specified. This message provides information to the operator.

Action: None.

Default: None.

11.9.16 JOB STREAM FLUSHED

Cause: This message is printed after a job stream has been flushed due to detection of an incorrect or invalid terminal command.

Action: Perform the action requested by the message printed preceding this message.

Default: The RJE task is placed in the wait state until the terminal reader is activated. A significant delay in activating the reader may cause a timeout condition in the telecommunications system.

11.9.17 NO BROADCAST MESSAGES FOR userid

userid may be the current termid instead, depending upon the terminal status.

Cause: In response to a request for broadcast messages, the RJE task determined that there were no messages (general or specific) for the userid element in the RJE message queue.

Action: None.

Default: None.

11.9.18 NO OUTPUT WAITING

Cause: This message is returned in response to a request for output via the OUTPUT command. No output for the user logged on was found in any of the output queues, or the output is either to be processed at the central installation or it is being processed by another RJE task which has the same user logged on. After this message is printed, the RJE task will continue reading from the terminal card reader.

Action: The user may verify this message by using the STATUS command for the appropriate output queues. Otherwise, no action is required.

Default: None.

11.9.19 PRINT FORMS formsid NEEDED FOR JOB jobname - CONTINUE COMMAND REQUIRED

formsid requested form identification

jobname job entry name

Cause: The formsid for the print output does not agree with the formsid used for the previous print output at this terminal. The RJSTART command resets the print and punch output formsid to the system default, blanks. Therefore, the first output processed after the RJSTART command will cause the above message to occur if a nonblank formsid had been specified in the PRT JECL statement. The RJE task will wait for the appropriate CONTINUE command option before processing the job output.

Action: See the description of the CONTINUE command under "Terminal Commands" for the operand options, and reply with a CONTINUE command.

Default: The RJE task is placed in the wait state until one of the action options is selected. A significant delay in responding may cause a time-out condition in the telecommunications system.

11.9.20 RJEND PROCESSED

Cause: An RJEND command was received and the terminal has been detached from the RJE system. An RJSTART command is required to attach the terminal to the RJE system again.

Action: None.

Default: None.

11.9.21 RJ STATUS DISCONTINUED

Cause: A terminal I/O error was detected while printing STATUS message. The RJE task must free the Qfile for use by other tasks.

Action: Resubmit the STATUS command.

Default: None.

11.9.22 STATUS OF queue QUEUE FOR USER userid

queue is specified in xxyyy format, where

xx =	BG	YYY =	RDR
	F2		PRT
			PUN

userid is userid for user requesting status information.

Cause: In response to a request for status information via the STATUS command, the message above is written as the first line of the status report.

Action: The second heading is:

JOB NAME	NUMBER	PR	COUNT	RDR
				PRT
				PUN

The first line following the second heading is as follows:

This message contains five fields, which report the status of the job entry named in the message. The first field is the name of the job entry. The second field is the number assigned to the job entry when it was logged into the POWER system. The third field is

the priority number of the job entry in the specified queue. The fourth field is the count of input or output records for the job entry in the specified queue. The fifth, is the hold status of the job entry for the specified queue. The reader queue hold status is H if the job is held or D if it is not held. The print queue and punch queue hold status is W if the output is held or to be held, R if the job entry output is to be returned to the terminal, or D if the disposition of the job output is neither W nor R.

Default: None.

11.9.23 TWO userid USERS ARE ALREADY LOGGED ON sequence-field

Cause: There may be no more than two users with the same userid logged on the RJE system at one time. The LOGON command indicated by sequence field of the command has exceeded this restriction. The input stream is flushed. The terminal state is preserved.

Action: 1. Items to be processed for the userid indicated in the message should be removed from the input stream. The balance of the input stream should be transmitted.
2. An RJEND command may be used to detach the terminal.

Default: The RJE task is placed in the wait state until the terminal reader is activated. A significant delay in activating the reader may cause a time-out condition in the telecommunications system.

11.9.24 USERID/TERMINAL NOT IN DIRECTORY

Cause: While responding to the request for broadcast messages, the RJE task determined that the userid/terminal is not in the RJE message queue directory. This omission does not deny the userid/terminal any general message. However, there cannot exist any messages sent to the current user's attention only. This omission results from changes to the userid list since the RJE message was created.

Action: None.

Default: None.

11.9.25 xxyyy QUEUE IS EMPTY

queue is specified in xxyyy format, where:

xx =	BE	YYY =	RDR
	F2		PRT
			PUN

Cause: A DELETE or STATUS command referenced a queue which had no job entries for the current remote user. This message provides operator information only.

Action: None.

Default: None.

11.10 DOS/POWER TERMINAL COMMANDS

Command statements provide a convenient means of requesting RJE system facilities for the remote environment. Terminal commands allow users at the remote terminal to communicate with the RJE system and request RJE facilities.

Terminal commands must not be included within a job entry. Since collection of the job entry stops only when an * \$\$ EOJ or /& statement is encountered, terminal commands may be placed between job entries only.

The command statement is entered through the terminal reader via a punched card. The format of the statement consists of an identification field, operation field, operand field, comments field, and sequence field.

The identification field contains characters which identify the statement as a terminal command. The characters -- asterisk, blank, period, period (* ..) -- are placed in column 1 through 4.

The operation field defines the function to be performed. This field must be preceded by one or more blanks. The operation field is terminated by a blank.

The operand field, if required, contains one or more positional parameters of information separated by commas. Positional parameters are described as values for which information must be substituted and must be declared in a specific order. The operand field has no fixed length. A blank terminates the operand field; therefore, none of its parameters may contain blanks. A single exception is the operand of the MSGR command, where blanks may appear as part of the message text. If trailing parameters are omitted, trailing commas may be omitted also. If the statement contains a comments field and the operand field is omitted, the omitted operand field is indicated by a comma preceded and followed by blanks. See example 4 of "The JOB Statement" for an illustration of an omitted operand field.

The sequence field contains up to eight characters of optional information used for statement identification. The sequence field is positionally dependent and must be coded in the last eight columns (73-80) of the terminal command. Column 72 is reserved and may not be used. Terminal commands may not be continued.

Use of the sequence field becomes especially useful in RJE, since a number of similar commands may be submitted from the terminal. RJE

returns the sequence field in all response and diagnostics for terminal command statements. The sequence field correlates the statement entered with the response received. With the use of the sequence field, therefore, the user can easily determine which statement is addressed by each response.

Columns 1-4	Columns 6-71	Columns 73-80
----------------	-----------------	------------------

* ..	Operation	Operand	Comments	Sequence
------	-----------	---------	----------	----------

NOTE

Comments and sequence fields are optional.

11.10.1 Function of Terminal Commands

The commands available to RJF users and operators at remote terminals provide a number of capabilities:

1. Commands used to define the state of the terminal:

RJSTART
RJEND
LOGON
LOGOFF

2. Commands used to manipulate job entries and associated output:

OUTPUT
CONTINUE
DELETE

3. Commands used to provide job and system information:

STATUS
BRDCSTR

4. Command used to communicate with central system operator:

MSGR

The RJSTART command is accepted only when the terminal is in the inactive state. The LOGON and RJEND commands are accepted when the terminal is in the active or processing state. All other terminal commands are accepted only when the terminal is in the processing state.

A complete description of the terminal commands and their operands follows. These commands are summarized in Figure 10-1.

ID	Operation	Operand
* ..	RJSTART	termid[,BRDCST]
* ..	RJEND	(no operand)
* ..	LOGON	userid
* ..	LOGOFF	(no operand)
* ..	OUTPUT	jobname [,jobnumber] ALL ALLUSERS
* ..	CONTINUE	BEGIN NO HOLD LOCAL PAGE [,count]
* ..	DELETE	queue, jobname [,jobnumber] ALL
* ..	STATUS	queue, jobname [,jobnumber] HOLD Pn ALLUSERS ALL

```

* ..          BRDCSTR          (no operand)

* ..          MSGR             M,'text'

```

Figure 10-1.
Summary of Terminal Commands

11.10.1.1 RJSTART - Attach a Terminal to RJE System

The RJSTART command logically attaches a terminal to the RJE system. The RJSTART command must be the first statement received from an inactive terminal (one not currently attached to the system). This command identifies the terminal to RJE. It also allows the terminal to request broadcast messages before continuing RJE processing. Communication proceeds between the central system and the terminal after a valid RJSTART command is received. Once the terminal is logically attached, users may gain access to the central system by logging on at the terminal.

ID	Operation	Operand
* ..	RJSTART	termid[,BRDCST]

termid: specifies the name of the terminal which is contained in the list of valid user identifications when the system was generated. It may consist of from one to eight alphanumeric (alphabetic and numeric) characters. If the termid specified is not recognized as a valid name, RJE rejects the command, and a corrected statement must be submitted.

BRDCST specifies that a copy of the broadcast messages for the specified termid is desired before the terminal continues RJE processing. Messages for the specified termid are deleted after a copy is printed at the remote terminal. If this parameter is omitted, no messages will be broadcast at this time.

NOTE

The RJSTART command must be the first statement submitted at an inactive terminal. If the terminal desires to resume RJE activity after it has been logically detached from the system (after an RJEND command or a system failure), it must resubmit the RJSTART command.

11.10.1.2 RJEND -- Detach a Terminal from the RJE System

The RJEND command allows an RJE user to logically detach his terminal from the system. No job output is returned to the terminal after the RJEND command is received. The last message sent to the terminal indicates that the RJEND command was received and that the terminal is now logically detached from the system.

If the terminal is connected to the central system via a switched connection, the connection is broken. To ensure successful termination, the operator should not take his terminal offline before he has received the message indicating that the RJEND command was accepted. No further communication occurs until the terminal resumes RJE activity with an RJSTART command.

ID	Operation	Operand
* ..	RJEND	(no operand)

11.10.1.3 LOGON -- Begin a Session in RJE

A user at a terminal logically attached to the RJE system issues a LOGON command to start his session. The command identifies the user to RJE and allows him access to the system. By checking the userid in the LOGON command, RJE guarantees that only valid users can submit input or request output from the system. The LOGON command remains in effect until another LOGON, a LOGOFF, or an RJEND command is issued.

ID	Operation	Operand
* ..	LOGON	userid

userid: specifies the name assigned to the user by the installation. If the userid specified in this parameter is not valid, RJE rejects the command, and a corrected statement must be submitted. Whenever a terminal user begins a session, a message will appear on the central site operator's console identifying the user and time logged on.

NOTE

Only the LOGON command or the RJEND command may follow the RJSTART command.

Programmer's Note

A user may be logged on two terminals at one time to permit the user of one line for input and another line for output; two lines for output, or two lines for input.

11.10.1.4 LOGOFF -- End a Session

With the LOGOFF command, the user indicates that he has completed his session. After receiving a LOGOFF command, RJE refuses job entries from the terminal until another LOGON command is submitted. Output to be returned to a user may be returned only during the user session. Whenever a terminal user ends a session, a message will appear on the central site operator's console identifying the user and time logged off.

ID	Operation	Operand
* ..	LOGOFF	(no operand)

NOTE

If the central system receives a valid LOGON command from a terminal with a session in progress, the central system logs off the current user and logs on the user identified in the LOGON command. If the central system receives an RJEND command from a terminal with a

session in progress, it logs off the user and logically detaches the terminal. In this manner, the terminal operator may omit the LOGOFF command when changing user sessions or detaching the terminal.

11.10.1.5 OUTPUT -- Request Job Output

Deferred job output is retrieved with the OUTPUT command. If the user is a valid recipient and output is not deferred, RJE returns the output to the user and an output card is not necessary. If the job is not complete when its output is requested, the job will not be in the output queues and RJE returns a message indicating the job is not found. The OUTPUT command must be resubmitted after the job has completed. The OUTPUT command provides capabilities:

1. The user may request (in a specific request) the deferred output of a specific job in the system which contains this userid or identified as ALLUSERS.
2. The user may request (in a major request) all deferred output which contains his userid or identified as ALLUSERS.

If the user is not a valid recipient of the output, a JOB NOT FOUND or NO OUTPUT WAITING message is returned. If output of a job that is not in the system is requested, the same messages are returned to the user.

This command may be used only during a user session.

ID	Operation	Operand
* ..	OUTPUT	jobname[,jobnumber] ALL ALLUSERS

jobname: indicates that the request is for the output of the job named in the parameter (specific request). The user receives the output if he originated the job or is named as a valid recipient for the output.

jobnumber: specifies the number assigned to the job entry by the POWER system when the job entry is logged in the input queue. The STATUS command may be used to inform the operator the correct specification for jobnumber.

Jobnumber may be specified with from one to five numeric characters.

ALL: specifies that RJE is to return to the user all the available output destined to the user, identified in the current LOGON command.

ALLUSERS: specifies that RJE is to return to the user all the output available on a read-only basis with destination ALLUSERS.

NOTE

A user cannot receive job output with another userid (except ALLUSERS). A user is automatically a valid recipient of job output if he submits the job (unless the destination field in the POWER JOB card was to another userid). Jobs with the destination "ALLUSERS" will not be purged when the output function has completed.

11.10.1.6 CONTINUE -- Request Discontinued Job Output

The user or operator at a terminal specifies the disposition of discontinued output with the CONTINUE command. Output may be discontinued (or interrupted) under one of the following conditions:

1. Operator intervention at the terminal causes output to be discontinued.
2. Intervention-required conditions arise during an output operation, which causes an interruption in output.
3. A forms change is required. The interrupted output is held pending the transmission of the appropriate CONTINUE command.

Interruptions which require the CONTINUE command will cause a message to be printed requesting a CONTINUE command. A card will be read. If it is not a CONTINUE card, the input stream will be flushed in preparation for the transmission of the CONTINUE command, and a message will be written to the terminal printer stating that the job stream was flushed. If the CONTINUE command is not transmitted within 28 seconds, a timeout will occur. The system will re-issue the read request until the generated RETRY count is exhausted, at which time the terminal will be detached from the RJE system. If the terminal is detached, the interrupted output is saved, and the user may or may not receive the appropriate ending message, depending upon the output component involved in the interrupted transmission. If the terminal is detached, the user must resubmit an RJSTART command and a LOGON command to reinstate his user session. The interrupted output must be requested via an OUTPUT command. The output will be transmitted from the beginning.

The CONTINUE command provides six capabilities:

1. The user can request the transmission of the entire interrupted output from the beginning.
2. The user can specify that transmission of the output be resumed with the record which was being written when the output was discontinued.
3. The user can specify that he does not desire the output and can direct RJE to delete it.
4. The user can specify that the output is to be held until called for at some later time.
5. The user may change the destination of output to a local output device.
6. The user may page forward or backward from the interrupted page or from the beginning of the job.

ID	Operation	Operand
* ..	CONTINUE	BEGIN NO HOLD LOCAL PAGE [,count]

BEGIN: specifies that the user desires transmission of the entire job output from the beginning.

NO: indicates that the user desires RJE to delete the job output.

HOLD: specifies that the job output is to be placed in the hold state and will be requested via the OUTPUT command at some later time. This option has particular significance when a change of forms is required and the forms are not available for immediate delivery of the output.

no operand: specifies that transmission of the data is to be resumed with the output data block that was being transmitted when the output was discontinued.

LOCAL: changes the destination of job output to a local output writer.

PAGE: allows the user to page forward or backward remotely printed jobs up to 999 pages from the interrupted page or from the beginning of the job.

count: is specified as a signed or unsigned value of from 0 to 999. A plus (+) sign indicates page forward, minus (-) sign indicates page backward from the interrupted page. No sign indicates a specified page count from the beginning. If the operand is omitted, printing will resume from the interrupted page. A page count beyond the limits of the job being printed will cause the following:

If the user specifies too great a backward page count, the job will print from the beginning. If the user specifies a page count greater than the last page, a message will be printed informing him the maximum number of pages in the job and will request another CONTINUE card.

NOTE

When using 2780 terminals, two or more records will print with each BTAM write operation (up to seven) if MRT is specified. If no operand is specified, a duplication of one or more records may result if the interrupt occurred before the write operation.

11.10.1.7 DELETE -- Remove a Job From the Specified Queue

With the DELETE command, the user may remove jobs from a specified queue. This command does not remove named data files created by the job. The DELETE command is not necessary to remove job output which already has been returned to the user. All references to the job in the RJE systems are normally removed after the output is returned to the user. A job entry can be deleted only if it is on the input queue or if it is on an output queue. The DELETE command provides two capabilities:

1. The user can delete a specific job previously submitted by him.
2. The user can delete all jobs previously submitted by him.

ID	Operation	Operand
* ..	DELETE	queue, jobname[,jobnumber] ALL

queue: specifies the queue to which the DELETE command is directed in the xxyy format, where

xx = BG
F2
yyy = RDR
PRT
PUN

jobname: specifies for the job option, the name by which the job entry is known to the POWER system. Jobname may be from one to eight alphanumeric characters. Each job entry name is qualified by a job number assigned to it by the POWER system. Therefore, if the possibility of duplicate jobnames exists, the jobnumber should be specified also. If a duplicate jobname exists and a jobnumber is not specified, the first job entry found with the specified jobname is deleted.

jobnumber: specifies that number assigned to the job entry by the POWER system when the job entry is logged in the input queue. This number is also used with output queue entries for this job. The STATUS command may be used to inform the operator the correct specification for jobnumber. Jobnumber may be specified with from one to five numeric characters.

ALL: specifies a general request to delete all job entries in the specified queue which were submitted by the remote user.

11.10.1.8 STATUS -- Determine the Status of a Job

The STATUS command allows a user to determine the status of one or more remotely submitted jobs in a specified queue. RJE returns the status of only those jobs addressed by this command which are currently in the system and for which the requester is a valid recipient. The STATUS command provides the following capabilities:

1. The user can request the status of a specific job (a specific request).
2. The user can request the status of all jobs in the specified queue for which he is a valid recipient (a major request).

The user receives a response for each job that satisfies the command. Each response contains the jobname and an indication of its status in the following format:

jobname
jobnumber
priority

number of logical records for this job entry for the queue specified

disposition of the job entry in the RDR, PRT, and PUN queues as specified by the JECL.

In addition to these responses, one of two responses may be returned:

JOB NOT FOUND or QUEUE IS EMPTY

The disposition information is given in the form of a 1-letter code. The codes and their meanings are:

D = the job is free for output at the central station
H = the job is in hold status at the central station
R = the job is free for output at the terminal
W = the job is in hold status at the terminal
* = the job output is being printed (or punched)

The STATUS command does not wait in the RJE system; it returns immediately the status of only those jobs in the system at the time the command is received. It does not automatically return the new status of a job when a change of job status occurs.

ID	Operation	Operand
* ..	STATUS	queue, jobname[,jobnumber] HOLD priority ALLUSERS ALL

queue: specifies the queue to which the display command is directed in the xxyyy format, where

xx = BG
F2

yyy = RDR
PRT
PUN

jobname: specifies, for the job option, the name by which the job entry is known to the POWER system. Jobname may be from one to eight alphanumeric characters. Each job entry name is qualified by a job number assigned to it by the POWER system. Therefore, if the possibility of duplicate jobnames exists, the jobnumber should be specified also.

jobnumber: specifies the number assigned to the job entry by the POWER system when the job entry is logged in the input queue. This number is also used with output queue entries for this job. Jobnumber may be specified with from one to five numeric characters.

HOLD: indicates that the request is for all jobs which are in the hold state in the queue.

priority: indicates that the request is for all jobs which have the priority number specified by Pn. n is a numeric character from 0 to 9. Nine is the highest priority.

ALLUSERS: indicates that the request is for all jobs in the queue destined on a read-only basis for all remote users.

ALL: indicates that the request is for all jobs in the queue for which the user is a valid recipient.

11.10.1.9 BRDCSTR -- Request the Broadcast Messages

The remote user requests a copy of the broadcast messages directed to his userid with the BRDCSTR command. RJE responds to this command by returning a copy of the system broadcast messages to the terminal. These messages contain information of general interest to the entire RJE system and information of specific interest to the individual user. They may include any information considered desirable by the central installation and are retrieved only on request from a terminal. The information might include:

1. The next scheduled RJE closedown at the central system.
2. The next scheduled RJE startup at the central system.
3. The installation equipment configuration and its status at the central system.

The broadcast messages are created by the central operator. Messages from the specified user are deleted after a copy is printed at the remote terminal.

ID	Operation	Operand
* ..	BRDCSTR	(no operand)

NOTE

To receive broadcast messages for the termid in the RJSTART command after the RJSTART command has been sent, the terminal operator may log on using the termid as the userid in the LOGON command and may send the BRDCSTR command.

11.10.1.10 MSGR -- Communicate Within RJE

Messages may be sent to the central operator and are displayed on SYSLOG when they are received.

Message text is limited to 40 characters. The MSGR command cannot be continued. Any messages requiring more than 40 characters of text must be sent by multiple commands.

ID	Operation	Operand
* ..	MSGR	M,'text'

M,'text': specifies the message text to be sent. The message text must be framed by single quotes. The text itself may include as many as 40 printable characters and blanks. Single quotes contained within the message text must be paired, and each pair counts as two text characters. Message text may be prepared with lower case characters or upper case characters. They will be printed on the central system console in upper case characters only.

Example 1: Initiating Terminal Operation and a User Session

* ..	RJSTART	SEATTLE,BRDCST	STMNT 1
* ..	LOGON	DIST3	STMNT 2
Jobs from District 3			
* ..	STATUS	BGRDR,ALL	STMNT 3
* ..	LOGOFF		STMNT 4
* ..	LOGON	DIST3A	STMNT 5
Jobs from District 3A			

```

* ..      LOGON DIST3           STMNT 6
* ..      OUTPUT ALL           STMNT 7
* ..      LOGOFF               STMNT 8
* ..      RJEND                 STMNT 9

```

STMNT 1 logically attaches the terminal to the RJE system and requests broadcast messages for Seattle, and STMNT 9 logically detaches the terminal. Between STMNT 1 and STMNT 9, three user sessions take place. District 3 has two sessions: The first begins with STMNT 2 and ends with STMNT 4, and the second begins with STMNT 6 and ends with STMNT 8. In the first session, District 3 submits jobs for processing and requests verification that the jobs were successfully entered into the POWER system. In the second session, District 3 requests all accumulated output which is to be returned to District 3. District 3A has only one session, which begins with STMNT 5 and ends with STMNT 6. Note that the LOGON command for District 3 terminates District 3A's session.

Example 2: Using the BRDCSTR, MSGR, STATUS, OUTPUT and DELETE Commands

```

* ..      RJSTART COURSE1      STMNT 1
* ..      LOGON CLASS2        STMNT 2
* ..      STATUS BGRDR,ALL     STMNT 3
* ..      STATUS BGPRT,ALL     STMNT 4
* ..      STATUS BGPUN,ALL     STMNT 5
* ..      BRDCSTR              STMNT 6
* ..      LOGOFF               STMNT 7
* ..      LOGON CLASS6        STMNT 8
* ..      BRDCSTR              STMNT 9

```

JOBS from Class 6

```

* ..      STATUS BGRDR,ALL     STMNT 10
* ..      LOGON CLASS2        STMNT 11
* ..      DELETE BGRDR,STUDENTI,6 STMNT 12
* ..      OUTPUT STUDENT9     STMNT 13
* ..      DELETE BGPUN,SAMPROB STMNT 14
* ..      STATUS BGRDR,ALL     STMNT 15
* ..      STATUS BGPRT,ALL     STMNT 16
* ..      RJEND                 STMNT 17

```

Example 2 assumes that Class 2 has previously submitted jobs for processing. The terminal is logically attached to the RJE system with STMNT 1 and logically detached with STMNT 17. Note that STMNT 17 also defines the end of Class 2's second session; no LOGOFF command is required. Class 2 has two user sessions: The first begins with STMNT 2 and ends with STMNT 7, and the second begins with STMNT 11 and ends with STMNT 17. During the first session, three general requests are made for status reports of jobs submitted for processing in the background partition. STMNT 6 requests any messages for Class 2. When these messages are transmitted, they are deleted from the message queue.

During the second session, selected jobs are deleted and output for one job is requested. The STATUS command is used again in STMNT 15 and STMNT 16 to verify the changes made to the BGRDR and BGPRT queues.

Class 6 has a user session beginning at STMNT 8 and ending at STMNT 11. Note that the user session was terminated with the LOGON command for Class 2; the LOGOFF command was not required. During the user session, Class 6 requested any broadcast messages for its userid, submitted jobs, and verified the results of job submission with the STATUS command.

Example 3: The CONTINUE Command (forms registration/intervention required on output).

```
* ..      RJSTART PAYROLL, BRDCST          STMNT 1
* ..      LOGON PAYROLL                    STMNT 2
* ..      OUTPUT PAYCHECK                  STMNT 3

Transmission is interrupted by the terminal operator

* ..      CONTINUE BEGIN                    STMNT 4
* ..      RJEND                             STMNT 5
```

PAYROLL logically attaches the terminal using its own userid as termid in STMNT 1 and begins its user session with STMNT 2. Note that the LOGON command is still required with the proper userid. The terminal operator has check forms on the printer when the session begins. STMNT 3 requests the output from the job PAYCHECK, which should be printed on the blank check forms. The terminal operator determines from the first check printed that the check forms are not aligned properly with the printed output, and he turns off the printer. The RJE task transmitting the output receives the signal that intervention is required at the terminal. The RJE task writes a message on the terminal printer indicating that the CONTINUE command is required to resume transmission. The task prepares to read from the terminal reader. If the card read is a CONTINUE command, the task processes it. Otherwise, the RJE task flushes the terminal reader in preparation for the CONTINUE command, writes a message on the terminal printer indicating that the job stream has been flushed and prepares to read from the terminal reader. The terminal operator properly aligns the blank check forms and requests that the output be restarted (STMNT 4). If the job PAYCHECK had a program failure resulting in a dump of main storage, the operator might change forms and use STMNT 4 to get the dump, or he might reply with * ..CONTINUE LOCAL, which would make the output available for printing at a local output writer.

Example 4: Transmission Failure While Submitting Job Entries

```
* ..      RJSTART DATAPROC                STMNT 1
* ..      LOGON PROGRL                    STMNT 2
```

From Programmer 2

Job 1
Job 2

Transmission failure during submission of Job 2

When a transmission failure occurs, the terminal operator must reestablish the line. This action requires an RJSTART command to logically attach the terminal once more, and the interrupted input must be resubmitted. One approach follows:

```

* ..      RJSTART DATAPROC          STMNT 1
* ..      LOGON PROGR1             STMNT 2
* ..      STATUS BGRDR,ALL         STMNT 3

```

From Programmer 1

```

          Job 3
          Job 2      (the job whose submission was
                    interrupted by transmission
failure)

```

```

* ..      STATUS BGRDR,ALL         STMNT 4
* ..      LOGOFF                   STMNT 5
* ..      RJEND                     STMNT 6

```

As soon as the line has been reestablished, the terminal operator verifies that Job 2 did not enter the POWER system. The operator then completes job submission by allowing Job 3 to precede Job 2 while he checks the status report. The operator again gets a status report after Job 2 is transmitted.

Example 5: Transmission Failure While Receiving Output.

```

* ..      RJSTART DATAPROC          STMNT 1
* ..      LOGON PROGR2             STMNT 2
* ..      OUTPUT ALL                STMNT 3

```

Transmission failure during printing of Job 2

When a transmission failure occurs, the terminal operator must reestablish the line. This action requires an RJSTART command to logically attach the terminal and request the output once more. One approach follows:

```

* ..      RJSTART DATAPROC          STMNT 1
* ..      LOGON PROGR2             STMNT 2
* ..      OUTPUT ALL                STMNT 3
* ..      RJEND                     STMNT 4

```

Even though the transmission was interrupted during receipt of the output from JOB 2, the transmission was occurring in response to the general request for output. Repeating this request will cause Job 2 output to be transmitted from the beginning. Job output is not deleted from the output queue until it has all been successfully transmitted. Therefore, if the OUTPUT command had specified Job 2 instead of ALL, the command could be reissued after reestablishing the line.

APPENDIX A

2780/BISYNC TRANSMISSION FORMATS

This appendix defines the data-link control sequences (i.e., BISYNC line discipline) and end-to-end control characters (i.e., printer format control) used by the 2780 RCS.

The DECcomm 2780 RCS prefixes all transmitted messages with four SYN framing characters. All messages transmitted by the remote terminal must be prefixed with at least two SYN characters.

A.1 INITIALIZATION PROCEDURE

The initialization procedure precedes each message transfer sequence and consists of a bid sequence. The 2780 RCS performs a master bid sequence to initiate a transmission from the card reader or other device. The reading and transmitting of data records proceeds when the bid sequence is affirmatively acknowledged.

A.1.1 Bid Sequence

TRANS	E P N A Q D	(Bid sequence)
RECE	D L 0 E	(ACK0 - Affirmative acknowledgement)
	N A K	(Negative acknowledgement; 2780 RCS retransmits master bid sequence.)
	'No response within a second'	(2780 retransmits the master bid sequence.)

A.2 MESSAGE TRANSFER PROCEDURE

After completing a successful bid sequence, the DECcomm 2780 RCS can process data records in any of the following four permissible formats.

S
 (Leading Y characters are not shown.)
 N

Master		S		I B P S		I B P	E B P
Station	TRANS	a)	T 'Data Record A'	T C A T	'Data Record B'	T C A...	T C A
			X	B C D X		B C D	B C D

The 2780 RCS uses the extended multiple record feature in which the transmission block consists of up to seven data records or a maximum of 400 characters.

		S		I B P S		E B P
		b)	T 'Data Record A'	T C A T	'Data Record B'	T C A
			X	B C D X		X C D

		S		E B P
		c)	T 'Data Record A'	T C A
			X	B C D

		S		E B P
		d)	T 'Data Record A'	T C A
			X	X C D

Slave Station response
upon detection

E	E		
of T	or T		
B	X	D	(Affirmative acknowledgement to first
		L 1	transmission block and each subsequent
		E	odd-numbered block)
		D	(Affirmative acknowledgement to second
		L 0	transmission block and each subsequent
		E	even-numbered block)
		N	(Negative acknowledgement; request
		A	for retransmission of entire previous
		K	block)
		E	(Abort reception due to line printer
		O	error requiring operator intervention)
		T	

NOTE

In transparent text mode, master station
transmission formats are identical except the

S	I	E	E	
T ,	T ,	T ,	and	T control codes are replaced by
X	B	B		X
D S	D I	D E		D E
L T ,	L T ,	L T ,	and	L T respectively.
E X	E B	E B		E X

Master
Station TRANS

E P	(End of transmission; sent after ETX
O A	record to return both stations to
T D	control mode and enable either
	station to initiate a new master bid
	sequence.)

A.3 END-TO-END CONTROL CHARACTERS

The DECcomm 2780 RCS supports all four end-to-end control characters defined for standard 2780 Model 1 terminals: EM, ESC, HT, and BEL. The DOS 2780 RCS supports the punch selection sequence (ESC,4), normally associated with 2780 Model 2 terminals, in conjunction with the selective receive feature (see 3.6.1.2 of 2780 RCS Operator's Guide).

EM (End of Media)

The EM control character can be punched following the last data column in the card to indicate a short record when transmitting in non-transparent mode. (The EM code is ignored, and all 80 columns are transmitted in transparent text mode.)

The 2780 RCS detects the EM code and processes the preceding data as an intermediate block record (ITB) or end block record (ETB). The EM code is not included in the transmission record.

EM codes embedded in receive records are ignored.

ESC (Escape) - Printer Vertical Format Control

The ESC character and the following character are usually the first characters in each print record received by the 2780 RCS. The 2-character combination provides printer vertical format control for data printing. A default single space print operation is performed if no vertical format escape sequence is detected.

The 2-character ESC sequence provides carriage skipping information, which is performed by programmed instructions after all of the data following the ESC sequence is printed. Double space, triple space, or skip operations are effective only for the record containing the associated ESC sequence. The DECcomm 2780 RCS interprets the following EBCDIC ESC codes:

ESC / (Q) (1) Single space

(1)USASCII code

ESC S (R) (1)	Double space
ESC T (S) (1)	Triple space
ESC A	Skip to Channel 1(2) (head of form)
ESC B	Skip to Channel 2(3) (line 8)
ESC C	Skip to Channel 3(3) (line 16)
ESC D	Skip to Channel 4(3) (line 24)
ESC E	Skip to Channel 5(3) (line 32)
ESC F	Skip to Channel 6(3) (line 40)
ESC G	Skip to Channel 7(3) (line 48)
ESC H	Skip to Channel 8(3) (line 56)

ESC HT - Printer Horizontal Format Control

The 2-character sequence ESC HT at the beginning of a record signifies that the remainder of the record is a printer horizontal format control record. Subsequent HT characters encountered within the record cause the DECcomm 2780 RCS to preset programmed tab stops to control horizontal formatting of subsequent records until a new horizontal format control record is detected.

The DECcomm 2780 RCS utilizes default tab stop settings of 8-space intervals when operating with a remote CPU that does not use the printer horizontal format control record feature.

 (2) Results in form feed (i.e., head of form).

(3) Results in a modulo 8 vertical spacing.

BEL - Terminal-to-Terminal Alarm Code

A BEL alarm code can be sent to a remote terminal (not a remote CPU), when the 2780 RCS is in online control mode.

A BEL code received while in online control mode results in an audible signal on the console terminal.

A.4 LINE PRINTER ERROR

Slave	F	P	(End of transmission; while in slave
Station	O	A	mode, a message transfer signals a
	T	D	transmission abort.)

A.5 DISCONNECT MESSAGE

D	E	P	(Disconnect; valid only in PDP-11-to
L	O	A	PDP-11 configurations; illegal in
E	T	D	RJE operation.)

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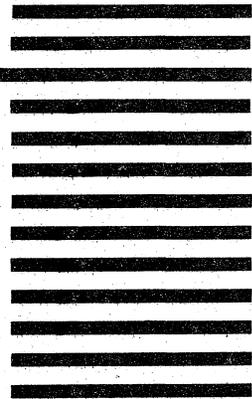
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