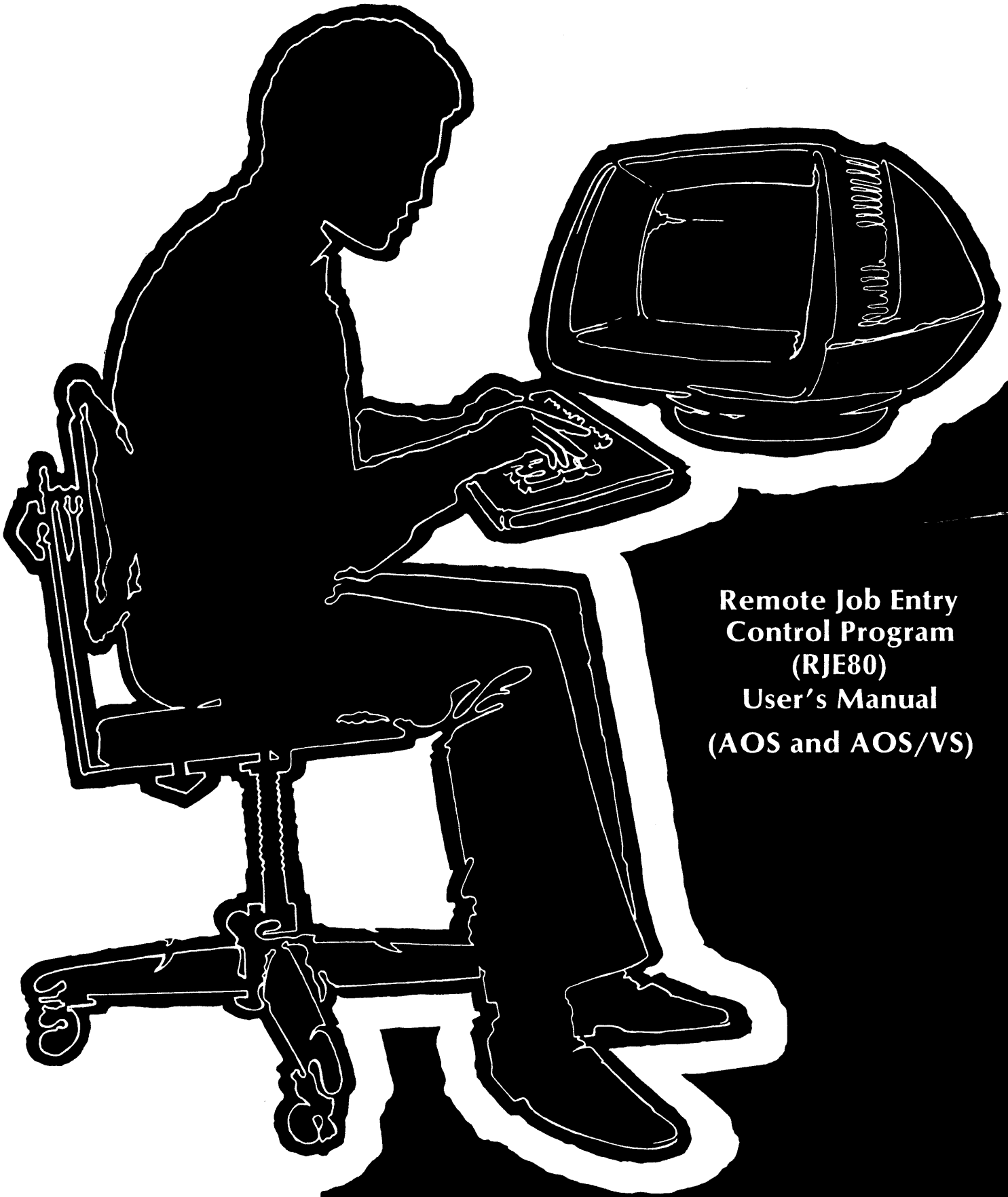
Data General



Remote Job Entry Control Program (RJE80) User's Manual (AOS and AOS/VS)

093-000157-01

Remote Job Entry Control Program
(RJE80)
User's Manual
(AOS and AOS/VS)

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For the latest enhancements, cautions, documentation changes, and other information on this product, please see the Release Notice (085-series) supplied with the software.

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NOTICE

Remote Job Entry Control Program (RJE80)
User's Manual (AOS and AOS/VS)
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This document has been extensively revised from the previous revision; therefore change indicators have not been used.

Preface

Who Should Read This Manual?

This book introduces the RJE80 Remote Job Entry Terminal Emulator and shows how to load, generate, and use it. The book is designed for operators, programmers, and analysts who have a working knowledge of Data General's Advanced Operating System (AOS and AOS/VS).

Manual Organization:

The manual is organized in the following way:

Chapter 1 describes RJE80's functions in general and tells what hardware and software you need to run it.

Chapter 2 explains RJE80's functions in more detail and shows how it manipulates data when sending and receiving.

Chapter 3 tells how to load and generate RJE80 and presents each generation phase command in detail.

Chapter 4 describes how to run RJE80 and presents each runtime command in detail.

There are three appendixes: Appendix A describes printer control characters for vertical and horizontal tabbing; Appendix B lists messages from RJE80 with their accompanying help messages; Appendix C is a copy of the ASCII/EBCDIC conversion table source file.

Prerequisite Manuals

Users of this product should familiarize themselves with the general protocol specifications and definitions. Three manuals on the subject are available for purchase from the International Business Machines Corporation (IBM):

1. *General Information—Binary Synchronous Communications*, Order No. GA27-3004-2.
2. *Component Description: IBM 2780 Data Transmission Terminal*, Order No. GA27-3005-3.
3. *Component Information for the IBM 3780 Data Communication Terminal*, Order No. GA27-3063-3.

Other Related Manuals:

These Data General manuals provide the necessary background for running RJE80 using Data General's Advanced Operating System (AOS and AOS/VS) and the Command Line Interpreter (CLI).

- *Learning to Use Your Advanced Operating System (AOS)* (069-000018)
- *Advanced Operating System (AOS) Operator's Guide* (093-000194)

- *Command Line Interpreter (CLI) (AOS and AOS/VS) User's Manual* (093-000122)
- *Advanced Operating System (AOS) Programmer's Manual* (093-000120)

Please Note:

We use these conventions for command formats in this manual:

COMMAND required *[optional]*

Where	Means
COMMAND	You must enter the command (or its accepted abbreviation) as shown.
required	You must enter some argument (such as a filename). Sometimes, we use: $\left\{\begin{matrix}\text{required}_1\\ \text{required}_2\end{matrix}\right\}$ which means you must enter one of the arguments. Do not enter the braces; they only set off the choice.
[optional]	You have the option of entering this argument. Do not enter the brackets; they only set off what is optional.
...	You may repeat the preceding entry or entries. The explanation below the command format will tell you what you may repeat.

In addition, this manual uses certain symbols in special ways.

Symbol	Means
⤶	Press the NEW LINE or carriage return (CR) key on your terminal's keyboard.
)	The system is ready to receive your command. The right parenthesis is called the prompt.
□	Be sure to put a space here.

In examples, we use these typefaces to distinguish command lines and system responses from normal manual text:

```
) The command line that you type is preceded by the prompt.
The line without the prompt is the system response.
```

Finally, all numbers are decimal unless otherwise indicated: for example, 35_8 is an octal number.

Contacting Data General

- To order any Data General manual, notify your sales representative and supply the manual title and order number.
- If you have software problems, please notify your local Data General systems engineer.
- If you have hardware problems, please notify the Field Engineering Dispatch Center.

End of Preface

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Chapter 1
Introduction

RJE80 emulates the IBM 2780 and 3780 Remote Job Entry Terminals and lets you transfer files between your local Data General system and a remote site. This version of RJE80 runs under either the AOS or AOS/VS operating systems.

Through RJE80, you can communicate with any computer system capable of supporting a 2780 or 3780 RJE terminal, and with any Data General computer running the RDOS, RTOS, DOS, MPOS, AOS, or AOS/VS versions of RJE80.

RJE80 Overview

RJE80 transmits and receives blocks of data. When sending data, it:

1. reads records from a file,
2. groups them into blocks, and
3. transmits the blocks over a communications line to the remote site.

When receiving, RJE80:

1. receives data from a remote site,
2. separates the data blocks into the component records, and
3. writes the data to a file (which may be a device such as a printer).

Once started, RJE80 runs until you terminate it. It sends data when you give the appropriate command, and can receive data whenever it is not sending. Its command structure permits several options for both sending and receiving.

RJE80 can run as part of a general-purpose computing system under AOS or AOS/VS. It will not interfere with other, simultaneously running applications.

RJE80 Features

RJE80 also offers the following:

- Binary Synchronous (BISYNC) data communications protocol
- Point-to-point or multidrop configuration
- Up to 39 poll entries in the poll list of a multidrop configuration
- Elimination of line bid contention in point-to-point configurations (stations can be declared primary or secondary)
- Interactive system generation through simple commands
- Transmission in either EBCDIC or ASCII line code (there is an on-line source file of ASCII-to-EBCDIC and EBCDIC-to-ASCII conversion tables), and user control over the number of records per block and bytes per record sent in text transmissions

- A choice of the three most common types of data block error checking: using hardware CRC16 and CCITT16, or software LRC
- Space compression in 3780 mode (from three to sixty-three spaces can be transmitted as a two-character sequence) and transparency (for transmitting binary files)
- Horizontal and vertical printer format controls and device selection control characters
- A report system to display current and accumulated transmission statistics
- A wrong number protection feature that keeps accidental outside phone calls from disabling your data line
- Timeout features to terminate RJE80 if an expected call does not arrive within a specified time and to stop the polling of a non-responding station in a multidrop configuration
- A disk-resident source file of all RJE80 messages with an identification number and severity level assigned to each message, and on-line help messages for explaining errors

RJE80 Hardware Requirements

Your Data General representative will discuss possible hardware configurations for running RJE80. These may vary depending on your system.

RJE80, running under AOS or AOS/VS, can use any device supported by the system. It can accept input from and send output to a console, a card reader, a paper tape reader, a tape file, diskette file, or disk file.

Figure 1-1 shows a typical installation in which RJE80 would run, including a Data General ECLIPSE® computer and several peripheral devices.

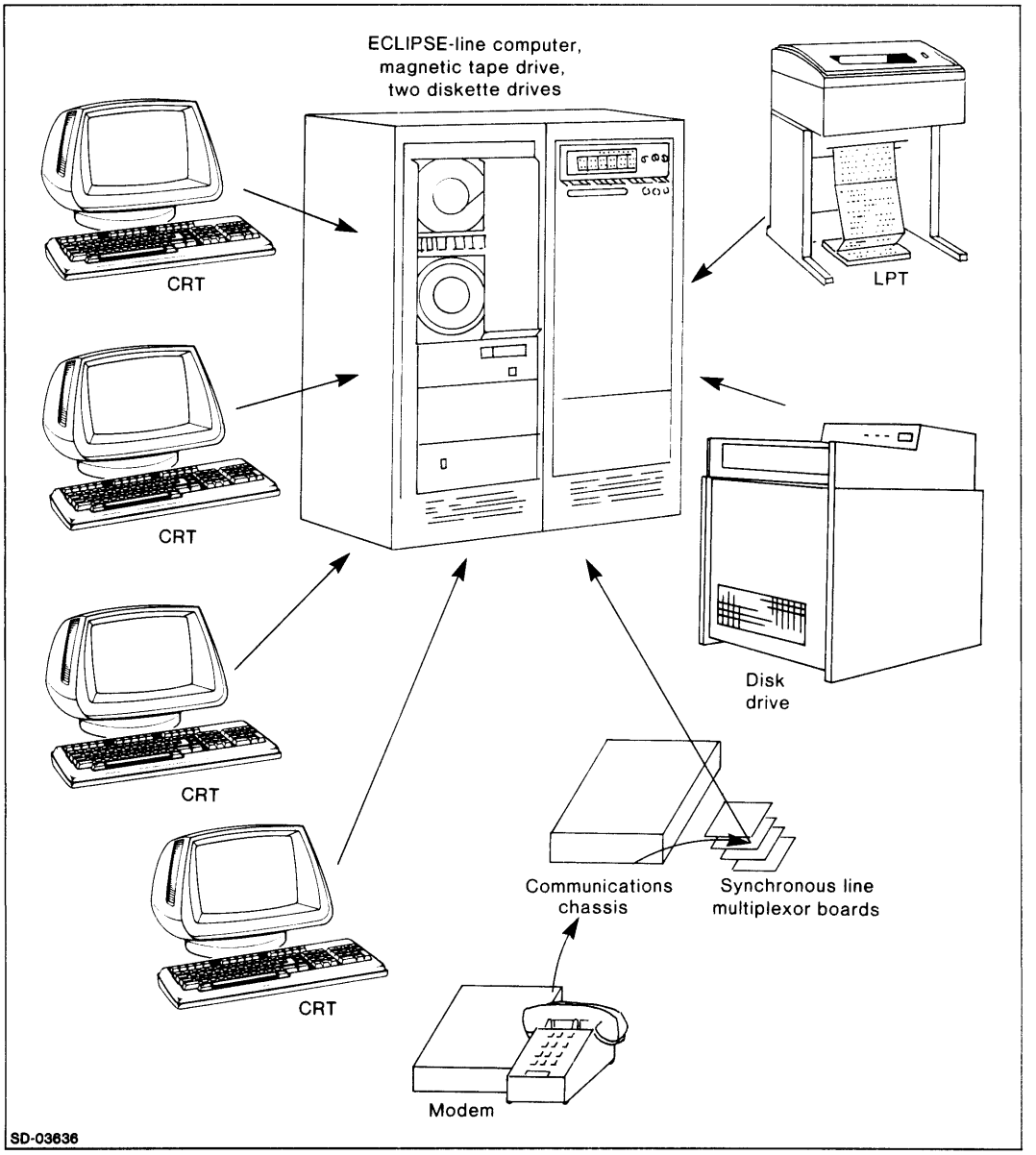

Figure 1-1. Typical Hardware Configuration for RJE80

Communicating with Data General Systems

An ECLIPSE system running RJE80 under AOS or AOS/VS can communicate with any other Data General system running RJE80, under any operating system, providing they are both emulating the same terminal (either a 2780 or 3780).

RJE80 Under AOS or AOS/VS

RJE80 runs as an independent process under AOS or AOS/VS. You start RJE80 with the CLI PROCESS command and communicate with it using the CLI CONTROL command; this lets you continue working in the AOS CLI or in other utilities (such as the text editors or the assembler) while you are transmitting and receiving with RJE80.

Figure 1-2 shows, in simplified form, how you communicate with RJE80 under AOS or AOS/VS.

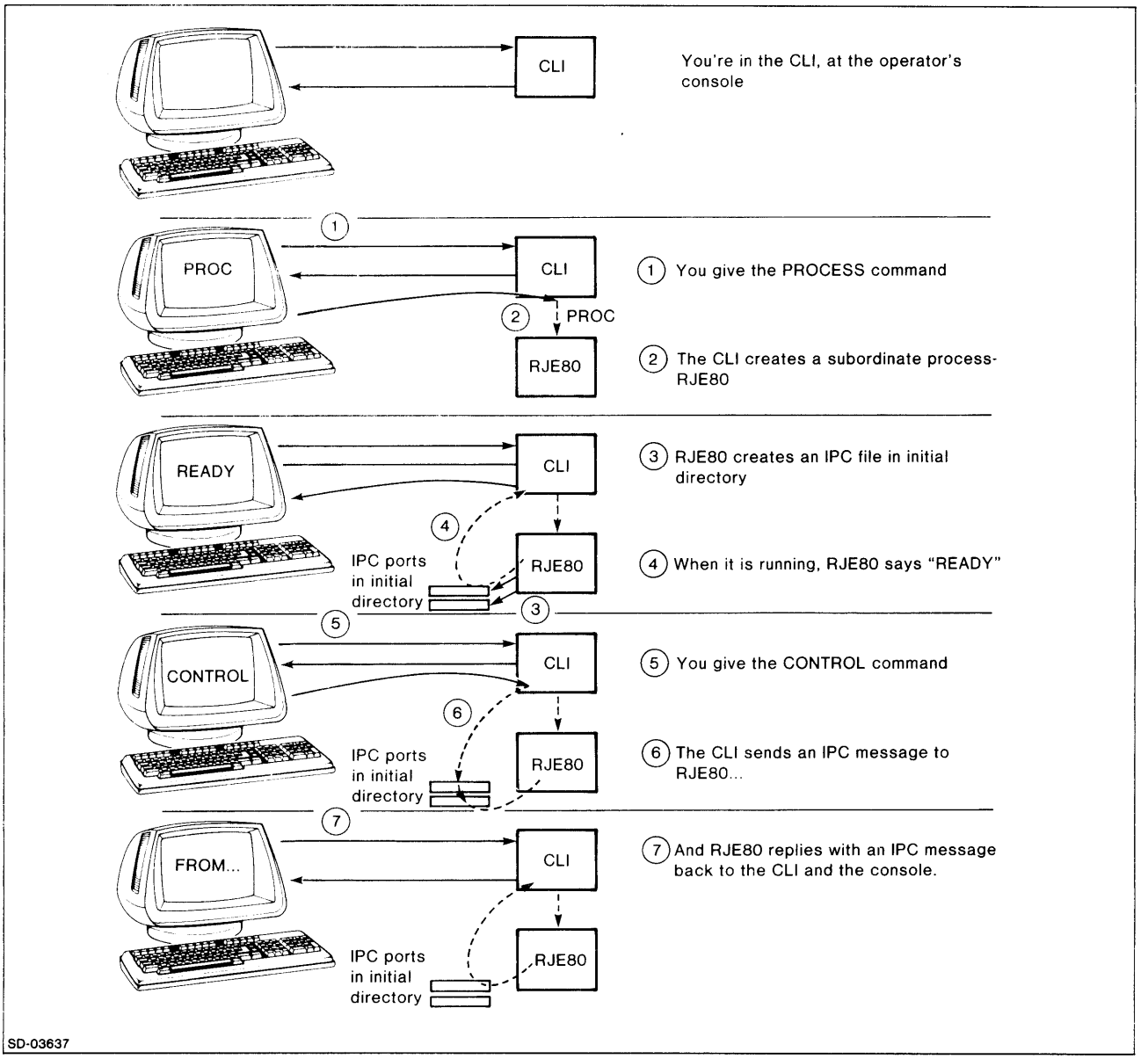

Figure 1-2. Communications with RJE80 under AOS or AOS/VS

Communicating with Data General Systems

If all stations/sites are Data General systems running RJE80, the procedure to establish communications is straightforward. At least one synchronous line should be configured on each system. For AOS, this is done using AOSGEN, for AOS/VS, it is done using VSGEN. (In the AOS/VS systems, the operator must bring up the GSMGR program before synchronous line users can do anything.) Then, RJE80 should be loaded, generated, and started on each system. At this point any site can dial up a remote site and transmit. The procedures for dialing up a remote site will vary according to your system's hardware.

Communicating with Other Systems

RJE80 will communicate with an IBM System 360/370 or another system configured for a 2780 or 3780 terminal. You should find out what the log-on procedure is for the installation receiving the data, before you invoke RJE80.

Operating RJE80

To get an idea of how RJE80 functions, let's assume that you are working at the console of an ECLIPSE computer system and are ready to transmit a file. Attached to the ECLIPSE computer are the data communications hardware and peripheral devices you need. To operate the RJE80 program, follow these steps:

1. Issue the CLI PROCESS command, creating a process to run the program, and set the system generation parameters.

2. Next, start the file transfer phase of the program and use RJE80 runtime commands to set the transmission parameters you want. These steps are explained in Chapter 3; individual RJE80 commands are described in Chapter 4.

3. Now, dial up the remote station and, as soon as contact is established, give the SEND command followed by the first filename. RJE80 will begin to read the file; it will group the first records to form the first block, compress the block (if you set compression to ON), and then send it out to the communications line; you will get the message *(RJE80) TRANSMITTING*. As soon as RJE80 receives an acknowledgement from the remote site, it will repeat the grouping and transmitting process until it reaches the end of the file.

4. The remote station now can return information to you.

The I/O packet timeout parameter, set during system generation, determines how long the reception and transmission commands will wait for a response before timing out.

As soon as RJE80 receives the first record, it scans the record for printer and punch control characters and sends the record to either the LIST file or the PUNCH file (whichever is appropriate). If the LIST or PUNCH file is the queue @LPT, the records directed to that file go to the line printer spooler. RJE80 sends a console message, *(RJE80) RECEIVING*, and when it receives the last record it displays *(RJE80) RECEIVE END.*

Use the console to direct output from your LIST file to another file or device, or else, if you sent your output to a printer, collect the output there. When all your jobs are done, you can terminate RJE80 with the HOME command.

Output

The IBM 2780 and 3780 Remote Job Entry terminals were designed for two output devices only: a line printer and a card punch. Since RJE80 uses 2780/3780 protocol, all data it receives carries destination identifiers specifying either the printer or the punch. The LIST and PUNCH settings in RJE80 specify where received data will be routed.

Data sent with a line printer specification is directed to the file or device indicated by the LIST setting. This may be the AOS or AOS/VS system line printer or any other file or device. Data specifying the card punch is directed to the file or device indicated by the PUNCH setting. RJE80 routes incoming records according to any device destination control characters the records contain, and appends the records to the appropriate file, either LIST or PUNCH.

Initially, both the LIST and PUNCH files are set to @LPT, so all output will go to the line printer's spooler (a part of AOS or AOS/VS; see below). You can specify other LIST and PUNCH files with the LIST and PUNCH commands, and have RJE80 direct output to those files; you can also specify that the LIST or PUNCH file be @LPT again at any time. The default for PUNCH is set to the line printer since most AOS systems do not have a card punch. For more on the LIST and PUNCH commands, see Chapter 4, "Commands".

AOS and AOS/VS Printer Queues

Data written to the print queue is not printed until the entire file has been received and the printer is available. RJE80 can receive or send another file while the first file waits in the queue. When the file's turn to be printed comes, XLPT will retrieve the file and write it to the line printer.

End of Chapter

Chapter 2
Station Configurations and Data Transmission

This chapter introduces the terminology and basic concepts used throughout this manual. It also explains how stations may be linked together and how RJE80 transmits data across the links.

RJE80 stations can be linked in two types of configurations: point-to-point and multidrop. The first part of this chapter explains each of these configurations, how to set them up, and how RJE80 directs data traffic within a configuration. The second part of the chapter shows how RJE80 prepares and transmits data.

Station Configurations

RJE80 supports point-to-point or multidrop configurations. Point-to-point is the simplest type of configuration. A point-to-point station can be linked to only one remote station, to which it sends all transmissions.

Multidrop configurations involve several stations, called *tributaries*. A multidrop configuration also has one *control* station that regulates traffic for the entire configuration. Each tributary station can exchange data only with the control station. If one tributary station wishes to communicate with another, it must do so through the control station.

Point-to-Point

The LINETYPE parameter, set during system generation, determines the type of station and configuration. For a point-to-point station, set LINETYPE to PTP, the default value for the parameter.

You designate a point-to-point station *primary* or *secondary* with the STATYPE system generation command. When both stations want to transmit, a secondary station relinquishes control to a primary station. If both stations have the same rank, the designation has no effect.

Multidrop

Multidrop configurations provide communication between tributary stations and a control station. The tributaries cannot talk directly with each other, but use the control station as an intermediary. RJE80 can support up to 27 stations (one control station plus 26 tributary stations). Figure 2-1 shows a multidrop configuration.

The communications line connecting a control station to a tributary is generally a dedicated, hardwired line with several connections for stations. A multidrop line can be configured by your local telephone company.

Each tributary station has an address to identify it. A tributary address is a single alphabetic character; upper- and lowercase letters are equivalent in 3780 mode. In 2780 mode, the POLIST and TRIBADDR addresses must match, both in spelling and case.

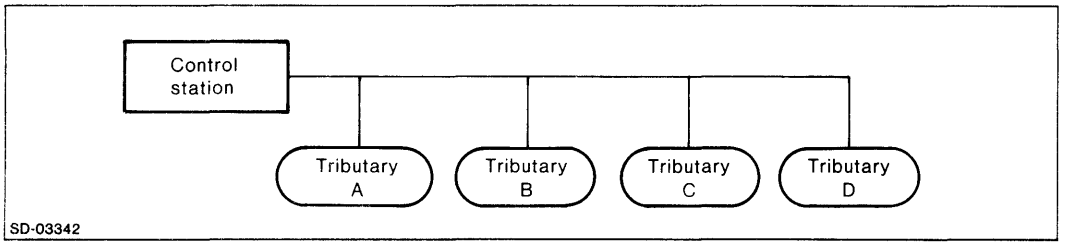

Figure 2-1. Multidrop Configuration

The control station is the nucleus of the configuration. It ensures an orderly flow of data traffic by initiating all data transfers through processes called *polling* and *selecting*. The control station sends special sequences of characters to the tributaries. A poll sequence invites a tributary station to transmit; a select alerts a tributary station to receive. After the poll or select, the sending station begins transmission. It sends one block of the file at a time, and waits for an acknowledgement before sending the next block. The transmission finishes with an EOT (end of transmission) character that signals the end of the file. Figure 2-2 illustrates this process.

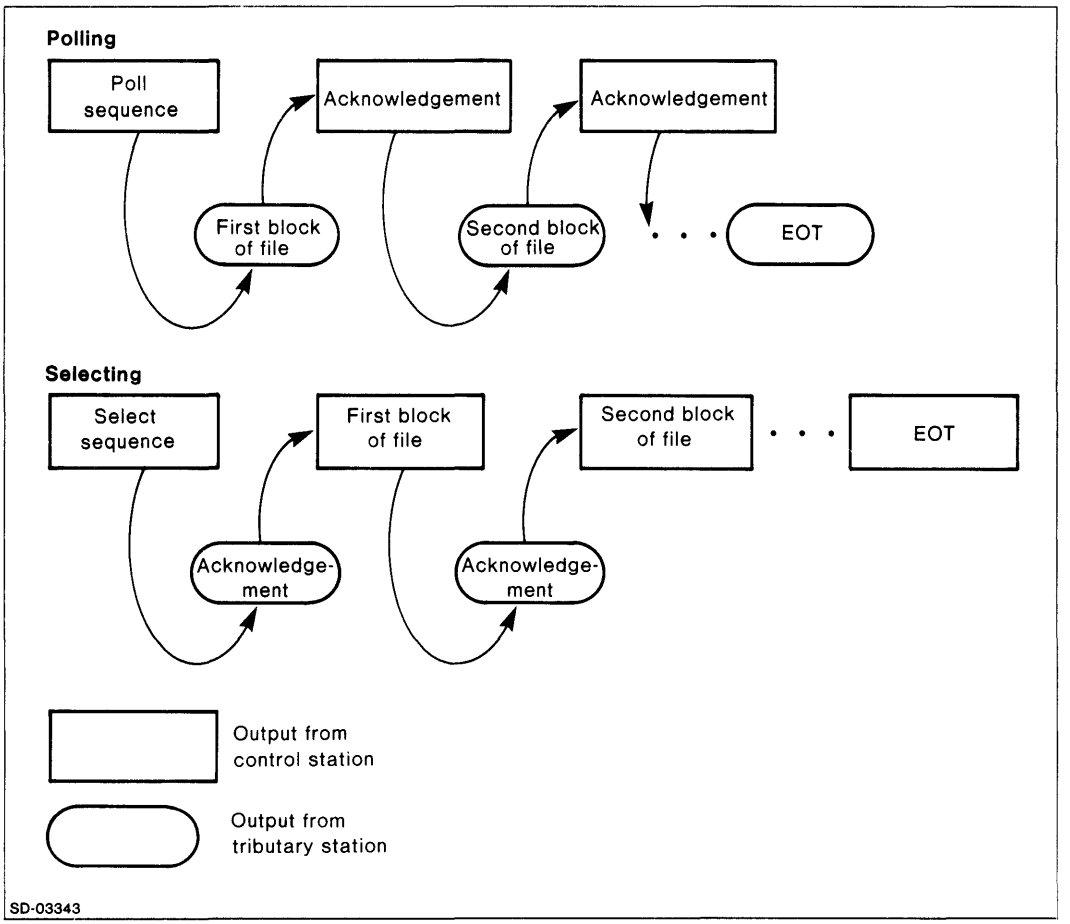

Figure 2-2. Polling and Selecting

When the control station wishes to send data to a tributary station, it issues a select to the station that is to receive the data. The control station then transmits the data and continues polling other stations. A tributary station with data to send must wait to be polled before it can transmit the data to the control station.

Stations are polled according to their order in the control station's *poll list*. The poll list is set during system generation, and may contain up to 39 tributary addresses (only 26 can be unique). Stations are polled in the order shown in the list; if a system appears several times in the list, it is polled several times in each polling cycle.

RJE80 checks the poll list when the control station specifies it during system generation, and may send any of the following error messages:

27 MORE THAN 26 UNIQUE POLL STATIONS CONFIGURED
28 NO MULTIDROP POLL STATIONS CONFIGURED
91 REQUEST DENIED. MORE THAN 39 POLL STATIONS

Disabling and Enabling Tributary Stations

The control station can disable or enable a tributary using the DISABLE or ENABLE commands described in Chapter 4. Disabling a tributary causes RJE80 to stop polling that station. Enabling a station causes it to be polled again in its turn, according to the poll list.

Possible error messages for the ENABLE and DISABLE commands are as follows:

51 REQUEST DENIED. STATION ADDRESS NOT DEFINED
54 REQUEST DENIED. STATION ADDRESS NOT ENABLED
55 REQUEST DENIED. STATION ADDRESS ALREADY DISABLED
53 REQUEST DENIED. ANOTHER REQUEST OUTSTANDING
63 CANNOT DISABLE MULTIDROP STATION
64 CANNOT ENABLE MULTIDROP STATION

Poll Station Time-Out

A tributary may be disabled automatically if it fails to respond during a given number of polling cycles. The POLTIME system generation parameter determines this number of cycles. If the POLTIME limit is reached, RJE80 disables the tributary and sends the following message to the control station:

18 TRIB STATION addr SET DISABLED

addr is the tributary address.

The control station operator can re-enable the tributary with the ENABLE command if desired.

If the default, NEVER, is chosen for the POLTIME parameter, tributaries are never disabled for failing to respond to polls.

Data Transmission

This section tells you more about RJE80's data transmission, including the codes it sends and the ways it manipulates records.

Codes

RJE80 transmits in either ASCII or EBCDIC line code, depending on the code type chosen during system generation. All stations in a configuration must select the same code. EBCDIC line code is usually used, even though printable files on Data General systems are in ASCII code. If you use ASCII line code, you cannot send binary files (ASCII is a seven-bit code).

ASCII/EBCDIC Conversion Tables

RJE80 comes with a copy of the source file (CONVT.SR) used for ASCII/EBCDIC conversion. You can modify this source file if you want some characters converted differently. Appendix C of this manual shows the conversion tables provided with RJE80.

If you modify the conversion tables, you must reassemble the conversion module and relink RJE80 using the supplied macros. On AOS, the command lines look like this:

```
) MASM CONVT↵
) LINK_RJE80↵
```

For AOS/VS, the command lines are:

```
) EMASM CONVT↵
) LINK_ERJE80↵
```

Units of Information

Although RJE80 transmits an entire file with each SEND command, it actually sends the file in smaller portions called *blocks*. The sending station forms the blocks, and they are checked and read at the receiving station. Blocks make transmission more accurate and efficient. RJE80 can check each block to find transmission problems before the entire file is sent. RJE80 also can translate the file code if necessary, and will interpret formatting characters.

In the discussion of RJE80 data transmission below, we refer to the following units of information:

Character	A letter, number, or special symbol represented by 7 or 8 bits.
Record	A string of characters.
Block	A group of records, sent together and delimited by data link protocol characters at each end of the block.
Transmission	A group of blocks, delimited by data link protocol characters.

Figure 2-3 illustrates the RJE80 message structure.

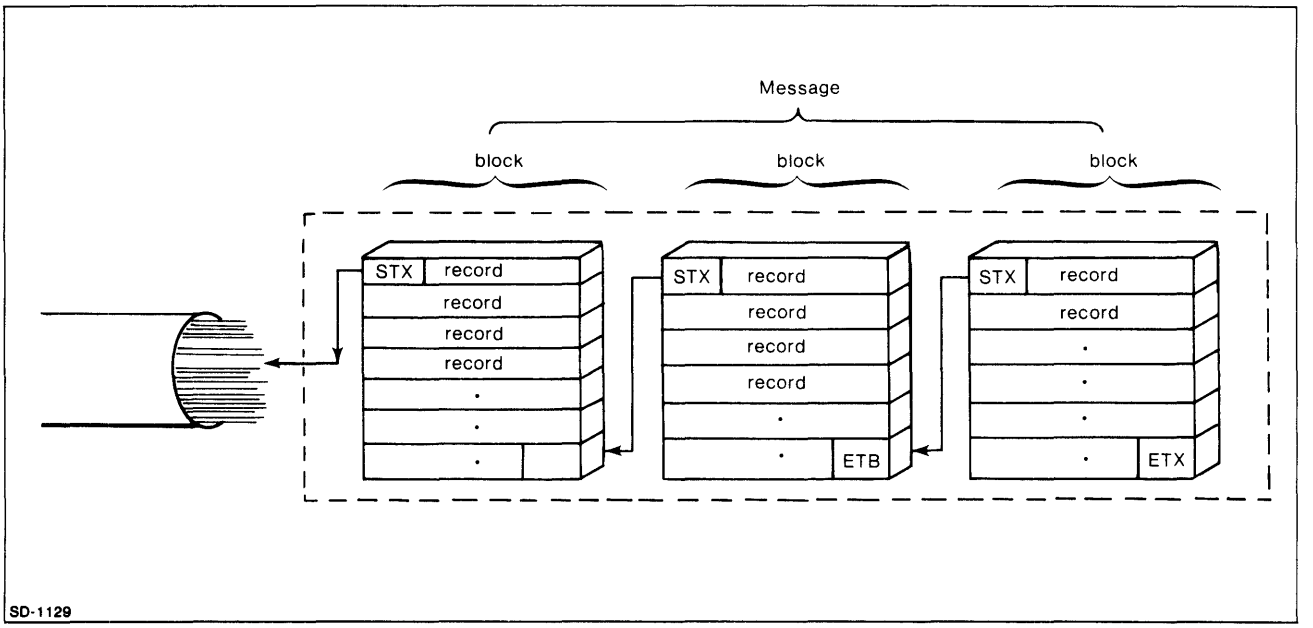

Figure 2-3. Message Structure

Block Formatting

The maximum block size is fixed at 400 bytes for 2780 mode and 512 bytes for 3780 mode. The number of records in the block depends on the record size. The standard record size for both the 2780 and the 3780 is 80 bytes; however, the 3780 requires an extra byte for each record.

The standard number of records per block for each mode is the number of standard records that fit into its maximum block size.

Line and Binary Type Files

Printable files are referred to as line type files. Each byte in a line type file is a legal ASCII character code. Binary files are non-printable. Program files and object files are examples of binary files. If you are using EBCDIC line code, as most users do, RJE80 must translate a line type file from ASCII to EBCDIC before transmitting it.

Nonstandard Blocking

When sending binary type files, or compressed files in 3780 mode, RJE80 always uses the standard record size and number of records per block. For any other kind of transmission, however, you can request nonstandard sizes by setting the FORMAT parameter during system generation.

The FORMAT command lets you specify a record size from 1 to 255 bytes, and as many records per block as will fit in the maximum block size. When choosing nonstandard sizes, remember that 3780 mode involves an overhead of 1 byte per record that is not included in the record size specified. The record size, plus overhead, times the number of records per block, must not be greater than the maximum block size.

RJE80 checks for violations of the block size limits when the FORMAT command is used during system generation. It can return any of these messages:

81 REQUEST DENIED. NUMERIC LIMIT ERROR
86 REQUEST DENIED. RECORD SIZE TOO LARGE
87 REQUEST DENIED. TOO MANY RECORDS

When RJE80 reads a file with nonstandard blocking, it performs data sensitive reads on the specified record. If the record is larger than the record size specified in FORMAT, RJE80 truncates the record and drops the extra bytes.

If, for 2780 mode, the actual record is smaller than the selected record size, RJE80 pads the record with blanks. In 3780 mode no padding occurs and any trailing blanks are deleted from the record.

Changes to Record Size

Because RJE80 pads records in 2780 mode, and removes trailing blanks in 3780 mode, your files may change in size when sent to another RJE80 site.

- In 2780 mode, the size of your files may increase. RJE80 uses spaces to pad each record to 80 characters before sending it out. The remote site does not remove the extra spaces, so the received file may be larger than the original.
- In 3780 mode, the size of your files may decrease. RJE80 automatically strips the trailing blanks from all records (even those sent compressed). The remote site does not restore the blanks, so the received file may be smaller than the original.

NOTE: If transparency is on, RJE80 does not strip any trailing blanks, nor does it pad records. See "Transparency" below.

Data Block Checking

RJE80 ensures transmission accuracy by checking each block as it arrives at the receiving station.

Checking is done by sending a special block-checking character (BCC) with each transmitted block. The sending station computes the block-checking character and appends it to the end of the block. The receiving station then computes its own BCC based on the block that arrives. It compares the computed BCC to the one received from the transmitting station. If they don't agree, a transmission error has occurred and the synchronous line handler at the receiving station requests that the block be sent again.

The three checking methods available, CRC16, CCITT16, and LRC, are distinguished by the formulas used to compute the block checking character. Your choice of line code helps determine which checking method you should use. In general, use CRC16 (16-bit Cyclic Redundancy Check) for sending EBCDIC line code. CCITT16 is another version of the Cyclic Redundancy Check, commonly used in Europe. LRC (Longitudinal Redundancy Check) is generally used with ASCII line code. ASCII code has a parity bit associated with each character; the check on the parity bit is called a vertical redundancy check (VRC). RJE80 permits all three types of parity for VRC: odd, even, and none.

Once a block has been successfully transmitted, RJE80 continues transmitting the rest of the file. RJE80 re-tries an erroneous block seven times before aborting transmission and displaying an error message.

Protocol Characters

RJE80 uses BISYNC communications line protocol. The protocol characters mark the beginning and end of a transmission, separate blocks, and generally allow orderly use of the line. The synchronous line driver for the operating system handles the protocol characters automatically.

Device Selection and Format Characters

In addition to BISYNC protocol, RJE80 recognizes two kinds of special control characters: those which select the device that should receive a record, and those which indicate the formatting that RJE80 should do to the record. If a file is sent in transparent mode, control characters within the file are ignored. Otherwise, RJE80 can recognize and respond to control characters:

- at the beginning of a file,
- at the beginning of a record, or
- within a record.

RJE80 supplies its own source file, CTAB.SR, for format control. The formatting characters used in this file are described in Appendix A. These characters control the horizontal and vertical spacing of records in the output file. If you wish, you may replace the table with one of your own, or modify the existing table with a text editor.

Device selection characters determine whether files are sent to the LIST or PUNCH output file at the receiving station.

For 3780 mode, the device selection character must be the first text character of the file. Any other device selection characters in the file are ignored. The 3780 device selection characters are:

DC1 — printer
DC2 — punch
DC3 — punch

In 2780 mode the selection code is a two-byte sequence:

ESC 4— punch
ESC X — printer (where X is any upper case character A-L, M, S, T, or the / or HT characters)

These device selection characters must appear as the first two bytes of a record. Device selection is permitted for every record.

RJE80 device selection for point-to-point stations is determined by the selection characters in the file. For multidrop configurations, device selection for a file sent from a tributary station to the control station is identical to point-to-point device selection. In both cases you usually do not need to worry about device selection because there are no device selection characters in the file. The file simply goes to the LIST destination by default. The receiving station will direct output to the desired device.

When sending from the control station to a tributary station, however, the device selection is specified by the poll or select sequence. Use the /SLIST or /SPUNCH switches on the SEND command to select the device. If device selection characters are in the file, they override the initial device selection.

Line Type File vs. Binary Type File

Users control code translation using the type switch on the SEND, LIST, and PUNCH commands. On the SEND command, the type switch determines whether the file is translated before it is sent. On the LIST and PUNCH commands, the type switch determines whether translation is done at the receiving station. The type can be either line or binary; translation is done only for line files. The LIST or PUNCH type setting file at the receiving station should have the same file type setting that was used in the SEND command at the transmitting station.

Transmissions sent in line type are read data-sensitively; they use line delimiters to mark the end of each line. Binary files, on the other hand, are sent in 80-byte records, regardless of line delimiters.

Transparency

Transparent text mode lets you use all possible bit combinations in the code set as data. Transparency is particularly useful for sending binary data, floating-point numbers, packed-decimal data, and unique specialized codes. You can send all data line control characters as transparent data; RJE80 ignores their control meanings.

Transparency also prevents RJE80 from stripping trailing blanks off your records in 3780 mode or padding the records with blanks in 2780 mode. Your files are sent as exact copies of the original.

- Turn transparency on when you send binary code or any text containing data line control characters that you want RJE80 to ignore and write to the output file.
- Turn transparency off if your text contains device selection and printer format codes that you want interpreted by the remote system. (See "Device Selection and Format Characters" in this Chapter, and Appendix A, for a description of the codes.)

3780 mode provides compression as well as transparency, but you may not use both at once. Transparency takes precedence; when you set transparency on, RJE80 will not compress any files until you turn transparency off.

Compression

If transparency is off and your configuration operates in 3780 mode, you can request record compression. Compression lets RJE80 shorten records by substituting a two-character code for sequences of three or more blanks. This saves transmission time. Each station can set compression on or off at runtime (see Chapter 4). 2780 mode does not provide compression; the compression setting is ignored.

If a 3780 station has compression on when RJE80 forms a block for transmission, RJE80 compresses any three or more consecutive blanks that appear in the text by substituting a two-character code for them. This code is standard for all 3780 terminals.

The receiving station decompresses the block by translating the code and replacing the spaces. The receiving station performs the decompression automatically so long as it is operating in 3780 mode; the block was sent with transparency off; and the output file that receives the transmission was not opened with binary as the type.

Figure 2-4 illustrates the compression and decompression functions, using a sample record.

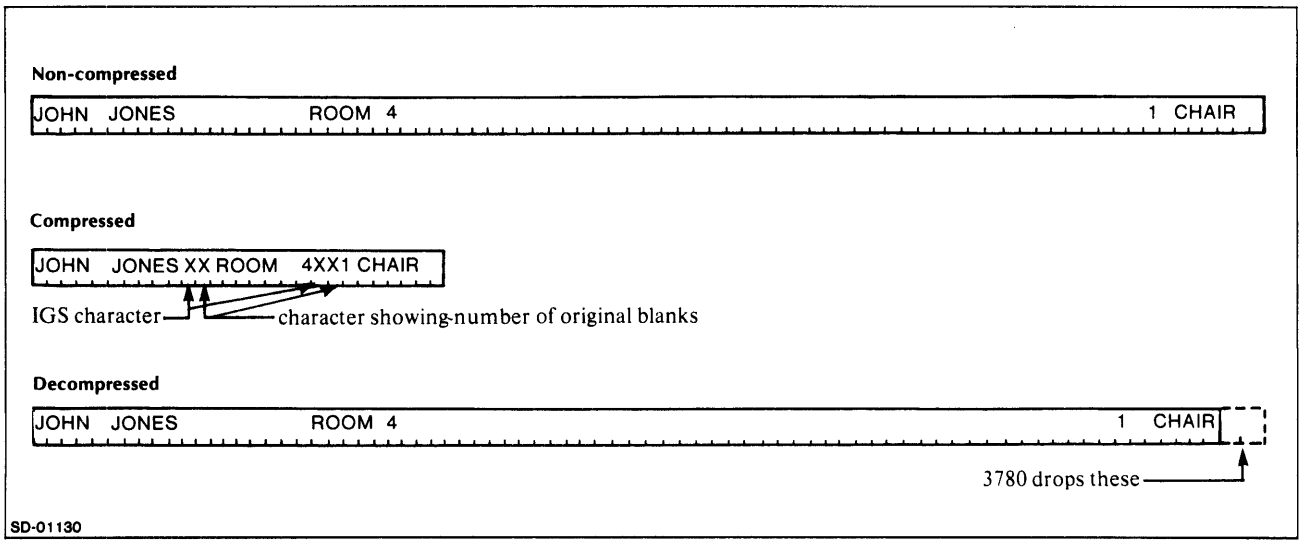

Figure 2-4. Compression and Decompression

Comparison of RJE80 2780 and 3780 Modes

Table 2-1, below, summarizes the differences between RJE80's 2780 and 3780 modes. The main differences are in the ways they handle records.

Table 2-1. Comparison of 2780 and 3780 Modes

2780 Mode	3780 Mode
Transmits all records as 80 characters.	Transmits variable length records.
Pads records to 80 characters when sending.	Strips trailing blanks off records.
Does not offer compression.	Allows compression if transparency is off.
Maximum block size is 400 bytes.	Maximum block size is 512 bytes.
No overhead bytes.	One byte of overhead per record.

End of Chapter

Chapter 3
How to Load and Generate RJE80

Before RJE80 can transmit files, it must be readied for operation. Four steps are required to bring up RJE80:

1. Load the RJE80 software.
2. Create a process to run the program.
3. Set RJE80 generation parameters.
4. Start the file transmission phase of the program.

This chapter describes the first three steps. They can be performed by an RJE80 user or by a system operator. Chapter 4 describes starting and operating the file transmission of the program.

Before loading RJE80, make sure at least one synchronous line is configured in the operating system. If it is not, have your system manager invoke AOSGEN or VSGEN and modify the current configuration. Record the number assigned to your synchronous line to use when generating RJE80. For further information on AOSGEN see *Managing AOS (Advanced Operating System)*; for VSGEN, see *How to Generate and Run the AOS/VS System* (093-000243-01).

Please note: If you are running RJE80 on AOS/VS, the process GSMGR.PR must be running. Also, you must build the RJE80 error file before you can use RJE80. To generate the error file, simply type the command:

```
) VS_ERROR RJERR ↵
```

When the error file is complete, you may run RJE80.

How to Load RJE80

Data General supplies the RJE80 software on a release tape or diskette. Load the files onto your system with the CLI command LOAD. Later, when the RJE80 process is created, you will choose a working directory for the program; it need not be the same directory that contains the files.

The RJE80 files can go in any directory on the system. This manual assumes that the RJE80 files are loaded into :UTIL.

To load RJE80 from tape, first set SUPERUSER ON to ensure access to :UTIL, and then use the following commands:

```
*) DIR :UTIL ↵
*) LOAD/V @MTAn:0↵
```

n is the number of the tape drive unit.

To load RJE80 from diskette, use this sequence:

```
*) DIR :UTIL⏎
*) LOAD/V @DPDn:0⏎
```

n is the number of the diskette drive unit.

When RJE80 is delivered, the access control lists for its files are set to OP, OWARE +, RE. This gives the operator all privileges, and everyone else may read and execute RJE80. After loading the files you, may use the CLI ACL command to restrict access to them.

Creating the RJE80 Process

An RJE80 process is needed to generate the system and, later, to run the file transmission phase. Create the RJE80 process with the CLI command PROCESS. RJE80 notes the user name of the user who issues the PROCESS command and only honors commands from that user name. However, any process with that user name can give RJE80 commands. You might create a special user profile on your system for RJE80 users; the RJE80 process would be created with that user name. Anyone who needed to use RJE80 could then log on with that user name and password.

The working directory for RJE80 can be any directory on the system. If the program files are not in the working directory, be sure to put them on the search list. In addition, since RJE80 may create files in the working directory, it needs Write access to it. The RJE80 process also needs Read access to the directories from which files will be sent. You might give the process the SUPERUSER privilege so it can send files from any directory on the system.

This manual assumes that :UDD:RJE is the working directory. The program files are assumed to be in :UTIL, which is on the user's search list. To create an RJE80 process with these attributes, type:

```
) PROCESS/PREEMPTIBLE/DIR=:UDD:RJE/SUPERUSER RJE80.PR⏎
```

This command line creates a preemptible process running the program RJE80.PR, found in :UTIL. The process also has the SUPERUSER privilege, which it might need to access the files it sends.

See the *Command Line Interpreter (CLI) (AOS and AOS/VS) User's Manual* (093-000122) for a complete description of the PROCESS command.

If your system runs several preemptible or resident processes, you may want to ensure that RJE80 responds quickly by running it as a resident process. For more on process control, see *Managing AOS (Advanced Operating System)* (093-000217).

Consider building a CLI macro that contains the PROCESS command for RJE80. The macro will make it simpler to bring up RJE80 in the future; this is especially important if a system operator loaded and generated the system but other users need an easy way to run it.

After you type the PROCESS command, RJE80 sends the message:

FROM PID n: (RJE80) 92 INPUT SYSTEM GENERATION REQUESTS

n is the identification number of the RJE80 process. All messages from RJE80 will have this PID. RJE80 is now running and is ready to accept commands from the console.

The first command must be either START or SPECFILE. Use START if you have already generated an RJE80 system and are ready to run it; otherwise, enter a SPECFILE command to begin the system generation procedure described below. Running RJE80 is described in the next chapter.

How to Generate RJE80

System generation is a way to set program variables before executing a program. For RJE80, generation parameters specify the hardware configuration, transmission characteristics, and special operational features. RJE80 also uses the generation parameters during program initialization to allocate resources.

The RJE80 system generation procedure is an interactive part of RJE80 rather than a separate program. An RJE80 process must be created and running as described above before you can generate the system.

You generate RJE80 by issuing generation commands during a special phase of program execution. Normally, you enter this phase immediately after creating the RJE80 process. However, you can return to the generation phase when you have been running RJE80 and want to change some of its parameters; use the GEN command described in Chapter 4.

Giving System Generation Commands

All RJE80 commands, including the system generation commands, are issued through the CLI command CONTROL. CONTROL is a way of passing commands from the CLI to another process, in this case, RJE80. If you are in RJE80's working directory, you give RJE80 commands as follows:

```
) CONTROL RJE80 command ⤶
```

where command is one of the generation or runtime commands in this manual. If you are not in RJE80's working directory, and if the working directory is not on your search list, you must use a full RJE80 program pathname in the CONTROL command. For instance, assuming the working directory :UDD:RJE, we would give commands by typing:

```
) CONTROL :UDD:RJE:RJE80 command ⤶
```

For simplicity, this manual assumes that all commands to RJE80 are given from the working directory and can use the simple program name instead of a full pathname.

The first system generation command must be SPECFILE. It has the form:

```
) CONTROL RJE80 SPECFILE filename⤶
```

filename in this command is a specifications file to be created or edited. If you omit the filename entirely or type STD, a file called RJE80SPEC is created (or opened for editing if it already exists). A newly created specifications file remains empty while you generate RJE80. Then, when you start the transmission phase of the program, the values established during system generation are placed in the file.

The RJE80 program originally contains default values for all parameters. These are either the pre-defined RJE80 defaults, or, if you are editing an old specifications file, the old values taken from the file.

You can then issue generation commands to modify any of the parameters. Those that you do not modify are left at their current values; either the RJE80 defaults or the values from the old specifications file.

When you are done giving generation commands you can write the modified parameters to the specifications file by using that file in a START command. Should you decide to terminate RJE80 before issuing a START, any changes made during this generation session are lost. The file remains as it was before the session.

You give generation commands within a CLI CONTROL command as described above. The generation commands fall into several categories. One set establishes the station configuration and tells whether you are defining a point-to-point or multidrop station. Other groups of commands set up the transmission characteristics and control special functions such as time-outs or reporting.

Table 3-1, later in this chapter, lists the RJE80 generation commands. Each command is described in detail at the end of this chapter. The discussion below refers to generation parameters by the names of the commands used to set them. For instance, the IOTIME command sets the IOTIME parameter.

Displaying Generation Parameters

RJE80 has two commands that let you display the generation parameters. These commands are useful to verify the changes made during system generation and to see the current values in the specifications file. Use the LIST command to look at a single parameter and the SYSLIST command to look at all the parameters.

In most cases, you can display the original RJE80 default values by typing:

```
) CONTROL RJE80 SYSLIST RJE80SPEC↵
```

This works even if there is no RJE80SPEC file; in fact, you may give this command while editing some other file. However, if you have created a file RJE80SPEC and changed its parameters, the values shown may be different from the original defaults.

Normally, the following will be displayed:

**** AOS RJE80 SYSGEN DEFINITIONS ****
DATE: 4/ 7/80 TIME: 15:36:55
FILE: RJE80SPEC

COMMAND	*MEANING*	*VALUE*
IOERROR	*NUMBER OF FORMAT ERRORS PER MESSAGE*	*3*
CANCEL	*DELETE INCOMPLETE RECEIVE FILE*	*YES*
SEVERITY	*MESSAGE SEVERITY PRINT INDICATOR*	*1*
SLN	*BISYNC LINE NUMBER GENERATED*	*0*
IOTIME	*I/O TIMEOUT RESPONSE WAIT IN SECONDS*	*6*
RECORD	*NUMBER OF BYTES PER RECORD*	*STANDARD*
BLOCK	*NUMBER OF RECORDS PER BLOCK*	*STANDARD*
LINECODE	*TRANSMISSION CODE*	*EBCDIC*
BCC	*BLOCK CHECKING METHOD*	*CRC16*
VRC	*VERTICAL REDUNDANCY CHECKING*	*ODD*
EMULATOR	*EMULATOR*	*3780*
CALLTIME	*CALL IN TIMEOUT IN MINUTES*	*NEVER*
PROTECT	*WRONG NUMBER PROTECTION*	*NO*
STATYPE	*STATION TYPE*	*PRIMARY*
LINETYPE	*LINE CONFIGURATION*	*PTP*
DEVICE	*3780 CARD READER SELECTION CODE*	*0*
TRIBADDR	*TRIBUTARY STATION ADDRESS*	*NONE*
POLTIME	*NO RESPONSE POLL TIMEOUT COUNT*	*NEVER*
STATREPROT	*INCLUDE STATISTICAL REPORT*	*YES*
AUTOREPORT	*WRITE STAT REPORT AT EOF*	*YES*
POLIST	*POLL LIST*	*NONE*

SYSLIST also has a /L switch that lists the generation parameters in a disk file instead of at the terminal. Request such a listing file when you have finished setting the generation parameters. Users then have a description available of the parameters when they are operating RJE80.

RJE80 also lets you display a single parameter; this is done through the LIST command. Suppose you had set the communications line number with the command:

```
) CONTROL RJE80 SLN 2↵
```

This command would verify the change:

```
) CONTROL RJE80 LIST SLN↵
```

RJE80 would display:

(RJE80) SLN BISYNC LINE NUMBER GENERATED 2

Specifying A Configuration

The station configuration includes the type of station, the line number of the communications line, and, for multidrop stations, polling information. Some parameters apply only to certain kinds of stations and are ignored for other kinds. For instance, the STATYPE parameter applies only to point-to-point stations.

All stations must have a synchronous line. Be sure that the line number is correctly specified at generation time. The default value for the SLN parameter is 0. If your system uses a different line number, be sure to change the SLN parameter.

Every station must also specify its configuration type. The default is point-to-point. Use the LINETYPE command to change this parameter if you have a tributary or control station.

Point-to-point stations may use the STATYPE command to state whether they are primary or secondary. A primary station has precedence over a secondary station when bidding for use of the line. This parameter is ignored for tributary and control stations.

Tributary stations need an address to identify them during polling. Since there is no default, all tributary stations must use the TRIBADDR command to specify an address.

Control stations have two parameters to manage polling of the tributary stations in the configuration. The POLIST command specifies the order in which tributaries will be polled. It accepts a list of up to 39 station addresses; since RJE80 supports only 26 stations, some of the entries will be repeated if all 39 slots are used. Repeating a station's address in the list causes that station to be polled more than once in each round of polling. Thus the poll list can give some stations special attention.

Control stations can also use the POLTIME command to determine how many times a tributary can decline a poll before being disabled (removed from the poll list). Set this parameter if you want to avoid polling non-responding tributaries.

Transmission Characteristics

Another set of generation parameters determines how different stations communicate. These parameters should be agreed upon by all stations in the configuration. Transmission will fail if two stations set these parameters differently.

Chapter 2 explains the different kinds of transmission available through RJE80. Use the EMULATOR command to choose 2780 or 3780 transmission, and the LINECODE command to request either ASCII or EBCDIC code. You can also set non-default sizes for records and blocks; this is done with the FORMAT command.

Part of transmission is checking that each block of a file arrives intact. The BCC (block checking character) command chooses the type of block checking that will be used. Stations that request LRC (longitudinal redundancy checking) may also request vertical redundancy checking with the VRC parameter.

Dialing Features

Some stations have a dedicated line that is permanently connected for transmission. Others have a switched line requiring the operator to establish a connection with the remote station. RJE80 offers two features that can make management of a switched line simpler.

The CALLTIME generation parameter limits the time RJE80 will run without a connection to another station. Stations with switched lines may want to disconnect the line when it is idle and use CALLTIME to automatically terminate RJE80 a given time after each transmission completes. CALLTIME is especially useful if you expect a station to call and want to terminate RJE80 if the call doesn't arrive in the expected time.

If the CALLTIME limit is reached before a call is received, RJE80 terminates. Before terminating, it disables the line and sends these messages:

32 LINE ENABLE FAILURE
30 PROGRAM SHUT DOWN

Possible values for CALLTIME are 1 to 60 minutes, or NEVER. NEVER is the default value. If CALLTIME is set to NEVER, RJE80 continues to run even if there are no incoming calls. Stations with dedicated lines are always connected and are not affected by the CALLTIME parameter.

Wrong number protection

If an outside phone call accidentally reaches your station it can tie up the communications line (even when the outside caller hangs up, the line is still open waiting for data to be transmitted).

To prevent such accidental calls from tying up the line, RJE80 has the PROTECT and IOTIME parameters which limit the time RJE80 waits for data transmission to start.

You must set the PROTECT parameter to YES to get wrong number protection. Once a phone call arrives and DSR (data set ready) comes up, RJE80 waits for valid data for a period ten times the IOTIME parameter (see IOTIME). If no data is received, RJE80 hangs up on the call by disabling and then re-enabling the line. The default for IOTIME is 6 seconds, so that once a call is received, RJE80 waits one minute for data.

Error Protection

A sending station normally receives an acknowledgement from a receiving station as each block arrives. If no acknowledgement arrives, the sending station can assume transmission failed. The IOTIME parameter determines how long the sending station will wait for acknowledgement. Thus, if the receiving station becomes disabled during transmission, the sending station can end the connection and free its line. IOTIME is also used in wrong number protection, described above.

The sending station might also abort transmission if it gets several RECORD FORMAT ERRORS messages. This indicates a format problem that results in garbled files. Possible causes are a line control character embedded in the file, or a record length larger than the RJE80 buffer limit (256 bytes). The IOERROR parameter limits the number of times this condition can occur before transmission is aborted.

Abnormal termination of a transmission may leave incomplete files at the receiving station. The CANCEL parameter determines whether these incomplete files are to be deleted.

Information Aids

Runtime information about RJE80 operation comes from on-line messages and from an optional report of transmission statistics.

The statistical report is available only if the STATREPORT parameter is YES. This causes RJE80 to collect the data for the report. To display the report, the user gives the REPORT command when RJE80 is running. In addition, if the AUTOREPORT generation parameter is YES, RJE80 writes a report to disk automatically after each transmission completes.

RJE80 sends messages to confirm certain commands or describe program errors. Each message is preceded by a numeric code and has a severity level associated with it. You can suppress the display of some errors by setting the SEVERITY generation parameter. RJE80 does not display messages with a severity lower than the chosen level. For instance, if you set the severity level to 2, messages with severity 1 are not displayed.

RJE80 also has a HELP command, available whenever an RJE80 process is running. If you receive a message during system generation, you can use the HELP command to request an explanation by supplying the numeric code for the message. These features are discussed in Chapter 4, and a list of status and help messages is in Appendix B.

System Generation Examples

This section presents several examples of system generation. Usually a station can keep the default values for most parameters; only a few parameters need changing. Therefore, the examples show how to perform specific changes and do not run through the entire set of generation commands.

Example of a Point-to-Point Station

We will generate RJE80 for a point-to-point station by creating a specifications file called PTP_SPEC. To start generating this file, give the command:

```
) CONTROL RJE80 SPECFILE PTP_SPEC↵
```

If we were to START RJE80 with the file PTP_SPEC, it would receive the default values for all parameters. However, assume we want to make the following parameter modifications:

a. Set the SLN line number to 2

b. Make this a secondary station

c. Request deletion of incompletely received files

d. Not maintain the statistical report data

e. Not write a statistical report at EOF

You would make these changes by typing these commands in any order:

```
) CONTROL RJE80 SLN 2↵
) CONTROL RJE80 STATYPE SECONDARY↵
) CONTROL RJE80 CANCEL YES↵
```

```
) CONTROL RJE80 STATREPORT NO↵
) CONTROL RJE80 AUTOREPORT NO↵
```

To display the specfile in its modified form, enter:

```
) CONTROL RJE80 SYSLIST↵
```

RJE80 displays the following:

*** *AOS RJE80 SYSGEN DEFINITIONS* ***
DATE: 4/ 7/80 TIME: 15:50:29
FILE: PTP_SPEC

COMMAND	*MEANING*	*VALUE*
IOERROR	*NUMBER OF FORMAT ERRORS PER MESSAGE*	*3*
CANCEL	*DELETE INCOMPLETE RECEIVE FILE*	*YES*
SEVERITY	*MESSAGE SEVERITY PRINT INDICATOR*	*1*
SLN	*BISYNC LINE NUMBER GENERATED*	*2*
IOTIME	*I/O TIMEOUT RESPONSE WAIT IN SECONDS*	*6*
RECORD	*NUMBER OF BYTES PER RECORD*	*STANDARD*
BLOCK	*NUMBER OF RECORDS PER BLOCK*	*STANDARD*
LINECODE	*TRANSMISSION CODE*	*EBCDIC*
BCC	*BLOCK CHECKING METHOD*	*CRC16*
VRC	*VERTICAL REDUNDANCY CHECKING*	*ODD*
EMULATOR	*EMULATOR*	*3780*
CALLTIME	*CALL IN TIMEOUT IN MINUTES*	*NEVER*
PROTECT	*WRONG NUMBER PROTECTIONS*	*NO*
STATYPE	*STATION TYPE*	*SECONDARY*
LINETYPE	*LINE CONFIGURATION*	*PTP*
DEVICE	*3780 CARD READER SELECTION CODE*	*0*
TRIBADDR	*TRIBUTARY STATION ADDRESS*	*NONE*
POLTIME	*NO RESPONSE POLL TIMEOUT COUNT*	*NEVER*
STATREPORT	*INCLUDE STATISTICAL REPORT*	*NO*
AUTOREPORT	*WRITE STAT REPORT AT EOF*	*NO*
POLIST	*POLL LIST*	*NONE*

Since the DEVICE, TRIBADDR, POLTIME, and POLIST parameters do not apply to point-to-point stations, the values displayed for them are inconsequential.

To make the sysgen report available on disk, enter:

```
) CONTROL RJE80 SYSLIST/L↵
```

The report contains the same information that SYSLIST displayed on the terminal. RJE80 names the report file by appending .LS to the specifications file name. For specfile PTP_SPEC, it would create a report named PTP_SPEC.LS. This report can be printed on the line printer or typed on the terminal at any time, through the CLI commands QPRINT and TYPE.

The RJE80 process is now ready to be started as described in Chapter 4.

Example of a Tributary Station

To define a specifications file, TRIB_SPEC, for a tributary station, give the command:

```
) CONTROL RJE80 SPECFILE TRIB_SPEC↵
```

If no changes are made, this file will have the default values for all parameters. However, we will change some parameters by giving commands to do the following:

a. Change the line configuration type to tributary

b. Enter a tributary station address

c. Change the SLN line number to 3

d. Request deletion of incompletely received files

The first two of these changes are required to generate any tributary station.

The following commands may be entered in any order:

```
) CONTROL RJE80 SLN 3↵
) CONTROL RJE80 CANCEL YES↵
) CONTROL RJE80 TRIBADDR A↵
) CONTROL RJE80 LINETYPE TRIB↵
```

To review all the parameters, type:

```
) CONTROL RJE80 SYSLIST↵
```

In the display, the STATYPE, POLIST, and POLTIME values are unimportant because these parameters do not apply to tributary stations.

After verifying the specfile, write the sysgen report to disk by entering:

```
) CONTROL RJE80 SYSLIST/L↵
```

You are now ready to start RJE80 as described in Chapter 4.

Example of a Control Station

We will create a control station specification file called CONTROL_SPEC. Start system generation by typing:

```
) CONTROL RJE80 SPECFILE CONTROL_SPEC↵
```

Below are commands to perform the following operations on the default specification values:

a. Change SLN line number to 4

b. Change the line configuration type to a control station

c. Form a poll list of tributary stations

d. Disable any tributary that ignores five rounds of polling

The commands can be given in any order.

```
) CONTROL RJE80 SLN 4↵
) CONTROL RJE80 LINETYPE CONTROL↵
) CONTROL RJE80 POLTIME 5↵
) CONTROL RJE80 POLIST A.B.C.D.E.F.G.H.I, ↵
```

Note that the LINETYPE command is required to generate the control station (since the default is point-to-point). The POLIST command is required if any tributary stations are to be polled. The STATYPE and TRIBADDR parameters do not apply to control stations.

We can then display the specfile by typing:

```
) CONTROL RJE80 SYSLIST ↵
```

Finally, write the sysgen report to disk:

```
) CONTROL RJE80 SYSLIST/L ↵
```

We are now ready to start and run RJE80 as described in Chapter 4.

RJE80 Generation Commands

Table 3-1 lists all RJE80 generation parameters/commands, their default values, the minimum command abbreviation, and the type of station affected by the parameter. The rest of this chapter gives the syntax of, and a detailed explanation for, each generation command.

Table 3-1. Generation Command Summary

Command	Abbreviation	Default	Applies to Line Type
AUTOREPORT	A	YES	P/T/C
BCC	BC	CRC16	P/T/C
CALLTIME	CAL	NEVER	P
CANCEL	CAN	NO	P/T/C
DEVICE	D	0	C
EMULATOR	E	3780	P/T/C
FORMAT	F	*STD	P/T/C
HELP	H	None	P/T/C
IOERROR	IOE	3	P/T/C
IOTIME	IOT	6	P/T/C
LINECODE	LINEC	EBCDIC	P/T/C
LINETYPE	LINE1	PTP	P/T/C
LIST	LIS	@LPT	P/T/C
POLIST	POLI	None	C
POLTIME	POLT	NEVER	C
PROTECT	PR	NO	P
SEVERITY	SE	1	P/T/C
SLN	SL	0	P/T/C
SPECFILE	SP	RJE80SPEC	P/T/C
START	STAR	RJE80SPEC	P/T/C
STATREPORT	STATR	YES	P/T/C
STATYPE	STATY	PRIMARY	P
SYSLIST	SY	Current specfile	P/T/C
TRIBADDR	T	None	T
VRC	V	ODD	P/T/C

WHERE:

PTP = Point to Point

STD = Standard

P = PTP Station

T = Tributary Station

C = Control Station

* = Used for Record and Block

Requesting Default Values

In the command descriptions below, STD indicates standard. Supplying STD in a command gives you the default value for that parameter. In commands where STD is not an argument, you request the default either by leaving the argument blank (if it is shown as optional) or by entering the actual value.

AUTOREPORT

Generate a statistical report at the end of each transmission.

Syntax

CONTROL RJE80 AUTOREPORT {YES / NO}

minimum abbreviation: A
default: YES

Description

If AUTOREPORT and STATREPORT are both set to YES, RJE80 automatically writes a statistical report to a disk file called OUTDATA at the completion of each transmission sent or received. OUTDATA is created in the RJE80 working directory.

If the STATREPORT parameter was set to NO, RJE80 does not collect data for a report and the AUTOREPORT feature produces no output.

Please note: AUTOREPORT users need Write access to RJE80's working directory.

BCC

Choose one of the three types of block checking characters.

Syntax

CONTROL RJE80 BCC {CRC16 / CCITT16 / LRC}

minimum abbreviation: BC
default: CRC16

Description

The three block checking methods are explained in Chapter 2. If you choose LRC (Longitudinal Redundancy Checking), you may also request vertical redundancy checking with the VRC command (shown later in this chapter).

All stations in a configuration must use the same type of block checking, or each will reject the others' transmissions.

CALLTIME

Limit the time RJE80 will run without receiving any calls.

Syntax

CONTROL RJE80 CALLTIME { STD / n }

minimum abbreviation: CAL
n: 1 to 60 minutes
default (STD): NEVER

Description

RJE80 terminates if line-enable (DSR) is not accomplished within the number of minutes specified. If CALLTIME is set to NEVER (by entering STD), RJE80 continues to run, even if no calls arrive, until the operator shuts it down.

This parameter applies only to stations with switched lines. Stations with dedicated lines always have the line enabled and will never time out.

CANCEL

Delete any incompletely received files.

Syntax

CONTROL RJE80 CANCEL { YES / NO }

minimum abbreviation: CAN
default: NO

Description

If transmission is interrupted when a station is receiving, incomplete message files may be left on disk. Setting CANCEL to YES requests that these files be deleted. CANCEL will delete only those incomplete messages that have been output to separate listing files; see the LIST command and /TOD switch in Chapter 4.

If the current list file is a queue, or if all messages are being appended to a single list file, nothing is deleted.

DEVICE

Set the polling character for a 3780 tributary station.

Syntax

CONTROL RJE80 DEVICE { 0 | 6 | 7 }

minimum abbreviation: D
default: 0

Description

3780 multidrop control stations can choose which character: 0, 6, or 7, will alert a tributary station in 3780 mode that it is being polled. The tributary stations and control station must have this parameter set to the same value. This character is used along with the tributary address.

EMULATOR

Choose 2780 or 3780 mode.

Syntax

CONTROL RJE80 EMULATOR { 2780 | 3780 }

minimum abbreviation: E
default: 3780

Description

RJE80 can emulate either the 2780 or 3780 Remote Job Entry terminals, according to the mode you select. Chapter 2 explains the differences between the modes. All stations in a configuration must emulate the same type of terminal.

Please note: once you select an emulator mode and specify your poll list, you cannot request to change emulators.

FORMAT

Choose the record and block sizes for data formatting.

Syntax

CONTROL RJE80 FORMAT [/*RECORD=rec_size* | /*STDRECORD*] [/*BLOCK=block_size* | /*STDBLOCK*]

minimum abbreviation: F
rec_size: 1 to 255 bytes
record_number: 1 to 50 records per block
default: record size of 80 bytes; number of records to fill the maximum block size

Description

The maximum size of a block is 400 bytes for 2780 mode and 512 for 3780 mode. The standard record size is always 80 bytes, and the standard record number for each mode is the number of 80-byte records that fit into its maximum block size.

Users may request nonstandard blocking by setting the record size and/or the number of records per block. The total block size, however, must be within the maximum size for the chosen mode, including overhead bytes. For 2780 mode there is no overhead, but for 3780 mode there is 1 byte of overhead per record. This means that setting a record size of 80 bytes actually takes up 81 bytes.

Format settings are used by the sending station. The RJE80 station that sends a file with long records must be configured for the proper size. The receiving station, however, may be set to receive standard size records; it will still receive the file properly.

HELP

Display the explanation for an error message code.

Syntax

CONTROL RJE80 HELP=n

minimum abbreviation: H
n : a message code, from 1 to 127
default: none

Description

Each of RJE80's status messages has a numerical code that is returned along with the message. You can get more information on a message by typing a HELP command with the message's code.

Appendix B lists all RJE80 messages and their help descriptions.

IOERROR

Set the number of record format errors conditions that will abort transmission.

Syntax

CONTROL REJ80 IOERROR $\left\{\begin{matrix}\text{STD}\\ n\end{matrix}\right\}$

minimum abbreviation: IOE
n : 1 to 50
default (STD): 3

Description

IOERROR determines how many record format error conditions can occur before RJE80 aborts transmission. Possible causes of this condition are line control characters embedded in a file, or a record length that exceeds the RJE80 buffer limit of 256 bytes.

IOTIME

Determine how long a SEND command will wait for a response from the receiver and how long the receiver will wait for the next data block.

Syntax

CONTROL RJE80 IOTIME $\left\{\begin{matrix}\text{STD}\\ n\end{matrix}\right\}$

minimum abbreviation: IOT
n : 1 to 1800 seconds
default: 6 seconds

Description

IOTIME sets the number of seconds a SEND command waits for acknowledgement from the receiving station before timing out. The Advanced Operating System will try the command seven times before returning an error, so the wait is actually seven times the number of seconds specified in IOTIME. Commands that affect I/O will not be executed during the wait period.

IOTIME is also used as part of the wrong-number protection feature (see PROTECT). If PROTECT is on, RJE80 hangs up on any call that fails to transmit data within 10 times the IOTIME limit.

LINECODE

Choose to transmit in ASCII or EBCDIC code.

Syntax

CONTROL RJE80 LINECODE { ASCII | EBCDIC }

minimum abbreviation: LINEC
default: EBCDIC

Description

The line transmission code may be either ASCII or EBCDIC. All stations in a configuration must select the same line code.

You can transmit in EBCDIC even if your files are in ASCII; the receiving station will reconstruct them. See Chapter 2 for the effects of transmitting in each code. The majority of RJE80 sites transmit in EBCDIC. You cannot transmit binary files in ASCII.

LINETYPE

Specify station type.

Syntax

CONTROL RJE80 LINETYPE { PTP | TRIB | CONTROL }

minimum abbreviation: LINET
default: PTP

Description

The possible line types are point-to-point (PTP), tributary (TRIB), and control (CONTROL).

The type of station chosen affects which other generation parameters are used. RJE80 ignores parameters that don't apply to the chosen station type.

LIST

Display a system generation parameter.

Syntax

CONTROL RJE80 LIST command_name

minimum abbreviation:	LIS
command_name :	one of the generation commands in this chapter
default:	none

Description

LIST displays the value of the specified parameter for the file currently being generated. It can be used to verify changes made to a parameter.

Please note: This command is the generation phase LIST command. *It is not the same as the LIST command used in operating RJE80.* See Chapter 4 for information on the LIST command for RJE80 operations.

POLIST

Set the list of tributary stations to be polled.

Syntax

CONTROL RJE80 POLIST*//NONE]* poll_list

minimum abbreviation:	POLI
poll_list :	a list of tributary addresses, separated by periods and ended with a comma
default:	no poll list

Description

The POLIST parameter affects only multidrop control stations. It determines which tributaries will be polled and in what order. Enter the tributary addresses in the desired order; you may repeat an address in the list if you want that station polled more than once in each sequence. The total address count must not exceed 39, of which 26 can be unique. Using the /NONE switch clears the poll list.

Each address is a one-byte ASCII alphabetic character, upper- or lowercase, separated from the next by a period. The last address is followed by a comma. For instance, the following is a valid poll list:

g.d.c.a.b.c.f.e.c,

The addresses, separators, and terminator must be entered in one continuous string. If the string is of such a length to overflow the CRT line, let the CLI furnish the line continuations.

POLTIME

Limit the number of times a tributary can decline a poll before being disabled.

Syntax

CONTROL RJE80 POLTIME { STD / n }

minimum abbreviation: POLT
n : number of polling cycles, 1 to 127
default (STD): NEVER

Description

This determines the number of times unresponding tributary stations are polled by the multidrop control station before being automatically disabled. Once disabled, the stations must be re-enabled before being polled again. If the standard (STD) is selected, stations are never disabled for failing to respond to a poll.

PROTECT

Request wrong number protection.

Syntax

CONTROL RJE80 PROTECT { YES / NO }

minimum abbreviation: PR
default: NO

Description

Set the PROTECT parameter to YES if you have a switched line and want to prevent accidental phone calls from tying up your line. The IOTIME parameter is then used to determine how long the line remains connected if no data arrives.

If after the line is enabled, valid data is not received within 10 times the IOTIME parameter, the line is disabled, a message displayed, and the line enabled again to receive further calls.

SEVERITY

Set the severity range for message display.

Syntax

CONTROL RJE80 SEVERITY $\left\{\begin{matrix}\text{STD}\\ n\end{matrix}\right\}$

minimum abbreviation: SE
n: 1 to 6
default (STD): 1

Description

RJE80 messages have severity levels indicating their importance. You can suppress the display of low-severity messages by setting the SEVERITY parameter. The most urgent messages, which have severity level 7, will always be displayed.

SLN

Specify the line number of the communications line.

Syntax

CONTROL RJE80 SLN $\left\{\begin{matrix}\text{STD}\\ n\end{matrix}\right\}$

minimum abbreviation: SL
n : 0 to 31
default (STD): 0

Description

Specify the synchronous line number configured with AOSGEN or VSGEN.

SPECFILE

Generate or edit a specifications file.

Syntax

CONTROL RJE80 SPECFILE [*pathname* | *no argument*]

minimum abbreviation: SP
pathname : pathname or simple filename
default (*no argument*): RJE80SPEC

Description

SPECFILE is the first command of RJE80 system generation. It sets up a file to receive generation parameters; such a specifications file must exist before RJE80 can be started.

The RJE80 process initially contains default values for all generation parameters. These values can be modified through system generation commands. When the program is started, whatever values have been established are written to a specifications file.

The SPECFILE command can create a new file to receive generation parameters, or open an existing specifications file so you can modify it. The named file is created if necessary, and then opened. Omitting the filename requests the default file RJE80SPEC, which is created if necessary.

When an existing specifications file is opened, its values are read by RJE80 and become the default values. If a new specifications file is created, it remains empty until it is used in a START command, at which time the values from this generation session are written to the file.

Once in the generation mode, any number of specfiles may be generated or modified. However, unless the generation session ends with a START command, any changes made to the file are cancelled.

The START command uses the current specifications file (the one named in SPECFILE) by default. However, you may name a different file in the START command.

START

End system generation and start RJE80 processing.

Syntax

CONTROL RJE80 START [*pathname* | *no argument*]

minimum abbreviation: STAR
pathname : pathname or simple filename
default (*no argument*): file just generated, or RJE80SPEC

Description

By default, the START command begins RJE80 processing with whatever specifications file was named in the most recent SPECFILE command. If you give the START command immediately after bringing up the RJE80 process, the default specifications file, RJE80SPEC, is used. RJE80SPEC is created if necessary, and filled with default values.

The START command also lets you name a specifications file other than the one just generated.

STATREPORT

Request that a statistical report be maintained.

Syntax

CONTROL RJE80 STATREPORT {YES | NO}

minimum abbreviation: STATR
default: YES

Description

The statistical report feature, described in Chapter 4, must be requested at generation time by setting this parameter. If STATREPORT is set to NO, RJE80 does not collect data for the report.

Users can ask to see the report with the REPORT command discussed in Chapter 4, or by setting the AUTOREPORT parameter so that a report is generated automatically after each transmission. Note that AUTOREPORT does not work if STATREPORT is set to NO.

STATYPE

Make a point-to-point station primary or secondary.

Syntax

CONTROL RJE80 STATYPE {PRIMARY / SECONDARY}

minimum abbreviation: STATY
default: PRIMARY

Description

STATYPE applies only to point-to-point configurations; it is ignored for tributary or control stations.

Point-to-point configurations can assign precedence to one of the stations by using STATYPE. During a line bid contention, a secondary station relinquishes control to a primary station.

SYSLIST

Display the contents of a specifications file.

Syntax

CONTROL RJE80 SYSLIST [/CRT / /L] *[pathname]*

minimum abbreviation: SYS
pathname : pathname or simple filename
default: current specifications file

Description

SYSLIST displays the current values of the RJE80 generation parameters. It can be used to verify changes made during a generation session. If you do not use a switch, output goes to the CRT.

With the /L switch, SYSLIST sends a report of the generation parameters to a disk file. The report filename will be the name of the specifications file with a .LS extension. If no pathname is given, the report goes to the current specifications file.

TRIBADDR

Assign an address to a tributary station.

Syntax

CONTROL RJE80 TRIBADDR addr

minimum abbreviation:	T
addr :	an ASCII alphabetic character, lower- or uppercase.
default:	none

Description

Every tributary station must specify its own tributary address (the parameter doesn't apply to other station types). The address should be a single alphabetic character, upper- or lowercase.

Please note: No two tributaries within a configuration should have the same address. The stations involved should agree on addresses before generating their RJE80 systems.

VRC

Set vertical redundancy checking.

Syntax

CONTROL RJE80 VRC { ODD | EVEN | NONE }

minimum abbreviation:	V
default:	ODD

Description

Vertical Redundancy Checking (VRC) is permitted only if the block checking character (BCC) is set to Longitudinal Redundancy Checking (LRC) and LINECODE to ASCII. If VRC is used, the parity may be ODD or EVEN. See Chapter 2 for a discussion of block checking.

End of Chapter

Chapter 4
Operating RJE80

This chapter shows how to start the RJE80 program, set runtime parameters, and send and receive data. Before transmitting data with RJE80, you must have loaded and generated an RJE80 system as explained in Chapter 3.

Once RJE80 is started, it should run without any need for intervention until the operator terminates it. It sends jobs in response to SEND commands and can receive jobs whenever it isn't sending.

Preparing to Run RJE80

If you just finished loading and generating the system, you already have an RJE80 process running. Otherwise, you must create an RJE80 process as described in Chapter 3. Once the process is running, simply issue a START command to prepare the system for data transmission, as described below.

Starting the Program

After you create the RJE80 process with a PROCESS command, RJE80 sends the message:

FROM PID n : (RJE80) 92 INPUT SYSTEM GENERATION REQUESTS

RJE80 is now running and is ready to accept commands from the console.

You must enter either a START or SPECFILE command. The SPECFILE command begins the RJE80 system generation procedure described in the last chapter. The START command begins RJE80 operation using an existing specification file. To start running the program, enter a START command of the form:

```
) CONTROL RJE80 START specfile)
```

specfile is the name of a specifications file created earlier during a system generation session. If no specfile is named, RJE80 uses the default specifications file, which is either the file just generated or RJE80SPEC.

Dialing Up

Once RJE80 has been started, you can dial a remote site and begin data transmission. If the remote site has an automatic answer, you will hear a high tone as soon as it is ready to receive. When you hear the tone, put your data set into DATA mode.

If a person answers at the remote site, ask to be connected with the remote system. Then, when you hear the high tone, put your data set into DATA mode.

When the line is successfully connected, RJE80 displays:

FROM PID n : (RJE80) LINE ENABLED

This means that:

- your modem is ready,
- RJE80 is listening to the line and is ready to receive, and
- RJE80 is ready to send.

The same conditions are true at the remote station.

The CALLTIME and PROTECT generation parameters can help ensure good use of your switched line by keeping it free to receive calls. These dialing features are explained in Chapter 3. Once you have connected the line you can perform your sign-on procedure, if you have one, and transmit your sign-on card. Sign-on is usually performed on systems where remote users might violate data security. For instance, when you are communicating with a remote job entry system and a host system, you have the power to execute programs in batch and can access data as well as simply transmit it. Such a system would probably have a special sign-on routine for remote users to help protect the system. Sign-on procedures vary; check with the remote station in question.

Transmission from one Data General system to another should not involve any special sign-on procedure because RJE80 does not queue batch jobs or violate file system security.

When your sign-on is done, you can reset runtime parameters, and transmit and receive files.

Setting Runtime Parameters

RJE80 has generation parameters and runtime parameters. In Chapter 3 we showed how to set system generation parameters; you do this before starting RJE80.

If you need to change system generation parameters after the START command has been given, use the GEN command to return to the generation phase of the program. RJE80 responds with the message:

FROM PID n : (RJE80) 92 INPUT SYSTEM GENERATION REQUESTS

You then enter a SPECFILE command to begin system generation.

RJE80 runtime parameters are set with the RJE80 commands listed in Table 4-4 later in this chapter. Runtime parameters must be set after RJE80 is started, but can be set whether the line is enabled or not.

You can give RJE80 commands even when transmission is in progress, but the new settings are not applied to the current message. They take effect after the current transmission has completed, at the beginning of the next transmission.

Sending and Receiving Data

This section shows how to set up a list file, receive messages, and send files or console messages to a remote station.

Setting Up a List or Punch File

Before you send to or receive from a remote station, you may want to change the list (or punch) file from @LPT to another file. To do this, give the LIST (or PUNCH) command and supply the complete pathname of the new file; for example:

```
) CONTROL RJE80 LIST :MAINDIR:UPDATE1↵
```

This tells RJE80 to send all its output to a list file named UPDATE1, which is in the directory :MAINDIR.

To change the list file to the line printer's spooler again, type:

```
) CONTROL RJE80 LIST @LPT↵
```

RJE80 can handle any number of files automatically and append them to the list file, one after the other. You can open the list file later from the CLI and edit or transfer it.

If you don't want individual messages combined in the list file, use the /TOD (time of day) switch on the LIST command; for example:

```
) CONTROL RJE80 LIST/TOD :MAINDIR:UPDATE1↵
```

This writes each incoming message into its own file, with a filename in this form:

filename.hhmmss

where

hh is hours (using a 24-hour clock)

mm is minutes

ss is seconds

If you wish to change the filenames, use the CLI command RENAME.

RJE80 provides selectable vertical tabbing through control characters embedded in text. This involves skipping to a specified line number or skipping a specified number of lines. Vertical forms control (VFU) can be done through two methods: soft VFU or hard VFU. In the soft VFU, RJE80 inserts the appropriate number of NEW LINE characters to advance to the requested line. In hard VFU, RJE80 translates 2780/3780 vertical formatting characters to the corresponding AOS characters. If you have a printer that can interpret these characters, it will automatically advance the proper number of lines. If your printer does not have this feature, XLPT will translate the codes to sequences of NEW LINE characters.

You select the desired vertical formatting techniques with the RJE80 LIST command. You select hard VFU by adding the /FORMS= forms-file switch. If you use the switch, RJE80 will translate the 2780/3780 codes to AOS codes. If the list output device is set to a printer queue, RJE80 will receive the data in a temporary file and, on completion of the transmission, enqueue the file to XLPT specifying the forms-file name you requested. You must use the Forms Control Utility to create this file and set its specifications; the file must reside in :UTIL:FORMS. If the list output is *not* a queue type file, then you must print the file with the /FORMS= switch.

If you leave off the /FORMS= switch, RJE80 will insert sequences of NEW LINE characters. In order to change the forms definition, you must edit and assemble CTAB.SR, and then relink RJE80. You will want to use soft forms control when you do not intend to print the data, for example, if you want to type the file at a terminal. Hard VFU permits you to change forms definition while running RJE80 (see Appendix A for further information on formatting).

Receiving a Transmission

When the line is enabled, RJE80 is always ready to receive data. When a remote station returns one of your jobs or sends a file, RJE80 sends the message:

FROM PID n : (RJE80) RECEIVING

When it is finished receiving, RJE80 sends:

FROM PID n : (RJE80) RECEIVE END

These messages are sent to the console that created the RJE80 process. The data goes to the current list file. If you want each transmission placed in a separate file, either use the /TOD switch on the LIST command, or issue a new LIST command after each transmission to change the filename.

Sending a File

The simplest command to send a file is:

```
) CONTROL RJE80 SEND pathname↵
```

pathname is the AOS pathname of the file being sent. In the command above, the file being sent is a printable ASCII file. To send a nonprintable file, set the value of the type switch to BINARY. Multidrop stations must also use a /STATION switch to supply the address of the station that is to receive the file. Control stations can use the /SLIST or /SPUNCH switches to direct the output to the LIST or PUNCH output files.

When RJE80 begins to transmit your file it sends the message:

FROM PID n : (RJE80) TRANSMITTING

When RJE80 is finished transmitting the file, it gives the message:

FROM PID n : (RJE80) TRANSMIT END

After RJE80 has finished transmitting or receiving, you can start transmitting again by giving a SEND command and another filename.

See Chapter 2 for more information about modes, transparency, device selection, and EBCDIC transmission.

Sending Directly to the Remote Console

Transmissions sent through RJE80 are normally written to the LIST or PUNCH file at the receiving station. Occasionally, however, you may want to send messages to the operator console instead. RJE80 offers the MONITOR feature to make this possible.

The MONITOR command sets a string that denotes records intended for the operator. Any transmission preceded by the MONITOR string will be displayed at the console, as well as sent to the ordinary output file.

Once the MONITOR string has been set, the easiest way to send a message to the console is through the /I switch of the CLI CONTROL command. Type your message after the)) prompt, starting with a period and then the MONITOR string. The period indicates the beginning of the message. Each message is terminated by a NEW LINE. You can send several without retyping CONTROL/I RJE80. Finally, type the right parenthesis,), and press NEW LINE. The CLI returns the original prompt.

Suppose we had chosen the dollar sign ($) for the MONITOR string. We could send a message as follows:

```
) CONTROL/I RJE80↵
)) .$COME HERE WATSON↵
))) ↵
)
```

RJE80 sends the message, $COME HERE WATSON.

Similarly, if the remote station happens to send a record preceded by the $ character, your MONITOR picks it up and shows it on the console:

FROM PID 3 : (RJE80) $WHAT DID YOU SAY?

Statistical Reports

RJE80 maintains data for a statistical report only if you requested the report feature during system generation (see the STATREPORT parameter in Chapter 3). If this feature was requested, RJE80 updates the report data before each command, after any error, and at the end of any message. The information is displayed only when you ask for it with the RJE80 REPORT command, which can display the statistics on the terminal screen or send the report to an output file.

Below is an example of the report:

```
*AOS RJE80 REVXX.XX DATE MM/DD/ TIME: START HH:MM:SS ELAPSED HH:MM:SS
 MODE 3780 LINE CODE EBCDIC BLOCK CHECK CCITT16 LRC PARITY
 DSR YES              RECEIVING        TRANSMITTING
 I/R/T            CURRENT  TOTAL   CURRENT  TOTAL
 BLOCKS/MSSG          .        .       .        .      STATION TYPE TRIB
 NAKS                 .        .       .        .      STATION ADDR A
 BLOCKCHECKS          .        .       .        .      TRANSPARENCY OFF
 TIME OUTS            .        .       .        .      COMPRESSION OFF
 RESTARTS             .        .       .        .      FILE TYPE BINARY
 FILENAME                                             LINE NO.SLN1
```

The values in the CURRENT column apply to the current transmission, or, if none is in progress, the most recent one. The TOTAL column accumulates statistics for all transmissions since the report data was last cleared.

To start accumulating fresh statistics, use the /CLEAR switch in the REPORT command to reset the data. The /CLEAR switch clears both the current and total statistics.

Multidrop control stations can use the /STATION switch on the REPORT command to generate statistics on a tributary station. There is a separate report for each tributary. A tributary or point-to-point station can access only its own report.

Table 4-1 explains each field in the report and its possible values.

Table 4-1. Statistical Report Definitions

Field	Possible Values
START TIME	Start time of receive or transmit
ELAPSED TIME	Time to receive or transmit message
MODE	3780 or 2780 emulation
LINE CODE	EBCDIC or ASCII
BLOCK	CHECK LRC, CRC16 or CCITT16
LRC PARITY	Odd, even, or none
DSR	Data set ready (line enabled) YES or NO
I/R/T	Idle, receiving, or transmitting
BLOCKS	Number of data blocks received or sent
MSSG	Total number of messages
NAKS	Number of negative acknowledgements (NAKS)
BLOCKCHECKS	Number of block checks
TIME OUTS	Number of time outs
RESTARTS	Number of line disconnects
STATION TYPE	CONTROL, TRIB, or PTP
STATION ADDR	Tributary station address
TRANSPARENT	Current status of transparency, ON or OFF
COMPRESSION	Current status of compression, ON or OFF
FILE TYPE	Binary or line
LINE NO.	SLNXX, line number specified at generation time

Each numeric field is precise to five digits. The largest possible number in a numeric field is 32,767; if the number grows past this limit, unpredictable results follow.

Because of the large amount of memory required, this report is optional. It is requested through the REPORT generation parameter described in Chapter 3.

Error Messages

RJE80 messages are listed in Appendix B. Each message has a code to identify it. When an error occurs, the code and message are displayed on your screen or sent to the output file. The code also identifies a help message that explains the condition. To access the help message, type:

```
) CONTROL RJE80 HELP=n↵
```

where n is the numeric code for the message. The message defined by code n is displayed on the CRT console, with up to three lines of explanatory help text.

If you are running RJE80 on AOS/VS, please note that the error file is not released with RJE80. Build this file before using RJE80 by typing the command:

```
) VS_ERROR RJERR ↵
```

Once the error file has been generated, you may run RJE80.

Message Severity Levels

All messages, both informative and error, reside on disk in one message file. Each message is preceeded by a unique message number.

The messages are arranged by category, and each has a severity code based on its importance to the RJE80 process.

With the SEVERITY system generation command, the user can choose a severity range that determines which messages will be displayed. The most serious conditions all have severity 7; this level error is always displayed. Messages of lesser importance can be suppressed by setting the severity range accordingly. Table 4-2 shows the error categories, codes, and associated severity ranges.

Table 4-2. Error Categories

Category	Codes	Severity Range
General information	1–25	2–7
Process termination	26–35	7
Send/receive	36–46	7
Command line	46–127	7

Most of the messages in the general information category have a severity level low enough to make their display optional. The general information messages with severity levels of less than 7 are listed in Table 4-3 below.

Table 4-3. Message Severity Levels

Message	Severity
1 LINE DISABLED	4
2 TRANSMIT END	2
3 TRANSMITTING	2
4 RECV FROM STA	2
5 SENDING TO STA	2
6 RECEIVE END	2
7 REVERSE INTERRUPT RECEIVED	5
8 LINE DISCONNECTED. NO DATA FROM CALLER	5
9 LINE DISCONNECTED	5
18 TRIB STATION SET DISABLED	2
19 TRIB STATION SET ENABLED	2
21 NO STATISTICS	4
22 RECEIVING	2
24 LINE ENABLED	4

If the SEVERITY generation parameter were set to 3, all messages having severity 3 through 7 would be displayed. Messages with severity levels of 1 or 2 would not be displayed.

Source Message File

The source message file may be modified by the user to suit local site requirements; however, if modified, the file must be assembled and bound. Instructions on modifying RJERR.SR have been included as comments in the module. Use the ERROR.CLI macro to assemble and bind the file as follows:

```
) ERROR RJERR
```

Please note: Do not type ERROR RJERR.SR because the source file will be deleted.

Transmission Abort Errors

Some RJE80 errors disable and then re-enable the communication line. If you have a switched rather than a dedicated line, you will have to redial the other station to re-establish the connection.

In general, errors that abort transmissions display one of the following messages:

DISCONNECT OCCURRED ON SWITCHED LINE

TRANSMISSION FAILURE (TIMEOUTS)

TRANSMISSION FAILURE (TOO MANY NAKS)

TRANSMITTER FAILURE

UNINTERPRETABLE RESPONSE RECEIVED

In addition, a system generation parameter (IOERROR) determines how many times the RECORD FORMAT ERRORS condition can occur before transmission is aborted. Record format errors are normally caused by a line control character embedded within the transmitted file, or by a record length that exceeds the RJE80 record buffer size of 256 bytes.

When transmission actually stops because of any abort condition, a second message appears. This tells whether the error occurred during transmission or reception. For a complete description of each message, see Appendix B.

How to Shut Down RJE80

To terminate RJE80, use the HOME command:

```
) CONTROL RJE80 HOME
```

The HOME command automatically disconnects the phone lines (if you have a switched line) and then terminates the RJE80 process. RJE80 sends the message:

FROM PID n : (RJE80) PROGRAM SHUT DOWN

RJE80 Runtime Commands

RJE80 runs as an independent process that receives all its commands through the CLI CONTROL command. The general form of an RJE80 command is:

```
CONTROL RJE80 command/switches arguments
```

CONTROL is the CLI command name, RJE80 identifies the process, and the rest of the line is the command.

If you are not in RJE80's working directory when you give a command, and if the working directory is not on the search list, you must give the full pathname of the RJE80 process. This will be the working directory pathname followed by :RJE80. It identifies the pathname of the IPC file for the process.

The process that communicates with RJE80 through CONTROL commands must have the same user name as the process that started RJE80. However, it needn't be the same process; any process with that user name can give RJE80 commands. RJE80 sends command responses to the same console from which a command was sent; this can be any console in the system. Unsolicited messages from the RJE80 process or a remote station go to the console from which RJE80 was created.

Table 4-4 lists the RJE80 runtime commands. The default values for the transmission characteristics are shown in Table 4-5. The rest of this chapter gives the syntax and description of each command.

Table 4-4. RJE80 Command Summary

Command Syntax	Meaning
COMPRESSION[/ = ON / OFF]	Set compression on or off
DISABLE / STATION = addr	Stop polling a tributary station
ENABLE / STATION = addr	Restart polling a disabled tributary
GEN	Return to system generation
HELP = n	Display information about a status code
HOME	Terminate RJE80
LIST*[/type][/STATION=addr][/TOD]* pathname	Change the LIST output file
MONITOR = *textstring* / *OFF*	Set the monitor string
OUTLIST*[/STATION=addr]*	Display the pathname of the current LIST file
OUTPUNCH*[/STATION=addr]*	Display the pathname of the current PUNCH file
PUNCH*[/type][/STATION=addr][/TOD]* pathname	Change the PUNCH output file
REPORT*[/STATION=addr][/CLEAR][/L]*	Produce a statistical report
SEND*[/type]* */SLIST* / */SPUNCH* *[/STATION=addr]* pathname	Send a file
STATISTICS	Display error statistics
TRANSPARENT[/ = ON / OFF]	Turn transparency on or off

Table 4-5. Transmission Options and Default Values

Option	Possible Values	Default
COMPRESSION	ON or OFF	OFF
LIST	any pathname	@LPT
MONITOR	a text string, or OFF	OFF
PUNCH	any pathname	@LPT
TRANSPARENT	ON or OFF	OFF
TYPE	LINE or BINARY	LINE

COMPRESSION

Remove consecutive spaces from input during transmission and reinsert them at the receiving station.

Syntax

CONTROL RJE80 COMPRESSION [/ON | =ON | /OFF | =OFF]

Description

When a transmission is compressed, RJE80 substitutes a two-character code for any sequence of three or more blanks. Compression works only for transmissions in 3780 mode sent with line type and transparency OFF. Otherwise, compression is ignored.

Without either switch, the COMPRESSION command displays the current status of the compression feature.

When compression is on, each group of 2 to 63 consecutive space bytes is replaced by a special character followed by a byte denoting the number of spaces.

Examples

To turn compression on, type:

```
) CONTROL RJE80 COMPRESSION=ON ↵
```

To find out the current setting of compression, type:

```
) CONTROL RJE80 COMPRESSION ↵
```

RJE80 answers:

FROM PID n : (RJE80) 14 COMPRESSION ON

DISABLE

Stop polling for a tributary station.

Syntax

CONTROL RJE80 DISABLE/STATION=addr

addr is the address of the station being disabled.

Description

The DISABLE command can be issued only at multidrop control stations. It disables a particular tributary station until an ENABLE command is issued for that station. This feature is intended to save time spent polling nonresponding stations.

Example

The following command removes station A from the polling list:

```
) CONTROL RJE80 DISABLE/STATION=A ↵
```

ENABLE

Resume polling for a tributary station.

Syntax

CONTROL RJE80 ENABLE/STATION=addr

addr is the address of the station being enabled.

Description

The ENABLE command can be issued only at multidrop control stations. It restarts polling for a disabled tributary station (see DISABLE).

Example

The following command restores station A to the polling list:

```
) CONTROL RJE80 ENABLE/STATION=A ↵
```

GEN

Return RJE80 to its system generation phase.

Syntax

CONTROL RJE80 GEN

Description

The GEN command returns RJE80 to the system generation phase so you can modify the generation parameters. Any RJE80 commands waiting for execution are flushed (and ignored) when this command is given.

When you are ready to continue RJE80 processing, issue a START command.

Example

Below is the sequence for returning to system generation:

```
) CONTROL RJE80 GEN ↵
```

FROM PID 12 : (RJE80) READY
FROM PID 12 : (RJE80) 92 INPUT SYSTEM GENERATION REQUESTS

You can now enter a SPECFILE command for the file to generate, as described in Chapter 3.

HELP

Display information about a status code.

Syntax

CONTROL RJE80 HELP=n

n is the status code to be explained.

Description

This command retrieves the description associated with a particular status message. Appendix B lists status messages and their help descriptions.

Example

To receive an explanation of status code 92, an input system generation request, type:

```
) CONTROL RJE80 HELP=92 ↵
```

FROM PID 12 : (RJE80) 92 INPUT SYSTEM GENERATION REQUESTS

RJE80 IS READY TO ALLOW CHANGES TO THE SYSTEM SPEC PARAMETER FILE. IF NO CHANGES ARE NECESSARY, ENTER THE COMMAND START.

HOME

Terminate RJE80.

Syntax

CONTROL RJE80 HOME

Description

The HOME command disables the line and terminates the RJE80 process at the next opportunity. If it is in the middle of a logical sequence, RJE80 finishes the sequence before terminating; an executing command or transmission is allowed to complete.

To restart RJE80 after a HOME command, issue another CLI PROCESS command.

Example

Below is the procedure for shutting down RJE80:

```
) CONTROL RJE80 HOME ↓
```

FROM PID 12 : (RJE80) READY
FROM PID 12 : (RJE80) 30 PROGRAM SHUT DOWN

LIST

Change the RJE80 list output file.

Syntax

CONTROL RJE80 LIST*[/type][/STATION=addr][/TOD][/FORMS=forms-file]* pathname

type	is LINE or BINARY.
addr	is the address of the station whose list file is being set.
pathname	is the pathname of the new listing file.
forms-file	is the name of a file that contains the format for printer output that you wish to use. The file must be in the directory :UTIL:FORMS.

Description

The LIST file receives all transmitted files not explicitly directed to the PUNCH file. Through the LIST command, the receiving station can set the LIST file to any disk file or device.

Initially, the LIST file is set to @LPT, the line-printer queue. EXEC or the Spooler sends the output of this queue to the line printer.

To specify a new LIST file, give a LIST command with the pathname of the new file. If the pathname identifies an existing file, output data is appended to that file. Otherwise, the requested file is created. You can specify a new LIST file at any time, but RJE80 waits until the end of the current transmission before switching to the new file.

Control stations have separate list files to receive data from the various tributaries. A control station must use the /STATION switch in the LIST command to specify which tributary will send data to a particular list file. There must be separate LIST commands to set up files for each tributary's transmissions. Then, when a control station receives data from a tributary, the data goes to the file for that particular tributary.

The /TOD switch appends the time of day to the list filename (in the form filename.HHMMSS). This option is useful if you want each received transmission sent to a separate file.

The value of the type switch determines whether any translation is done on the received data when writing it to the list file. The type switch should always have the same value as that of the type switch for the SEND command at the remote station. For instance, if the remote station sent a file of binary type, your LIST file should also be binary. Otherwise the data will unreadable. Check with the remote station operator to see which type file is being sent.

The type defaults to line, which produces a printable ASCII file. If your line code is EBCDIC, RJE80 will translate the data before writing it to the list file. Line files are written in data sensitive mode, using ASCII code and a maximum record size of 400 bytes for 2780 mode and 512 bytes for 3780. If the file contains any formatting characters, they are used to format the file; they are not written as data. If no formatting characters were used, RJE80 inserts NEW LINE as a delimiter between records.

The /FORMS switch allows you to specify the name of a file containing formatting instructions. The file must already exist in the UTIL:FORMS directory. You may use the Forms Control Utility (see the *Command Line Interpreter (CLI) (AOS and AOS/VS) User's Manual*) to create this file. See Appendix A for further information on vertical format control.

Please note: If you use the /FORMS switch and specify an output format file, the file being sent by RJE80 will be formatted for printing using an electronic vertical forms control unit (see Appendix A for a description of VFU). This means that the output file will not look correct if you try to view it at the terminal.

LIST (continued)

Binary files are written in dynamic mode; RJE80 does not add any delimiters, translate the data, or perform any formatting. Binary is required for sending any type of nonprintable file. It can also be used for text or other types of files. For more about line and binary transmission, see Chapter 2.

All files received with transparency off are subject to device selection (see "Device Selection and Format Characters" in Chapter 2). The device selection characters are not written to the listing file.

Also, if transparency is off and you receive data that contains nonprintable characters, the AOS synchronous line handler may interpret some of them as control characters. If it tries to act on them, it may terminate RJE80 prematurely. Alert your remote station to this possibility and have them send files in transparent mode when necessary.

Please note: The runtime LIST command is different from the LIST command used during system generation. That command displays a system generation parameter; this command sets the filename for list output. You may use the runtime LIST command *after* you have issued the START command only; you may use the system generation LIST command during the generation phase only.

Examples

To write received data to a file :UDD:$RJE:LIST1, without formatting or translating the output, type:

```
) CONTROL RJE80 LIST/BINARY :UDD:$RJE:LIST1 ⤸
```

To put each received transmission in a separate list file, type:

```
) CONTROL RJE80 LIST/TOD :UDD:$RJE:LIST1 ⤸
```

Each transmission will be named according to the time it arrives. For instance, a file received at 12:05 will be named LIST1.120500.

To write printable ASCII output to a file :UDD:SUBDIR:UPDATE2, we could use either of these LIST commands:

```
) CONTROL RJE80 LIST/LINE :UDD:SUBDIR:UPDATE2 ⤸
```

```
) CONTROL RJE80 LIST :UDD:SUBDIR:UPDATE2 ⤸
```

The second of these uses the default value for type.

MONITOR

Write records beginning with a specified text string to the CRT as well as the list file.

Syntax

CONTROL RJE80 MONITOR [=*textstring* / /OFF]

textstring is a string of up to 10 characters containing no blanks or delimiters.

Description

The MONITOR string distinguishes incoming records that are messages to the station operator. RJE80 inspects the first 10 bytes of each received record to see if they match the string. Records beginning with this string are sent to the CRT.

To cause RJE80 to perform this search, give the MONITOR command followed by a text string; this turns MONITOR on. If the incoming record contains format controls in the first two characters, RJE80 skips them before it attempts a match.

To display the current setting of MONITOR, give the command without an argument.

MONITOR will not work if your output file is a LIST or PUNCH file opened with binary as the type.

Examples

This command turns MONITOR mode on and sets the text string to $FRED:

```
) CONTROL RJE80 MONITOR=$FRED ↵
```

To find the current setting of MONITOR, type:

```
) CONTROL RJE80 MONITOR ↵
```

RJE80 answers:

FROM PID n : (RJE80) MONITOR $FRED

To turn MONITOR off, type this command:

```
) CONTROL RJE80 MONITOR/OFF ↵
```

OUTLIST

Display the pathname of the current LIST file.

Syntax

CONTROL RJE80 OUTLIST[/*STATION=addr*]

addr is the address of a multidrop tributary station.

Description

The OUTLIST command displays the pathname of the current LIST file, set with the LIST command. It also shows whether the type switch or /TOD switch have been set (note that the forms information is not given). A control station must use the /STATION switch to specify which of its list files it wants displayed.

Examples

If you had used the LIST command and then the OUTLIST command as shown, your output would look like this:

```
) CONTROL RJE80 LIST A ↓
) CONTROL RJE80 OUTLIST ↓
FROM PID n : (RJE80) LIST A
```

The *n* is the process identifier. The next example shows what OUTLIST would give you if you had listed a file with binary as the type and used the TOD switch:

```
) CONTROL RJE80 LIST/BINARY/TOD B ↓
) CONTROL RJE80 OUTLIST ↓
FROM PID n : (RJE80) LIST B BINARY TOD
```

OUTPUNCH

Display the pathname of the current PUNCH file.

Syntax

CONTROL RJE80 OUTPUNCH[/*STATION=addr*]

addr is the address of a multidrop tributary station.

Description

The OUTPUNCH command displays the pathname of the current PUNCH file, set with the PUNCH command. It also shows whether the type switch or TOD switch have been set. A control station must use the /STATION switch to specify which of its punch files should be displayed.

Examples

If you had used the PUNCH command and then the OUTPUNCH command as shown, your output would look like this:

```
) CONTROL RJE80 PUNCH A ↵
) CONTROL RJE80 OUTPUNCH ↵
FROM PID n : (RJE80) PUNCH A
```

The *n* is the process identifier. The next example shows what OUTPUNCH would give you if you had listed a file with BINARY and the /TOD switch:

```
) CONTROL RJE80 PUNCH/BINARY/TOD B ↵
) CONTROL RJE80 OUTPUNCH ↵
FROM PID n : (RJE80) PUNCH B BINARY TOD
```

PUNCH

Change the PUNCH output file.

Syntax

CONTROL RJE80 PUNCH*[/type][/STATION=addr][/TOD]* pathname

addr is the address of the multidrop tributary station whose PUNCH file is being set.

type is LINE or BINARY.

pathname is the pathname of the new punch output file.

Description

The PUNCH file receives transmissions explicitly directed to it through the /SPUNCH switch on a SEND command or through device selection characters in the received file (see "Device Selection and Format Characters" in Chapter 2).

Through the PUNCH command, the receiving station can set the PUNCH file to any disk file or device. Initially, the PUNCH file is set to @LPT, the line-printer queue. EXEC or the Spooler sends the output of this queue to the line printer.

To specify a new PUNCH file, give a pathname to the new file in your PUNCH command. If the pathname identifies an existing file, output data is appended to that file. Otherwise, the file is created. You can specify a new PUNCH file at any time, but RJE80 waits until the end of the current transmission before switching to the new file.

Control stations have separate punch files to receive data from the various tributaries. A control station must use the /STATION switch in the PUNCH command to specify which tributary will send data to a punch file. There must be separate PUNCH commands to set up files for each tributary's transmissions. Then, when a control station receives data from a tributary, the data goes to the file for that particular tributary.

The /TOD switch appends the time of day to the PUNCH filename (in the form filename.HHMMSS). This option is useful if you want each received transmission output to a separate file.

The type switch determines whether any translation is done on the received data when writing it to the PUNCH file. The type should always have the same value as the type used on the SEND command at the remote station. For instance, if the remote station sent a file of binary type, your PUNCH file should also be BINARY. Otherwise, the data will be unreadable. Check with the remote station operator to see which type is being sent.

The type defaults to line, which produces an ASCII file. Line files are written in data sensitive mode, using ASCII code and a maximum record size of 400 bytes for 2780 mode and 512 bytes for 3780. If the file contains any formatting characters, they are used to format the file; they are not written as data. If no formatting characters were used, RJE80 inserts NEW LINE as a delimiter between records.

Binary files are written in dynamic mode using EBCDIC code. RJE80 does not add any delimiters, translate the data, or perform any formatting. BINARY is required for sending program files; it can also be used for text or other types of files. For more about LINE and BINARY transmission, see Chapter 2.

All files received with transparency off are subject to device selection (see "Device Selection and Format Characters" in Chapter 2). The device selection characters are not written to the PUNCH file.

Also, if transparency is off and you receive data that contains non-ASCII, non-EBCDIC characters, the AOS synchronous line handler may interpret some of them as control characters. If it tries to act on them, it may terminate RJE80 prematurely. Alert your remote station to this possibility and have them send files in transparent mode when necessary.

Examples

To send output to a disk file :UDD:$RJE:PUNCH_OUTPUT, without formatting or translating the output, type:

```
) CONTROL RJE80 PUNCH/BINARY :UDD:$RJE:PUNCH_OUTPUT ⤸
```

To put each transmission in a separate PUNCH file, type:

```
) CONTROL RJE80 PUNCH/TOD :UDD:$RJE:PUNCH_OUTPUT ⤸
```

Each transmission will be named according to the time it arrives. For instance, a file received at 12:05 will be named UPDATE1.120500.

To send output in ASCII to a file :UDD:SUBDIR:PAPER_TAPE, we could use either of these PUNCH commands which default to ASCII code.

```
) CONTROL RJE80 PUNCH/LINE :UDD:SUBDIR:PAPER_TAPE ⤸
```

```
) CONTROL RJE80 PUNCH :UDD:SUBDIR:PAPER_TAPE ⤸
```

REPORT

Display the statistical report.

Syntax

CONTROL RJE80 REPORT [/CLEAR | /L] [/STATION=addr]

addr is the address of the station whose statistics will be displayed.

Description

A statistical report is displayed at the CRT or sent to OUTDATA, as specified in the REPORT command. For a description of the report, see Chapter 3.

REPORT works only if the STATREPORT feature was requested during system generation. In addition, some traffic must have occurred on the line before a report can be made; the RJE80 process must have sent or received a file.

Control stations can receive a report on any tributary. Use the /STATION switch to specify which tributary you want statistics for.

The /CLEAR switch resets the collected report statistics; RJE80 begins collecting new statistics.

If the /L switch is used, the report is sent to a file named OUTDATA in the RJE80 working directory. This file is created if it does not exist; if it does, the report is appended to the file. Without the /L switch, REPORT displays the data on the user terminal.

Examples

To send a report on tributary station B to the OUTDATA file, type:

```
) CONTROL RJE80 REPORT/L/STATION=B ↵
```

To clear the accumulated report statistics, type:

```
) CONTROL RJE80 REPORT/CLEAR ↵
```

SEND

Transmit a file to another station.

Syntax

CONTROL RJE80 SEND[*//type*][*//STATION=addr*][*/SLIST* | */SPUNCH*] pathname

type is LINE or BINARY.

addr is the address of the multidrop tributary station to receive the file. This switch only applies if you are sending from the control station.

pathname is the pathname of the file to be sent.

Description

The SEND command reads the file to be transmitted and then translates it according to the type switch, using compression or transparency if they are on. It then groups the file records into blocks and sends one block at a time over the communications line to the remote station. The file is output to the LIST or PUNCH file, according to the device selection used.

If the file to be sent is not in the same working directory as RJE80, you must specify a complete pathname to it.

The value of the type switch determines whether the file is translated before transmission. The default, if you omit the switch, is LINE.

When the type is LINE, RJE80 assumes the file is in ASCII code. It reads the file in data sensitive mode with a maximum byte count of whatever you set the byte count to be, plus one overhead byte (the default is 80 plus 1, or 81). RJE80 then strips the delimiting character from the end of each record as the record is read and sent. If, during system generation, LINECODE is set to EBCDIC (this is the default value), the file is translated for transmission according to the conversion table in Appendix C.

For line type files in 2780 mode, records are padded with blanks to 80 bytes. In 3780 mode, however, trailing blanks are dropped. Records are variable in length as a result. Record and block sizes are determined by the FORMAT system generation parameter.

A binary type file may contain data of any format. RJE80 transmits the file without translating it. It performs a dynamic read on the file using a byte count of 80, and ignores all delimiters. This means the records can be any size. (For size manipulations performed on binary files, see the table "Comparison of 2780 and 3780 Modes" in Chapter 2.)

Binary files can be sent only in standard blocking format (400-byte blocks for 2780 mode and 512-byte blocks for 3780).

Binary file text often contains RJE80 control characters. To prevent transmission problems, we suggest sending them with transparency on (see the TRANSPARENT command). Otherwise, some of the data may be treated as control characters, with unpredictable results. If ASCII line code is used, you cannot use transparency during transmissions. Therefore, if you use ASCII line code, you generally cannot transmit binary files.

Device selection (see Chapter 2) is performed for both binary and line type files if transparency is off. Device selection characters determine whether output goes to the LIST or PUNCH file at the remote station. RJE80 drops the device selection characters before sending the data to the output file.

Control stations can also use the /SLIST and /SPUNCH switches to select devices, but if the file contains any device selection characters, the characters override the switches. If transparency is on, device selection characters have no effect, but the /SLIST and /SPUNCH switches do.

SEND (continued)

Examples

To send a file called UPDATE3 from RJE80's working directory, using binary code, type:

```
) CONTROL RJE80 SEND/BINARY UPDATE3 ↵
```

To send the file UPDATE3 from RJE80's working directory using the default type LINE, enter:

```
) CONTROL RJE80 SEND UPDATE3 ↵
```

To send a file UPDATE1 from directory :UDD:HERMES, (which is not RJE80's working directory), type:

```
) CONTROL RJE80 SEND :UDD:HERMES:UPDATE1 ↵
```

STATISTICS

Display the error statistics for the transmission line.

Syntax

CONTROL RJE80 STATISTICS

Description

Every time your synchronous line driver (part of the operating system) transmits or receives, it counts the number of errors that it encounters on the line. These numbers suggest the quality of the communications line. The error statistics are not cumulative; every time you give this command, they are reset to zero. The display is to the CRT console as follows:

FROM PID n : (RJE80) mmmmm=NAKS mmmmm=TIMEOUTS mmmmm=BC ERRORS

mmmmm represents the number of occurrences of the particular error.

NAKS is the total number of negative acknowledgements sent since the last display. A NAK requests that the block be retransmitted.

TIMEOUTS is the total number of timeouts that occurred during receive operations since the last display.

BC ERRORS is the number of block check errors during receive operations since the last display.

For a longer description of these errors, see the *Advanced Operating System (AOS) Programmer's Manual* (093-000120).

You may use this command with the statistical report, if you wish, but the report will give much more information (see STATREPORT in Chapter 3).

Example

To display error statistics, type:

) CONTROL RJE80 STATISTICS ↵

FROM PID 12: (RJE80) 00004=NAKS 00000=TIMEOUTS 00004=BC ERRORS

TRANSPARENT

Set transparency on or off.

Syntax

CONTROL RJE80 TRANSPARENT [/ON | =ON | /OFF | =OFF]

Description

The TRANSPARENT command lets you specify whether RJE80 sends text in transparent mode. With no switch, the TRANSPARENT command displays the current transparency setting.

Transparency is most useful for binary line code. It lets all 256 EBCDIC code combinations be used as data. In transparent mode, binary-bit configurations that match line control bytes can be transmitted and received as data. RJE80 automatically prevents interference by inserting a special character ahead of a line control byte to flag it in the data stream. The receiver strips off these characters.

If you are sending files in ASCII line code, you cannot turn transparency on. This means that you cannot send binary files in ASCII. This restriction is due to the fact that ASCII is a seven-bit code.

When RJE80 receives text, it responds to transparency automatically if the file was sent in transparent mode. If you need to know whether transparency was on for a received transmission, ask the remote operator beforehand.

Please note: In 3780 mode, you can use transparency or compression but not both at the same time. Transparency takes precedence; that is, whenever you send text in transparent mode, RJE80 ignores the compression setting until you type TRANSPARENT OFF.

Examples

To set transparent mode ON, type:

```
) CONTROL RJE80 TRANSPARENT ON )
```

To find out the current setting of transparency at your site, type:

```
) CONTROL RJE80 TRANSPARENT )
```

RJE80 answers:

FROM PID n : (RJE80) 10 TRANSPARENCY ON

You can ask whether you are sending transmissions with transparency on, but not whether a transmission you received was sent with transparency on.

End of Chapter

Appendix A
Formatting Output

Vertical forms control information is transmitted along with data sent using RJE80. This information describes how the data should be spaced on the page when it is printed. Printed material usually contains many blank lines. Vertical forms control information tells the printer how many lines to skip or how far down the page to advance before printing the next line. This increases transmission efficiency by reducing the number of characters that need to be sent to indicate vertical spacing.

Vertical Forms Unit (VFU) Tapes

The brain of the Vertical Forms Unit (VFU) is called a *VFU tape* (see Figure A-1). This terminology dates back to when printers were controlled by paper tapes with holes punched in them. These tapes had twelve vertical columns and as many horizontal rows as there were lines on the form being printed. The columns were numbered and referred to as *channels*. The rows represented the lines on the page being printed.

The tape's holes, located at the intersection of particular columns and rows, associated lines on the print form with channels on the tape. A small hole punched in column 1 of row 1 corresponded to the first line of the form. Similarly, a hole in column 12 defined the last line of the form. Holes punched in other columns marked the lines where printing was to start again after skipping over some amount of space. Each time forms were changed, the paper tape had to be changed to match the new form.

VFU control bytes are coded signals telling the printer to skip to a specified channel or advance a specified number of lines. These codes are unprintable two-character sequences contained in RJE80 data written to the printer. For example, CTRL-R CTRL-B means "skip to channel 3"; this tells the printer to tab from wherever it is on the page to the line marked by a hole in column three of the VFU tape. CTRL-R CTRL-S means "advance three lines"; this tells the printer to move down three lines from the current position. Both form-control techniques save time spacing over blank areas.

The printers normally used on AOS systems do not use paper VFU tapes. However, they often have an *electronic VFU*. In addition to having the same capabilities as a paper tape unit, an electronic VFU has the added advantage that the settings can be changed without having to change a paper tape. Instead of punching holes and mounting a paper tape, an AOS program writes out a sequence to the VFU indicating where the "holes" are punched. If the printer has no VFU at all, a NEW LINE character must be written out for each line to be skipped.

VFU Controls

RJE80 now lets you take advantage of an electronic vertical forms unit (VFU), if you have one, or XLPT's ability to simulate one if you do not. The RJE80 LIST command has been enhanced (see Chapter 4) to provide this option. In order to use or simulate VFU, XLPT must control the printer. You cannot set RJE80's LIST output to @LPB (the device name). The LIST output must be directed to a queue serviced by XLPT. (This feature does not apply to PUNCH output.)

RJE80 provides selectable vertical tabbing through control characters embedded in text. This involves skipping to a specified line number or skipping a specified number of lines. Either a hardware or software VFU controls such tabbing.

Hardware (Electronic) VFU

A *hardware VFU* is a piece of electronic equipment on a line printer. This equipment interprets the two-character VFU codes, or channel skips (see Table A-1), called VFU control bytes, embedded in the text of the file. They tell the printer where and how much to tab both vertically and horizontally. You can, of course, use hardware VFU only if your printer is equipped with an electronic VFU.

Using hardware VFU to skip to specified lines requires a VFU tape associating the line numbers with tab channels. The VFU tape has up to 12 channels, as described above, that specify the top and bottom of the form and vertical tab stops in between. Table A-1 gives the octal and ASCII values of the VFU control bytes for tape and nontape tabbing.

RJE80 can respond to several kinds of vertical format controls: 1) ESC sequences that cause channel skips, 2) ESC sequences that cause line spacing, and 3) printer control characters which cause other kinds of formatting.

Note that the ESC sequences will simultaneously function as device selection codes; for example, ESC S selects the LIST file and specifies double spaces.

The ESC sequences, as vertical format controls, simulate the functions of a line-printer carriage control tape.

When it performs vertical format controls, RJE80 reads the code and formats the record itself, before it writes it out to the LIST file. RJE80 performs no vertical formatting with PUNCH files.

Please note: Vertical format controls in incoming data will work only if the LIST was opened with the type set to LINE.

ESC Sequences and Line Spacing

An ESC character followed by certain reserved control characters at the beginning of a record causes RJE80 to print the line and then skip. Table A-1 shows the ESC sequences and the skips they cause.

Table A-1. ESC Sequences and Channel Skips

ESC Sequence	Means Skip to Channel
ESC,A	1
ESC,B	2
ESC,C	3
ESC,D	4
ESC,E	5
ESC,F	6
ESC,G	7
ESC,H	8
ESC,I	9
ESC,J	10
ESC,K	11
ESC,L	12

The channel skips, in turn, will cause RJE80 to format output with line skips as in Table A-2.

Table A-2. Default Forms Control Table

Channel	Skips to Line
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	63

RJE80 uses the above table for hardware VFU. The filename for this table is CTAB.SR. If you wish, you may replace the table with one of your own, or you may modify CTAB.SR using a text editor.

Other ESC and reserved character sequences cause single, double, and triple spacing as follows:

ESC,M	suppresses spacing.
ESC,/ ESC,x	cause single-spacing (where x is any character other than /, A through L, M, S, T, and HT).
ESC,S	causes double-spacing.
ESC,T	causes triple-spacing.

Other Printer Control Characters

Certain characters cause vertical formatting as follows:

LF, NL, and IRS	cause the record to print and enact any outstanding ESC sequences. If there are none, then it spaces 1 line.
VT	causes the data preceding it to print. It also tells RJE80 to ignore any outstanding ESC sequences and skip to channel 2 (same as ESC, B).
FF	causes the data preceding it to print and tells RJE80 to ignore any outstanding ESC sequences and skip to channel 1 (same as ESC, A).

Please note: In AOS RJE80 the LF and NL vertical formatting characters work the same way.

Software VFU

RJE80 provides selectable vertical tabbing through control characters embedded in text. This involves skipping to a specified line number or skipping a specified number of lines. Vertical forms control (VFU) can be done through two methods: soft VFU or hard VFU. In the *software VFU*, RJE80 inserts the appropriate number of NEW LINE characters to advance to the requested line. In hard VFU, RJE80 translates 2780/3780 vertical formatting characters to the corresponding AOS characters. If you have a printer that can interpret these characters, it will automatically advance the proper number of lines. If your printer does not have this feature, XLPT will translate the codes to sequences of NEW LINE characters.

You select the desired vertical formatting techniques with the RJE80 LIST command. You select hard VFU by adding the /FORMS= forms-file switch. If you use the switch, RJE80 will translate the 2780/3780 codes to AOS codes. If the list output device is set to a printer queue, RJE80 will receive the data in a temporary file and, on completion of the transmission, enqueue the file to XLPT specifying the forms-file name you requested. You must use the Forms Control Utility to create this file, and the file must reside in :UTIL:FORMS.

If you leave off the /FORMS= switch, RJE80 will insert sequences of NEW LINE characters. In order to change the forms definition, you must edit and assemble CTAB.SR, and then relink RJE80. You will want to use soft forms control when you do not intend to print the data. For example, if you want to type the file at a terminal, hard VFU permits you to change forms definition while running RJE80.

How to Edit CTAB.SR

If you decide to edit the CTAB.SR source file, you may wish to print out the file before doing so. When you have the file to look at, note that there is information on the CCTAB macro. This macro must begin each instruction that pairs a line number with a channel number. Beneath this information is a table listing the CCTAB line numbers and their corresponding channels like this:

```
CCTAB   1    1
CCTAB   2    2
CCTAB   3    3
CCTAB   4    4
CCTAB   5    5
CCTAB   6    6
CCTAB   7    7
CCTAB   8    8
CCTAB   9    9
CCTAB   10   10
CCTAB   11   11
CCTAB   63   12
```

Note that the list is in the form:

CCTAB 63 12

This means that at channel number 12, RJE80 will instruct the printer to skip to line 63 on the output page. For CCTAB 11 11, RJE80 will skip to line 11 on the output page for channel number 11. You may change the line number-channel number association simply by editing this CTAB.SR file. Make sure you enter the changes as follows:

CCTAB line number channel number

The instruction must begin with the CCTAB macro, followed by the line number and then the channel number. For example, you might want the printer to skip to line number 45 instead of line number 11. When you finish editing, the table in CTAB.SR should like like this:

```
CCTAB   1    1
CCTAB   2    2
CCTAB   3    3
CCTAB   4    4
CCTAB   5    5
CCTAB   6    6
CCTAB   7    7
CCTAB   8    8
CCTAB   9    9
CCTAB   10   10
CCTAB   45   11
CCTAB   63   12
```

Make sure that the CCTAB lines are in order by line number.

When you are through editing the CTAB.SR file, you must reassemble it using the macroassembler MASM.CLI, then build a new load module with LINK_RJE80.CLI. For AOS the command lines are:

```
) MASM CTAB↓
) LINK_RJE80↓
```

For AOS/VS the command lines are:

```
) EMASM CTAB↓
) LINK_ERJE80↓
```

Forms Control Utility (FCU)

The type of forms control provided by a VFU tape is one of a number of forms control specifications produced by the AOS utility FCU. Other specifications include characters per line, horizontal tab stops, and form length in lines per page. FCU creates, edits, and reads these specifications in a file's user data area (UDA).

The UDA is ignored by the Command Line Interpreter's TYPE, COPY, and FILESTATUS/LENGTH commands. It is invisible except to a utility such as FCU or DISPLAY, or to the QPRINT command. (See the *Command Line Interpreter (CLI) (AOS and AOS/VS) User's Manual* (093-000122).)

During the FCU dialog, you can assign values to each of the channels listed in Table A-2. When the line printer encounters code for a channel, it advances to the line specified in the dialog.

The form definition file that you tell RJE80 to use must reside in :UTIL:FORMS, or else you must give a complete pathname each time you use the form. The former is preferable.

If special forms are not required and none are mounted in the printer, the printer prints the file without intervention by the system operator. If a file is queued to print with a special form, it cannot be printed until the system operator mounts those forms on the printer and switches forms files with the EXEC FORMS command. Then, all print jobs specifying that form can print.

Printers with hardware VFUs have the device name @LPB, optionally followed by a number, as in @LPB1. Print devices named @LPA, @LPC, or @LPD do not have such hardware. (See the AOS or AOS/VS operator's guide for an explanation of device naming conventions.)

Horizontal Formatting

The sending station can send a tab format record any time during a transmission. The tab format will apply to all records received until another tab format record is sent. The tab format record instructs RJE80 how many spaces to insert for each tab. Since RJE80 replaces tabs with spaces, the tab settings cannot be overridden by anything you specify to the FCU program.

RJE80 will perform this horizontal formatting only if the files are in nontransparent mode and the LIST or PUNCH file was opened with the type set to LINE.

Tab Format Record

An ESC followed by a horizontal tab character makes that record a tab format record. Any other such characters in the line will set tab stops where the characters appear.

The tab format record must end with one of the following characters:

In 2780 mode US only

In 3780 mode NL IRS

Please note: A new tab format record that arrives will replace everything in the old tab record up to its own length. Figure A-1 shows the horizontal format controls in a typical message.

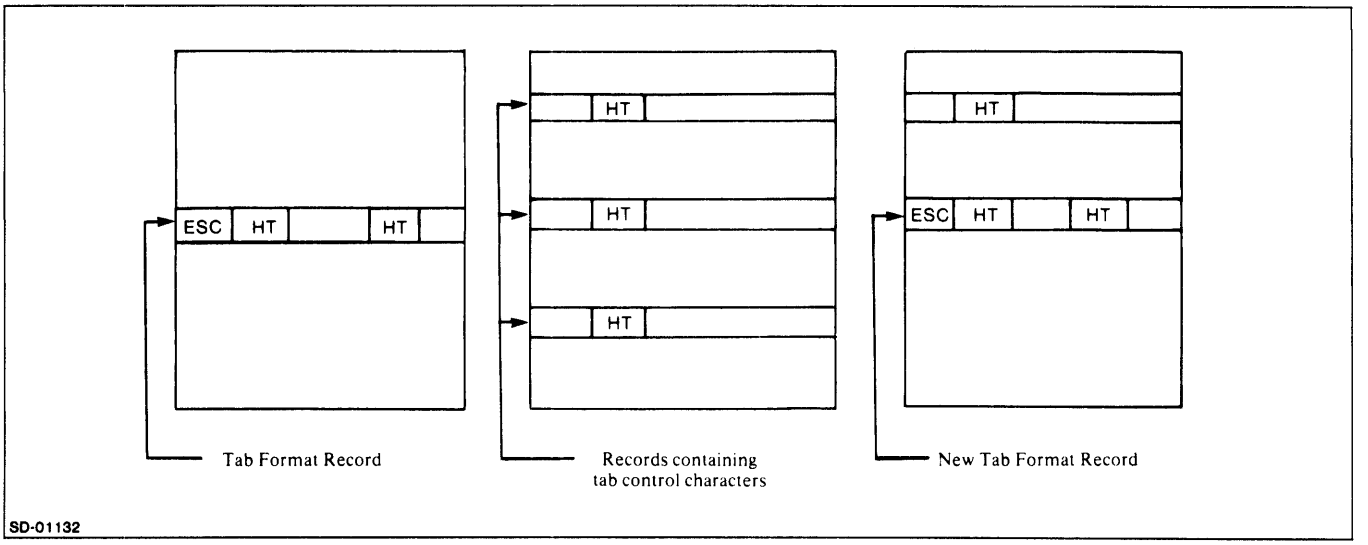

Figure A-1. Horizontal Format Controls

Device Selection and Format Characters

In 2780 mode, the first two characters of any record in a message can select the device (or disk file) to which all the subsequent records are to be sent, as follows:

ESC,4 selects the PUNCH

ESC,x selects the PRINTER

The x is a vertical formatting control character.

In 3780 mode, the first character of the first record of each message may select the output device, as follows:

DC1 selects the PRINTER

DC2 or DC3 selects the PUNCH

The device selection characters remain in effect until new ones occur. RJE80 performs the selection by sorting the records according to device selection characters they contain; printer records will go to the LIST file, and punch records will go to the PUNCH file.

Note that RJE80 will only act on these control characters if the block is in nontransparent mode.

End of Appendix

Appendix B
Messages

RJE80 sends two kinds of messages: those that inform you about aborts, and those that inform you about the current status of RJE80 and nonabort errors.

All messages that come to you from RJE80 will have the form:

FROM PID n : (RJE80) message

General Information Messages

RJE80 messages are numbered as shown below. When you want more information about a particular message, use the HELP command with the message's number as the argument. For example, if you want help for the message 4 RECV FROM STA, enter the HELP command as follows:

```
) CONTROL RJE80 HELP=4 ↓
```

RJE80 sends back the information listed for that number (see below).

This is the list of the RJE80 messages and their corresponding help files.

1 LINE DISABLED
The communications line is not connected.

2 TRANSMIT END
RJE80 has finished transmitting a file.

3 TRANSMITTING
RJE80 is in the process of transmitting a file.

4 RECV FROM STA
A multidrop control station is currently receiving a file from the tributary station specified.

5 SENDING TO STA
A multidrop control station is currently transmitting a file to the tributary station specified.

6 RECEIVE END
The prior transmission has completed. The message has been logged to the filename specified in either the list or punch definition.

7 REVERSE INTERRUPT RECEIVED
Reverse interrupt from a remote site. RJE80 will finish the block being sent or send one more block, allow the remote site to send its message, and then continue transmitting the interrupted message.

8 LINE DISCONNECTED. NO DATA FROM CALLER
Wrong number protection was selected and valid data has not been received within 10 times the I/O timeout parameter after DSR comes up. A line disable is immediately followed by a line enable.

9 LINE DISCONNECTED
The connection was broken or the line disabled due to a repeating error. The process disables and then immediately re-enables the line, waiting for a remote call in.

10 TRANSPARENCY ON
Messages are transmitted in transparent mode which permits line control characters to be embedded within the text and transmitted as normal data.

11 TRANSPARENCY OFF
Messages are transmitted in non-transparent mode which does not allow line control characters to be transmitted as normal text.

12 MONITOR NOT PERMITTED
The monitor function is not supported for multidrop.

13 MONITOR OFF
The monitor function is disabled.

14 COMPRESSION ON
RJE80 3780 emulator space compression for TYPE=LINE and non-transparent data is enabled. Up to 63 trailing blanks are replaced by an IGS(EBCDIC) or GS(ASCII) followed by the count.

15 COMPRESSION OFF
Embedded blanks are not suppressed during the transmission of a 3780 TYPE=LINE, non-transparent file.

16 COMPRESSION ILLEGAL
The compression feature is not allowed if any one of the following conditions are true: you use a 2780 emulator, file type is binary, or transparency on.

17 RJE80 READY
RJE80 is executing and ready to accept line commands.

18 TRIB STATION SET DISABLED
The multidrop tributary station address defined in the poll list has been disabled due to non-response timeout or at the operator's request.

19 TRIB STATION SET ENABLED
A disabled multidrop tributary station defined in the poll list has been enabled at the operator's request.

20 TRANSPARENCY NOT PERMITTED
Transparency is not supported for ASCII line code.

21 NO STATISTICS
There has been no input to generate statistical data.

22 RECEIVING
A message is currently in the process of being received.

23 TRANSMISSION ABORTED
The abort was executed because of excessive errors. A receive initial will be performed immediately.

24 LINE ENABLED
Dial up is completed and the communications lines are connected.

25 ILLEGAL CARD CODE
Invalid Hollerith card code.

Process Termination Error Messages

26 BAD STATION INDEX
An incorrect poll list station index was received by the multidrop control station from the AOS call ?SRCV while attempting to poll the tributary stations.

27 MORE THAN 26 TRIBUTARY STATIONS
No more than 26 unique tributary station addresses are permitted in the control station's tributary poll list.

28 NO MULTIDROP STATIONS CONFIGURED
In multidrop mode, at least one tributary poll station must be configured.

29 POLL STATION ADDRESSES NOT ALPHA ASCII
All tributary station addresses must be one alpha ASCII byte.

30 PROGRAM SHUT DOWN
A process termination error was detected or the operator requested termination using a "HOME" command.

31 BLOCK OVERFLOW
The number of bytes per record times the number of records per block, plus line control bytes, has exceeded the maximum buffer size.

32 LINE ENABLE FAILURE
The sync line was already enabled or @PER directory was not on the search list.

Receiving and Transmitting Errors

36 ABORTING TRANSMISSION
Transmission aborted because: line disconnect, timeouts, too many NAKS, transmitter failure, or uninterpretable response received. The line will be disabled then re-enabled.

37 ABORT RECEIVING
Receiving has terminated because: line disconnect, timeouts, or uninterpretable response received. A receive initial will be performed immediately.

38 RECORD FORMAT ERROR
Record size error normally caused by line control characters embedded within text or record length exceeding buffer size. Retransmit in TYPE=BINARY with transparency on.

46 REQUEST DENIED. COMMAND ABBREVIATION NOT UNIQUE
Not enough characters entered to define command.

47 REQUEST DENIED. ILLEGAL FILENAME
The pathname/filename specified in a list/punch/send command is incorrect or unknown.

48 REQUEST DENIED. NO SUCH MESSAGE
You have requested a message that does not exist.

49 REQUEST DENIED. ILLEGAL COMMAND
An unknown command has been requested.

50 REQUEST DENIED. STATION ADDRESS NOT PERMITTED
Multidrop control stations require station addresses as switches only in the command request line.

51 REQUEST DENIED. STATION ADDRESS NOT DEFINED
The station address requested has not been defined in the control stations poll list.

52: REQUEST DENIED. STATION DISABLED
A send command has been requested for a disabled station.

53 REQUEST DENIED. ANOTHER REQUEST OUTSTANDING
An enable/disable command was given for a station, but there is a command outstanding that has not been honored yet.

54 REQUEST DENIED. STATION ALREADY ENABLED
An enable command was given but the station is already enabled.

55 REQUEST DENIED. STATION ALREADY DISABLED
A disable command was given but the station is already disabled.

56 REQUEST DENIED. ILLEGAL DESCRIPTION
The requested command contains an unknown switch.

57 REQUEST DENIED. SLIST/SPUNCH NOT ALLOWED
SLIST/SPUNCH send switches are permitted only for a multidrop control station.

58 REQUEST DENIED. ENABLE/DISABLE NOT ALLOWED
ENABLE/DISABLE commands are permitted only for a multidrop control station.

59 REQUEST DENIED. TRANSPARENCY NOT ALLOWED
Transparency is not supported for ASCII line code.

60 REQUEST DENIED. SWITCH ABBREVIATION NOT UNIQUE
Additional characters are required to define the switch in question.

61 REQUEST DENIED. EQUAL SIGN MISSING
Equal sign missing in command string.

62 HELPS INPUT ERROR
Help input must be ASCII decimal and at least one, but not more than three, characters.

63 CANNOT DISABLE MULTIDROP STATION
The disable requested cannot be performed. Processing will continue.

64 CANNOT ENABLE MULTIDROP STATION
The enable requested cannot be performed. Processing will continue.

65 TRANSPARENCY ALREADY ON
Request denied. Transparency is already on.

66 TRANSPARENCY ALREADY OFF
Request denied. Transparency is already off.

67 COMPRESSION ALREADY ON
Request denied. Compression is already on.

68 COMPRESSION ALREADY OFF
Request denied. Compression is already off.

System Generation Errors

80 REQUEST DENIED. NUMERIC ERROR
A non-numeric character has been detected in a numeric field.

81 REQUEST DENIED NUMERIC LIMIT ERROR
The numeric input was discovered to be outside of the predefined limits.

82 REQUEST DENIED. SWITCH NOT DEFINED
The command expects one or more switches to be defined.

83 REQUEST DENIED. SLASH MISSING
The command expects a slash before the switch.

84 REQUEST DENIED. EQUAL SIGN NOT PERMITTED
An equal sign is out of order or not permitted in the command.

85 REQUEST DENIED. TOO MANY SWITCHES
More than the allotted number of switches/arguments found in the command line.

86 REQUEST DENIED. RECORD SIZE TO LARGE
The non-standard record size request exceeds the block size.

87 REQUEST DENIED. TOO MANY RECORDS
The product of the number of records and the number of bytes per record must be less than the block size.

88 REQUEST DENIED. LRC NOT PERMITTED
Longitudinal Redundancy Checking is not allowed for EBCDIC line code.

89 REQUEST DENIED. VRC ONLY ALLOWED WITH LRC
Vertical Redundancy Checking is character parity and only permitted with LRC and not with either CRC16 or CCITT16.

90 REQUEST DENIED. INPUT FORMAT ERROR
An error has been detected in the input data string.

91 REQUEST DENIED. MORE THAN 39 POLL STATIONS
No more than 39 poll stations may be configured, and 26 of these must be unique.

92 INPUT SYSTEM GENERATION REQUESTS
RJE80 is ready to allow changes to the system spec parameter file. If no changes are necessary, enter the command START.

93 REQUEST DENIED. SLASH ILLEGAL IN INPUT
A slash is not permitted in this command.

94 ENTER "SPECFILE" OR "START" AS 1ST COMMAND
System generation parameter modifying commands are not accepted unless "SPECFILE" was entered as the 1st command.

95 I/O ERROR ON SPECFILE
An AOS system I/O error occurred while trying to read or write the spec file. Repeat the commands and if this error recurs, terminate the process.

96 FILENAME DOES NOT EXIST
The pathname/filename specified in the command line does not exist.

97 INCORRECT SYSGEN FILE REQUESTED
The file requested is not a system generation file.

98 INPUT EXCEEDS BUFFER SIZE
Request denied. Re-enter line command with a shorter format.

End of Appendix

Appendix C
ASCII/EBCDIC Conversion Tables (CONVT.SR) for RJE80

CONVT.SR This appendix is a copy of the code file that RJE80 uses when converting between ASCII and EBCDIC.

```
; COPYRIGHT (C) DATA GENERAL CORPORATION 1979, 1982
; ALL RIGHTS RESERVED.
; LICENSED MATERIAL-PROPERTY OF DATA GENERAL CORPORATION

        .TITL   CONVT
;;;;DOC_START

;*****************************************************************
;SYSTEM:        DGC COMMUNICATIONS SYSTEMS
;
;MODULE:        CONVT
;*****************************************************************
;
;FUNCTIONAL DESCRIPTION:
;
;       TWO TABLES FOR TRANSLATION MODULES.
;               ASCII   --->    EBCDIC
;               EBCDIC  --->    ASCII
;
;       IF THE ENTRY 'SYMBOL'/'MEANING' IS BLANK THE CODE
;       IS NOT DEFINED. IT TRANSLATES INTO A NUL.
;
;       'UC A' AND 'LC A' MEANS UPPERCASE A AND LOWER
;       CASE A RESP.
;
;       ENTRIES MARKED WITH '#' IN THE LAST COLUMN
;       ARE THOSE WHICH HAVE CHANGED IN RJE80 AFTER
;       REV 1.10 (AOS).
;
;CALLING CONVENTIONS:
;
;       THE PROCEDURE USING THIS MODULE USES THE
;       ENTRYPOINTS .ATE AND .ETA.
;
;ASSUMPTONS:
;
;
; NOTE:
;
;       THIS IS THE STANDARD TRANSLATION TABLE FOR
;       DGC COMMUNICATIONS PRODUCTS.
;       FURTHER CHANGES WILL BE PUBLISHED IN RELEASE AND
;       UPDATE NOTICES.
;
```

```
;
;DOCUMENTED:
;   BY:         XX
;   DATE:       05/04/79
;   CHANGED:    00/00/00
;
;*****************************************************************
;;;;DOC_END
        .ENT    .ATE..ETA
        .NREL
        .ENT    PETA,PATE

;
;  ASCII TO EBCDIC CONVERSION TABLE
;  ================================
        .RDX    8
;                               ASCII BYTE          EBCDIC BYTE
;                           OCT SYMBOL MEANING      OCT SYM
.ATE:   0*256.+1            ;0  NUL    NULL         0   NUL
;                           ;1  SOH                 1   SOH
        2*256.+3            ;2  STX                 2   STX
;                           ;3  ETX                 3   ETX
        67*256.+55          ;4  EOT                 67  EOT
;                           ;5  ENQ                 55  ENQ
        56*256.+57          ;6  ACK                 57  ACK
;                           ;7  BEL                 57  BEL
        26*256.+5           ;10 BS                  26  BS
;                           ;11 HT                  5   HT
        45*256.+13          ;12 LF                  45  LF
;                           ;13 VT                  13  VT
        14*256.+15          ;14 FF                  14  FF
;                           ;15 CR                  15  CR
        16*256.+17          ;16 SO                  16  SO
;                           ;17 SI                  17  SI
        20*256.+21          ;20 DLE                 20  DLE
;                           ;21 DC1                 21  DC1
        22*256.+23          ;22 DC2                 22  DC2
;                           ;23 DC3                 23  DC3
        74*256.+75          ;24 DC4                 74  DC4
;                           ;25 NAK                 75  NAK
        62*256.+46          ;26 SYN                 62  SYN
;                           ;27 ETB                 46  ETB
        30*256.+31          ;30 CAN                 30  CAN
;                           ;31 EM                  31  EM
        77*256.+47          ;32 SUB                 77  SUB
;                           ;33 ESC                 47  ESC
        34*256.+35          ;34 FS                  34  IFS
;                           ;35 GS                  35  IGS
        36*256.+37          ;36 RS                  36  IRS
;                           ;37 US                  37  IUS
        100*256.+132        ;40 SPACE               100 SPACE
;                           ;41 !   EXCLAMATION PT  132 !
        177*256.+173        ;42 "   QUOTATION       177 "
;                           ;43 #   POUND SIGN      173 #
        133*256.+154        ;44 $   DOLLAR SIGN     133 $
;                           ;45 %   PERCENT SIGN    154 %
```

```
        120*256.+175    ;46  &   AMPERSAND       120  &
;                       ;47  '   APOSTROPHE      75   '
        115*256.+135    ;50  (   LT PARENTHESIS  115  (
;                       ;51  )   RT PARENTHESIS  135  )
        134*256.+116    ;52  *   ASTERISK        134  *
;                       ;53  +   PLUS SIGN       116  +
        153*256.+140    ;54  ,   COMMA           153  ,
;                       ;55  -   MINUS           140  -
        113*256.+141    ;56  .   PERIOD          113  .
;                       ;57  /   SLASH           141  /
        360*256.+361    ;60  0   ZERO            360  0
;                       ;61  1   ONE             361  1
        362*256.+363    ;62  2   TWO             362  2
;                       ;63  3   THREE           363  3
        364*256.+365    ;64  4   FOUR            364  4
;                       ;65  5   FIVE            365  5
        366*256.+367    ;66  6   SIX             366  6
;                       ;67  7   SEVEN           367  7
        370*256.+371    ;70  8   EIGHT           370  8
;                       ;71  9   NINE            371  9
        172*256.+136    ;72  :   COLON           172  :
;                       ;73  ;   SEMICOLON       136  ;
        114*256.+176    ;74  <   LESS THAN       114  <
;                       ;75  =   EQUAL           176  =
        156*256.+157    ;76  >   GREATER THAN    156  >
;                       ;77  ?   QUESTION MARK   157  ?
        174*256.+301    ;100 @   AT SIGN         174  @
;                       ;101 A   UC  A           301  A
        302*256.+303    ;102 B   UC  B           302  B
;                       ;103 C   UC  C           303  C
        304*256.+305    ;104 D   UC  D           304  D
;                       ;105 E   UC  E           305  E
        306*256.+307    ;106 F   UC  F           306  F
;                       ;107 G   UC  G           307  G
        310*256.+311    ;110 H   UC  H           310  H
;                       ;111 I   UC  I           311  I
        321*256.+322    ;112 J   UC  J           321  J
;                       ;113 K   UC  K           322  K
        323*256.+324    ;114 L   UC  L           323  L
;                       ;115 M   UC  M           324  M
        325*256.+326    ;116 N   UC  N           325  N
;                       ;117 O   UC  O           326  O
        327*256.+330    ;120 P   UC  P           327  P
;                       ;121 Q   UC  Q           330  Q
        331*256.+342    ;122 R   UC  R           331  R
;                       ;123 S   UC  S           342  S
        343*256.+344    ;124 T   UC  T           343  T
;                       ;125 U   UC  U           344  U
        345*256.+346    ;126 V   UC  V           345  V
;                       ;127 W   UC  W           346  W
        347*256.+350    ;130 X   UC  X           347  X
;                       ;131 Y   UC  Y           350  Y
        351*256.+133    ;132 Z   UC  Z           351  Z
;                       ;133 [   LF BRACKET      133  [  #
        341*256.+135    ;134 \   BACK SLASH      341  \
;                       ;135 ]   RT BRACKET      135  ]  #
```

```
        137*256.+155    ;136     LOGICAL NOT    137
;                       ;137 _   UNDERSCORE     155 _
        171*256.+201    ;140 `   QUOTE          171 `  #
;                       ;141 a   LC  a          201 a
        202*256.+203    ;142 b   LC  b          202 b
;                       ;143 c   LC  c          203 c
        204*256.+205    ;144 d   LC  d          204 d
;                       ;145 e   LC  e          205 e
        206*256.+207    ;146 f   LC  f          206 f
;                       ;147 g   LC  g          207 g
        210*256.+211    ;150 h   LC  h          210 h
;                       ;151 i   LC  i          211 i
        221*256.+222    ;152 j   LC  j          221 j
;                       ;153 k   LC  k          222 k
        223*256.+224    ;154 l   LC  l          223 l
;                       ;155 m   LC  m          224 m
        225*256.+226    ;156 n   LC  n          225 n
;                       ;157 o   LC  o          226 o
        227*256.+230    ;160 p   LC  p          227 p
;                       ;161 q   LC  q          230 q
        231*256.+242    ;162 r   LC  r          231 r
;                       ;163 s   LC  s          242 s
        243*256.+244    ;164 t   LC  t          243 t
;                       ;165 u   LC  u          244 u
        245*256.+246    ;166 v   LC  v          245 v
;                       ;167 w   LC  w          246 w
        247*256.+250    ;170 x   LC  x          247 x
;                       ;171 y   LC  y          250 y
        251*256.+300    ;172 z   LC  z          251 z
;                       ;173 {   LT BRACE       213 {  #
        152*256.+320    ;174 |   VERTICAL BAR    152 |  #
;                       ;175 }   RT BRACE       320 }  #
        241*256.+7      ;176 ~   TILDE          241 ~  #
;                       ;177 DEL DELETE         7   DEL
;
;  EBCDIC TO ASCII CONVERSION TABLE
;  ================================
        .RDX    8

;                                EBCDIC BYTE          ASCII BYTE
;                           OCT SYMBOL MEANING       OCT SYM
.ETA:   0*256.+1        ;0   NUL   NULL             0   NUL
;                       ;1   SOH                    1   SOH
        2*256.+3        ;2   STX                    2   STX
;                       ;3   ETX                    3   ETX
        0*256.+11       ;4   PF                     0   NUL
;                       ;5   HT                     11  HT
        0*256.+177      ;6   LC                     0   NUL
;                       ;7   DEL                    177 DEL
        0*256.+0        ;10                         0   NUL
;                       ;11  RLF                    0   NUL
        0*256.+13       ;12  SMM                    0   NUL
;                       ;13  VT                     13  VT
        14*256.+15      ;14  FF                     14  FF
;                       ;15  CR                     15  CR
        16*256.+17      ;16  SO                     16  SO
```

```
;                       ;17  SI          17  SI
        20*256.+21      ;20  DLE         20  DLE
;                       ;21  DC1         21  DC1
        22*256.+23      ;22  DC2         22  DC2
;                       ;23  DC3         23  DC3
        0*256.+0        ;24  RES         0   NUL
;                       ;25  NL          0   NUL
        10*256.+0       ;26  BS          10  BS
;                       ;27  IL          0   NUL
        30*256.+31      ;30  CAN         30  CAN
;                       ;31  EM          31  EM
        0*256.+0        ;32  CC          0   NUL
;                       ;33              0   NUL
        34*256.+35      ;34  IFS         34  FS
;                       ;35  IGS         35  GS
        36*256.+37      ;36  IRS         36  RS
;                       ;37  IUS         37  US
        0*256.+0        ;40  DS          0   NUL
;                       ;41  SOS         0   NUL
        0*256.+0        ;42  FS          0   NUL
;                       ;43              0   NUL
        0*256.+12       ;44  BYP         0   NUL
;                       ;45  LF          12  LF
        27*256.+33      ;46  ETB         27  ETB
;                       ;47  ESC         33  ESC
        0*256.+0        ;50              0   NUL
;                       ;51              0   NUL
        0*256.+0        ;52  SM          0   NUL
;                       ;53              0   NUL
        0*256.+5        ;54              0   NUL
;                       ;55  ENQ         5   ENQ
        6*256.+7        ;56  ACK         6   ACK
;                       ;57  BEL         7   BEL
        0*256.+0        ;60              0   NUL
;                       ;61              0   NUL
        26*256.+0       ;62  SYN         26  SYN
;                       ;63              0   NUL
        0*256.+0        ;64  PN          0   NUL
;                       ;65  RS          0   NUL
        0*256.+4        ;66  UC          0   NUL
;                       ;67  EOT         4   EOT
        0*256.+0        ;70              0   NUL
;                       ;71              0   NUL
        0*256.+0        ;72              0   NUL
;                       ;73              0   NUL
        24*256.+25      ;74  DC4         24  DC4
;                       ;75  NAK         25  NAK
        0*256.+32       ;76              0   NUL
;                       ;77  SUB         32  SUB
        40*256.+0       ;100 SPACE       40  SPACE
;                       ;101             0   NUL
        0*256.+0        ;102             0   NUL
;                       ;103             0   NUL
        0*256.+0        ;104             0   NUL
;                       ;105             0   NUL
        0*256.+0        ;106             0   NUL
```

```
;                       ;107                    0   NUL
        0*256.+0        ;110                    0   NUL
;                       ;111                    0   NUL
        0*256.+56       ;112    CENT SIGN       0   NUL  #
;                       ;113 .  PERIOD          56  .
        74*256.+50      ;114 <  LESS THAN       74  <
;                       ;115 (  LT PARENTHESIS  50  (
        53*256.+41      ;116 +  PLUS SIGN       53  +
;                       ;117 |  LOGICAL OR      41  |  (!)
        46*256.+0       ;120 &  AMPERSAND       46  &
;                       ;121                    0   NUL
        0*256.+0        ;122                    0   NUL
;                       ;123                    0   NUL
        0*256.+0        ;124                    0   NUL
;                       ;125                    0   NUL
        0*256.+0        ;126                    0   NUL
;                       ;127                    0   NUL
        0*256.+0        ;130                    0   NUL
;                       ;131                    0   NUL
        41*256.+44      ;132 !  EXCLAMATION PT  41  !
;                       ;133 $  DOLLAR SIGN     44  $
        52*256.+51      ;134 *  ASTERISK        52  *
;                       ;135 )  RT PARENTHESIS  51  )
        73*256.+136     ;136 ;  SEMICOLON       73  ;
;                       ;137    LOGICAL NOT     136 ;
        55*256.+57      ;140 -  MINUS SIGN      55  -
;                       ;141 /  SLASH           57  /
        0*256.+0        ;142                    0   NUL
;                       ;143                    0   NUL
        0*256.+0        ;144                    0   NUL
;                       ;145                    0   NUL
        0*256.+0        ;146                    0   NUL
;                       ;147                    0   NUL
        0*256.+0        ;150                    0   NUL
;                       ;151                    0   NUL
        174*256.+54     ;152 |  VERTICAL BAR    174 |
;                       ;153 ,  COMMA           54  COMMA
        45*256.+137     ;154 %  PERCENT SIGN    45  %
;                       ;155 _  UNDERSCORE      137 _
        76*256.+77      ;156 >  GREATER THAN    76  >
;                       ;157 ?  QUESTION MARK   77  ?
        0*256.+0        ;160                    0   NUL
;                       ;161                    0   NUL
        0*256.+0        ;162                    0   NUL
;                       ;163                    0   NUL
        0*256.+0        ;164                    0   NUL
;                       ;165                    0   NUL
        0*256.+0        ;166                    0   NUL
;                       ;167                    0   NUL
        0*256+140       ;170                    0   NUL
;                       ;171 `  QUOTE           140 `
        72*256.+43      ;172 :  COLON           72  :
;                       ;173 #  POUND SIGN      43  #
        100*256.+47     ;174 @  AT SIGN         100 @
;                       ;175 '  APOSTROPHE      47  '
        75*256.+42      ;176 =  EQUAL SIGN      75  =
```

```
;                       ;177 "   DOUBLE QUOTE    42  "
        0*256.+141      ;200                     0   NUL
;                       ;201 a   LC  a           141 a
        142*256.+143    ;202 b   LC  b           142 b
;                       ;203 c   LC  c           143 c
        144*256.+145    ;204 d   LC  d           144 d
;                       ;205 e   LC  e           145 e
        146*256.+147    ;206 f   LC  f           146 f
;                       ;207 g   LC  g           147 g
        150*256.+151    ;210 h   LC  h           150 h
;                       ;211 i   LC  i           151 i
        0*256.+0        ;212                     0   NUL
;                       ;213 {   LT BRACE        173 {
        0*256.+0        ;214                     0   NUL
;                       ;215                     0   NUL
        0*256.+0        ;216                     0   NUL
;                       ;217                     0   NUL
        0*256.+152      ;220                     0   NUL
;                       ;221 j   LC  j           152 j
        153*256.+154    ;222 k   LC  k           153 k
;                       ;223 l   LC  l           154 l
        155*256.+156    ;224 m   LC  m           155 m
;                       ;225 n   LC  n           156 n
        157*256.+160    ;226 o   LC  o           157 o
;                       ;227 p   LC  p           160 p
        161*256.+162    ;230 q   LC  q           161 q
;                       ;231 r   LC  r           162 r
        0*256.+0        ;232                     0   NUL
;                       ;233                     )   NUL
        0*256.+0        ;234                     0   NUL
;                       ;235                     0   NUL
        0*256.+0        ;236                     0   NUL
;                       ;237                     0   NUL
        0*256.+176      ;240                     0   NUL
;                       ;241 □   TILDE           176 □
        163*256.+164    ;242 s   LC  s           163 s
;                       ;243 t   LC  t           164 t
        165*256.+166    ;244 u   LC  u           165 u
;                       ;245 v   LC  v           166 v
        167*256.+170    ;246 w   LC  w           167 w
;                       ;247 x   LC  x           170 x
        171*256.+172    ;250 y   LC  y           171 y
;                       ;251 z   LC  z           172 z
        0*256.+0        ;252                     0   NUL
;                       ;253                     0   NUL
        0*256.+0        ;254                     0   NUL
;                       ;255                     0   NUL
        0*256.+0        ;256                     0   NUL
;                       ;257                     0   NUL
        0*256.+0        ;260                     0   NUL  #
;                       ;261                     0   NUL
        0*256.+0        ;262                     0   NUL
;                       ;263                     0   NUL
        0*256.+0        ;264                     0   NUL
;                       ;265                     0   NUL
        0*256.+0        ;266                     0   NUL
```

```
;                       ;267                    0   NUL
        0*256.+0        ;270                    0   NUL
;                       ;271                    0   NUL
        0*256.+0        ;272                    0   NUL
;                       ;273                    0   NUL
        0*256.+0        ;274                    0   NUL
;                       ;275                    0   NUL
        0*256.+0        ;276                    0   NUL
;                       ;277                    0   NUL
        173*256.+101    ;300 {  LT BRACE        173 {
;                       ;301 A  UC  A           101 A
        102*256.+103    ;302 B  UC  B           102 B
;                       ;303 C  UC  C           103 C
        104*256.+105    ;304 D  UC  D           104 D
;                       ;305 E  UC  E           105 E
        106*256.+107    ;306 F  UC  F           106 F
;                       ;307 G  UC  G           107 G
        110*256.+111    ;310 H  UC  H           110 H
;                       ;311 I  UC  I           111 I
        0*256.+0        ;312                    0   NUL
;                       ;313                    0   NUL
        0*256.+0        ;314                    0   NUL
;                       ;315                    0   NUL
        0*256.+0        ;316                    0   NUL
;                       ;317                    0   NUL   #
        175*256.+112    ;320 }  RT BRACE        175 }
;                       ;321 J  UC  J           112 J
        113*256.+114    ;322 K  UC  K           113 K
;                       ;323 L  UC  L           114 L
        115*256.+116    ;324 M  UC  M           115 M
;                       ;325 N  UC  N           116 N
        117*256.+120    ;326 O  UC  O           117 O
;                       ;327 P  UC  P           120 P
        121*256.+122    ;330 Q  UC  Q           121 Q
;                       ;331 R  UC  R           122 R
        0*256.+0        ;332                    0   NUL
;                       ;333                    0   NUL
        0*256.+0        ;334                    0   NUL
;                       ;335                    0   NUL
        0*256.+0        ;336                    0   NUL
;                       ;337                    0   NUL
        134*256.+0      ;340 \  BACK SLASH      134 \
;                       ;341                    0   NUL   #
        123*256.+124    ;342 S  UC  S           123 S
;                       ;343 T  UC  T           124 T
        125*256.+126    ;344 U  UC  U           125 U
;                       ;345 V  UC  V           126 V
        127*256.+130    ;346 W  UC  W           127 W
;                       ;347 X  UC  X           130 X
        131*256.+132    ;350 Y  UC  Y           131 Y
;                       ;351 Z  UC  Z           132 Z
        0*256.+0        ;352                    0   NUL
;                       ;353                    0   NUL
        0*256.+0        ;354                    0   NUL
;                       ;355                    0   NUL
        0*256.+0        ;356                    0   NUL
```

```
;                       ;357                    0   NUL
        60*256.+61      ;360 0  ZERO            60  0
;                       ;361 1  ONE             61  1
        62*256.+63      ;362 2  TWO             62  2
;                       ;363 3  THREE           63  3
        64*256.+65      ;364 4  FOUR            64  4
;                       ;365 5  FIVE            65  5
        66*256.+67      ;366 6  SIX             66  6
;                       ;367 7  SEVEN           67  7
        70*256.+71      ;370 8  EIGHT           70  8
;                       ;371 9  NINE            71  9
        0*256.+0        ;372                    0   NUL
;                       ;373                    0   NUL
        0*256.+0        ;374                    0   NUL
;                       ;375                    0   NUL
        0*256.+0        ;376                    0   NUL
;                       ;377                    0   NUL
;
        PETA    = .ETA*2                ;BYTEPOINTER TO EBCDIC TO
                                                    ASCII
        PATE    = .ATE*2                ;BYTEPOINTER TO ASCII TO
                                                    EBCDIC
```

End of Appendix

Index

DataGeneral

users group

Installation Membership Form

Name _____ Position _____ Date _____

Company, Organization or School _____

Address _____ City _____ State _____ Zip _____

Telephone: Area Code _____ No. _____ Ext. _____

1. Account Category

- ☐ OEM
- ☐ End User
- ☐ System House
- ☐ Government
- ☐ Educational

2. Hardware

	Qty. Installed	Qty. On Order
MV/600		
COMMERCIAL ECLIPSE		
SCIENTIFIC ECLIPSE		
AP/130		
CS Series		
Mapped NOVA		
Unmapped NOVA		
microNOVA		
Other (Specify)		

3. Software

- ☐ AOS
- ☐ DOS
- ☐ MP/OS
- ☐ RDOS
- ☐ Other

Specify _____

4. Languages

- ☐ Algol
- ☐ DG/L
- ☐ Cobol
- ☐ PASCAL
- ☐ Business BASIC
- ☐ BASIC
- ☐ Assembler
- ☐ Fortran
- ☐ RPG II
- ☐ PL/1
- ☐ Other

Specify _____

5. Mode of Operation

- ☐ Batch (Central)
- ☐ Batch (Via RJE)
- ☐ On-Line Interactive

6. Communications

- ☐ HASP
- ☐ RJE80
- ☐ RCX 70
- ☐ CAM
- ☐ XODIAC
- ☐ Other

Specify _____

7. Application Description

○ _____

8. Purchase

From whom was your machine(s) purchased?

- ☐ **Data General Corp.**
- ☐ Other

Specify _____

9. Users Group

Are you interested in joining a special interest or regional Data General Users Group?

○ _____

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DataGeneral

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Who are you?

- ☐ **EDP Manager**
- ☐ **Senior Systems Analyst**
- ☐ **Other** _____
- ☐ **Analyst/Programmer**
- ☐ **Operator**

What programming language(s) do you use? _____

How do you use this manual? *(List in order: 1 = Primary Use)*

- ____ **Introduction to the product**
- ____ **Reference**
- ____ **Other** _____
- ____ **Tutorial Text**
- ____ **Operating Guide**

About the manual:	**Yes**	**Somewhat**	**No**
Is it easy to read?	☐	☐	☐
Is it easy to understand?	☐	☐	☐
Are the topics logically organized?	☐	☐	☐
Is the technical information accurate?	☐	☐	☐
Can you easily find what you want?	☐	☐	☐
Does it tell you everything you need to know?	☐	☐	☐
Do the illustrations help you?	☐	☐	☐

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