



PRODUCT SPECIFICATION

REV LTR	REVISION ISSUE DATE	APPROVED BY	REVISIONS
A	3/22/78	<i>J. Dale</i>	Original Issue - Software Release Level Mark 7.0.
B	11/6/78	<i>J. Dale</i>	8.0 Release 5-2 If SPO is set to a value "n", the first 72 characters of "n" lines of every message from the host will be displayed on the SPO. 6-2 Added Program Switch #1, SPO display. 6-3 Added Program Switch #7, HOT READER. 6-4 Handler Notes: added reference to line turnaround. 8-1 Handler Section example for Terminal Section changed. 9-1&9-2 Added Section on HOT READERS. A-3 Message WAITING FOR MCS QUEUE NOT FULL new. A-12 Message NOT ALLOWED IN HOT READER MODE added. A-14 Message STREAM DECK MISSING and THE INPUT FILE IS A HOT READER AND new. A-17 Message <?END> CARD MISSING - EOF ASSUMED new.
C	2/6/81	<i>J. Dale</i>	Changes for MARK 10.0 Release 2-1 Changed "(0-17)" to "(0-18)" in "RJE3780/HANDLER AS FSA" paragraph. 2-3 Updated second paragraph in "Message Transmission" sect. 2-4 Updated "If the input begins..." paragraph. 2-5 Updated "For any exception..." paragraph. Updated "If the 'transparent' bit..." paragraph. 2-6 Added "LOSS OF DATA SET READY" section. 2-7 Updated "TEMPORARY TEXT DELAY - (TTD)" section. 3-6 Deleted "loss of data set ready" from "Line Problem" sect. Added "Re-Establishing Connection" paragraph. 4-5 Updated "RESET" - TERMINAL RESET section. 6-2 Changed "0" to "1" in "Program Switch #2". 6-3 Added "Program Switch #8". 9-1 Added "If RJE3780 is executed..." paragraph. A-2 Added "LINE BID ACCEPTED" handler message. A-5 Added "AUTO SIGN-ON IN PROGRESS" message. A-11 Added "<INTEGER> MESSAGES REMOVED FROM LSN <INTEGER> message." A-12 Added "LINE DISCONNECTED. IF NOT ACU,..." message. A-14 Added "PRIMARY FILE = 'STREAM DECK'," "PRIMARY FILE FLUSHED: <FILE NAME>," "PRIMARY FILE IS <FILE NAME>" and "PRIMARY FILE '<FILE NAME>' OPENED" messages. A-16 Added "SECONDARY FILE FLUSHED: <FILE NAME>," "SECONDARY FILE IS <FILE NAME>," "SECONDARY FILE '<FILE NAME>'," "STREAM DECK MISSING PLEASE LOAD..." and "STREAM DECK STILL MISSING. GOODBYE!" messages.

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INTRODUCTION

This product specification describes the RJE3780 software package as implemented on the Burroughs B1000. RJE3780 allows a B1000 system to act as a remote site (terminal) to a central host IBM computer communicating over telephone lines using a binary-synchronous line discipline. Two systems with which it has actually been qualified are DDS/POWER and OS/JES2.

RJE3780 allows the remote user to transmit queries, programs, and data files to the central host for processing and, upon completion, to receive the final print or punch output at the remote site. Any computing service available to a remote IBM 3780 user is now available to a Burroughs B1000 user through the use of RJE3780.

RJE3780 PACKAGE

The RJE3780 package consists of two related programs: RJE3780 and RJE3780/HANDLER. RJE3780/HANDLER is a datacomm handler written in NDL. It handles all of the details of communicating via the binary-synchronous line discipline. RJE3780 is an MCS written in SDL which handles all user interface. It is responsible for accepting and executing all user commands. These include packing data for transmission, unpacking and printing (or punching) data received, and any reconfiguration requested by the user (i.e., transparent/non-transparent, compress/non-compress, etc.).

To use the RJE3780 package, both RJE3780 and the NDL handler (i.e., RJE3780/HANDLER) must be executing. Communication between the two programs is achieved through the remote file "RJE3780Q". Users wishing to run other datacomm programs at the same time (e.g., CANDE), may write their own handlers tailored to their specific needs using the REQUEST and CONTROL sections of the RJE3780/HANDLER and any other REQUEST(s) and CONTROL(s) which they may need.

The remainder of this document is divided into several sections. The first section covers RJE3780/HANDLER. It contains both general information on the structure of the handler, and details of handling the line discipline and the HANDLER-MCS interface. The second section covers RJE3780. It contains both a general overview of RJE3780, and specifics concerning the user interface and the internal workings of the program. The third section covers the commands available to the user and their various effects when utilized. The fourth section is intended to aid the user in setting up and running RJE3780. It contains useful

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information which does not conveniently fit into the other sections of this document. The remaining sections cover Operating Instructions, a Sample Handler Section and an Appendix giving both Handler and RJE3780 Error Messages.

RELATED DOCUMENTATION

NAME ----	NUMBER -----
B1000 NDL Information Manual	1073715
B1000 System Software Operational Guide	1068731
B1000 DC/Audit	P.S. 2212 5421
B1000 Message Control System Interface	P.S. 2212 5447
B1000 Supervisory MCS	P.S. 2219 0482
B1000 NDL/Library	P.S. 2212 5215

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RJE3780/HANDLER

RJE3780/HANDLER is a datacomm handler, written in NDL, which manages the details of the binary-synchronous line discipline. Except for an occasional message on the SPD, RJE3780/HANDLER is invisible to the user. There is no user interface, and all of its interactions are either with RJE3780 (the MCS) or the datacomm lines.

RJE3780/HANDLER AS FSA

RJE3780/HANDLER is actually a finite state automata (FSA) where the states are defined by the finite (0-18) values of 'LINE(TALLY[0])'. In all cases it is this value of 'LINE(TALLY[0])' which determines the portion of the code to be executed. The REQUEST section of the handler is an infinite loop with a CASE statement as its only element. The index into this CASE statement is 'LINE(TALLY[0])' (the state). The handler can loop through this CASE statement and, depending on the inputs (e.g., line bid, improper response, message queued, etc.), may change its state from one cycle to the next. The state can also be changed by going through the CONTROL (e.g., time-up, message queued, etc.) and having the value of 'LINE(TALLY[0])' changed there.

COMMUNICATION WITH RJE3780

As was mentioned earlier, the only external interactions of RJE3780/HANDLER are either with the datacomm line (FINISH TRANSMIT, INITIATE RECEIVE) or with RJE3780. Communication with RJE3780 is accomplished through a remote file with headers. Messages which are sent or received over the line by the handler are passed through this file. In addition to these messages, some information is passed back and forth in the header. TOG[1] through TOG[4] are used to pass data related information (transparent/non-transparent, ETB/ETX, etc.). TALLY[0] is the real work horse, carrying line related information (line bid rejected/accepted, line disconnected, RVI received, etc.). Message length, message type, station number, etc., are also passed in the header. The various values and purposes for the TALLY's and TOG's of the line and of the station are listed in the source for RJE3780/HANDLER and will not be reiterated here.

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TWO STATIONS DEFINED ON ONE LINE

One point which deserves note is the existence of the two stations defined on the one line. The definitions of the two stations are the same. All normal message transmission and reception is handled by station number one (#1). Station number two (#2) is reserved for sending an EOT out of sequence (e.g., during reception) or a DLE EOT (line disconnect). This will happen as soon as the CONTROL is entered and the appropriate queued message is recognized. This allows the line to be "turned around" or disconnected while input is in progress from the host. The mechanics of this will be discussed later.

EXECUTION PATHS AND STATES

To aid the user in understanding the workings of the code, (or the programmer who must enhance or modify it), the basic execution paths through the handler will be covered in detail. These include line bid and message transmission, message reception, line disconnects, reverse interrupts (RVI), and temporary text delays (TTD). While studying this section of the product spec, the reader might find it helpful to have a source listing of the handler present for perusal. A working knowledge of NDLE as implemented on the B1000 will also be necessary if the reader wishes to take full advantage of this section. All actions are assumed to be handled by station number one (#1) unless specifically stated otherwise. For the sake of these discussions, "State n" will be synonymous with "'LINE(TALLYE0)'" with value n" and a "message" will be composed of one or more blocks of data. The idle state of the handler is State 17. In this state the handler is waiting for a line bid from the host. This consists of a READ with no time-out and is completed either by a line bid from the host or a CANCEL in the CONTROL (i.e., if a message is queued to be sent).

LINE BID AND MESSAGE TRANSMISSION

Line Bid

The line bid and message transmission sequence is performed every time the first block of a new message is queued to the handler for transmission. Assuming a READ is in progress on the line (waiting for a line bid from the host), the READ is cancelled in the CONTROL and State 0 is then entered. If there is no READ on the line, State 0 is entered directly. State 0 initializes the retry count to the retry limit and continues to State 1. In State 1, an ENQ is sent out on the line with a timer limit of one

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second. If an ACK0 is received, a "line bid accepted" message is queued for RJE3780 and State 2 is entered where the first block of data will be prepared for transmission. If a NAK is received, a "line bid rejected" message is queued for RJE3780 and State 8 is entered where control of the line is relinquished by sending an EOT. If an EOT is received, State 13 is entered where the handler clears its output queue and queues an informative message to RJE3780 before entering its original idle state (State 17). If a DLE EOT is received, State 14 is entered where the output queue is cleared and an appropriate message is sent to RJE3780 before disconnecting the line. In the case of "dial-out" exceptions (line busy, timeout, etc.), the idle state is entered after an appropriate "line bid rejected" message to RJE3780 and a clearing of the output queue. All other replies from the host (ENQ, ACK1, timeout, parity, etc.) are treated by re-entering State 1, decreasing the retry count, and repeating the ENQ transmission if the retry count has not been exhausted. If State 1 is ever entered with a retry count of 0, a "line bid rejected" message is queued for RJE3780, the output queue is cleared, and the idle state is entered after transmitting an EOT.

Message Transmission

The most common case is where the line bid is accepted with an ACK0. This is the input necessary to enable State 2. In this state, a queued block of data is prepared for transmission. If no block is queued, either State 8 is entered to release control of the line (if an ETX was sent last or an RVI was received from the host), or State 6 is entered where a two-second wait is initiated by entering the CONTROL. Assuming a block of data is present for transmission, it is preceded with STX (DLE STX if transparent) and followed with ETX or ETB depending on whether or not it is the last block of a message (DLE ETX or DLE ETB if transparent). After that, State 3 is entered where the actual transmission is initiated. In this state, the block of data is actually transmitted and a reply is awaited.

If the appropriate 'ACK' is received, the block of the message which was sent is thrown away and State 2 is re-entered to begin the transmission of another block. If the wrong 'ACK' is received, a WACK is received, or the handler times out, the message is written back to the station queue and State 4 is entered where an ENQ is prepared before returning to State 3 again where it is actually transmitted.

If an RVI is received, a message is queued for RJE3780 appraising it of the fact and processing continues as though the appropriate 'ACK' had been received. If a NAK is received, State 5 is entered and the message block is rebuilt before returning to

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State 3 for retransmission. An STX (or DLE STX) received after having just sent the last block of a message turns the line around. It is treated both as the correct 'ACK' reply to the last block sent and as though a line bid from the host had already been approved and this was the first block of the message. Information is gleaned from the block of data (transparent/non-transparent, text, ETB/ETX) and it is queued for RJE3780 along with the information that the line has been turned-around and whether the text block is going to be ACKed or NAKed. (TOG[4] is set if the text is to be ignored). State 11 is then entered where the process of receiving messages from the host is handled.

MESSAGE RECEPTION

Message reception is normally initiated from the idle state. When input is read by the handler in its idle state, State 10 is entered where the input is examined for meaningful content. If the input is an ENQ, then, after a bit of housekeeping, State 11 is entered where the actual message reception is handled. If the input is a DLE EOT, then State 14 is entered where a "disconnect" message is queued for RJE3780 and the handler awaits another line connection. If the input is neither an ENQ nor a DLE EOT, then a message is written on the SPQ and the idle state is re-entered to wait further action.

If a proper line bid is received (and State 11 is entered), the appropriate 'ACK' is returned (having been set in the housekeeping of State 10), and the handler waits for further input from the host. If the input begins with an STX (or DLE STX) and ends with an ETB or ETX (DLE ETB or DLE ETX), the enclosed text is queued for the MCS with the necessary information (transparent/non-transparent, ETB, ETX) and State 11 is re-entered to send the appropriate 'ACK' and wait for further input.

If the input begins with STX (or DLE STX) but ends with ENQ, State 11 is re-entered to send a NAK to the host and await further input. If a DLE EOT is received, State 14 is entered where a message is queued to RJE3780 informing it of the "disconnect" before waiting for another line connection. If an EOT is received, State 13 is entered where an "end reception" message is queued to RJE3780 and the idle state is entered to await further developments. For any line error other than loss of data set ready and timeout (parity, end of buffer, etc.), State 11 is re-entered to send a NAK and await a response. For inputs other than loss of data set ready (timeout, undecipherable input, etc.), State 12 is entered where the handler waits for another response from the host. In this state, if an ENQ is

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received, State 11 is re-entered to send the 'ACK' it sent last and to wait for more input. If an EOT or DLE EOT is received in State 12, either State 13 or State 14 is entered, respectively. (See action above).

For any exception other than timeout and loss of data set ready (parity, etc.), State 11 is re-entered to send a NAK and wait for further input.

Message reception is ended at any time upon receiving an EOT. State 13 is entered, an "end" message queued for RJE3780, and the idle state is then entered where it waits further action.

LINE DISCONNECT - RECEPTION

Line disconnects operate in both directions. If, at any time, a DLE EOT is received from the host, State 14 is entered, a "disconnect" message queued for RJE3780, and the handler waits for another connection after clearing the output queue.

LINE DISCONNECT - TRANSMISSION

If the user wishes to send a line disconnect (DLE EOT) or a cease function (EOT), a message must be queued to the handler for station #2. State 15 will be entered and the appropriate action taken. If input is in progress the message queued to station #2 will be detected immediately upon the next entry into State 11 and the handler will enter the CONTROL from where it will go to State 15. If the "transparent" bit (TOG[2]) is set,

1. DLE EOT will be sent,
2. State 14 will be entered,
3. A "disconnect" message will be queued for RJE3780,
4. The output queue will be cleared,
5. The handler will wait for another line connection.

If the "transparent" bit is not set, EOT will be transmitted.

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LOSS OF DATA SET READY

If loss of data set ready occurs and the user is utilizing the autosign-on option, the handler queues the "Re-establish Connection" message to RJE3780, clears the output queue, and waits for another connection. If the auto sign-on is not used, the handler queues the "LINE DISCONNECT" message to RJE3780, clears the output queue, and waits for another connection.

REVERSE INTERRUPT - (RVI)

At the present time, RJE3780/HANDLER is only able to receive a reverse interrupt (RVI). It cannot send one. Upon receipt of an RVI during message transmission, an "interrupt" message is queued for RJE3780 and processing continues as though the proper 'ACK' had been received, though note is taken that an RVI has been received (LINE(TOG[3]) is set to 1). Upon receiving the "interrupt" message from the handler, RJE3780 will stop queuing message blocks to RJE3780/HANDLER. When the handler finally runs out of message blocks to send, it will note an RVI had been received and release control of the line by sending an EDT (in State 8). It will then wait for a line bid from the host in the same manner as in the idle state. Upon receiving a line bid, it will clear the RVI indicator (LINE(TOG[3])) and continue the message processing normally. It is the responsibility of RJE3780 to restart transmission of the interrupted message by queuing blocks to the handler after receiving the message from the host.

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TEMPORARY TEXT DELAY - (TTD)

A temporary text delay (TTD) is transmitted when the handler is in a message transmission mode, has not yet sent a block ended with ETX, and does not yet have the next block of the message to send after a two-second wait. This condition is initially detected in State 2 and causes the handler to enter State 6. From here it enters the CONTROL where it waits for two seconds or until a message block is queued, whichever comes first. If a message block is queued, the handler returns to State 2 where it prepares the block for transmission and continues processing in the normal message transmission mode. If, on the other hand, no message block is queued after two seconds, the handler enters State 7. If a message is queued, State 2 is entered for normal message transmission. Otherwise a TTD is sent to the host. If a NAK is received (this is the proper response), the handler returns to State 6 where it re-enters the CONTROL for another two second wait. If an EOT or a DLE EOT is received, State 13 or State 14 is entered for function cessation (EOT) or line disconnect (DLE EOT). Loss of carrier or break results in a message being queued to RJE3780. All other responses result in a message on the SPD and the handler returns to State 2 to make another attempt at finding a message block to send.

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RJE3780

RJE3780 provides the user interface in the system. It is an MCS written in SDL which accepts commands from the user via the SPQ and input from cards, tape, or disk, and returns output by way of the SPQ, printer or card punch. It is responsible for all user communication and provides the interface (or bridge) with the handler. All input is prepared for transmission (space compression, packing, etc.) and the resultant message blocks passed to the handler for actual transmission. Similarly, it accepts message blocks from the handler and outputs them on the appropriate device(s) after any necessary processing (unpacking, space expansion, etc.).

MAIN LOOP - WAIT STATEMENT

RJE3780 is an infinite loop within which individual actions are driven (or initiated) by events in a complex WAIT statement which forms the core of the loop. By enabling or disabling various events in the WAIT, many possible execution paths are enabled or disabled. These events in the WAIT statement will be discussed in the following sections, as well as some of the major execution paths through RJE3780 (send, receive, reset, etc.). As presently configured, the WAIT statement has seven possible event triggers.

Timer Event

The first of these events, and the last in line to be checked, is the timer. This is never disabled and is triggered every thirty (30) seconds if there is no other activity in the WAIT. It is reset every time some other event in the WAIT is activated. Depending upon the state of the system, disconnect procedures may be initiated upon the expiration of the timer.

SPQ Event

The presence of input from the user (SPQ) is the first element of the event list to be checked for possible truth. As with the timer, this event is always enabled.

It is the first path chosen for processing on any swing through the main program loop and all user commands are initiated in this way. These user inputs are either commands (which will be discussed in a later section) or data for transmission to the host. This allows the user to transmit a one (1) record message (if the line is not otherwise occupied).

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Q (Remote File) Read Event

The next check made in the event list is for the presence of input from the remote file (QFILE). Should this be the case, the input will be read and the appropriate action taken depending upon information contained in the header (i.e., TALLY(0)). This event is usually enabled except for those periods when a message block is being unpacked and printed (or punched). The execution paths possible for this event will be discussed later.

Q (Remote File) Write Event

The next element in the event list is for writing to the remote file (QFILE). This event is usually disabled except for those times when a message block is ready for transmission. If this is the case, the event is enabled, and, when the event path is executed, the block is written and the event disabled again.

(Punch/Print)-Unpack Event

The next two separate events in the list are for output from the host. If there is material to be punched (or printed), the appropriate event is enabled, and, when that path is taken, the data is punched (printed) and unpacking continued. These events are only enabled when there is something to punch (print) and unpack, and are disabled otherwise. Again, the details of this path are covered later in this document.

Read-Pack Event

This is the last event in the list (although it is checked just prior to the timer). It is enabled when the system is prepared to read and pack a record of a message. It is disabled at all other times. When this path is taken, a record is read from the appropriate device (determined earlier via a user command), the record is compressed according to whatever option the user has specified earlier, and the compressed record is added to the output buffer. If there is no room for the record in the buffer, this event is disabled, the remote file write is enabled, and, when the buffer has finally been written to the remote file (QFILE), this event is then enabled for further processing.

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Remote File Read

There are currently eleven (11) possible inputs that can be read from the remote file (QFILE) which prompt action from RJE3780. These will be listed and discussed including the effects they have on RJE3780.

All buffers read from the remote file are expected to have a header. After reading the buffer, the 'TYPE' field of the header is checked to determine whether or not the buffer is a data buffer. If not, the buffer is discarded and the main looping of RJE3780 continues. If the buffer is a data message, then the 'TALLY(0)' in the header is checked to determine which of the eleven possible courses of action to take.

Line Bid Rejected

[TALLY(0) = 0]

If a line bid is attempted (by queuing an initial message block to the handler) and is rejected for any reason, a "line bid rejected" message will be returned to RJE3780. This is a null message (no data, just a header) with TALLY(0) = 0. The effect will be to inform the user that the line bid was rejected and it gives the user the option of either attempting another line bid sequence or returning the system to a normal state for further processing.

Line Bid Accepted

[TALLY(0) = 1]

If a line bid is attempted (by queuing an initial message block to the handler) and is accepted, a "line bid accepted" message is returned to RJE3780. This is a null message (no data, just a header) with TALLY(0) = 1. This enables READ-PACK event in the complex WAIT statement allowing RJE3780 to continue reading, packing, and transmitting the data file. If the first block of the message is also the last block, the system will be reset to a normal state.

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Reverse Interrupt = (RVI)

[TALLY(0) = 2]

If the handler receives a reverse interrupt (RVI) from the host, it sends a null message (no data, just a header) to RJE3780. Upon reading this message, RJE3780 sets a flag that inhibits any further transmission of message blocks (although reading and packing may continue until the output buffer is full). This same flag is also used to automatically restart the transmission of further message blocks after receiving an 'EOT' from the host, providing the appropriate option is set.

Cease Function = Transmit/Receive

[TALLY(0) = 3]

The "cease function" message from the handler is used to inform RJE3780 that the handler has received an 'EOT' from the host either during transmission or reception. This is a null message (no data, just a header) with TALLY(0) = 3. If the 'EOT' is received during a line bid sequence, the user has the option of rebidding or not. If received during message transmission, the transmission is terminated and the system returns to a quiescent state.

If the 'EOT' is received from the host during reception, it indicates the end of the message. In this case, any transmission previously interrupted by an 'RVI' can be restarted automatically or not, depending upon the options which have been selected.

Line Turnaround

[TALLY(0) = 4]

The "line turnaround" message indicates to RJE3780 that the host has taken control of the line. This is accomplished by responding to the last block of a message (ending with 'ETX') with a message block (beginning with 'STX') rather than the appropriate 'ACK'. This avoids giving up control of the line ('EOT') and letting the host bid for control.

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This message may or may not contain viable data. If TOG(4) in the header is set, the data contained in the buffer is in error and will not be processed. Otherwise, further reading from the remote file is suspended (by disabling the event in the complex WAIT statement) and unpacking and punching/printing of the data is begun. Reading from the remote file will again be enabled after all data in the current buffer is processed.

Line Disconnect

[TALLY(0) = 5]

The "line disconnect" message is a null message (no data, just a header) which indicates to RJE3780 that the line has become disconnected. This is usually a result of receiving a 'DLE EOT' from the host, or having sent one to the host. In either case, the user is informed of the fact and the system returns to a state waiting for the line to be connected again. If a line bid is in progress, the system will be prepared to retry the line bid, should the user so desire.

Read Mode

[TALLY(0) = 6]

The "read mode" message is a non-null message from the host containing output data to be processed by RJE3780. The effect of this message is to temporarily disable further reading from the remote file (via the complex WAIT) and initiate unpacking and punching/printing of the buffer. When processing of the buffer is completed (all records punched or printed), the remote file read is again enabled for further message processing.

'EOT' Sent

[TALLY(0) = 7]

This message is an indication to RJE3780 that the handler has sent an 'EOT' to the host. It is a null message (no data, just a header) with TALLY(0) = 7. At the present time, this is purely cosmetic. While the handler will send this message to RJE3780 upon completing a message transmission, it currently has no effect upon the state of the system.

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Line Problem

[TALLY(0) = 8]

The "line problem" message is a general purpose message which is used to inform the user that there is some problem on the line. It is a null message (no data, just a header) with TALLY(0) = 8. It contains no information about the nature of the problem encountered, but serves merely to inform the user that a problem has been detected. Some problems which might be encountered are break and loss of carrier.

Line Connected

[TALLY(0) = 9]

The "line connected" message is a null message (no data, just a header) with TALLY(0) = 9. It serves to inform RJE3780 that a connection has been established, either at system initialization or when the line is re-connected following a prior disconnection for any reason.

Host Bid

[TALLY(0) = 10]

The "host bid" message is a null message (no data, just a header) with TALLY(0) = 10. It serves to inform RJE3780 that the host has bid for and received control of the line and will be sending a message presently. It locks out any attempt to start a message transmission by RJE3780 and initializes the system to a "receive ready" state.

Re-Establishing Connection

[TALLY(0) = 11]

The "Re-establish Connection" message is a null message (no data, just a header). This message is sent if the user has set the auto sign-on option. This message invokes the "Re-establish Connection" procedure.

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TRANSMIT/RECEIVE

Two of the major execution paths possible in RJE3780 are sending a message to the host and receiving a message from the host. Since these are the basic tasks for which RJE3780 was devised, they will be covered in some detail. The transmission sequence will be covered first from inception to completion. After this, the reception sequence will be discussed. For the purposes of these discussions, it will be assumed that the message (file) to be transmitted is contained on some external storage medium (e.g., cards, tape, or disk). The sequence followed when transmitting a message from the SPD is essentially the same and should be easy enough to follow in the code, given the following discussion.

Initiate Transmit

The transmission sequence is initiated by a '.SD', '.SR', or '.ST' command to RJE3780, depending upon whether the file to be sent is on disk, cards, or tape. (See the appropriate listing under COMMANDS for a complete description of the exact form of the command). Assuming the system is not otherwise occupied, the transmission sequence is started. The first step is to determine the name of the file to be sent and to OPEN the file INPUT. If the file is not present on the specified device, the command is ignored and no transmission is attempted. If the file does exist on the designated device, various system flags are initialized and the READ-PACK event in the complex WAIT is enabled.

Read = Pack

A record is read from the input file. It is passed to COMPRESS where it is compressed according to preset system parameters (blank compression or not, transparent vs. non-transparent, etc.) and the result returned in the same buffer (CARD_BUFF) in which it was passed.

The number of meaningful characters in the (now compressed) buffer will be contained in REC_SIZE. If there is room in the output buffer for the compressed record, it is included and further reading and packing continue. If there is no more space in the output buffer, further reading from the input file is halted by disabling the event in the complex WAIT and steps are taken to initiate transmission of the output buffer. Similarly, if there are no more records to be read from the input file, further reading from the input file is halted, and steps taken to

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send the message block.

Line Bid

When the first block of the message is completed (output buffer full), the READ-PACK event in the complex WAIT is disabled and the remote file WRITE event is enabled. When the event comes true, the buffer is written to the remote file (this starts the line bid in the handler) and further writing is disabled. The output buffer is not discarded, and, since no further reading and packing is taking place, the information in the buffer remains viable.

If the line bid is accepted by the host, further reading and packing (and sending) will be enabled via the complex WAIT. If the line bid is rejected for any reason, the user is given the option of trying again or cancelling the attempt. The line bid may be rejected because of exceeding the retry limit, or it may be due to a line bid from the host being accepted before the handler received the buffer to send. Should the user decide to retry a rejected line bid, he enters '.REBID'. Since the buffer is still around with the necessary information, the remote file WRITE event can be enabled in the complex WAIT and, when triggered, the output buffer written to the handler to try bidding again. If further line bid attempts are cancelled (via '.CANCEL'), various flags and parameters which indicate that a file is being sent are cleared and the system is returned to a normal state.

Final Block

If, while filling a message block, the end of the input file is encountered, the buffer is marked as the last block of the message ('TOG(1)' is set TRUE), further reading is disabled, and the remote file READ is enabled via the complex WAIT. (This last message block might also be the first block of the message). After writing this buffer to the remote file, the system parameters are reset to a normal state and the system is ready for any further processing.

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Message Reception

Message reception from the host is initiated as soon as the line bid is accepted by the handler. If, after accepting the 'ENQ' from the host, the handler notices that a buffer has been queued by RJE3780 (for a line bid), it rejects the line bid attempt by RJE3780 and sends another message indicating that a line bid has been accepted from the host. This causes RJE3780 to initialize various system parameters in preparation for receiving input from the host.

Unpack

We will assume that the message being received from the host is to be printed on the line printer. Punch data is handled in an analogous fashion and it should be easy enough to decipher the punch paths given the following discussion of print paths.

Upon getting a buffer from the handler for unpacking, RJE3780 bars any further reception from the handler (via the complex WAIT) until the buffer has been completely processed. Control is then passed to UNPACK where various checks are made on the state of the "unpack". If the system is in the middle of unpacking a record, control is returned to the appropriate procedure for further unpacking. If there is nothing left in the buffer for unpacking, printing (punching) is disabled in the complex WAIT and further reading from the remote file for a new buffer is enabled. If the buffer is transparent data, unpacking is handled immediately and printing (punching) enabled. If the buffer being processed is the first block in a message (i.e., the last buffer was the last block of a message), then some system flags and parameters are initialized and a check made for a device selection character (since this is the only point in the message where it could be contained). Finally, if there is data to be unpacked, the appropriate expansion routine is called (EXPAND_PRINT_RECORD) after which output is enabled on the associated device (printer).

Expand Record

Expansion of a punch record is relatively simple since there are no punch control characters to be sensitive to. In the case of a print record, there are various printer control characters which must be processed along with the print record. If no record is currently in the process of being unpacked, then the next record to be unpacked is put in RCRD, parameters are initialized, and the actual expansion is started. This takes the form of a loop where the routine is scanning the record for various delimiters

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and filling the print buffer with the print data it takes from the record being unpacked. Various flags and variables are used to hold the subsidiary information concerning printer controls and spacing. The record is in the process of being unpacked until either the end of the record is reached (on the scan), or until there is a problem with one of the scan delimiters. Upon leaving this routine, control eventually passes to an output procedure (PRINT_AND_UNPACK). The expansion routine (EXPAND_PRINT_RECORD) is quit upon finding some delimiter which requires immediate action. This could be one of various printer control characters, or could be an 'IRS' which signals the end of the packed record. The unpacking of the record could still be in progress even though the routine is left to handle some printer control character. In such a case, control will eventually be returned to continue unpacking the record.

Print (Punch) Record

Upon leaving the record expansion routine (EXPAND_PRINT_RECORD), control is returned to the UNPACK. From here, the appropriate output event in the complex WAIT is enabled and, when the event comes true, the control passes to the proper routine (PRINT_AND_UNPACK). In this routine, the communicate is built and the output performed. In the case of triple spacing on the printer, the routine is entered a second time to complete the necessary spacing before returning to UNPACK for further processing.

Interrupt/Disconnect

RJE3780 gives the user the ability to send an 'EOT' (cease function) or a 'DLE EOT' (disconnect) to the host. Although not designed to send an 'RVI', a similar function can be performed by sending an 'EOT'. This will cause the host to cease its transmission and release control of the line, at which time RJE3780 can initiate a line bid for control. The 'EOT' transmission sequence is initiated by giving RJE3780 the command ".RVI" or ".INT". Control is then passed to SPO_INTERRUPT where, if no other output is in progress, a message is written to Station #2 indicating "non-transparent", "ETX", and irrelevant data. Upon reading this message the handler will send an 'EOT' to the host.

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To send a 'DLE EOT' (disconnect) to the host, the user gives RJE3780 the command ".EOT" or ".END". In this case, a message will be sent to Station #2 with "transparent", "ETX", and irrelevant data. This will occur regardless of the state of RJE3780 (output in progress, etc.) and will result in the line being disconnected by the handler.

OPTIONS

The only other major path in RJE3780 concerns the manipulation of various system parameters which can be affected by the user at run time. By using the appropriate command (".SU", ".RO", ".TO") with one of the options, the appropriate routine is entered (SET_OPTION, RESET_OPTION, TEST_OPTION) and from there control is passed to the procedure which affects the chosen option (FIX_<option>). In all cases, the final value of the option is displayed on the SPO.

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USER COMMANDS

All user input to RJE3780 is entered via an ACCEPT, either from the SPD or from cards. All commands are of the form ".<command>" where the period (.) is used to signify to RJE3780 that it is a user command and must be the first character in the record (no preceding blanks are permitted). If the period is missing (or if it is not the first character in the record), RJE3780 will assume it is a message record and pack it and transmit it to the host. The rest of this section covers all the commands available to the user and the effect they have on the system.

"BREAK" - LINE BREAK

Format: .BREAK
.BRK

This command is a combination of ".RVI" and ".CANCEL". It stops any ongoing transmissions to the host and halts any transmission coming from the host. No statement is made about the state of the system after using this command.

"CANCEL" - LINE BID SURRENDER

Format: .CANCEL
.CAN

This command may also be used in response to the rejection of a line bid, no matter what the cause. It forces RJE3780 to cease any further line bid attempts with the current message. All relevant data is cleared from the buffers, the input file is closed, and the system is returned to a normal state.

"CLOSE" - TERMINATE SESSION

Format: .CLOSE

This command is used to terminate the current session with the host. If there is no system activity, then a line disconnect is sent to the host. If input or output is in progress, then a line disconnect is sent when the current activity has ceased.

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"END" - LINE DISCONNECT

Format: .END

This command is used to send a line disconnect ('DLE EOT') to the host. It takes effect immediately, regardless of any other activity in progress at the time. It does not reset the system to any particular state, but merely interrupts whatever activity is in progress to send the disconnect message. No statement is made about the state of the system having sent the disconnect.

"EOF" - END STREAM

Format: .EOF

This command is used in conjunction with the "Sx" commands. If a secondary file is called for and cannot be found, this command causes further reading from primary and secondary files to cease and closes out the transmission by sending the contents of the current buffer with an 'ETX', indicating the end of the message.

This command is also used in conjunction with restarting a stream which has been interrupted by the host (via 'RVI'). If the option for "auto-restart" is not set, it will close out the current input file and return the system to a normal state (i.e., the rest of the file will not be sent).

"EOT" - LINE DISCONNECT

Format: .EOT

The effect of this command is the same as for .END.

"FINI" - ABORT SESSION

Format: .FINI

This command is used to unconditionally terminate the current session with the host. A "line disconnect" is sent to the handler and the system goes to EOJ regardless of whether the line is actually disconnected or not, or whether any input or output is in progress at the time.

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"GO" = CONTINUE STREAM

Format: .GD

This command is used in conjunction with the "Sx" commands. If a secondary file is called for and cannot be found, it causes processing to continue with the next card in the primary file (i.e., the card calling for the secondary file is ignored and reading continues from the primary card file).

This command is also used in conjunction with restarting a stream which has been interrupted by the host (via 'RVI'). If the option for "auto-restart" is not set, it restarts the interrupted stream. Writing is enabled to the remote file, and RJE3780 takes up where it left off, bidding for the line again and sending the rest of the interrupted message.

"INT" = INTERRUPT HOST

Format: .INT

This command has the same effect as the .RVI command.

"PHONE" = AUTO-DIAL PHONE NUMBER

Format: .PHONE [=] (n)
 .PH [=] (n)

This command is used to change the phone number to be used by the handler if auto-dialout is used. The format of this command is ".PHONE [=] n" where the equal sign (=) is optional. If no value (n) is present, the current value of the phone number as last changed by RJE3780 is printed on the SPO.

If the phone number has not been changed since BOJ or since the last ".RESET", then the value displayed will be blank.

If a value is present, it must consist of digits and dashes (-) and must be more than six (6) and less than twenty-one (21) characters in length. If the form of "n" is proper, then the value of the phone number in the handler for auto-dialout is changed to reflect the new value. No check is made to determine whether the number is a valid phone number (it is permissible to input a value of all dashes).

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Dashes (-) are used as pause characters and are added at the user's discretion to give the phone hardware time enough to complete each digit dialed. The actual format of the number input along with the time fill dashes is the user's responsibility.

"PRINT" - START NEW PRINT FILE

Format: .PRINT
.NPR
.NEW.PRT
.PRINTER

Output print files from the host are printed continuously on the printer or go to one large, continuous backup print file on disk. This command is used primarily when the print output is going to backup. It will allow the user to close the current active backup file immediately and open a new print file (probably backup) to continue writing to. In this way it is possible for the user to have his output on a number of moderate sized backup files rather than one very large one.

"PUNCH" - START NEW PUNCH FILE

Format: .PUNCH
.NPU
.NEW.PUN

This command has the same effect as .PRINT, except for punch files.

"REBID" - LINE BID RETRY

Format: .REBID
.REB

This command may be used in response to the rejection of a line bid, no matter what the cause. It allows RJE3780 to try another line bid sequence (since all necessary information is still present). There is no limit to the number of times a line bid can be attempted with this command. If, after repeated attempts, the line bid is accepted, the transmission of the message (if more than one block) continues in the normal fashion.

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"RESET" - TERMINAL RESET

Format: .RESET
 .RES

This command has the same effect as restarting RJE3780. It clears all messages from the remote file and resets the system to an initial starting condition with all system parameters set according to the current values of the program switches. The number of messages removed from both station queues of RJE3780 is displayed on the SPO. The line is not disconnected, but an 'EOT' is sent to the host before clearing the remote file to halt any activity which might be in progress. If the program switches have been changed since RJE3780 was executed, the new values will be reflected in the new values for the system parameters. This is a very unforgiving command and will be executed regardless of any other system activity in progress at the time.

"RETRY" - SET RETRY LIMIT

Format: .RETRY [=] n

The format of this command is .RETRY [=] n, where the equal sign (=) is optional. If the value of "n" is omitted, the current value of the retry limit is printed on the SPO. If a legal value of "n" is present (legal being $0 < n < 16$), the value of the retry limit is changed in the handler. If an illegal value is present, a value of 15 is assumed and the retry limit is changed accordingly.

"RO" - RESET OPTION

Format: .RO
 .RO <option>
 .RO <option> [=] n

See discussion under .SO option.

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"RVI" = INTERRUPT HOST

Format: .RVI

The effect of this command is to send an 'EOT' to the host to halt any activity it may have in progress at the time. When the host ceases its activity, the user can try for control of the line (with a ".REBID", ".SD", etc.) or take any other action desired.

"SD" = SET OPTION

Format: .SD
 .SD <option>
 .SD <option> [=] n

This command, along with ".RO" and ".TO", is used to change the various system parameters which are user modifiable. ".SD" is used to set an option (TRUE). ".RO" is used to reset an option (FALSE). And ".TO" is used to test and display the values of the various options.

Each option will be discussed in turn, in the USER OPTIONS section. It should be noted that not all options are a simple set/reset (e.g., PHONE), though the majority are. Most options are given a value at system initialization. This is done by using various program switches to hold the initial values. By modifying the object file of RJE3780, it is possible to set these values to tailor the system to the user's individual defaults (rather than to the release defaults) to suit a particular installation's configuration.

For set/reset options, the command format is ".SD <option>". For all other options, the format is ".SD <option> [=] n" where the equal sign (=) is optional and the value "n" is within certain limits. If the value "n" is omitted, a default value is usually assumed.

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"STATUS" = SYSTEM STATUS

Format: .STATUS
.STAT

This command enables the user to discover the current state of the system (input in progress, line disconnected, etc.).

"Sx" - START_READER/SEND

"SD" = START READER (DISK)

Format: .SD [<file name>]

Assumes the initial device for the input file will be disk and opens the appropriate <file name> on that device.

"SR" = START READER (CARD)

Format: .SR [<file name>]

Assumes the initial device for the input file will be a card reader and opens the appropriate <file name> on that device.

"ST" = START READER (TAPE)

Format: .ST [<file name>]

Assumes the initial device for the input file will be magnetic tape and opens the appropriate <file name> on that device.

This command is used to initiate file transmission to the host. It reads records from the appropriate file, packs them according to the current system option, and, after having the line bid accepted, transmits them to the host. Note that the <file name> is optional. If <file name> is omitted, a name of "RJE3780/CARDS" is assumed as default.

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The transmission stream can be either a single file from one device, or multiple files from various devices sent as though they were a single contiguous file. RJE3780 begins reading, packing, and sending records from the primary file (specified in the initial "Sx" command) until it reaches either the end of the file, or until it reads a record which begins with ".SD ", ".SR ", or ".ST " as the first four (4) characters. In this latter case, the rest of the record is scanned for a file name. If no name is found, the default name ("RJE3780/CARDS") is used. This secondary file is then opened on the appropriate device (".SD " = disk, etc.) and reading and packing of records continues from this secondary file.

Only primary and secondary files are allowed. Attempts to read from higher order files are ignored as commands and treated like data. In other words, the "Sx" commands have meaning in a primary file as directions to a secondary, but in the secondary file, the "Sx" commands are simply treated as part of the data.

If the secondary file cannot be found on the specified device, the user is given the option of closing out the transmission at that point (".EOF") or to continue reading from the primary file (".GO"). When the end of file is encountered while reading a secondary file, reading continues from the primary file from the point at which it left off last. When the end of file is encountered on the primary file, the message is terminated. At no point during the transmission is the host aware that it has received multiple files from multiple devices. All data is sent as if it came from a single file.

"IO" = TEST OPTION

Format: .TO
 .TO <option>
 .TO <option> [=] n

See discussion under .SD option.

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USER OPTIONS

These options are to be used with the ".RO", ".SO" and ".TO" commands (see USER COMMANDS section for further discussion of commands).

AUTODISC Option (set/reset)

```
<option> ::= AUTODISC
              DS
              DISC
```

This option determines whether RJE3780 automatically disconnects the line after thirty seconds if there is no activity on the line. The value (30 seconds) is a system parameter and is not currently modifiable by the user. The release default for this option is RESET. The initial value is determined by Program Switch #3.

AUTORESTART Option (set/reset)

```
<option> ::= AUTORESTART
              AS
              RESTART
```

This option is used if an 'RVI' is received from the host. If, after the host has finished with its transmission, this option is set, then RJE3780 will automatically bid for the line and continue its transmission from where it was interrupted. Otherwise, the user will have the responsibility for restarting the transmission. The release default for this option is RESET. The initial value is determined by Program Switch #4.

COMPRESS Option (set/reset)

```
<option> ::= COMPRESS
              SQ
              COMP
```

This option determines the format used to compress the data sent to the host. If this option is set, all strings of blanks greater than one are compressed. If this option is reset, only the trailing blanks at the end of a record are compressed (by

PUNCH Option (set/reset)

<option> ::= PUNCH
 PU

Similar to the "PRINTER" option except used with punch files. (Also see and contrast with command ".PUNCH".) Release default is RESET. Initial value is determined by Program Switch #6.

TELEPHONE Option (value)

<option> ::= PHONE [=] [n]
 PH [=] [n]

This option is the same as the ".PHONE" command. Both ".SD" and ".RO" set a value for the auto-dialout phone number if one is provided. There is no initial value and no program switch connected with it.

The format for testing the phone value is:

.TO PHONE [=] [n]

This will cause the most recently changed value of the phone number to be displayed. If the phone number has not been changed since BOJ or since the last ".RESET", the value will be blank. In testing the value (".TO"), any equal sign (=) or value (n) present on the command line will be ignored.

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TRANSPARENT Option (set/reset)

```
<option> ::= TRANSPARENT  
            TR  
            TRAN  
            TRNSP  
            TRANSP
```

This option determines whether the message sent to the host is transmitted in transparent mode or not. If it is set, all messages sent to the host will be transmitted in transparent mode. This will assure that any control characters which might be imbedded in the message will not affect the transmission. The option will have no effect upon messages received from the host, since the handler is responsible for accepting either form of message from the host. The release default for this option is RESET. The initial value is determined by Program Switch #2.

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USER AIDS

LINE DISCIPLINE

1. The handler, as presently devised, will not accept a message block which begins with "SOH" or "DLE SOH". Only an "STX" or a "DLE STX" are accepted as proper beginnings of a message block.
2. An "ITB" character cannot be used as a line control character due to a hardware restriction in the Bi-sync line adapter. For this reason, RJE3780 cannot emulate an IBM 2780.
3. The system, as currently devised, will operate only in Point-to-Point mode. It will not support multipoint operation (multiple independent on-line terminals simultaneously attached to a common I/O bus).
4. An "end-of-media" (EM) punch control character (to send or receive a "short card") is not handled as such but is treated as part of the data to be sent or received.
5. A "BEL" character will not be recognized as such by the handler or the MCS as the system is currently written.

MCS NOTES

1. Program Switches

The program switches contain information which is used by the system to specify its internal configuration and run time parameters. These settings are looked at only at system initialization and when the "RESET" command is invoked. They may be dynamically modified while RJE3780 is running, but will not take effect until ".RESET" is specified. We give here the parameter which the program switch controls and the default value.

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Program Switch #0 Space compression. [Default = 0 (compress)]

Compresses all multiple (>1) blanks in records when transmitting. If value is 0 then blanks are truncated from the end and not compressed. See COMPRESS option.

Program Switch #1 SPO display. [Default = 0 (no lines displayed)]

Will display the first n line(s) of any printer output (if non-blank) from the host on the operator console depending on the value of switch 1. Legal values are 0-15 (see DISPLAY option).

Program Switch #2 Transmission mode. [Default = 0 (non-transparent)]

Sends all information to the host in non-transparent mode. If value is 1, then all data is sent in transparent mode. See TRANSPARENT option.

Program Switch #3 Auto-disconnect. [Default = 0 (operator)]

RJE3780 will not go to EDJ without operator command. If value is 1 then RJE3780 will go to EDJ after 30 seconds of inactivity. See AUTODISC option.

Program Switch #4 Auto-restart. [Default = 0 (automatic)]

Automatically bids for the line and continues a transmission which was in progress when an 'RVI' was received from the host. Will not bid for the line if value was 0. See AUTORESTART option.

Program Switch #5 Print files. [Default = 0 (continuous)]

Will write print output to one large file. If value is 1, then a new file is created for each output message (i.e., backup files). See PRINTER option.

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Program Switch #6 Punch files. [Default = 0 (continuous)]

Will write punch output to one large file. If value is 1, then a new file is created for each output message (i.e., backup files). See PUNCH option.

Program Switch #7 HOT READER [Default = 0 (no HOT READER)]

If the value is 1, then the MCS will treat the input primary file as a HOT READER (see Section 9).

Program Switch #8 AUTO SIGN-ON [DEFAULT = 0 (no AUTO SIGN-ON)]

If this value is set to 1, RJE3780 will save the first record sent to the host as the sign-on record. If loss of data set ready occurs, RJE3780 will perform a spo cancel and automatically send the sign-on message. If an ACU (Auto-Call Unit) is not utilized, the operator is required to redial the host.

Program Switch #9 Line connected. [Default = 0 (disconnected)]

The line is assumed to be disconnected at system initialization and after a "RESET" command. If the value is 1, then the line is assumed to be connected, even if this is not the case. This is necessary when using the auto-dialout capability since the "line connected" indicator must show "connected" for any message to be sent to the handler for transmission. It is also useful for forcing a "line connected" status should this need ever arise.

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2. Record Size Specifications

The release version of RJE3780 uses an I/O buffer of 562 bytes. Of this, 50 bytes are header information, leaving 512 bytes available for actual data to be sent or received. This value may be varied by changing the record size of QFILE. This may be accomplished either by object code modifications [?MO RJE3780 FILE QFILE RECORD.SIZE = 450;] or at execution time [?EX RJE3780 FILE QFILE RECORD.SIZE = 450;]. Be warned that the handler will add up to 4 bytes (for STX [or DLE STX] and ETX [or DLE ETX]) when sending the message block. Also, the user MUST remember to include the 50 bytes for the header information in the total record size specification. A record size less than 131 bytes (81 bytes data) is not allowed. A record size greater than 562 bytes total should not be used unless modifications are made to the handler and to RJE3780. (See note 1 under HANDLER NOTES.)

3. Default Input File Name

The name to be used if none is specified on the input command (".SD", ".SR", or ".ST") is taken from the FPB at system initialization and at ".RESET". Consequently, if the user does not want to use the release name of "RJE3780/CARDS", the name (and pack-id) of INPUTFILE may be modified to suit the user. This can be done either at run time [?EX RJE3780 FILE INPUTFILE NAME = TOM/DICK PACK.ID = HARRY;] or by modification of the object file [?MO RJE3780 FILE INPUTFILE NAME = WEE/WILLIE PACK.ID = WINKLE;]. The device type to be used will still be determined by the input command (".SD" for disk, ".SR" for cards, and ".ST" for tape). It is only the default name to be used which can be specified in this manner.

HANDLER NOTES

1. The release version of the handler specifies a buffer size of 516 bytes in the TERMINAL section. This is for an MCS record size of 562 bytes (512 bytes data, 50 bytes header information). It will also work for any record size less than 562 bytes.

To determine the minimum buffer size to specify in the handler, take the record size of QFILE from RJE3780, subtract 50, and add 8. $BUFFERSIZE = (RSZ - 50) + 8$. Where RSZ is the record size of QFILE in RJE3780. (See also section 2 under MCS NOTES).

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The IBM 3780 protocol allows for an ending block to be answered by a block with data. This is known as line turnaround (see section 3). Should this ability of the protocol ever want to be used, the minimum buffer size should be multiplied by 2. This is because in NDL's write linked to a read, the transmitted message and the received message are both stored in the one I/O buffer.

2. In the STATION section of the handler, the user must define two identical stations on the line. These stations must be #1 and #2 on the line, since the CONTROL (and REQUEST) expect this arrangement. A sample of the last four sections of the handler is given at the end of this document.

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OPERATING INSTRUCTIONS

In the discussion which follows, it will be assumed that the object file (RJE3780) has already had all program switches and file names modified to conform to what the user wishes to use as defaults. (See the appropriate sections relating to setting the options via the program switches and setting the input file name by modifying INPUTFILE for more information about these features).

EXECUTING RJE3780 AND HANDLER

The first step is to execute RJE3780. This is accomplished quite simply by entering "EX RJE3780" at the SPO. If a compatible handler is not already running, then it will need to be started. If the handler to be used is already in the "C" (Controller) slot of the Name Table (via "CM C <handler name>"), then it will be started automatically. Otherwise the user must start the handler manually by entering "EX <handler name>" at the SPO.

PRINT FILES

Note that as soon as RJE3780 has detected a compatible handler and established connection, it opens the print file. This means that if it can find an unused printer, it will grab it and not relinquish control until EOJ (or ".RESET"). Also refer to the "PRINT" option. The punch file will not be opened until actually needed. But if the printer is needed for other tasks during the execution of RJE3780, then it should be saved prior to the execution of the handler, thereby sending the print output to backup until such times as the file may be closed and reopened (".RESET", ".PRINT", etc.).

ESTABLISHING DATACOMM CONNECTION

If the user does not have an ACU (Auto-Call Unit), or is choosing not to use it, then this is the stage at which to dial-up the host station and establish connection. (If the user has an ACU and is using the auto-dial feature, the dialing and subsequent connection will be made during the first attempt to transmit data to the host.)

The user is now in a position to communicate with the host. In most installations, it will be necessary to signon to the host. Depending upon the system to which the user is connected, the proper procedure for signing-on will be different. Two methods

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The content of <job stream> will be dependent upon the particular host installation being used and the aims of the user submitting the stream for processing.

SESSION TERMINATION

If the data comm line is still connected when the user wishes to end the session, the ".CLOSE" command will disconnect the line and send RJE3780 to EOJ as soon as all ongoing processing has ceased. Remember to send the sign-off card before entering ".CLOSE" since RJE3780 will not allow any new transmissions to the host after initiating the "close" sequence. ".FINI" will not wait for ongoing processing to cease, but will attempt a line disconnect and go to EOJ unconditionally.

STATUS QUERY

If the user is ever curious about what the status of RJE3780 is, the input command of ".STATUS" will give him a brief description of what it thinks it is doing.

RECOVERY/RESTART PROCEDURES

When RJE3780 does not respond properly to processing commands or it appears that the program is looping, there are various recovery procedures that should be attempted before DS-ing the current job and re-executing the program. They are preferable because they avoid the lengthier disconnect and re-establish processes that also result in the loss of all data currently being transmitted.

The least costly recovery procedure is entry of either the ".RVI" or the ".INT" commands. These commands interrupt the host and allow the user to take control of the line, e.g., through a ".REBID" or an ".SD" (initiate transmission of a file to the host), etc. These commands do not affect the state of open files or data being transmitted from the host system.

If ".RVI" or ".INT" have no effect (i.e., .STATUS reports the same state of the program), users should then ".RESET" RJE3780. This command, unfortunately, causes all open files to be closed and results in the loss of all transmission data in the handler. It, in effect, restarts the program and may require a disconnection and re-establishment of the datacomm connection with the host system. It is preferable, however, to merely DS-ing RJE3780 and re-executing it.

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AUDIT PROCEDURES

RJE3780 contains an optional audit facility that can be used to trace the activity of the RJE3780/HANDLER in order to discover what errors are causing line problems. Auditing procedures require two steps to be taken: the IOLOG option in the handler must be set, and the DC/AUDIT program must be executed.

The IOLOG boolean is set by entering the job number of the currently executing RJE3780/HANDLER and the IOLOG command:

```
<job-number>AXIOLOG
```

The handler itself will open the audit file and begin its auditing procedures.

The second step involves executing DC/AUDIT, a released program that is available for auditing line activity. DC/AUDIT knows which audit file it is looking for and requires no file-equation if the IOLOG option has been set normally. It begins to process the audit file and will continue to do so until the audit file is closed. The audit file is closed when the user re-enters the IOLOG command again:

```
<job-number of the RJE3780/HANDLER>AXIOLOG
```

Re-entry of the command resets the audit boolean and closes the audit file. It makes no difference whether the audit file is open or closed when DC/AUDIT is executed. However, users must note that DC/AUDIT will not go to EOJ until the file is closed and that if a closed audit file is re-opened before the original audit file has been analyzed and printed out, the open removes the old file.

When DC/AUDIT goes to BOJ, it displays a message asking whether or not it should use its default parameters for analysis and printing of the audit file. Normal response to the program should be:

```
<job-number of DC/AUDIT>AXADDRESS END
```

The response produces a printout that would cover most circumstances in which there are line problems. If users wish a more specialized printout, they should consult the DC/AUDIT Product Specification, P. S. 2212 5421 for information about how to specify special audit procedures.

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SAMPLE HANDLER SECTIONS

XX
XXXXX TERMINAL SECTION XXXXX
XX
X

TERMINAL IBMHOST: X
BUFFERSIZE = 516. X TRANSMIT & RECEIVE 516-BYTE
X BUFFERS-See Section 6 HANDLER
X NOTES, Note 1

ADDRESS = 0. X
TRANSMISSION = 0. X
REQUEST = RJE3780RQST:RECEIVE, RJE3780RQST:TRANSMIT. X

X
X
XX
XXXXX STATION SECTION XXXXX
XX
X

STATION IBMSTATN1: X
MYUSE = INPUT,OUTPUT. X
PHONE = " ". X FOR AUTO-DIALOUT ONLY
RETRY = 15. X
CONTROLLER = FALSE. X
TERMINAL = IBMHOST. X

STATION IBMSTATN2: X
MYUSE = INPUT,OUTPUT. X
PHONE = " ". X FOR AUTO-DIALOUT ONLY
RETRY = 15. X
CONTROLLER = FALSE. X
TERMINAL = IBMHOST. X

X
X
XX
XXXXX LINE SECTION XXXXX
XX
X

LINE BISYNCSWITCH: X
CONTROL = RJE3780CNTRL. X
STATION = IBMSTATN1, IBMSTATN2. X
ADDRESS = 1:0:1. X

X
X
XX
XXXXX FILE SECTION XXXXX
XX
X

FILE RJE3780Q: X
FAMILY = ALL. X

X
FINI

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HOT READER

The HOT READER function for the RJE3780 program is invoked by setting program switch seven at BOJ. If this switch is equal to 1 (SW7=1), then the RJE3780 program will force the input primary file device type to be CARD.READER. It will then open an input primary card file, whose internal name is "CARDS". If the file is present, i.e., the open completes, the program will bid for the line. If accepted, it will start sending the file.

If RJE3780 is executed with the hot reader option set and the stream deck is missing, RJE3780 will prompt the operator to load the stream deck prior to establishing connection with the host system. If connection is established and the stream deck is still missing, RJE3780 will go to EOJ.

If the line is in use by the HOST at the time a line bid is attempted, the RJE3780 program will wait until the HOST gives up control of the line, at which time the line bid will be attempted again.

RJE3780 will check the value of SW7 at BOJ and set a flag indicating the user desires to invoke the HOT READER function. Since the value is tested only at BOJ, the HOT READER function, once turned on, may not be turned off.

While running with a HOT READER, the stream deck, i.e., the input primary file, remains open. Any card put into the reader will be scanned by the RJE3780 program. The program will be looking for a "<?>END", a "<?>DATA", or a ".Sx" card. Either an END or a DATA card will cause an EOF indicator to be sent to the HOST for the current file. The next card encountered by the card reader will cause the start if a new file is to be sent to the HOST. A ".Sx" card will be processed as a request to start sending a secondary file to the HOST, just as a normal operation (running without a HOT READER).

When EOF is encountered on the input primary file, the RJE3780 program will send an EOF indicator to the HOST for the current file being transmitted if necessary, close all open files, and go to EOJ. EOF on the input primary file is received when a "<?>TERMINATE" card is read from the HOT READER.

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A change has been made to a ".STATUS" query. The display will include an indication as to whether or not a HOT READER is being used. Also changed is that a ".Sx" from the SPD is no longer valid if a HOT READER is invoked.

NOTE: Normally the MCP will treat cards with a question mark (?) in column one as control cards. When using a stream deck, cards between the STREAM card and the TERMINATE card which begin with a question mark in column one will not be treated as control cards. They will be treated as regular input cards. Only cards beginning with an invalid character, as indicated by <?>, will be treated as control cards. For further information see the System Operation Guide, section 2.

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APPENDIX A: ERROR MESSAGES

The following is a list of all possible messages which might be displayed by RJE3780 and its handler. Included with each message is a short description of what the message means and if any action should be taken. Most of the messages are merely informative and require no action on the part of the user. Of these, a large number will never be seen by the user, since they will never appear in the normal course of operation.

The messages are separated into messages from the handler and messages from RJE3780. As a general rule, messages from the handler are merely informative, and are usually associated with a message from the MCS (RJE3780).

HANDLER MESSAGES

AUTO-CALL UNIT POWERED OFF

This message indicates there is an auto-call unit hooked to the system which is not powered up. If processing is to proceed, the unit should be powered up or the dialing performed manually.

BAD RESPONSE TO 'TTD'

The handler has received DLE<etwas> from the host as a response to a TTD. (<etwas> is other than EOT). This is an informative message only.

CALL ABANDONED - CHECK PHONE

For any of a number of reasons (illegal phone number, auto-call unit not strapped for the correct line, etc.) the call has been abandoned. This is an informative message. Further action is up to the user regarding a cure.

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EXCEPTION DETECTED ON 'TTD'

The handler has detected an exception (parity, timeout, etc.) on the line while waiting for a response to a TTD. This is an informative message only. No action need be taken.

EXCEPTION ON LINE BID RECEPTION

While in a "Wait For Bid" state, the handler has detected some exception on the line (parity, loss of data set ready, etc.). This is an informative message only.

IMPROPER LINE BID RECEIVED

While in a "Wait For Bid" state, the handler has received some data other than ENQ. This is an informative message only. No action need be taken.

IMPROPER RESPONSE TO TIMEOUT

While waiting for a response from the host (after timing out), the handler has received what it considers to be an invalid response. This is an informative message only.

IMPROPER RESPONSE TO 'TTD'

The handler has sent a TTD to the host and received an incorrect response. This is an informative message only. No action need be taken.

LINE BIT ACCEPTED

This spo message is displayed when the line bid record "ENQ" is accepted by the host.

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LINE IS BUSY

The auto-call unit has detected that the number it tried to dial is busy. The call has been abandoned. This is an informative message only. No handler related action need be taken.

'NAK' RECEIVED TO LINE BID

This message indicates that the handler has specifically been denied control of the datacomm line on a line bid attempt. This is an informative message only. No handler related action need be taken.

RETRIES EXCEEDED ON 'ENQ'

The handler has exceeded the current retry limit while sending ENQ's to the host, or incorrect ACK0/ACK1 was received during transmission. Transmission is being terminated. This is an informative message only.

RETRY LIMIT EXCEEDED ON LINE BID

This message indicates that the handler has exceeded the current retry limit while bidding for control of the datacomm line. This is an informative message only. No action related to the handler need be taken.

RETRY LIMIT EXCEEDED ON WRITE

The handler has exceeded the current retry limit while trying to send a message block without getting a proper response from the host. Transmission is being terminated. This is an informative message only.

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TIMEOUT BY HOST - AWAITING RESPONSE

While waiting for a message block from the host, the handler has timed out (nominal 2-3 second timeout for Bi-Sync adapter). This is an informative message only.

WAITING FOR MCS QUEUE NOT FULL

The handler has a message to queue for the MCS but the queue is full. The handler will NAK any further messages from the host until the queue full condition is relieved. This message will be displayed every time the number of NAKs equals the retry limit. This condition most frequently occurs because a physical output device (i.e., printer or punch) is not ready while in use, possibly combined with a small value for Q.MAX.MESSAGES (QMX) in the MCS.

10 SECOND TIMEOUT - WAITING HOST RESPONSE

The handler has waited ten (10) seconds for a response to a time-out by the host. This is an informative message only.

60 SECOND TIMEOUT ON DIALING

The auto-call unit has waited 60 seconds without a response. The call has been abandoned. This is an informative message only. No handler related action need be taken.

RJE3780 MESSAGES

AUTODISC = n

This message displays the newest setting of the auto-disconnect option (1=auto-disconnect, 0=operator disconnect) in response to an AUTODISC option command.

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AUTORESTART = n

This message displays the newest setting of the auto-restart option (1=auto-restart, 0=operator restart) in response to an AUTORESTART option command.

AUTO SIGN-ON IN PROGRESS

This spo message informs the user that the sign-on message has been re-constructed and will be sent upon re-establishing connection with the host.

AWAITING A 'LINE BID', ".REBID", OR ".CANCEL"

This message is displayed in response to a ".STATUS" command when the system is waiting to get a line bid accepted, or when it is waiting for ".REBID" or ".CANCEL" from the user. If no message has been displayed earlier indicating that the system is waiting for ".REBID" or ".CANCEL", then no action need be taken.

AWAITING ".GO" OR ".EOF"

This message is displayed in response to a ".STATUS" command when the system is waiting for ".GO" or ".EOF" from the user. The user should enter one or the other of these commands.

AWAITING SHUT-DOWN - REQUEST IGNORED

This message is displayed in response to various user commands when RJE3780 is in the process of closing down. The command has been ignored. RJE3780 will come to EOJ as soon as all processing has ceased.

CLOSE PENDING

This message is displayed in response to a ".STATUS" command when the system is in the process of closing-down in response to a ".CLOSE" command entered earlier.

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COMPRESS = n

This message displays the newest setting of the compress option (1=compress, 0=no compression) in response to a COMPRESS option command.

CONNECTION ESTABLISHED - WAITING

This message indicates that the datacomm connection with the host has been completed and data transmission and reception may now commence.

DATA AFTER TAB FORMAT - IGNORED

A record has been received from the host with horizontal tab format information and data following the tab format. This is not allowed and the data in this record following the horizontal tab format has been ignored.

DISPLAY = n

This message displays the newest value for the number of first lines to be displayed when receiving a new message from the host. This display appears in response to a DISPLAY option command.

END OF FILE ENCOUNTERED ON PRINT

An "End-of-File" condition has been detected when trying to print a record. No action is taken, and the record is not retried. Processing continues as if no error had occurred.

END OF FILE ENCOUNTERED ON PUNCH

An "End-Of-File" condition has been detected when trying to punch a record. No action is taken, and the record is not retried. Processing continues as if no error had occurred.

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ENTER ".GO" OR ".EOF" FOR INTERRUPTED STREAM

This message indicates that while sending data to the host, RJE3780 received an interrupt from the host so it could send a message. That message has completed, and the user must now enter ".GO" to continue transmission of the interrupted data stream to the host, or ".EOF" to send the end of stream indicator to the host and cease further transmission of that stream.

".EOF" NOT VALID IN THIS CONTEXT

This message is displayed in response to an ".EOF" command when the system is not expecting a ".GO" or ".EOF" from the user. The command is ignored. No action need be taken.

'EOT' RECEIVED FROM HOST
ENTER ".REBID" OR ".CANCEL"

This message indicates that an EOT has been received from the host which is not an end-of-input indicator. RJE3780 has data to transmit and the user should enter ".REBID" to bid and attempt to send the data, or ".CANCEL" to discard and ignore the data it has for transmission.

'EOT' RECEIVED FROM THE HOST
TRANSMISSION TERMINATED

This message indicates that an EOT has been received from the host which is not an end-of-input indicator. Any transmission RJE3780 may have had in progress is terminated and the data discarded.

ERROR - RECORD ENDED WITH 'IGS'

While unpacking a message block which has been received compressed, a punch record (delimited by IRS) has been found which ends with been re-constructed and will be sent upon re-establishing connection with the host. the IGS character. The record, as currently constituted, is punched, and unpacking continues with the next record.

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ERROR - RECORD TERMINATES ON 'IGS'

While unpacking a message block which has been received compressed, a print record (delimited by IRS) has been found which ends with the IGS character. The record, as currently constituted, is printed, and unpacking continues with the next record.

ESCAPE SEQUENCE DETECTED IN TAB FORMAT - REST OF FORMAT IGNORED

An ESC character has been detected in a horizontal tab format record. Everything following the tab format information (beginning with the ESC) has been ignored. The tab format is determined by the data preceding the ESC character.

FILE NAME "<file name>" IS ILLEGAL

This message is displayed in response to various user commands when the file name in the command is illegal. The command has been ignored. Re-entering the command with the legal file name should work.

FILE "<file name>" MISSING. ENTER '.GO' OR '.EOF'

This message is displayed during transmission (out) upon discovering that a requested secondary file (<file name>) does not exist on the designated device. The user can either terminate the stream by entering an ".EOF" or continue with the next record from the primary file by entering ".GO". The record in error is ignored.

FILE "<file name>" MISSING. REQUEST IGNORED.

This message is displayed in response to an ".S" command when the file is not present on the specified device. The ".S" command is ignored, and the system waits for further input.

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".GO" NOT VALID IN THIS CONTEXT

This message is displayed in response to a ".GO" command when the system is not expecting a ".GO" or ".EOF" from the user. The command is ignored. No action need be taken.

IDLE

This message is displayed in reply to a ".STATUS" command when RJE3780 is in a quiescent state. It means that no activity is currently in progress, and the system is prepared to act on any command.

IMPOSSIBLE CONDITION REACHED WHILE UNPACKING

This is a catch-all message displayed when RJE3780 encounters some unexpected problem while unpacking a message block. No statement is made about the veracity of the information in this record, or the processing of the rest of the information in the block. This is an informative warning only. RJE3780 will eventually untangle itself and processing will continue correctly with the next message block.

IMPOSSIBLE 0 CONDITION REACHED ON SCAN

This message is displayed when a null option is found. It indicates either very bad input, interpreter problems, or hardware problems.

IMPROPER 'ESC' SEQUENCE

This message is displayed if an ESC character is detected which is followed by an invalid qualifier. The invalid qualifier is ignored, and unpacking continues as though the improper ESC sequence had not been in the message block.

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INCOMPLETE ".RD" COMMAND

An option command of ".RD" has been entered with no option specified. The command is ignored. No action need be taken.

INCOMPLETE ".SD" COMMAND

An option command of ".SD" has been entered with no option specified. The command is ignored. No action need be taken.

INCOMPLETE I/O ON PRINT

An "Incomplete I/O" condition has been detected when trying to print a record. No action is taken, and the record is not retried. Processing continues as if no error has occurred.

INCOMPLETE I/O ON PUNCH

An "Incomplete I/O" condition has been detected when trying to punch a record. No action is taken, and the record is not retried. Processing continues as if no error has occurred.

INCOMPLETE I/O ON QUEUE WRITE

This message is displayed when a message block is written to the handler by the MCS for transmission to the host and finds the communication queue full. No action need be taken since this message should never be displayed. Processing (transmission) will continue correctly regardless.

INPUT CURRENTLY IN PROGRESS

This message is displayed in response to various user commands when input is being received from the host. The command has been ignored. Transmission from the host must cease before the command will have any effect.

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INPUT IN PROGRESS

This message is displayed in response to a ".STATUS" command when the system is in the process of receiving input from the host. No action need be taken.

INVALID COMMAND

This message is displayed in response to an input of ".TEST". The input is ignored and processing continues.

INVALID ENTRY IN ".RETRY" COMMAND

This message is displayed in response to a ".RETRY" command when the characters following the ".RETRY" are non-numeric. The command is ignored. No action need be taken.

I/O ERROR ON PRINT

An "Exception" condition has been detected when trying to print a record. No action is taken, and the record is not retried. Processing continues as if no error had occurred.

I/O ERROR ON PUNCH

An "Exception" condition has been detected when trying to punch a record. No action is taken, and the record is not retried. Processing continues as if no error had occurred.

<INTEGER> MESSAGES REMOVED FROM LSN <INTEGER>

This spo message indicates the number of messages removed from the station queues of RJE3780 during a ".RESET" terminal command.

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LINE BID REJECTED
ENTER ".REBID" OR ".CANCEL"

This message is displayed if the host either rejects or ignores an attempt to bid for the line (NAK received from host, retry limit exceeded, etc.). No other data transmission to the host is possible until a ".REBID" or ".CANCEL" is entered.

LINE DISCONNECTED

This message is displayed in response to a ".STATUS" command when the datacomm line is disconnected. The user might want to reconnect the line if further processing is desired.

LINE DISCONNECTED.

This message indicates that the datacomm line has been disconnected and no processing will continue until the line is reconnected. No transmission or reception was in progress at the time.

LINE DISCONNECTED. IF NOT ACU, PLEASE REDIAL HOST.
OR
LINE DISCONNECTED. PLEASE REDIAL HOST.

These spo messages indicate that the line has become disconnected and auto sign-on has begun. If the previous connection has been obtained through an ACU, the first message is displayed; otherwise, the second message is displayed.

LINE STILL DISCONNECTED

This message is displayed in response to various user commands when the line is disconnected. The user command has been ignored and a connection must be established before any of these commands will have an effect.

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NO DATA TO BID WITH

This message is displayed in response to a ".REBID" command when there is no data present with which to initiate transmission to the host. The request is ignored.

NO HANDLER RUNNING

This message is displayed when the handler goes to EOJ, normal or abnormal (DS or DP). The MCS will also go to EOJ at this point.

NOT ALLOWED IN HOT READER MODE

This message is in response to a ".Sx" command from the local SPO. When using the HOT READER function, a ".Sx" is only valid in the stream deck.

NOT ENOUGH CHARS FOR PHONE NUMBER - IGNORED

This message is displayed if there are fewer than 7 phone characters present when changing the phone number. The command is ignored. No action need be taken.

PHONE = <phone number>

This message is displayed in response to a PHONE option command or a PHONE command. It displays the latest value of the phone number as known by RJE3780. If no value is given in the command, (thereby constituting a query), the value displayed is correct only if the value has been changed by RJE3780 since 80J or ".RESET".

PLEASE CONNECT AND ENTER ".REBID" OR ".CANCEL"

This message indicates that the datacomm line has been disconnected while a line bid was in progress. The user can either enter ".CANCEL" to discard the attempted line bid data, or reconnect the line and enter ".REBID" to continue to bid for the line and attempt transmission of the data.

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PRIMARY FILE = "STREAM DECK"

This spo message indicates that the hot reader has opened the stream deck file.

PRIMARY FILE FLUSHED: <FILE NAME>

This spo message indicates the name of the primary file closed and flushed from the system during a spo ".CANCEL".

PRIMARY FILE IS <FILE NAME>

This spo message is a ".STATUS" command response indicating the name of the current primary file.

PRIMARY FILE "<FILE NAME>" OPENED

This spo message is displayed when RJE3780 opens a primary file.

PRINTER = n

This message displays the newest setting for the new print file option (1=separate files, 0=single file) in response to a PRINTER option command.

PROBLEM ENCOUNTERED ON LINE

This is a catch-all message when some problem (unspecified) occurs on the datacomm line. Some examples might be parity, loss of data set ready, loss of carrier, etc..

PUNCH = n

This message displays the newest setting for the new punch file option (1=separate files, 0=single file) in response to a PUNCH option command.

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READER ACTIVE

This message is displayed in response to a ".STATUS" command when the system is in the process of transmitting data to the host. No action need be taken.

READER ALREADY ACTIVE

This message is displayed in response to various user commands when a reader is already active. (Transmission is in progress). The command has been ignored. The previous reader must be closed before the command will have any effect.

READER CLOSED

This message indicates that the MCS has just completed transmission of a data stream or a control character to the handler (which governs transmission to the host). It does not mean that the data has been transmitted to the host. No action is necessary. This is an informative message only.

RECORD SIZE TOO LARGE - SIZE SET TO 512 BYTES

RJE3780 has been executed with a record size for QFILE which is greater than 562 (512 data bytes). Only the first 562 bytes (for 512 bytes of data) will be used for transmission.

RETRY LIMIT = n

This message displays the newest value of the retry limit as known by RJE3780 in response to a RETRY option command. This value may be wrong if the value originally given for the retry limit in the program (15) is incorrect and the ".RETRY" command has not been invoked since the most recent BDJ or ".RESET".

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SECONDARY FILE FLUSHED: <FILE NAME>

This spo message indicates the name of the secondary file closed and flushed from the system during a spo ".CANCEL".

SECONDARY FILE IS <FILE NAME>

This spo message is a ".STATUS" command response indicating the name of the current secondary file.

SECONDARY FILE "<FILE NAME>" OPENED

This spo message is displayed when RJE3780 opens a secondary file.

STREAM DECK MISSING
PLEASE LOAD READER WITH STREAM DECK BEFORE
ESTABLISHING CONNECTION

This spo message indicates that the hot reader was requested (SW=7) but the stream deck was not present. The user is prompted to load the stream deck prior to establishing connection with the host.

STREAM DECK STILL MISSING. GOBYE!

This spo message indicates that the hot reader was requested and the stream deck was not present when connection with the host was established. In this situation, RJE3780 goes to EOJ.

TAB FORMAT NOT TERMINATED PROPERLY - REST OF FORMAT IGNORED

A horizontal tab format record has not been terminated correctly. The format information is taken from the data preceding the improper termination, and the rest of the data in the record is ignored.

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THE INPUT FILE IS A HOT READER AND

This message is in response to a ".STATUS" SPO input. It indicates that the HOT READER function has been invoked. The standard response will follow on the next line.

TOO MANY CHARS IN PHONE NUMBER - IGNORED

This message is displayed when there are more than 20 phone characters present when changing the phone number. The command is ignored. No action need be taken.

TRANSFER WAS IN PROGRESS
LINE DISCONNECTED.

This message indicates that the datacomm line was disconnected while transmission or reception was in progress. The system will wait for a connection before any further attempts at transmission.

TRANSPARENT = n

This message displays the newest setting of the transparent transmission option (1=transparent, 0=non-transparent) in response to a TRANSPARENT option command.

USEABLE RECORD SIZE OF "QFILE" LESS THAN 81 BYTES

RJE3780 has been executed with a record size for QFILE which is less than 131 (81 bytes for transmission data). The record size for QFILE must be modified before RJE3780 will be allowed to run.

WARNING - INCOMPLETE 'ESC' SEQUENCE

An ESC character has been detected in a print block which is not followed by a qualifier. Unpacking of the record ends with this character and the record, as currently constituted, is printed. Unpacking continues with the next record in the block.

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WARNING - PRINT BUFFER OVERFLOW

This message is displayed when unpacking a print message block and encountering a record which is longer than the allotted 132 print characters. Only the first 132 characters are printed and unpacking continues with the next record.

WARNING - PUNCH BUFFER OVERFLOW

This message is displayed when unpacking a punch message block and encountering a record which is longer than the allotted 80 punch characters. Only the first 80 characters are punched and unpacking continues with the next record.

WARNING - RECORD NOT DELIMITED WITH 'IRS'

While unpacking a message block from the host, the last record of the block was found to be missing an IRS character. No statement is made about the veracity of this record since some information may have been lost somewhere in transit. Processing continues in a normal fashion. No action need be taken.

"<input>" IS AN INVALID OPTION

An option command (RO, SO, or TD) has been entered with an option which is not valid. The command is ignored. No action need be taken.

"<input>" - UNKNOWN COMMAND

This message is displayed in reply to an input command to RJE3780 which is not recognized as a legal command. The input is ignored and processing continues normally.

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<?END> CARD MISSING - EOF ASSUMED

This message appears on the SPD whenever a card deck is being sent to the HOST and a <?>DATA card is read before an <?>END card. The RJE3780 program assumes that the user wishes to start sending a new deck, and therefore, end the deck currently being sent.

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