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IBM System/360 Time Sharing System Remote Job Entry

Remote Job Entry (RJE) allows users at remote locations to submit punched-card input to, and receive printed output from, the central IBM System/360 Time Sharing System (TSS/360) installation.

RJE users can enter card decks in the same format as that used at the local, online card reader. Nonconversational SYSIN data sets can be entered for execution, and data-card card decks can be entered and stored as virtual storage data sets. Output can be returned to the originating location or routed to the installation's high-speed printer. SYSOUT data sets are returned to the originating location unless redirected by the system operator.

This publication describes RJE concepts, terminology, and procedures. Information required by users at remote locations including RJE control statements, is presented; also, commands used by the system manager, system administrator, and system operator to control the RJE system are described.

The user should have basic knowledge of TSS/360. This information is contained in IBM System/360 Time Sharing System: Concepts and Facilities, GC28-2003. In addition, he should be familiar with the TSS/360 command system, which is described in IBM System/360 Time Sharing System: Command System User's Guide, GC28-2001.



PREFACE

This publication describes the TSS/360 Remote Job Entry (RJE) feature.

Section 1: RJE Operation - control of remote stations, user access to the system, and input/output capabilities of the system.

Section 2: RJE Commands and Control Statements - formats, use, and examples.

Section 3: Format of RJE Input Decks - nonconversational SYSIN data sets, data-card data sets, and RJE input streams.

Section 4: 2780 Data Transmission Terminal - operating procedures and suggestions.

Appendix: Carriage Tape - to control printing format.

The reader is assumed to have an overall understanding of TSS/360 as presented in IBM System/360 Time Sharing System: Concepts and Facilities, GC28-2003, and of the TSS/360 command system as presented in IBM System/360 Time Sharing System: Command System User's Guide, GC28-2001.

Specific information about the remote station device is in IBM 2780 Data Transmission Terminal - Component Description, GA27-3005.

Second Edition (September 1971)

This is a major revision of, and makes obsolete, GC28-2057-0 and Technical Newsletter GN28-3163.

This edition is current with Version 8, Modification 1, of IBM System/360 Time Sharing System and remains in effect for all subsequent versions or modifications unless otherwise indicated.

Significant changes or additions to this publication will be provided in new editions or Technical Newsletters. Before using this publication, refer to the latest edition of IBM System/360 Time Sharing System: Addendum, GC28-2043, which may contain information pertinent to topics covered in this edition. The Addendum also lists the editions of all TSS/360 publications that are applicable and current.

Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

A form is provided at the back of this publication for reader's comments. If the form has been removed, comments may be addressed to IBM Corporation, Time Sharing System/360 Programming Publications, Department 643, Neighborhood Road, Kingston, New York 12401.

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The TSS/360 user at a remote terminal, or station, can enter batch jobs in the same format as that used at a local, online reader. He can enter nonconversational SYSIN data sets for execution or card decks to be stored within the system as virtual storage data sets. His output can be returned to his remote station or printed at the central installation's high-speed printer.

Acknowledgments of jobs received and batch sequence numbers assigned to nonconversational tasks are sent to the remote station at the end of each transmission from that station. If the transmission includes several individual jobs, the acknowledgments for each of them are queued up in an acknowledgment data set. This data set also contains messages related to initiation and completion of data set printing. The acknowledgment data set is sent and printed after an end-of-transmission (EOT) is received from the remote station.

RJE TERMINOLOGY

The following terms should be understood before reading this publication.

A remote station is a 2780 Data Transmission Terminal used to enter TSS/360 batch jobs at locations removed from the central installation. The batch jobs are card decks that can contain: nonconversational SYSIN data sets, (all the commands and data needed to run a nonconversational task), and data-card data sets (card decks that begin with a DATASET (data set descriptor) card, end with a %ENDDS card, and contain any information that the user wants in public storage as a cataloged data set).

An RJSTART control statement activates a remote station and prepares it to receive input. An RJEND control statement places a remote station in inactive state. All the activity that takes place between the time the RJSTART card activates the remote station and the RJEND card deactivates it is known as an RJE input/output session. During an RJE input/output session, nonconversational SYSIN data sets and data-card data sets are read in, and task output and output from PRINT commands is printed at the remote station or at the installation's online high-speed printer. The user controls the destination of his output unless the system operator intervenes by issuing a DIRECT command that specifies another location for the output. The user can issue the OUTPUT control statement to control the sequence and type of output dispatched to a remote station. By issuing the STATUS control statement, the user can display the status of RJE jobs; he can cancel jobs using the DELETE control statement. The CONTINUE control statement reinitiates output that was interrupted to enter input.

Each remote station is identified to the system by a station identification, (or station ID), which is a symbolic identification of a logical location or the "mailing address" for the RJE user's output. At various times, the same station ID could be assigned to different physical remote stations, but a station ID can only be assigned to one location at a time. Remote stations are granted access to the time-sharing system by the JOINRJE command; the QUITRJE command withdraws this access.

REMOTE STATION DEVICES

The RJE remote station is a 2780 Data Transmission Terminal, Model 1. The 2780 is connected to the central processing unit through a 2701 Data Adapter Unit with a Binary Synchronous Data Adapter, Type 2, equipped with the transparency feature, attached. The 2780, Model 1, is equipped with a 1440-series type printer and card reader. EBCDIC code is supported for both input and output; EBCDIC transparency is supported for input (that is, all 256 EBCDIC codes are transmitted as data characters). Output transmission is in normal mode (63-character set required).

A printer with a 144 character print line and the 63-character set print bar is required. The Extended Retry Transmission Feature allows the 2780 to perform up to fifteen retries in an effort to recognize a valid response to the last block of data transmitted before declaring an error condition. The Multiple Record Transmission Feature, an option, permits transmission of four records at a time from the card reader, instead of the standard two, and transmission of up to seven records at a time to the printer.

The 2780 Horizontal Format Control special feature (tabbing) improves remote station throughput by allowing records to be compacted. Record compaction reduces the time required for data transmission and allows for better utilization of the Multiple Record Transmission Feature. Tabs are not specified by the user; they are always preset at the 2780 at eight-byte intervals. Records to be transmitted to the 2780 are scanned from right to left at eight-byte intervals to check for blanks. Blanks encountered (if more than one) are removed and a tab character inserted after the last nonblank character; the remainder of the record is moved to the left to be contiguous with the tab character. This process is repeated until the end of the record is reached.

The telephone facilities, supported on a point-to-point basis, are:

- 2-wire or 4-wire private (that is, dedicated) line; rated at 2400 bits per second; used with Western Electric 201B1 modem (modulator-demodulator).
- 2-wire switched (that is, dial-up) line; rated at 2000 bits per second; used with a 201A3 modem.

RJE CONTROL

The commands that control authorization of remote stations are JOINRJE and QUITRJE; they establish the identification against which the station ID operands of RJSTART, PRINT, and DIRECT are validated. Operands in JOIN and PRINT give TSS/360 users the option of printing at a remote station. The DIRECT command allows the system operator to shift output to other remote stations or local printers.

Six control statements are used at the remote stations:

- RJSTART - starts each input/output session and identifies each remote station to the system.
- CONTINUE - restarts printing that was interrupted to read cards.
- STATUS - displays status of remotely submitted jobs or jobs destined for a remote station.
- OUTPUT - controls the sequence and type of output dispatched to a remote station.

- DELETE - removes user jobs from the system Batch Work Queue.
- RJEND - logically disconnects the remote station from the system.

SUMMARY OF RJE CHARACTERISTICS

RJE Input

Input from RJE devices is completely compatible with input from the local, online card reader. All the TSS/360 nonconversational facilities are available to the RJE user. Acknowledgment of all SYSINs and data sets received from the RJE remote station including the batch sequence numbers assigned to SYSINs are listed at the remote station at the end of each transmission. If a printout is in process, the acknowledgments are listed after printout is complete. In case of system or remote station failure, the user's acknowledgments are saved until the next time the station is active.

RJE Output

Output generated as a result of RJE input is automatically routed back to the point of origin unless:

- The system operator issues a DIRECT command specifying another remote station or a local, online printer, or
- The RJE user specifies that output be issued to a local, online device or to a remote station other than the originating station via the PRINT command.

Users who were joined with the RJE privilege can route data sets to remote stations from any conversational terminal by specifying the station ID of the remote station as an operand of the PRINT command. Printouts can be interrupted to read in cards. After the cards have been read, printing can be resumed by issuing a CONTINUE control statement.

Printer control characters that can be generated by TSS/360 but do not exist on the 2780 printer (for example, suppress spacing and skips to channels 9 through 12) are defaulted to single space.

Trailing blanks of records are removed to reduce transmission time.

Remote Station Control

Remote stations can be added to, and deleted from, the system, by use of the ASNED command, in the same manner as local unit record devices. Remote stations must be joined in order for their station IDs to be validated. Thus, the user is ensured of receiving his output, and the system is protected from unauthorized users. The system operator is notified when a remote station fails or is experiencing line trouble.

SECTION 1: RJE OPERATION

CONNECTING A REMOTE STATION

Remote stations are connected to TSS/360 in the same way as local, online, unit record devices.

- During system generation, communication lines must be reserved for the 2780 by using the DEVGRP racrc instruction.
- The system operator must assign lines for the remote devices by issuing the ASNBD (add) command with a symbolic device address as the operand. If the remote station is connected via a dedicated line, the symbolic device address is the one directly associated with the line; if the station is connected via a dial-up, the symbolic device address is that of any line reserved for RJE when the system was generated.
- If the line is dedicated, the remote work station is then ready for the RJSTART card. If it is a dial-up line the user must first dial into the system and then enter the RJSTART card.

AUTHORIZING USE OF REMOTE JOB ENTRY

Before an RJE input/output session can be initiated, the station ID that is used to designate the work station must be authorized by a system manager or administrator in a JOINRJE command. The station ID in the JOINRJE command is a symbolic designation only; it does not indicate a specific 2780 device. A list of valid station IDs is maintained by the system; it is updated by JOINRJE and QUITRJE commands. The station IDs specified in user commands are validated against the list maintained by the system to ensure that the user receives his output and to protect the system against unauthorized users.

INITIATING AN INPUT/OUTPUT SESSION

An RJE input/output session consists of all the activity that takes place at a remote station from the time an RJSTART card is read by the system until the session is terminated by an RJEND card.

When the RJSTART card is recognized, its station ID operand is compared with the list of station IDs maintained by the system. If valid, the station ID is used to route subsequent output to the station. If the station ID is invalid or is already in use for another physical work station, a message is printed at the remote station and another RJSTART card must be entered. Once the RJSTART card is read and validated, it is not necessary to enter another one unless an RJEND card has ended the session and reactivation of the station is required.

DISCONNECTING A REMOTE STATION

There are three ways of disassociating a remote station from the system:

- A remote station is logically disconnected from the system (that is, placed in INACTIVE state) whenever the user enters an RJEND card.

- A remote station's communication line is disconnected from the system when the system operator issues the ASNBD (delete) command.

Note: For the above two cases, the line remains busy unless the user hangs up the modulator/demodulator by pushing the TALK button.

- The system manager or administrator can eliminate a station ID by issuing a QUITRJE command. An RJSTART card entered with this deleted station ID will not be accepted, and an error message will be returned to the remote station.

If there is no job in progress when the RJEND card is received, the Acknowledgment Data Set is printed. If a printout is in progress, the print request is rescheduled, and then the Acknowledgment Data Set is printed. If the station is connected to the central system with a switched line, the connection with the central system is broken, and the line is made available for another remote station. It is also necessary to hang up the line (that is, press the TALK button) to make the 2780 not busy.

REMOTE STATION STATES

Remote stations can be in one of the following states: INACTIVE, CONTROL, TRANSMIT, and RECEIVE. When one of the commands representing a valid change of state is received, operation proceeds in the new state until another valid change is specified by the remote station. Invalid requests are not serviced, and an error message is sent to the remote station which made the request.

After startup procedures have been completed at the central system, the system is ready to service the remote stations. At this time all remote stations appear in the INACTIVE state.

INACTIVE State

When a remote station is in the INACTIVE state, it is logically detached from the RJE system. All active remote stations are placed in the INACTIVE state when the central system is closed down. The central system assumes that an INACTIVE remote station does not want to participate in RJE activities and, consequently, it does not initiate any data transmissions to the station. However, it will accept an RJSTART control statement from an INACTIVE remote station. If any other input is received from an INACTIVE remote station, it is refused, and an error message is returned to the remote station. A remote station is made INACTIVE by submitting an RJEND control statement.

CONTROL State

CONTROL state is entered initially when the system operator assigns dedicated or dial-up lines to the 2780 and, when necessary, the dial-up procedure is accomplished. Subsequently, CONTROL state is the transition state between any two of the other three states.

TRANSMIT State

TRANSMIT is the input state; the system is reading cards from the 2780. A remote station enters TRANSMIT state when the START button is pushed. The LOGON command indicates that the user wants to execute the job stream that follows; the DATASET card indicates that he wants to enter data to be stored within the system as a virtual storage data set. RJE input is accepted by the central system only from remote stations in TRANSMIT state. RJE input consists of job deck entries and remote station commands.

In all cases, TRANSMIT has priority over RECEIVE; printing can be interrupted to read cards, and when all the cards have been read, printing can be resumed. Card reading, however, cannot be interrupted so that printing can be done.

RECEIVE State

RECEIVE is the output state; the system is printing on the 2780. The central system transmits remote station output and user output to a remote station in RECEIVE state. User output is returned only if the remote station is in RECEIVE state. If the station is in INACTIVE state (RJEND control statement was the last card entered) or TRANSMIT state (cards are being read in), output will be queued until the station is again in RECEIVE state. RECEIVE state can be activated by the CPU whenever the 2780 is in CONTROL state.

STARTUP AND SHUTDOWN

When the central system is in operation, remote station users can begin and end RJE activities as necessary, provided that an ASNED command has been issued for their line. When the central system ceases operation, all remote stations are closed down.

USER ACCESS

A user gains access to the RJE system by submitting the LOGON command at an active remote station (the same procedure as when using the online high-speed card reader). This procedure ensures that only valid TSS/360 users have access to the RJE system. A user may submit input and receive output at any remote station in the system. When he is not logged on, a user is associated with the last remote station at which he was logged on.

SYSTEM SECURITY

The RJE system is protected from unauthorized access through the combined use of the remote station identification in the RJSTART control statement and the user identification in the LOGON command.

Verification of valid remote stations occurs when the RJSTART card is read; verification of valid TSS/360 users is established from the LOGON command's user identification operand.

INPUT AT THE REMOTE STATION

The input at the remote station consists of RJE control statements and TSS/360 commands and data.

RJE Control Statements

Six control statements (or cards) are used at the remote station: RJSTART, CONTINUE, STATUS, OUTPUT, DELETE, and RJEND. The RJSTART card starts an input/output session and identifies the remote station to the system. The CONTINUE card restarts printing that was interrupted to read cards. The RJEND card logically disconnects the remote station from the system.

TSS/360 Commands and Data

The user at a remote station can enter batch jobs in the same format as that used at a local, online reader. He can use LOGON and LOGOFF

commands to delimit executable nonconversational SYSIN data sets; he can use the DATASET card to create virtual storage data sets. Output is always returned to the originating remote station as printer output unless the user specifies a high-speed online local printer on another RJE remote station in a PRINT command. SYSOUT data sets are always returned to the originating station unless redirected by the system operator.

Input Processing

After the remote station has been connected and an input/output session has been initiated, remote job entry transmission can be started. The batch decks are in the same format as those entered in the local card reader.

An RJE user places his card deck into the card reader hopper and presses the START and end-of-file (EOF) buttons simultaneously; the system then reads the cards. If the station ID has not been validated, all cards are flushed through the reader, and an error message is printed at the remote station printer.

While the input stream is being read:

- All messages, batch sequence numbers assigned, and other acknowledgments of input are saved by the system in a data set. The contents of this data set are transmitted to the remote station at the normal end of a transmission from the remote station (that is, after reading all the cards in the hopper).
- The station ID is associated with all tasks and output generated as the result of a remotely entered SYSIN.
- The user is charged for each card read and line printed. The charge is made to the user ID that appears in the LOGCN or DATASET card, or to the data set name of a print job.

When a station completes transmission to the central system, the line is again ready to receive input. Thus, the system is always prepared to respond to new input, unless it is in INACTIVE state.

OUTPUT AT THE REMOTE STATION

Two kinds of output are received at the remote station; job output and messages.

Job Output

Job output is the result of execution of remotely submitted jobs; it includes SYSOUT messages and data sets printed.

Printed output that results from PRINT commands in RJE input and from SYSOUTS is automatically routed back to the point of origin. The user or system operator can override this automatic routing:

- A user at a remote station, who has previously been joined with the RJE option can specify in a PRINT command that output is to be routed to another remote station or to the local printer.
- A user at a terminal, previously joined with the RJE option, can also route printed output to a remote station from a conversational terminal via the station ID operand of the PRINT command.

- The system operator can specify, via the DIRECT command, that printed output be routed to another remote station or local printer. This rerouting applies to all output for the station; output cannot be selectively redirected.

A request to print data sets residing on private storage is defaulted to the local printer (that is, the system ignores the station ID). To have the data set printed at a remote station, the user can copy the data set onto public storage before issuing the PRINT command. Then, the output can be printed at the remote station.

During output, printer-control characters that are generated by TSS/360, but are nonexistent on the 2780 (for example, suppress spacing, skip to channels 9-12), are defaulted to single space. All trailing blanks on output records are stripped off to reduce transmission time. When printing is completed, the transmission line is prepared to receive input.

The user can interrupt a printing by pressing the STOP button on the printer. Then, he can enter his cards in the reader and press the START button. When all the cards have been read, the user can resume printing by readying the printer (this includes turning the operation mode switch from TSM TRSP to OFFLINE and back again) and entering a CONTINUE control statement in the reader (see CONTINUE control statement later).

Messages

Messages received at the remote station include responses to input from the remote station, diagnostic messages, messages sent to RJE users and the system operator from bulk input/output operations that include any information considered desirable by the installation (for example, closedown of the central system).

Messages are sent to remote stations acknowledging completion of a read cards operation; the message indicates the number of cards read. When a PRINT job is completed, an acknowledgment message is printed immediately following the job.

Acknowledgment messages are saved until the printer is available; a user's output will not be interrupted to issue an acknowledgment message.

The RJE Acknowledgment Data Set

Because the printer or the line is not always available (for example, when cards are being read), it is not always possible to display a message at a user's station. Therefore, the Acknowledgment Data Set is maintained by the system as a mechanism for queueing up messages (for example, acknowledgments or error messages) and displaying them when possible.

The RJE Acknowledgment Data Set is named TSS*****.RJEACK; it has virtual partitioned organization. There is a member for each station ID and a member - VALIDSTA - that contains a list of valid station IDs; the members have virtual index sequential organization.

The format of records in this data set is:

record length 4 bytes	message ID 8 bytes	key 2 bytes	text
--------------------------	-----------------------	----------------	------

SECTION 2: RJE COMMANDS AND CONTROL STATEMENTS

There are three commands - JOINRJE, QUITRJE, and DIRECT - and six control statements - RJSTART, CONTINUE, STATUS, OUTPUT, DELETE, and RJEND - associated with the TSS/360 remote job entry feature. In addition, two commands - JOIN and PRINT - are modified to support remote job entry.

COMMAND AND CONTROL STATEMENT FORMAT ILLUSTRATIONS

The notational conventions described in the following paragraphs are used in the command and control statement format illustrations to explain how an operand is to be written.

Use of Metasymbols

Four metasymbols are used in the format illustrations to describe operands:

<u>Name</u>	<u>Symbol</u>	<u>Use</u>
braces	{ }	delimit alternatives, delimit syntactical units (one or more operands) that can be repeated.
brackets	[]	delimit optional operands.
vertical stroke		represents "exclusive OR" and separates alternative representation of operands; for example, {Y N} denotes that, for the syntactical unit enclosed by the braces, either Y or N may be chosen, but not both. Alternatives may also be indicated by aligning the choices vertically within the braces: $\begin{Bmatrix} Y \\ N \end{Bmatrix}$
ellipsis	...	indicates that the preceding syntactical unit may be repeated one or more times.

Operand Description

Within the operand field of the format illustration, the word or phrase used to identify each operand is written in lowercase letters. For positional operands, only the lowercase word or phrase appears; for keyword operands, the keyword (to the left of the equal sign) is in uppercase letters, and the keyword descriptor (to the right of the equal sign) is in lowercase letters.

Note: Unless otherwise noted in the operand description, all operands shown in keyword format may be specified positionally. However, the converse is not true; operands shown in positional format must be specified in positional notation.

Coded Value: This is a character or string of characters that is to be written exactly as shown in the format illustration. Coded values always appear in format illustrations as numbers or uppercase letters, either to the right of the equal sign or standing alone.

The comma, the period, and the parentheses have special significance in format illustrations. Commas (or the tab) must always be entered to separate operands, or to show the omission of operands, unless no other operand follows the omission. Parentheses and periods must be entered as shown in the illustrations.

REMOTE JOB ENTRY COMMANDS

Two RJE commands, JOINRJE and QUITRJE, permit the system manager or administrator to add new station IDs to, and eliminate existing station IDs from, the list of valid station IDs maintained in the system. The third RJE command, DIRECT, allows the system operator to reroute the RJE output. See Table 1.

RJE commands are specified in the same manner as other TSS/360 commands: if entered from the terminal keyboard, they may be entered in free-form format; if entered from a card reader, the LOGON and LOGOFF commands and the DATASET and %ENDDS cards must start in column 3.

In addition to these three RJE commands, the TSS/360 JOIN command is used to specify whether a user to be joined can use the installation's RJE facilities, and the TSS/360 PRINT command is used to specify printing of a data set at an RJE remote station.

Table 1. Remote job entry commands

Command	Available to	Function
JOINRJE	System manager or administrator	Assigns a station ID to a remote station. A station must be joined to the system before input will be accepted from it or output sent to it.
QUITRJE	System manager or administrator	Removes a station ID from the list of valid station IDs.
DIRECT	System operator	Reroutes an RJE station's output to local printers or to another remote station.

JOINRJE Command

The JOINRJE command is used by the system manager or administrator to grant a new RJE remote station access to the time-sharing system.

Operation	Operand
JOINRJE	STATION=station name [,TYPE=station type] [,MRF={Y N}][,TAB={Y N}] [,BRK={Y N}][,REC={Y N}]

STATION

The RJE name of the remote station to be added to the system.

Specified as: 3 to 8 alphanumeric characters, the first of which is alphabetic.

System default: None.

TYPE

The type of remote station.

Specified as: If entered, must be specified as 2780.

System default: 2780

MRF

The presence or absence of the Multiple Record Transmission Feature on a 2780 remote station.

Specified as: Y - The Multiple Record Transmission Feature is present.
N - The Multiple Record Transmission Feature is not present.

System default: N

TAB

The presence or absence of the Printer Horizontal Format Control on a 2780 remote station.

Specified as: Y - The Printer Horizontal Format Control is present at the remote station.
N - The Printer Horizontal Format Control is not present at the station.

System default: N

BRK

Whether lines of asterisks are to be printed as break characters between print jobs to separate them.

Specified as: Y - Print break characters.
N - Do not print break characters.

System default: N

REC

Whether the station is to receive data originated from any other station.

Specified as: Y - The system will allow PRINT commands from any authorized user to specify this station.
N - The system will only allow PRINT commands to be issued against the station by jobs it originated or that are originated by the system manager, administrator, or operator.

System default: Y

Programming Notes: An RJE user must request the system manager or administrator to join his station ID to the system before any input will be accepted from or transmitted to it. The JOINRJE command merely validates that the station ID is not a duplicate and then adds it to a validation data set (a member of the Acknowledgment Data Set) - TSS*****.RJEACK(VALIDSTA).

The term "station ID" does not actually designate a physical location or a specific piece of hardware, but a logical location or the current "mailing address" for the RJE user's output. An RJE user could enter his input at one remote station, disconnect (with an RJEND card), and then enter an RJSTART card with the same station ID at another remote station. Output will then be received at his new location. The station ID ensures that RJE output is routed to the current location.

The system manager or administrator can rejoin a remote station by specifying the name of a previously joined remote station (without issuing a QUITRJE command); the remote station will be assigned the parameters entered when a rejoin is requested. The changes will not be effective if the station is attached; when the station is detached (via RJEND) and then attached (via RJSTART), the changes will be effective.

Example: The system manager wants to add a new station - REMOTE - to the list of valid station identifications:

```
JOINRJE    STATION=REMOTE
OR
JOINRJE    REMOTE
```

QUITRJE Command

The QUITRJE command is used by the system manager or administrator to revoke an RJE remote station's access to the time-sharing system.

Operation	Operand
QUITRJE	STATION=station name

STATION

The RJE name of the remote station whose access to the system is to be revoked.

Specified as: 3 to 8 alphanumeric characters, the first of which is alphabetic.

System default: None.

Programming Notes: The QUITRJE command removes an RJE station ID from the validation data set. After this command is executed, an RJSTART card specifying this name will not be accepted.

Example: The system manager wants to remove station REMOTE from the list of valid station identifications.

```
QUITRJE    STATION=REMOTE
OR
QUITRJE    REMOTE
```

DIRECT Command

This command allows the system operator to reroute RJE output to local online printers or to another RJE station.

Operation	Operand
DIRECT	STAIID1={ ALL } [,STAIID2=station-2]

STAIID1

The RJE station whose output is to be rerouted. If the ALL option is specified, all output queued for RJE devices is rerouted to the local, online high-speed printers. If ALL is specified, STAIID2 should not be specified and is ignored if specified.

Specified as: 3 to 8 alphanumeric characters, the first of which is alphabetic; or ALL.

System default: None.

STAIID2

The RJE station to which the queued output for STAIID1 is to be redirected.

Specified as: 3 to 8 alphanumeric characters, the first of which is alphabetic.

System default: If STAIID2 is not specified, the output for STAIID1 defaults to the local, online, high-speed printer.

Programming Notes: This command is provided for use in the event that an RJE station malfunctions and the user does not want to wait for repairs to be completed before receiving his output. It can also relieve the burden on public storage in the event that one or more RJE stations are inactive. If public storage is being exhausted, the DIRECT command can specify that all RJE output be defaulted to the faster local printers.

Users must be restricted from using "ALL" and "ICCAI" as station designations, since "ALL" is a specification for STAIID1 and LOCAL pertains to the online print device.

Examples: The system operator wants to reroute all output for remote station LAURIE to remote station KATHLEEN.

```
DIRECT      STAIID1=LAURIE,STAIID2=KATHLEEN
or
DIRECT      LAURIE,KATHLEEN
```

The system operator wants to redirect all RJE output to the local, online high-speed printer:

```
DIRECT      ALL
```

REMOTE JOB ENTRY CONTROL STATEMENTS

The six RJE control statements allow the user to start and stop RJE sessions or to continue an interrupted session. See Table 2.

RJE control statements are identified by two consecutive periods immediately preceding the operation field. The operation field must be specified in this format, for example:

```
..RJSTART
```

is the correct way to specify the control statement, but

```
.. RJSTART ,
or
RJSTART
```

would not be recognized as an RJE control statement.

Table 2. Remote job entry control statements

Control Statement	Available to	Function
RJSTART	User at remote station	Attaches and identifies a remote station to the system or resumes RJE activity after the remote station has been logically disconnected from the system.
CONTINUE	User at remote station	Specifies the disposition of interrupted output: output can be restarted, resumed, or canceled.
STATUS	User at remote station	Allows a user to request the status of remotely submitted jobs and jobs destined for remote stations.
OUTPUT	User at remote station	Controls the sequence and types of jobs dispatched to remote stations.
DELETE	User at remote station	Allows the user to remove (or cancel) jobs from the Batch Work Queue.
RJEND	User at remote station	Detaches a remote station from the system.

RJSTART Control Statement

The RJSTART control statement attaches and identifies a remote station to the system. Only after the RJSTART card has been received can any further input or output be scheduled for the remote station.

Operation	Operand
..RJSTART	station name

station name

The RJE name of the remote station supplied by the system manager or administrator when the station was joined to the system.

Specified as: 3 to 8 alphanumeric characters, the first of which is alphabetic.

System default: None.

Programming Notes: Only after a station has been connected via RJSTART can any further input or output be scheduled for it. Therefore, the RJSTART control statement must be the first submitted at an inactive station. A subsequent RJSTART control statement is not recognized when received from an active station.

An RJSTART control statement must be submitted to resume RJE activity after the 2780 has been detached from the system (by an RJEND control statement or a system failure).

When an RJSTART card is read, and is valid, any pending acknowledgments for the station are printed (that is, messages not printed because of system failure). If no further input is received, pending output

will be printed. A message is also issued if an invalid station ID is entered or if the station ID is currently being used by another station.

Example: A remote station is to be started and assigned the station ID ZEBRA:

```
..RJSTART ZEBRA
```

CONTINUE Control Statement

The CONTINUE control statement specifies the disposition of interrupted output. Conditions that may cause the interruptions are:

- A forms-requirement message, indicating a change in the form number specified for the output, sent to the RJE station.
- User intervention at the remote station to read in a high-priority job.
- Equipment failure during an output operation; for example, a forms-jam.

Operation	Operand
..CONTINUE	[BEGIN NO]

BEGIN

Specifies that the user wants the entire data set retransmitted.

NO

Specifies that the user wants printing of the data set discontinued and the request deleted from the Batch Work Queue.

System default: Transmission or printing of the data set is resumed at the point of interruption.

Programming Notes: When interrupted output is pending for a remote station, no output is resumed until a CONTINUE control statement is received. Input will still be accepted, however. If the user submits an RJEND statement when a discontinued data set is pending, the entire data set will be transmitted when the station again becomes active.

The CONTINUE control statement provides three options:

1. The user can request the transmission of the entire interrupted output data set.
2. The user can specify that transmission be resumed at the point of interruption.
3. The user can specify that he does not want the output and can direct the system to delete the data set.

If output is expected at a remote station and it is not received, a CONTINUE card should be entered; the system may be waiting for such an indication before proceeding.

If a CONTINUE card is entered to resume interrupted output, the contents of the 2780 hardware output buffer may be reprinted. To prevent reprinting of records when printing is to be restarted from the beginning, the output buffer should be flushed by turning the terminal dial from TRANSMIT to OFFLINE and back to TRANSMIT, and pushing the START button on the printer.

The CONTINUE card must appear between logical delimiters (that is, after LOGOFF or %ENDDS and before IOGCN or DATASET) to be recognized by the system.

Examples: An interrupted print job is to be resumed; printing is to be restarted from the beginning:

```
..CONTINUE BEGIN
```

Printing of a data set was interrupted; when the remote station is restarted, printing is not to be resumed, and the request deleted from the Batch Work Queue. SYSOUT data sets and PRINT data sets with ERASE=Y specified are deleted from the system.

```
..CONTINUE NC
```

Printing is to be resumed from the point of interruption:

```
..CONTINUE
```

STATUS Control Statement

The STATUS control statement allows a user at a remote station to request the status of remotely submitted jobs and jobs destined for remote stations. RJE returns the status of only those jobs, addressed by this command, that are currently in the system and for which the requester is a valid recipient.

Operation	Operand
..STATUS	[J=batch sequence number] [U=user identification]

J

indicates that the request is for the status of a job identified by the specified batch sequence number. If the remote station from which STATUS is submitted is not the designated recipient, or if this job is not in the system, the status request is denied, and the user is informed.

Specified as: A decimal number in the range 257-9999.

U

indicates that the request is for the status of all jobs currently in the system with the specified user identification or for all output for which the indicated user is the designated recipient. Status will be returned only for those jobs destined for the remote station from which STATUS is entered.

Specified as: One to eight alphanumeric characters, the first of which is alphabetic.

System default: The status of all jobs submitted by, or destined for, the remote station from which STATUS is entered.

The STATUS command provides the following capabilities:

1. The user can request the status of a specific job by specifying its batch sequence number.
2. The user can request the status of all jobs in the system for which he is a valid recipient.

- The user can request the status of all jobs that are currently associated with (or destined for) his station ID.

The user receives a response for each job that satisfies the command. The response will be returned to the user's station the next time the Acknowledgment Data Set is transmitted. The responses will be grouped in the data set and will be preceded by two lines of descriptive heading. Each response contains the following information:

- BSN - Batch Sequence Number (or Job Name).
- USERID - The user identification.
- TID - The task number assigned if active.
- TYPE - This field will indicate if the batch request is a List (Print), Execute, Read tape, or Write tape.
- STAT - This field will indicate if the job request is active (A), awaiting execution and pending (P), canceled (C), shutdown (S) and if erase is specified (E) (for example, P/E).
- DEV - This field will show the type of device required, unit record (U/R), Remote Job Entry (RJE), etc.
- STAID - The station identification for RJE jobs will be shown here.
- DSNAME - The data set name involved (up to 35 characters).

The following depicts the image of the STATUS control statement headings and the format of the response lines:

```
BATCH WORK QUEUE STATUS AT date AND time
BSN USERID TID TYPE STAT DEV STAID DSNAME
0262 USERID03 057 LIST A/E U/R RJESTA01 DSNAME.MAY OCCUPY.UP.TO.35.SPACES
      EXEC F RJE
      RTAP C
      WTAP S
      PUN
↑   ↑           ↑   ↑   ↑   ↑   ↑   ↑
|   |           |   |   |   |   |
0   5           14  18  23  28  32   41
```

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

Programming Notes: The ESN indicates the relative priority of each job in the Batch Work Queue (the lower number being of higher priority). However, certain jobs may be dispatched out of sequence depending upon their private resource requirements (for example disks). This priority may be overridden with respect to output jobs via the OUTPUT control statement.

The STATUS control statement entered will precede the response headings.

OUTPUT Control Statement

The OUTPUT control statement controls the sequence and types of jobs dispatched to the remote station. OUTPUT allows the RJE user to request, on a priority basis, all queued output for his remote station by individual entry user identification, or to specify that output be suspended.

Operation	Operand
..OUTPUT	J=batch sequence number U=user identification PR HCLD

J

Indicates that the request is for the job associated with the specified batch sequence number. The user receives the output if the station ID associated with the job matches his own.

Specified as: A decimal number in the range 257-9999.

U

Indicates that the request is for all jobs destined for the submitter's station ID that bear the specified user identification.

Specified as: One to eight alphameric characters, the first of which is alphabetic.

PR

Indicates that the user wants all print jobs destined for his work station to be transmitted.

Specified as: PR

HOLD

Specifies that the user wants all dispatching of output to his station to be suspended (with the exception of acknowledgments). Once an OUTPUT control statement specifying the HOLD operand has been accepted, the user must request subsequent output by entering an OUTPUT control statement with another operand.

Specified as: HOLD

System default: An OUTPUT control statement submitted with a blank operand field resets the output status of the remote station to normal output mode (that is, all jobs queued for the station will be dispatched in the order of occurrence in the Batch Work Queue).

Programming Notes: Once an RJE station is identified to the system via a valid RJSTART card, the station is ready to receive output (normal mode). In normal mode, output is dispatched from the Batch Work Queue to the RJE station on a first-in first-out basis. However, the RJE user can gain immediate control of the dispatching process by following the RJSTART card with an OUTPUT card that specifies the HCLD option. The system will then not dispatch any output to the station until an OUTPUT card specifying another option is entered (HCLD mode).

When in HOLD mode, the subsequently requested option remains in effect until changed by a subsequent OUTPUT card, with the exception that the J or BSN option has effect only for one pass through the Batch Work Queue, after which the previous option is restored. If an entry bearing the BSN specified does not exist or does not belong to the requesting station, the request is ignored on subsequent scans. The HCLD option, however, can only be overridden by a blank operand to restore normal output status.

The OUTPUT control statement can be entered at any time. By entering OUTPUT immediately after RJSTART, the user can inspect any queued output via the STATUS command and thus ascertain the order of output. He can also run in normal mode and from time to time petition a particular job

or group of jobs (via the J, U, or PR parameters). In this case, the specified option will remain in effect until no more jobs of the type requested remain in the Batch Work Queue or until a new OUTPUT control statement is entered. Normal mode is then restored, and no message is sent to the RJE station. If an output job is in progress when an OUTPUT command is entered, it will be allowed to finish unless a CONTINUE NO control statement follows the OUTPUT control statement.

Examples: The user wants to receive the printed output from job assigned batch sequence number 0567.

```
..OUTPUT    J=0567
```

Output from all jobs associated with the user identification TERI is to be printed.

```
..OUTPUT    U=TERI
```

DELETE Control Statement

The DELETE control statement provides the user at a remote station the ability to remove (or cancel) jobs from the system Batch Work Queue. Any job that a user sees in his responses from the STATUS control statement can be removed via this control statement.

Operation	Operand
..DELETE	J=batch sequence number, U=user identification

J

Specifies that the job or output assigned the specified batch sequence number (ESN) is to be deleted from the Batch Work Queue.

Specified as: A decimal number in the range 257-9999.

U

Specifies the originator or owner of the job. This command is ignored if the user requesting the removal is not the user who originated the job.

Specified as: One to eight alphanumeric characters, the first of which is alphabetic.

Programming Notes: DELETE performs a function similar to the conversational CANCEL command. The user will see no response from the DELETE in his Acknowledgment Data Set, although the command itself will appear there. If DELETE is accepted by RJE, the request will be performed. This may be verified by a subsequent STATUS control statement submitted in a separate transmission. If DELETE is issued against a job not destined for the submitter's station, it is ignored.

Example: User KATHLEEN wants to remove from the Batch Work Queue a request with batch sequence number 426:

```
..DELETE    J=426, U=KATHLEEN
```

RJEND Control Statement

The RJEND control statement detaches a remote station from the system.

Operation	Operand
..RJEND	

Programming Notes: If there is no job in progress when this card is received, the Acknowledgment Data Set is printed before the station is disconnected. If a print job is in progress, it will be rescheduled for later printing before the station is disconnected. When the RJEND card is recognized in the middle of a job stream (for example, between a LOGOFF and a LOGON card), the remaining cards are flushed before the Acknowledgment Data Set is printed. The RJEND card will not be recognized unless it appears after a LOGOFF or %ENDDS or after an implied ending sequence.

Once RJEND is entered, the line must be redialed; the modem light remains lit. It is also necessary to hang up the line (that is, press the TALK button) to take the line out of busy state and turn out the DATA light. If this procedure is not followed, the user will continue to be billed for the line by the common carrier. An RJEND card should not be entered if output is expected imminently because the station would have to be restarted (via RJSTART) before the output could be received.

If RJEND is entered in the middle of a printout, the printout will be restarted when an RJSTART card is entered for the station.

SECTION 3: FORMAT OF RJE INPUT DECKS

The format of RJE input decks, identical to TSS/360 batch input, is summarized here. Two types of input data sets are permitted: nonconversational SYSIN data sets and data-card data sets. The two types may be interspersed, one following another, in any order between the RJSTART and RJEND delimiters. The rules for setting up these data sets are given below.

Note: When the user wants to enter a nonconversational SYSIN data set together with the data sets it uses, he must be certain that the data sets precede the SYSIN data set. The system will generally try to execute the SYSIN data set as soon as it has been read.

The acceptable character set for punched cards is described in Terminal User's Guide.

NONCONVERSATIONAL SYSIN DATA SETS

A nonconversational SYSIN data set contains all commands and data needed to run a nonconversational task. These commands are punched in exactly the format used to enter commands from a terminal. The first card must be a LOGON command; the last, LOGOFF. Other commands are as required for the particular task. Only the LOGON and LOGOFF commands must begin in column 3. Any command that is preceded by a break character (normally the underscore) must begin with the break character in column 1 if it is to be recognized properly. When the data set is read in, it becomes the SYSIN data set of a nonconversational task; it is executed as soon as space is available. After execution, the SYSIN data set is erased; it does not remain in the catalog nor in system storage. The card-deck format is shown in Figure 1.

The SYSIN data set may include data that is to be read by the user's object program during execution. If so, the data to be read must appear immediately after the command that will start execution of the

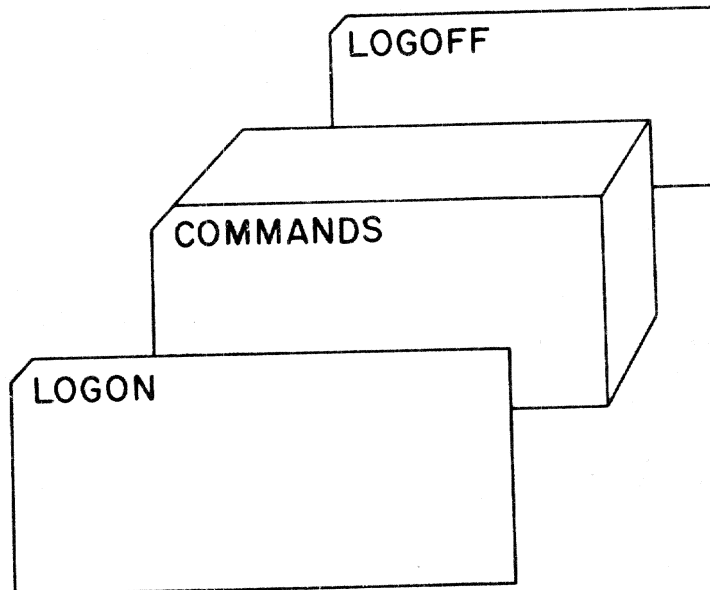


Figure 1. Nonconversational SYSIN data set that contains only commands

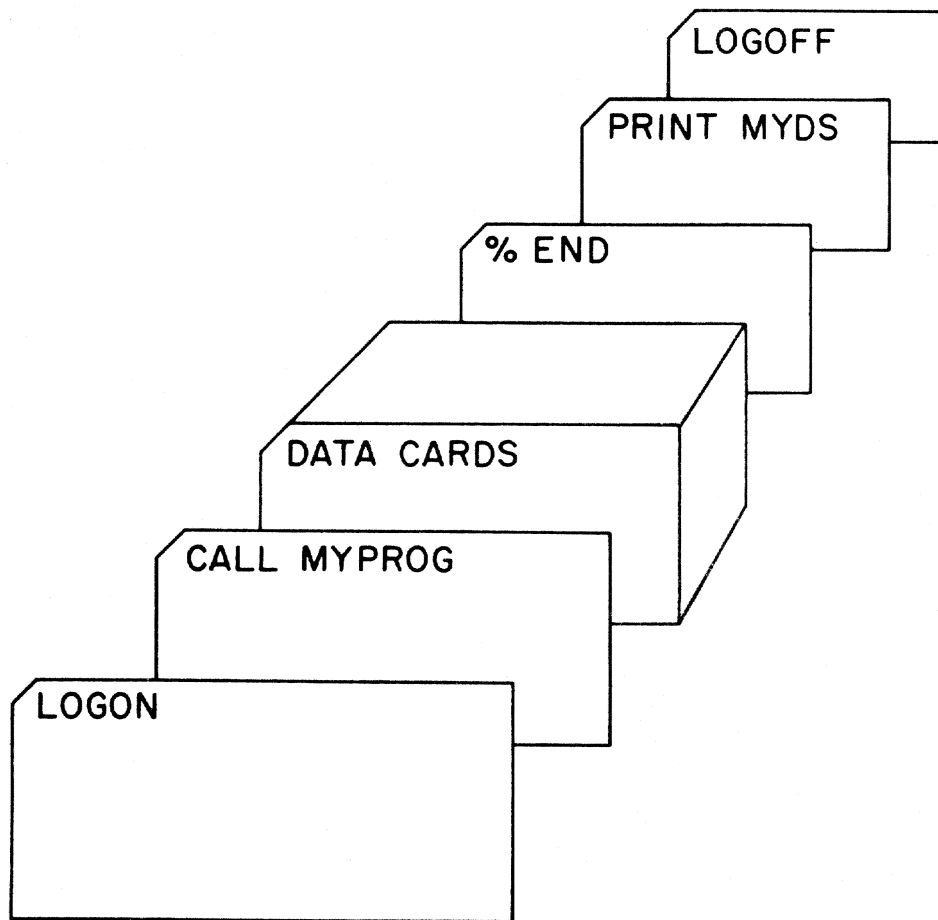


Figure 2. Nonconversational SYSIN data set that contains commands and data

user's program. (Card data may also start in column 1.) Also for FORTRAN data the end-of-data card, %END, starting in column 1, must follow the last data card, as in Figure 2.

DATA-CARD DATA SET

This type of data set, shown in Figure 3, contains any information the user wants to put into public storage as a cataloged data set; it may include commands. When this type of data set is read, a virtual storage data set is created and cataloged in public storage. This virtual storage data set will continue to reside in storage until it is specifically erased. Unlike the nonconversational SYSIN data set, it is not executed upon being read.

The first card of the data set must be a data descriptor card; the last must be the %ENDDS card. Each must start in column 3.

Data Descriptor Card

This card provides information needed by the system to create the desired data set; the format, with DATASET starting in column 3, is:

Operands

DATASET, user identification, data set name, [format],
[starting number], [ending number],

LINE
FIN
COMP
CARD

, [error][,REPLACE]

A description of the operands and their specification is in Command System User's Guide, Appendix B.

%ENDDS Card

This card, with %ENDDS starting in column 3, marks the end of a data set that is entered following a data descriptor card.

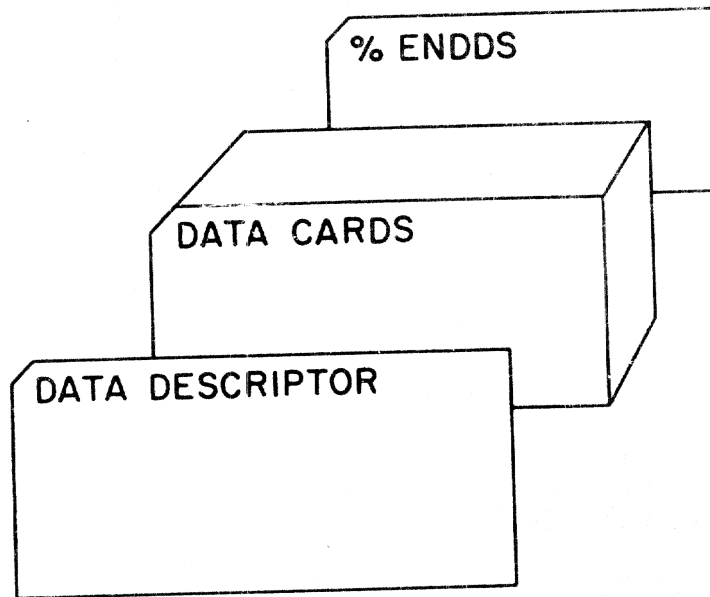


Figure 3. A data-card data set

RJE INPUT STREAMS

RJE input streams are made up of RJE input decks, as just described, and the RJE control statements used to control the work stations. The decks may be submitted as a group, or they may be submitted separately over a period of time.

An example of an RJE input stream is shown in Figure 4.

The first RJE session begins with an RJSTART card and is followed by three input decks. The first deck is a data set card deck (delimited by data descriptor and %ENDDS cards). The next two decks are nonconversational SYSIN data sets (delimited by LOGON and LOGOFF commands) for different users. The RJEND card terminates the RJE session.

The second RJE session is initiated by an RJSTART card and terminated by an RJEND card. The only other card in the session is a CONTINUE card. The purpose of this session is to activate the work station to receive any pending output. (If the RJEND card in the first RJE session had not been submitted, there would have been no need for the second session.)

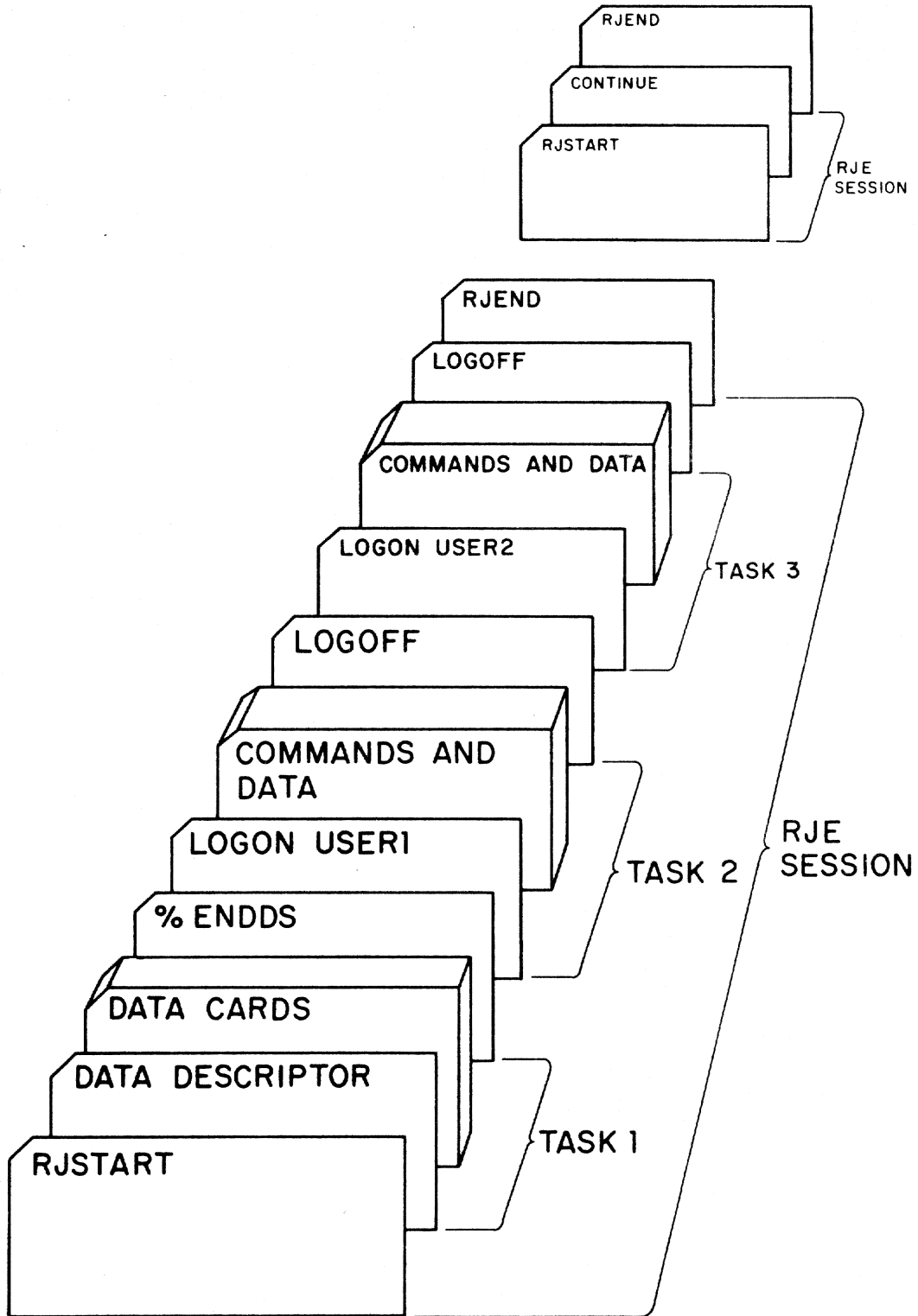


Figure 4. RJE input stream

SECTION 4: 2780 DATA TRANSMISSION TERMINAL

The IBM 2780 Data Transmission Terminal, Model 1, is the TSS/360 RJE work station. It provides input and output capability over command carrier communication lines via binary synchronous communications procedures. Card input and printer output are supported.

For a description of the various switches, lights, and controls, see IBM 2780 Data Transmission Terminal--Component Description, GA27-3005.

OPERATING PROCEDURES

Normal Operation

Sending Input: The mode switch must be set to "transmit transparency." After powering up the 2780 according to procedures in the 2780 manual an RJSTART card is placed in the card reader. If the 2780 is connected via a modem, the TALK button is pressed and the appropriate number dialed. When a continuous high-pitch tone is heard, the DATA button is pressed. The START and EOF (end-of-file) buttons are then pressed simultaneously. Pressing the START button causes synchronization with the CPU; the EOF button causes an end-of-transmission (EOT) character to be sent to the CPU after the last card is read. Subsequent RJSTART cards are not recognized when received from an active station. If additional input is to be sent, a LOGCN or DATASET card and the additional input follow the RJSTART card. If there is no Multiple Record Transmission Feature (MRF) at the remote station, the RJSTART card should be submitted by itself to improve performance on the first transmission.

The 2780 sends all the cards in the reader before entering CONTROL state. The audible alarm will be triggered by reading the last card and an EOT character will be sent to the CPU if the EOF key has been pressed. This alarm will sound until it is turned off either by receiving output from the central system or by 2780 operator intervention.

Receiving Output: When the 2780 receives an ECT character after receiving a complete transmission the audible alarm sounds unless the reader is in ready status. The alarm is turned off when the 2780 receives an ENQ character from the central system signifying more output, or when the 2780 operator presses the STOP key causing the 2780 to drop ready status. The START keys for the printer and reader must be pressed to return the 2780 to ready status.

Receiving Acknowledgment Data Set Output: The 2780 printer is skipped to channel 5 after printing the contents of the Acknowledgment Data Set. To prevent a runaway printer condition, the carriage tape must contain a punch in row 5. See "Appendix: Carriage Tape" for suggested format.

Discontinuing Output: Output in progress may be discontinued at any time by pressing the STOP key on the printer. After output has been discontinued, the central system will accept input, but no output will be sent until a CONTINUE command is received.

Special Forms Output: If output requiring special forms is to be sent by the central system, and a message giving the required form number is sent from the central system to the 2780. The required forms must be placed in the printer, and a CONTINUE control statement must be transmitted from the 2780 reader. Upon receipt of this control statement the central system transmits the output.

Preparing More Input: While output is being written on the printer, the 2780 operator may load and ready the reader to send more input. Since the work station is already active, no RJSTART command is submitted. The printer may be stopped to initiate card reading. Card reading cannot be stopped to initiate printing, however; the cards must all be read before the printer can be started. Output will not be resumed if reading of cards was terminated before a complete data set was entered (that is, before a LOGOFF or %ENDDS card was read).

Error Recovery Procedures

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

Failure During Input

When the 2780 card reader fails (jams, etc.), the condition should be corrected and the card reader and printer brought to ready status. If no activity takes place on a switched line for three minutes after dial-up (a valid RJSTART card is not entered), the system will disconnect the line. If the reader stops when reading cards, it is possible that the system did not acknowledge a transmission within 45 seconds (for example, an RSS dump was being taken). In that case the operator should push the START button to resume reading.

Aborted Transmission: The central system will abort data transmission if an RJSTART card is missing. The 2780 will drop ready status; the INCP light will be turned on, the audible alarm will sound. No message will be returned to indicate the error. The omitted RJSTART card and all input must be resubmitted.

Carriage Control Limitation: The range of carriage control functions for the 2780 is less than that provided for local printers. Specifically, the 2780 does not provide skips past channel 8, nor space suppression. When using the 2780 for remote output, these carriage control functions should be avoided. If they are requested, they will result in a single space.

Failure While Receiving Output

Unit Not Ready: If the central system tries to transmit to a device that is not in ready status, the audible alarm sounds, and the TERM ADDRESSED light comes on. Follow the procedures outlined under Unit Failure for recovery procedures.

Central Failure: If the central system fails while output is in progress, the remote station is placed in INACTIVE status. When the central system comes back on line, submit an RJSTART card. After the RJSTART acknowledgment message, output that was in progress at the time of the failure is rescheduled; interrupted output will not necessarily be the first transmitted, although it is very likely to be.

Printer Recovery: Under certain conditions, a printer may rapidly eject paper without printing. For example, a user may have requested the EDIT option with his PRINT request, and a bad carriage control character may have been encountered. To rectify the problem:

1. Press CARRIAGE STOP on the printer.
2. Enter a control card of the form ..CONTINUE NO.
3. Re-ready the printer so that subsequent output can be received. This includes clearing the line (that is, turning the operation mode switch from TSM TRSP to OFFLINE and back again).

Testing the RJE System

If it is desirable to test the system to check that transmissions are being received, a CONTINUE control statement should be entered. CONTINUE will be entered into the Acknowledgment Data Set, which will be printed as a result of entering CONTINUE. This procedure ensures that input is correctly received and output correctly sent.

Recommended Operating Suggestions

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

1. The RJSTART and LOGON commands may be submitted separately to ensure that they are correct.
2. Job input streams should be limited to a few jobs in order to reduce the number that must be resubmitted in case of an input error that requires the central system to flush the entire input stream.
3. Remote Job Entry operations on the 2780 are with the "transmit transparency" mode switch set at all times.
4. The following steps should be performed before submitting input:
 - a. Press the STOP button.
 - b. Press the NPRO button (to flush cards).
 - c. Set mode switch to OFFLINE and back to TSM TRSP (to drop ready status on the printer).
 - d. Ready the printer.
 - e. Place the input cards in the hopper.
 - f. Press the End-of-File and the START button, simultaneously.
5. Unattended 2780 operation is not recommended.

APPENDIX: CARRIAGE TAPE

A standard 6 lines/inch tape is used to control printing format at the remote station printer. A carriage tape punched as follows will provide carriage functions similar to those provided by most TSS/360 functions.

<u>Column</u>	<u>Row</u>	<u>Function</u>
2	1	channel 1
11	2	channel 2
19	3	channel 3
27	4	channel 4
35	5	channel 5
43	6	channel 6
51	7	channel 7
58	8	channel 8
68	1	channel 1
77	2	channel 2
85	3	channel 3
93	4	channel 4
101	5	channel 5
109	6	channel 6
117	7	channel 7
125	8	channel 8

Where more than one page reference is given, the major reference is first.

..CONTINUE
 (see CONTINUE control statement)
 ..DELETE
 (see DELETE control statement)
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 (see OUTPUT control statement)
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 (see RJEND control statement)
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