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IBM System/360 Operating System

Planning for Remote Job Entry (MFT Version II)

Remote Job Entry (RJE) allows users at remote locations to submit jobs over communication lines to an IBM System/360 using the Operating System that provides multi-programming. RJE includes a unique Job Entry Control Language which provides the additional flexibility and control required for remote entry.

This publication provides preliminary information required by the programmer and the operator concerning general RJE concepts and facilities, and a complete discussion of RJE capabilities and uses. Job Entry Control Language is introduced and explained. Sections describing RJE system generation at the central installation and at a remote computer are included for the system programmer. In addition, RJE operating procedures for both the central and remote operation are included. The telecommunications support used by RJE is discussed, in general terms, only when necessary to give a complete picture of the system.



PREFACE

Remote Job Entry (RJE) extends operating system facilities to remote users. This publication describes the facilities provided by RJE, the use of these facilities and the creation of an RJE system. A brief description of the related telecommunications systems is included. Operating procedures are defined for the central installation and the various work stations. This publication also introduces Job Entry Control Language (JECL) with which a user requests, controls, and maintains RJE facilities in the system.

The material contained in this document is to be used for planning purposes only. For Remote Job Entry information not pertaining to MFT (i.e., MVT), the user should consult: IBM System/360 Operating System Remote Job Entry, Form C30-2006.

The RJE user should be familiar with the concepts and terminology introduced in:

IBM System/360 Operating System Introduction, Form C28-6534
Concepts and Facilities, Form C28-6535

Job Control Language, Form C28-6539

The installation programmer responsible for the creation and maintenance of

the central RJE system also should be familiar with:

IBM System/360 Operating System System Generation, Form C28-6554
Basic Telecommunications Access Method, Form C30-2004
System Programmer's Guide, Form C28-6550

Publications relevant to programming and operation of remote work stations are:
IBM System/360 work station

IBM System/360 Basic Operating System System Generation and Maintenance, Form C24-5060

Programmer's Guide, Form C24-3372
Control Program and Assembler Operating Guide, Form C24-3450

Operator Message, Form C24-5024

IBM System/360 Basic Programming Support Programmer's Guide, Form C24-3350

IBM 2780 Data Transmission Terminal work station

IBM 2780 Data Transmission Terminal Component Description, Form A27-3005

IBM 1130 Computing System work station

IBM 1130 Disk Monitor System, Version 2, System Introduction, Form C26-3709

IBM 1130 Functional Characteristics, Form A26-5881

First Edition, December 1967

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The Remote Job Entry (RJE) facility of the Operating System (OS) provides, to an IBM System/360 with attached communication lines, an efficient and convenient method of entering jobs submitted from remote work stations into the job stream. Once a job has been entered into the job stream by RJE, execution of the job proceeds under the supervision of operating system job-management routines. All data sets created by the job are handled by the operating system data management routines. Output data sets which have been created by remotely submitted jobs and which are to be returned to the remote user are placed in a distinct output class. These data sets are then removed from this output class and returned to the remote user under the direction of the RJE program. This type of operation provides a remote user the same batch computing facility that is available at the central installation.

However, the capability to accept input automatically from remote stations greatly increases the need for strong system discipline.

Jobs requiring set-up are particularly unsuited to RJE's SYSIN/SYSOUT environment. For example, if a job requiring data sets at the central installation is to be submitted, the volume involved must be available for prompt mounting. Otherwise, the system job flow can be upset or interrupted. A job requiring a large amount of core storage also can cause a system problem since processing is delayed until core storage is available.

The Remote Job Entry system provides several facilities to assist installation managers in controlling access to the system, to regulate job flow, and to provide information on system status. User exits (for example, to examine JOB cards), the message broadcast facility, remote and central messages, and the Job Entry Control Language are provided for orderly and efficient system control.

RJE not only provides a means for efficient operation of computing facilities by equipment centralization, but also gives substantial computing power on a demand basis to locations not requiring it on a regular basis. In addition, it allows sharing of a common body of information within a company by

widely separated organizational units having related requirements.

RJE provides fast turnaround of computer requirements for people in all parts of a company by placing the computer facilities close to the source of input with high speed communication lines.

EQUIPMENT AT THE CENTRAL COMPUTING SYSTEM

Remote Job Entry operation is now possible with an IBM System/360 having at least 256K bytes of main storage, which uses the improved Operating System providing multiprogramming with a fixed number of tasks, MFT Version II. The only additions to the minimum requirements for MFT-II are:

1. An IBM 2701 Data Adapter Unit with Synchronous Data Adapter - Type II, or an IBM 2703 Telecommunications Control Unit, with the binary synchronous features, equipped for EBCDIC code and full transparency operation. The dual communications interface is a supported special feature on the 2701.
2. Direct Access Storage space for RJE tables, typically less than one IBM 2311 Direct Access Storage Device (DASD). Exact requirements depend on the number of jobs, users, and work stations supported by the system:
 - a. Three tracks are required for every multiple of 42 jobs.
 - b. One track is required for every multiple of 28 work stations.
 - c. One track is required for every multiple of 45 users.
 - d. Ten tracks are required for the message/broadcast data set.
3. Direct access space for SYSIN data of remotely submitted jobs. The space required is dependent on the SYSIN requirements for the installations.

Thus, a system allowing up to 100 active remote jobs, 10 work stations, and 30 users would require 18 tracks of 2311 DASD storage for RJE tables plus the additional SYSIN requirements.

EQUIPMENT AT THE REMOTE WORK STATION

Any of three devices can serve as work stations in the RJE system.

IBM System/360

An IBM System/360, 16K or larger, may be used as an RJE work station. It is connected to the central System/360 by a communication line via an IBM 2701 Data Adapter Unit with Synchronous Data Adapter, Type II, equipped with EBCDIC transparency. Four special features are required:

- 1. Card Reader
- 2. Card Punch
- 3. Line Printer
- 4. 1052 Printer-Keybaord

The auto-call and dual communication interface special features are supported on the 2701.

IBM 2780 Data Transmission Terminal

The IBM 2780 Data Transmission Terminal (Model 1 or 2) may be used as an RJE work station. The following special features are required:

- 1. EBCDIC Transmission Code
- 2. EBCDIC Transparency
- 3. 120 Character Print Line
- 4. Auto-Turnaround (Model 2 only)

In addition, the following 2780 special features are supported:

- 1. Multipoint Line Control
- 2. 144 Character Print Line
- 3. Multiple Record Transmission

IBM 1130 Computing System

An IBM 1130 Computing System may also be used as an RJE work station. The 1130 work station requires an 1131 CPU (Central Processing Unit), including a console printer-keyboard, with a single disk storage drive and at least 8K words of core storage. The system is connected to a 1200-2400 bit-per-second line via a Synchronous Communications Adapter in binary mode. Three special features are required:

- 1. Card Reader
- 2. Card Punch
- 3. Line Printer

RJE TELECOMMUNICATIONS CONCEPTS AND TERMINOLOGY

This section describes the basic characteristics and operational concepts of the Remote Job Entry telecommunications system: what it is, how its sections are related, how communication proceeds, and how control is maintained. A number of commonly used terms are defined.

The RJE system is, in effect, a specific application of a computer-based telecommunications system. The particular telecommunications system used for Remote Job Entry is characterized by a number of work stations which are connected to a central processor by one or more communication lines operating in half-duplex mode. (A half-duplex line is a line over which data can flow in either direction, but in only one direction at a time.)

The RJE program uses the OS/360 Basic Telecommunications Access Method (BTAM) to control the communication lines and communicate with the work stations. Work station is used as a general term to represent interconnected equipment at the remote location having both input and output capability. Work stations are usually separated from the central processor by a distance sufficient to require common carrier facilities and data transmission techniques to accomplish communication with the central processor. The system, however, may include work stations attached to the central location by local cables. Regardless of location, all supported work stations are classified as "remote" since they are attached at the central system by an IBM 2701 or 2703 telecommunications control unit.

TELECOMMUNICATIONS NETWORKS

A telecommunications system may utilize a nonswitched network, a switched network, or a combination of the two.

A nonswitched network consists of a number of private or leased lines that connect the computer to one or more work stations. The computer and work stations are physically connected; that is, the circuits making up the communication lines are continuously established for predetermined time periods during which data may be transmitted over them. The lines that comprise a nonswitched network are known variously as private,

leased, or dedicated lines. These lines are usually furnished by a common carrier on a contract basis between specified locations for a continuous period or for regularly recurring periods at stated hours for the exclusive use of one customer.

A switched network allows many work stations to communicate with the computer without requiring dedicated communication connections. The computer and the several work stations are connected by access lines to the common-carrier exchanges serving their respective locations. A complete and continuous data path is established between computer and work station only for the period of time in which transmission takes place. The connection is established by dialing the telephone number of the unit at the other end. In this case, line refers to a discrete data path between the telecommunications control unit and the common carrier exchange. The service provided by the common carrier is usually on a time-used basis.

Some communication networks have characteristics typical of both switched and nonswitched networks. In this publication, the term switched network refers to any network in which a direct physical connection between computer and work station must be established by dialing in order for data transmission to occur. The term nonswitched network refers to a network in which the communication lines linking computer and work station are continuously established, thus requiring no dialing.

NETWORK CONTROL

Initial contact between the central system and the remote work stations in an RJE system may occur in two ways, dependent on the type of line connection between them. The connections possible are multipoint (on nonswitched lines) and point-to-point contention (on both switched and nonswitched lines). The RJE system permits communication using either type of connection.

If a work station is connected via a multipoint line, data is sent and received under control of the central system. In order to send data, the work station must

be polled by the central system. In order to receive data, the work station must be selected by the central system. Polling is an invitation to a work station to transmit data to the central system. Once a work station has accepted this invitation (through recognition of its polling characters), it may use the line to send data. When it has finished, it sends the central system an End of Transmission (EOT) character. At such time, the central system is again free to poll or select another work station.

Selection, on the other hand, is a request to a work station to receive data from the central system. If it is a multiple component work station (more than one output device, for example, the IBM 2780), the selection characters specify the component which is to receive the data. When the central system has finished transmitting, it sends an End of Transmission character and polls or selects another work station on the line. Selection normally has precedence over polling. That is, after initial contact, output is sent by the central system before any input is collected from a work station.

The other type of line connection possible in a RJE system is point-to-point contention, with one work station connected over a switched or nonswitched line. On a nonswitched line, either the central system or the work station may initiate transmission of data after the work station is logically attached to the system. The central system always yields to a work station, even though it may itself desire to transmit.

Over switched lines (dial connection), operation is similar to nonswitched once initial contact has been made. In the RJE communications environment, the central system never initiates communications with a work station on a switched line. The central system breaks the connection only after receiving a disconnect sequence or an RJEND command from the work station. (Refer to the section on work station commands for a description of the RJEND command.)

Data transmission in the RJE system uses binary synchronous communication in the EBCDIC transparent mode of transmission. The transparent mode of communication allows transmission of the full EBCDIC character set as data.

RJE CONCEPTS AND FACILITIES

GENERAL CONCEPTS

Remote Job Entry controls a flow of data and processes that data as required. Data entering from remote sources is the primary input to the RJE system and consists of job entries and commands. Commands also are entered by the central operator.

Jobs submitted by remote users are passed to OS/360 for scheduling and execution. When the output resulting from these jobs becomes available, it is returned to the user as requested--either immediately or on command.

OPERATING ENVIRONMENT

RJE operates in conjunction with the Operating System with the improved MFT Version II as a system task, much like a combined reader and output writer. Jobs received from the work station are scheduled for subsequent execution. When a remotely submitted job is completed, the job output is placed in a common SYSOUT class for RJE. RJE removes the output from this class and returns it to the work stations as directed.

RJE FACILITIES

In addition to those facilities provided by OS/360, the RJE user is provided with the following capabilities:

- He can submit a job via communication line to the central system from a remote location. This job is submitted just as it would be at a local card reader except for the possible addition of control statements requesting special RJE processing.
- Using the command language provided, the RJE user can request services not otherwise available in the remote environment. The work station commands are:
 1. RJSTART - Attach a work station to the RJE system.
 2. RJEND - Detach a work station from the RJE system.
 3. LOGON - Attach a user to the RJE system.
- He can direct job output to himself, to an alternate user, or to the central system output devices. Only the user who submits the job or an alternate specified by him can receive job output.
- The user can specify that job output be returned either immediately or on command.
- The user can request notification of job completion, including an indication of normal or abnormal termination and other user-supplied information.
- The remote operator can discontinue in-process output and continue it at a later time by command.
- The user can specify form numbers for each output data set. When a change in form number occurs, output is discontinued, and a message is sent to the remote operator who may continue the output when the form requirement is satisfied.
- The central operator, using commands provided him, can supervise the central system and communicate with remote users. The central commands are:
 4. LOGOFF - Detach a user from the RJE system.
 5. OUTPUT - Retrieve selected job output.
 6. CONTINUE - Continue interrupted in-process output.
 7. DELETE - Delete a selected job or jobs from the RJE system.
 8. ALERT - Request notification of selected job completion.
 9. STATUS - Retrieve selected job status.
 10. BRDCSTR - Retrieve broadcast messages containing system status from the central system.
 11. MSGR - Send a message to a work station or the central operator.

1. START - Begin RJE operation at the central installation.
2. STOP - Cease RJE operation at the central installation.
3. USERID - Add users to or delete users from the system.
4. CENOUT - Cause output from remotely submitted jobs to be written locally.
5. SHOW - Display information pertaining to RJE.
6. MSG - Send a message to a work station.
7. BRDCST - Maintain information in the broadcast data set.

STATES OF WORK STATIONS

In describing the remote job entry system, it is convenient to refer to work stations in the following states: inactive, active, and processing. These states reflect the appearances a work station may give to the central system. On the basis of the state of a work station, the central system determines what communication is permitted. While all states may be found in the RJE system at a given time, a specific work station is in only one state at a time. The movement between states is controlled by the work station through various JECL commands sent to the central system. When one of these commands representing a valid change of state is received, operation proceeds in the new state until another valid change is specified by the work station. Invalid requests are not serviced, and an error message is sent to the work station which made the request.

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

The Inactive State

All work stations are placed in the inactive state when the central system is closed down. A work station in an active or processing state becomes inactive by submitting an RJEND command. When a work station is in the inactive state, it is logically detached from the RJE system. The central system assumes that an inactive work station does not want to participate in RJE activities and, consequently, it does not initiate any transmissions to the station. However,

it is conditioned to receive an RJSTART command from an inactive work station. If any other input is received from an inactive work station, it is refused, and an error message is returned to the work station. The RJSTART command changes a work station from an inactive state to an active state.

The Active State

Work stations enter the active state when the central system receives an RJSTART command from an inactive work station or a LOGOFF command from a processing work station. Active work stations are logically attached to the RJE system. The central system can initiate transmissions to active work stations. These transmissions consist of any work station output which is on the work station output queue. Work station output is any output that is directed to the work station whether or not a valid user is logged on at the work station, for example, immediate job output and source notification messages. Broadcast messages are transmitted to active work stations if requested.

When the central system receives a valid RJSTART command, the work station is logically attached to the RJE system. When the central system receives a valid LOGOFF command (from a processing station), the current user is detached from the RJE system, but the work station reverts to the active state and remains attached. The central system is conditioned to receive only a LOGON, an RJEND, or a CONTINUE command from an active work station. If any other input is received from an active work station, it is rejected, and an error message is returned to the work station.

The Processing State

An active work station enters the processing state when the central system receives a valid LOGON command. The LOGON command indicates that a user desires to access

the RJE system. RJE input is accepted by the central system only from processing work stations. RJE input consists of job entries and work station commands. In addition, the central system transmits work station output and user output to a processing work station if the work station has no input to submit. User output is that output which is returned only if the user is logged on at the work station.

The central system is conditioned to receive any input from a processing work station. However, if the work station transmits any of those control statements which specify a change of state, it assumes the new state.

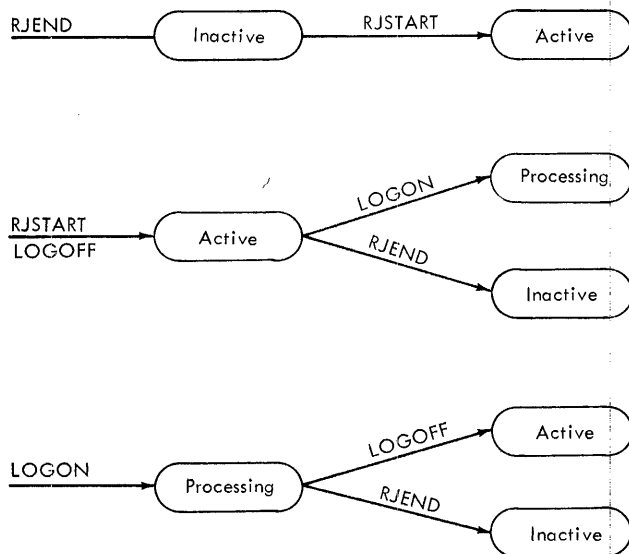


Figure 1. Transition of Work Station States

Figure 1 shows the three states and the commands leading to and from these states.

STARTUP AND CLOSEDOWN

When the central system is in operation, remote work stations may begin and end RJE activities at will. When the central system ceases operation, all work stations are closed down.

Central Startup and Closedown

Central startup and closedown are achieved by the START and STOP commands provided for the central operator. When startup is initiated by the START command, a message is sent to the central operator indicating that the RJE task is in operation. When closedown is initiated by the STOP command, a message is sent to the operator indicating completion of the RJE task.

Work Station Startup

A work station starts up in the RJE system by submitting the RJSTART command to identify it to the system. This command, if accepted as valid by the central system, places the work station in the active state. A user now may access the system from this work station by logging on, or the work station may simply wait for work station output directed to it. Of course, before sending the command to the central system, the work station must be brought on-line, as outlined in the sections of this manual dealing with the various work stations supported by RJE. The procedure for attaching the work station once these procedures are executed is the same for all work stations--submitting the RJSTART command.

Work Station Closedown

A work station terminates RJE activities (closedown) with the RJEND command. This command initiates logical detachment of the work station from the system. The central system first responds with any pending messages. It then places the work station in an inactive state. When the work station receives the message that the closedown procedures are complete, it is free to be used for local processing. In addition, if the work station is connected to the central system with a switched line, the connection is broken, and the line is available to another work station.

USER ACCESS

A user gains access to the RJE system with the LOGON command submitted at an active work station. This procedure allows RJE to insure that only valid users have access to the system (especially critical on switched networks). If he is identified as a valid RJE user, he may submit input to the central system or request job output. The period during which a user is actively engaged in remote job entry is a session. A session begins when a valid LOGON command is received and ends with the LOGOFF command. A user may submit input and receive output at any work station in the system. When he is not logged on, a user is associated with the last work station at which he was logged on.

System Security

The system is protected from unauthorized access through the use of an identification and protection key sequence in the LOGON command. (See LOGON Command.)

Verification of valid RJE users is established at LOGON time with the user identification and protection key.

Output from a remotely submitted job is further protected in that it may be requested only by a recipient named in the JED for that job or by the originator.

INPUT AT THE WORK STATION

The input stream at the remote work station comprises job entries and work station commands.

Job Entry

The job entry is the primary input of the remote job entry system. It is a combination of the job to be executed at the central system and the optional RJE control statement, that is, the job entry definition statement (JED). This optional statement specifies certain actions to be taken in processing the job by RJE. If the JED is not specified, system options are assumed when the job is received.

The jobname found in the JOB statement identifies the job entry to RJE. This allows the RJE user to request and receive job output and job information

by jobname--a name which the user specifies. RJE operation requires unique jobnames. If a job with the same name as a job already in the system is received, the job is rejected and a message is sent to the user. Once the user has either received the job output or deleted the job, he is free to reuse that jobname. Duplicate jobnames can be avoided if users begin their jobnames with their unique userids.

Work Station Commands

The user makes specific requests of the RJE system via work station commands. Work station commands may be entered through the card reader or the printer-keyboard. If the commands are entered through the card reader, they may appear anywhere within the input stream except within a job entry. A detailed description of the work station commands is given in the section describing Job Entry Control Language.

OUTPUT AT THE WORK STATION

Two kinds of output are received at the work station--job output and messages.

Job Output

Job output is the result of execution of remotely submitted jobs. Job output includes job management messages and output data sets created by the job. The output data sets to be returned to users must be specified as SYSOUT. The remote device to which output is returned is specified by the class in the SYSOUT keyword. Macro instructions used during the RJE assembly process allow the specification of remote SYSOUT classes consistent with those used at the central system. That is, if class A normally represents a central printer, the RJE system is assembled so that class A in a remotely submitted job causes output to be directed to the remote work station printer.

RJE supports output to a remote printer and punch. In addition, it provides an exit for remote computers allowing a user written routine to write output to any available device. Each remotely submitted job can generate a maximum of 24 SYSOUT data sets to be returned to the remote work station. Any data set beyond the 24 maximum is automatically directed to the work station printer.

Note: The SYSOUT designation must be used even though the remote work station is a 2780 or a computer whose operating system does not support a SYSOUT designation. The RJE program determines the disposition from the SYSOUT parameter on the DD statement.

Job management messages, including diagnostics of job control statements and allocation and deallocation messages, are always returned to the work station. Results of Write-To-Operator macros within a job and of password requests for password data sets are directed to the printer-keyboard of the central system and are not available at the work station.

Output Control

Output at the work stations also involves a number of options which are specified in the job entry definition statement (JED) and work station command commands.

- The output may be directed to the source work station as soon as the job completes and the work station is available to receive it.
- The output may be directed to an alternate user by the originator.
- The output may be directed to an alternate user by the originator.

- Output may be requested at any work station either by the originator or by a user named as the potential recipient. The recipient who first requests the output receives the only copy of the output.

- The remote user makes multiple copies of his output available to either of himself or an alternate by writing his output to a named data set and submitting a job step which executes an OS/360 data set utility program - IEBTPCH - to copy the output to SYSOUT. The IEBTPCH program is described in the publication IBM System/360 Operating System Utilities, Form C28-6586.

- Notification of job completion can be requested. This notification includes indication of normal or abnormal termination.

Details of JECL specifications for output control are given in the section JOB ENTRY CONTROL LANGUAGE.

Messages

Messages received at a work station include responses to input from the work station, messages sent by RJE users and the central operator, and broadcast messages maintained by the central operator and sent to a work station upon request. These broadcast messages include any information considered desirable by the installation, for example:

- Closedown of the central system
- Loss of a central resource
- Addition of a central resource

If a work station has no printer-keyboard, for example, a 2780, these messages appear on the line printer between job outputs. If a work station has a printer keyboard, a user may request that messages appear on it, rather than on the line printer.

Detailed specifications for messages are given in the section describing Job Entry Control Language.

FORMS REQUIREMENTS

The form number subparameter of the SYSOUT parameter is used to specify special forms requirements. A message is sent to the work station when RJE finds a form number different from the form number of the last data set sent to the work station. This message includes the form number specified for the data set waiting to be sent. RJE then waits until it receives a CONTINUE command from the work station indicating that it is ready to receive the output. The operator at the work station submits this command when the proper forms have been inserted in the output device. When the CONTINUE command is received at the central system, output resumes until another change in form number is found, or the remote operator initiates action to discontinue output at the work station. Since the procedures for discontinuing output are dependent on the work station device type, they are discussed separately under the operating procedures for each work station.

SYSTEM OVERLOAD

An overload condition results if direct access storage space at the central installation is insufficient to meet the demands of the system. Input already received and acknowledged by RJE is not affected by an overload condition. Any input transmission causing an overload condition is aborted and must be wholly resubmitted at a later time.

In each overload situation, a message is sent to both the central operator and the work station operator indicating the particular resource depleted. If the system continually overloads, the direct access storage space allotted for the resource must be increased to more realistically reflect the peak traffic requirements of the system. An alternate solution may be to reschedule the work load to take advantage of periods of relative inactivity.

The total system input capacity is specified by the central installation and is dependent on the following resources:

- The quantity of SYS1.SYSJOBQE space--specified at OS system generation.

- The number of concurrent jobs RJE is to maintain--specified at RJE assembly.
- The quantity of space for remotely submitted SYSIN data--specified in an RJE catalogued procedure referenced in the START command for RJE.

SYS1.SYSJOBQE depletion is the most serious overload condition. This condition results when job input submitted both locally and from attached work stations exceeds the limit specified by the central installation. If this condition continues to occur, the size of the SYS1.SYSJOBQE must be increased to reflect the requirements of the system--both local and remote. This requires an OS system generation.

An overload condition also occurs when the number of remote jobs resident in the central system exceeds the limit specified when the RJE program was assembled. Remote jobs have residence until the output is removed from the RJE SYSOUT class. This condition is relieved by requesting the output of completed remote jobs or by deleting jobs which are tying up the system. The central operator has this facility with the CENOUT command. The RJE user has this facility with the OUTPUT and DELETE commands. If the condition continues to occur, the number of remote jobs RJE can maintain must be increased. This requires an RJE assembly.

Depletion of SYSIN space is the final cause of a system overload. In its catalogued RJE procedure, the installation specifies SYSIN data sets on a communication line basis--one SYSIN data set for each attached communication line. In this procedure, the installation specifies both the total quantity of SYSIN space available to the system and the maximum space available for any one input data set. Specifying the maximum amount of space allocated for one input data set prevents one job from getting all the SYSIN space. This is a system protection feature, and no special action is necessary if a job exceeds this limit. On the other hand, a regular depletion of the total SYSIN allocation necessitates a new catalogued procedure, referenced at START RJE time, which makes more SYSIN space available to the system.

JOB ENTRY CONTROL LANGUAGE

The additional flexibility and control required by the remote entry are provided in the RJE system by Job Entry Control Language (JECL). JECL is independent of JCL, allowing system independence for RJE applications and isolation of those control statements needed only for an RJE application. As a result, only JECL statements are added or removed when a user moves between local and remote environments. The job and its scheduling information (its JCL) are the same in either environment. JECL uses the same coding format as that used for Job Control Language statements.

The RJE user identifies himself and his work station to the system with JECL. When the user and the work station are identified as part of the system, the user may request other RJE facilities with additional JECL statements. These other RJE facilities include the ability to:

- Select job output control options
- Communicate with the central operator
- Communicate with other RJE users
- Inquire about the status of RJE resources
- Inquire about the status of jobs in the system
- Receive notification of job completion
- Detach the work station from the system
- Continue transmission of interrupted output
- Define RJE processing of a remotely submitted job

JOB ENTRY CONTROL LANGUAGE STATEMENTS

Communication between the user and RJE processing programs is accomplished by two types of job entry control statements:

1. Job Entry Definition Statement
2. Work Station Command Statement

These control statements aid the RJE processing programs in the servicing of users and the supervision of work stations attached to the RJE system.

The Job Entry Definition Statement

The job entry definition statement (called the JED statement) marks the beginning of a job entry. It is the only JECL statement which may be continued on successive cards. With the JED statement, the user specifies disposition of job output, notification at job completion, alternate recipient of the output, and information to be returned with notification. The JED statement is an optional statement. If a job in the input stream is not preceded by a JED statement or the JED statement is in error, RJE system default options are assumed.

The Work Station Command Statements

Work station command statements provide to the RJE user a convenient means of requesting RJE facilities to aid him in his application. They give the ability to request output, determine the status of a job, specify the state of the work station, etc. A thorough discussion of the commands provided and the facilities that they offer is provided in the section on Work Station Commands.

FIELDS IN THE CONTROL STATEMENTS

Control statements submitted at a work station contain two identifying characters (..) and four fields: operation, operand, comment, and sequence. In some of the statements one or more of the fields are blank. Figure 2 shows the fields in each statement.

Statement	Columns 1 & 2	Fields (Columns 4-71)	Columns 73-80
Job Entry Definition	..	JED Operand Comment*	Sequence *
Work Station Command	..	Operation Operand Comment* (Command)	Sequence *

* Optional

Figure 2. Fields in the Control Statements.

The operation field specifies the type of control statement or, in case of a command statement, the command. It can contain only one of the set of prescribed operations or commands. The operation field need not begin in a specific card column, but it must be preceded and followed by at least one blank.

The operand field contains one or more parameters of information separated by commas. Parameters are described as values for which information must be substituted. The operand field has no fixed length or column requirements but must be preceded and followed by at least one blank.

The comment field can contain any information considered helpful by the person who codes the control statement. It has no fixed length or column requirements but must be separated from the operand field by at least one blank. If the operand field is omitted, a comma followed by at least one blank indicates that comments follow.

The sequence field contains eight characters of optional information used for control statement identification. It becomes especially useful in RJE since a number of similar commands may be submitted from the same work station. RJE returns the sequence field in all responses and diagnostics for JECL statements. The sequence field correlates the statement entered with the response received. With the use of the sequence field, therefore, the user can easily determine which statement is addressed by each response. The sequence field is positionally dependent and must be coded in the last eight columns (73-80) of the control statement.

Identifying characters and fields are contained in columns 1 through 71 of the control statement. The total number of characters cannot exceed 71, except in a JED statement. Statement continuation is indicated by coding a non-blank character in column 72.

Programmer's Note: The only control statement which may be continued is the JED statement.

Parameters in the Operand Field

The operand field is made up of two types of parameters: positional and keyword. A positional parameter is characterized

by its position in the operand in relation to other parameters; a keyword parameter is positionally independent with respect to others of its type and is characterized by a keyword followed by an equal sign and variable information. The variable information in keyword parameters can take the form of a list of several items (subparameters) of information. A list of subparameters must be enclosed in parentheses, unless the list reduces to a single parameter.

Positional parameters must be placed first in the operand in a specific order. The absence of a positional parameter is indicated by a comma coded in its place.

DESCRIPTION OF CONTROL STATEMENTS

Several conventions are followed in illustrating the format and coding of Job Entry Control Language:

- Upper case letters, numbers, and punctuation marks must be coded by the programmer exactly as shown. Exceptions to this convention are brackets, []; braces, {}; ellipses, ...; and subscripts. These are never coded.
- Lower case letters and words represent variables for which the programmer must substitute specific information or specific values.
- Items or groups of items within brackets, [], are optional; that is they may be omitted at the programmer's discretion. Any item or group of items not within brackets must be coded.
- Braces, {}, group related items, one of which must be coded.
- Stacked items, enclosed in either brackets or braces, represent alternative items. No more than one of the stacked items may be coded by the programmer.
- If an alternative item is underlined, that item is implied; that is, the RJE system automatically assumes that it is the programmer's choice when none of the items are coded.
- An ellipsis, ..., indicates that the preceding item or group of items can be coded more than once in succession.

With the JED statement, the user specifies how his job entry is handled at the central system. The JED statement describes job entry processing through a combination of optional keyword parameters. The choice of these parameters depends upon the RJE application. The JED statement is not required as part of the job entry. If the JED statement is omitted, system default options are assumed. These assumed options are:

1. Immediate output
2. No notification of job completion
3. All output returned to the user

If the JED statement is included but contains errors in syntax, the statement is rejected, but the job is accepted and is processed with the assumed system default options. The descriptions of the keyword parameters in Figure 3 include the assumptions made by RJE if the parameters are omitted.

The operand and comment fields can be continued on as many cards as are required to define the job entry. A non-blank character in column 72 indicates that the statement is continued on the next card. A continuation card is identified by the characters (..) in columns 1 and 2. Columns 3 through 15 in the card are blank. A continued operand field begins in column 16 of the card. A continued comment field can begin in any column past column 15.

Programmer's Note: A trailing comma in the operand field indicates that the field is continued on the next card.

ID	Operation	Operand (Keyword Parameters)
..	JED	[OUTPUT=IMMED OUTPUT=(DEFER[,userid])]
..		[,NOTIFY=({SOURCE BOTH}[, 'text'])]
..		[,CENTRAL=({stepname.ddname},...)] [,CENTRAL=ALL]

Figure 3. Format of the JED Statement.

OUTPUT--Specifying Job Output Disposition

The OUTPUT keyword parameter allows the user to specify job output as immediate or deferred. This parameter also allows the user submitting the job to specify another user as a valid recipient of the output. RJE returns immediate job output to the originator of the job as soon as it is completed. RJE returns deferred job output when it is requested via command by valid recipients. RJE returns deferred job output only to a user who submitted the job or was named as a valid recipient.

Only one copy of job output is available. This copy is returned to the first valid recipient requesting it. The remote user makes multiple copies of his output available to either himself or an alternate by writing his output to a named data set and submitting a job step which executes a utility program (IEBPTPCH) to copy the output to SYSOUT. The IEBPTPCH program is described in the publication IBM System/360 Operating System Utilities, Form C28-6586.

If the user omits this keyword in the JED statement, the RJE system assumes OUTPUT=IMMED.

Operation	Operand
JED	OUTPUT=IMMED OUTPUT=(DEFER[,userid])

OUTPUT=IMMED

Specifies job output as immediate. The user receives this output at the work station where he is logged on. If the user is not logged on when the job completes, RJE sends the output to the work station where the user was last logged on. If this work station is inactive, the output is held until either the work station is logically attached or the user logs on at another work station. In addition, if the inactive work station is connected via a switched line, RJE sends a message to the central operator indicating that output is available for the work station. This message allows the central operator to call the work station and inform the operator that there is immediate output available. Thus, the work station need not maintain connection with the central system when there is no traffic

over the line. If the work station is connected via a nonswitched line, no message is sent to the central operator.

OUTPUT=DEFER

Specifies job output as deferred. The user must retrieve this output by command. It is sent to the work station where the user requests the output. Since no alternate is specified, the job output can only be requested by the user who submitted the job. The work station may or may not be the work station from which RJE received the job. The status of deferred job output in the system is available by command.

OUTPUT=(DEFER,userid)

Specifies job output as deferred, and specifies that another RJE user, identified by the userid, is a valid job output recipient. RJE returns this output to the user submitting the job or to the user named in this subparameter. If an invalid userid is specified, the userid subparameter is ignored, and a message indicating the error is sent to the user. The JED statement is processed as though no userid were specified.

NOTIFY--Requesting Notification of Job Completion

The NOTIFY keyword parameter allows the user to request notification of job completion. In addition, the user may specify up to 25 characters of text which RJE returns with the notification. The NOTIFY keyword parameter is used in conjunction with the DEFER subparameter in the OUTPUT keyword parameter. Notification includes the jobname and the type of job termination--normal or abnormal. If the user omits this parameter, no notification is sent at job completion. If the JED statement includes OUTPUT=IMMED, RJE ignores the NOTIFY parameter and continues processing the statement.

Operation	Operand
JED	NOTIFY = ({SOURCE} {BOTH} [, 'text'])

NOTIFY=SOURCE

Indicates that the user originating the job desires notification of job completion. The procedure for

notifying the user of job completion is the same as the procedure for sending immediate output, described above in OUTPUT=IMMED.

NOTIFY=BOTH

Specifies that the user originating the job desires that both he and an alternate recipient be notified at job completion. He specifies the alternate recipient in the OUTPUT parameter. If an alternate recipient is not specified, only the originator receives notification. No error message is sent. Procedures for notifying the user originating the job are the same as those for sending immediate output, described in OUTPUT=IMMED. An alternate recipient receives notification only when he is logged on after job completion. If the originator requests the output before the alternate recipient logs on, no notification is sent to the alternate.

NOTIFY=(SOURCE,'text')

Indicates that the notification at job completion is to include the text which the user has specified as a subparameter. The text is limited to 25 printable characters and blanks, and must be framed in apostrophes. If the text contains apostrophes, they must be paired, and each pair counts as one text character. The text subparameter contains any information that the user considers valuable in the job completion notification.

NOTIFY=(BOTH,'text')

Specifies that the user originating the job desires that both he and an alternate recipient, specified in the OUTPUT parameter, be notified at job completion, and that the notification of each user include the information specified in the text subparameter. Notification of each user takes place as described for NOTIFY=BOTH.

Note: The information specified in the text subparameter also is included in the response for any ALERT command associated with this job. (See ALERT.)

CENTRAL - Writing on the Central Installation Output Devices

The CENTRAL keyword parameter allows the user to direct job output data sets to the central installation output writers for processing. These output writers process the output by class in accordance with the normal installation SYSOUT conventions. That is, if the user specifies his output as class A (SYSOUT=A), the output is written when an output writer is started for class A at the central system. The user may specify that all output data sets created by the job are to be processed centrally, or that one or more output data sets are to be processed centrally and the remaining job output returned to him. Job management messages (allocation, deallocation, statement errors, etc.) are always directed back to the remote user. Once the specified output has been given to the local output writers for processing, it can not be returned to the user. If the user omits the CENTRAL parameter, all output created by the job is returned to him.

Operation	Operand
JED	CENTRAL=({ stepname. ddname }, ...) CENTRAL=ALL

CENTRAL=stepname.ddname
Specifies that the output data set created in the step named (stepname) and defined by the DD statement named (ddname) is to be processed by the central output writers. The output data set is processed by an output writer according to the class specified in the SYSOUT parameter of the DD statement. If the indicated DD statement is not included in the specified job step, the error is ignored, and the JED statement is processed as if no reference to the data set were made. No error message is returned.

CENTRAL=(stepname.ddname, ..., stepname.ddname)
Provides a list of output data sets which are to be processed by the central output writers. Each data set specified in the list must be identified with the name of the step which creates it and the name of the DD statement which defines it. The maximum number of data sets that can be specified in this list is ten.

CENTRAL=ALL

Specifies that all output data sets created by the job are to be processed by the central output writers. Job management messages are never given to the central output writers for processing and are always available to the user after job completion.

Programmer's Note: The subparameter list of the CENTRAL keyword may be continued on as many cards as necessary to complete the list. (See example one in Figure 4.)

JED STATEMENT EXAMPLES

The examples here explained are illustrated in Figure 4.

Example One

1. OUTPUT=(DEFER,CHC) specifies job output as deferred. This output is kept until a valid user requests it. It also specifies that a user assigned the userid CHC is a valid recipient of this output. Whoever requests the job output first, the originator or CHC, receives the only copy of the output.
2. NOTIFY=(BOTH,'CALL JONES IF NOT PRESENT') specifies that both the originator and CHC are to be notified

Example One

JED OUTPUT=(DEFER,CHC), NOTIFY=(BOTH,'CALL JONES IF NOT PRESENT'), CENTRAL=(STEP1.STSDS1,STEP2.STSDS2, STEP3.STSDS3)	*COSINE01 *COSINE02 *COSINE03 COSINE04
---	---

Example Two

JED OUTPUT=IMMED, NOTIFY=SOURCE	*SORT001 SORT002
------------------------------------	---------------------

Example Three

JED CENTRAL=ALL,NOTIFY=SOURCE,OUTPUT=DEFER	MONLRPT
--	---------

Example Four (Incorrect)

JED OUTPUT=(ERR,DEFER), NOTIFY=(BOTH,SQUARE ROOT FINISH'D CENTRAL=(STEP1.OUTPUT1,STEP2. OUTPUT2)	*SQROOT01 *SQROOT02 *SQROOT03 SQROOT04
---	---

Figure 4. JED Statement Examples

when the job completes. The originator receives the notification at his work station even if he is not logged on. CHC receives notification when he is logged on. The notification includes CALL JONES IF NOT PRESENT. The notification is not sent to CHC if the output is requested by the originator before CHC logs on.

3. CENTRAL=(STEP1.STSDS1,STEP2.STSDS2,STEP3.STSDS3) shows that the user desires that three output data sets, STSDS1 created in the first step of the job, STSDS2 created in the second step, and STSDS3 created in the third step, be processed by the central installation output writers. These three data sets are not returned to the user.
4. The sequence field, COSINE01, COSINE02, or COSINE03, is returned in any JED diagnostic message to identify the specific card in error.

Example Two

1. OUTPUT=IMMED specifies the job output as immediate. RJE returns the output to the work station where the user is or was last logged on when it is complete.
2. NOTIFY=SOURCE is ignored by RJE since the output is specified as immediate. No error message is sent.
3. All job output is returned to the user since the CENTRAL parameter is omitted.
4. The sequence field, SORT0001 or SORT0002, is returned in any JED diagnostic message to identify the specific card in error.

Example Three

1. CENTRAL=ALL specifies that the central output writers process all output data sets created by the job according to class. These data sets are not available to the user.
2. NOTIFY=SOURCE specifies that the user receives notification of job completion.
3. OUTPUT=DEFER specifies that job output is deferred and returned to the user upon command. In this example only job management messages are available since CENTRAL=ALL is specified.
4. The sequence field MONLRPT is returned in any diagnostic message pertaining to this statement.

Example Four

This JED statement example, illustrates possible coding errors:

1. The OUTPUT subparameters are specified in the wrong order. The disposition of output must be specified before specification of an alternate recipient of the output.
2. The text subparameter in the NOTIFY parameter is not framed with apostrophes. Also, the apostrophe contained within the text is not paired.
3. The second continuation card, SQROOT03, is treated as a comment since operand field continuation is not specified with a trailing comma in the preceding card.
4. On cards SQROOT03 and SQROOT04, a stepname.ddname in the CENTRAL keyword is specified on separate cards.

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

Work station commands are interspersed between job entries in the input stream. They must not be included within a job entry since collection of the job entry stops when a JECL statement is encountered. Work station commands may also be entered from a printer-keyboard if it is available at the work station.

The command statement contains the identifying characters (..) in columns 1 and 2, the command and, in most cases, an operand field. In addition, the sequence field may be used for statement identification. RJE returns this field with all responses and diagnostics pertaining to the statement. Any comments appear after the operand field, separated from it by at least one blank. If the operand field is not present, and comments are desired, the user codes a comma to indicate that the operand field is absent and that the information specified is a comment. The user must follow the comma with at least one blank before his comment.

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

FUNCTIONS OF WORK STATION COMMANDS

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

1. Commands used to define the state of the work station:

RJSTART
RJEND
LOGON
LOGOFF

2. Commands used to manipulate job output:

OUTPUT
CONTINUE
DELETE

3. Commands used to provide job and system information:

ALERT
STATUS
BRDCSTR

4. Command used to communicate among RJE users:

MSGR

A complete description of the work station commands and their operands follows. These commands are summarized in Figure 5.

RJSTART--Attach A Work Station to the RJE System

The RJSTART command logically attaches a work station to the RJE system. The RJSTART command must be the first statement received from an inactive work station (one not currently attached to

ID	Operation	Operand
	RJSTART	termname-termid [,BRDCST=NO] [,BRDCST=YES] [,CALL=integer]
	RJEND	(no operand)
	LOGON	user-userid,protection-key
	LOGOFF	(no operand)
	OUTPUT	[J=jobname] [U=userid] [major-*]
	CONTINUE	[place-code]
	DELETE	[specific-jobname]
	ALERT	[specific-jobname] [major-*] [cancel-/]
	STATUS	[J=jobname] [U=userid] [major-*] [terminal-T]
	BRDCSTR	(no operand)
	MSGR	M='text' [, U=userid] [, T=termid]

Figure 5. Summary of Work Station Commands.

the system). This command identifies the work station to RJE. It also allows the work station to request broadcast messages before continuing RJE processing. Communication proceeds between the central system and the work station when a valid RJSTART command is received. Once the work station is logically attached, it can monitor the RJE system for output directed to it, and users may access the central system by logging on at the work station. If the work station has the Autocall special feature installed, the user can give the telephone number of the central system as a parameter. If the user codes this parameter, the work station calls the number specified.

Operation	Operand
RJSTART	termname-termid, BRDCST=YES [, BRDCST=NO] [, CALL=integers]

termname

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

[BRDCST=YES]

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

[BRDCST=NO]

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

[CALL=integers]

Specifies the telephone number of the central system which the work station is to dial. This parameter is only valid if the work station has the Autocall feature installed. The user can code a maximum of fifteen digits in this parameter.

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

RJEND--Detach a Work Station from the RJE System

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

If the work station is connected to the central system via a switched connection, the connection is broken. The operator at the work station should not take his work station off-line until he has received the message indicating that the RJEND command was accepted. If he does, the central system notes an error condition which must be resolved at the next work station startup. No further communication occurs until the work station resm
station resumes RJE activity with an RJSTART command:

Operation	Operand
RJEND	(no operand)

LOGON--Begin a Session in RJE

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

Operation	Operand
LOGON	user-userid,protection-key

user

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

protection

Specifies the valid protective key assigned with the userid. If the key specified in this parameter is not the key which was assigned with the userid, the LOGON command is rejected. The RJE system never prints a protection key at a work station.

Note 1: Only two statements other than the LOGON command may follow the RJSTART command: RJEND or CONTINUE.

Note 2: The userid/key pair assignments are specified either at RJE assembly time or dynamically by the central operator with the USERID command.

Programmer's Note: A user cannot be logged on at more than one work station at a time. If a user desires to change work stations, he must log off at his old work station before logging on at the new work station. If a user who is logged on at one work station submits a LOGON command at another work station, the LOGON command is rejected.

LOGOFF--End a Session

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

Operation	Operand
LOGOFF	(no operand)

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

OUTPUT--Request Job Output

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

1. The user may request (in a specific request) the deferred output of a specific job in the system.

2. The user may request (in a minor request) all deferred output created by jobs submitted by a specified user and naming him as a valid recipient.
3. The user may request (in a major request) all deferred output naming him as a valid recipient.

If the user is not a valid recipient of the output, an invalid request response is returned. If the job whose output is requested is not in the system, this information is also returned to the user.

Operation	Operand
OUTPUT	J=jobname U=userid major-*

J=jobname

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

U=userid

Indicates that the request is for output from all jobs submitted by the named user which designate the requesting user as a valid recipient. If the user gives his own userid, or omits the operand, he receives all available output from jobs submitted by him.

major

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

no operand

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

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

CONTINUE--Request Discontinued Job Output

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

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

When interrupted output is pending for a work station, no output is returned to the work station until a CONTINUE command is received. RJE continues to accept input from the work station. If the operator submits an RJEND command, transmission of the entire discontinued output data set will resume when he submits his next RJSTART command. The CONTINUE command provides three capabilities:

1. The user can request the transmission of the entire interrupted output data set.
2. The user can specify that transmission of the data set is to resume where it was discontinued.
3. The user can specify that he does not desire the output and direct RJE to delete it.

Operation	Operand
CONTINUE	[place-code]

place

Specifies a coded value which indicates the action the user desires taken regarding the interrupted output data set.

BEGIN specifies that the user desires transmission of the entire data set.

NO indicates that the user desires that RJE delete the data set.

no operand

Specifies that transmission of the data set is to resume where it was discontinued.

DELETE--Remove a Job from the RJE System

With the DELETE command, the user may remove jobs from the RJE system, without receiving a copy of the job output. This command directs RJE to remove from the system all job output and all references to the job. It does not remove named data sets created by the job or output data sets directed to the central installation. The DELETE command is not necessary to remove jobs whose output already has been returned to the user. All references to the job in the RJE system are normally removed after the job output is returned to the user. Jobs may be deleted any time after they are submitted. The DELETE command provides two capabilities:

1. The user can delete a specific job previously submitted by him.
2. The user can delete all job currently in the system under his userid.

Operation	Operand
DELETE	[specific-jobname]

specific

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

no operand

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

ALERT--Request Notification of Availability of Deferred Output

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

1. When the output of a specific job is available (specific alert).
2. When output from any job submitted by him is available (minor alert).

3. When any output for which he is a valid recipient is available (major alert).

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

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

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

Alert command responses are sent to the work station associated with the user who submitted the command, that is, the work station where that user is or last was logged on. If the work station is logically attached to the system, the response is sent regardless of who is logged on and whether or not anyone is logged on.

Operation	Operand
ALERT	[specific-jobname] major-* cancel-/

specific

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

major

The coded value *(asterisk) is used if the user desires to be alerted when any job output is available for him. It is especially useful if the user expects job output from other users who have specified him

as an alternate recipient. The ALERT * remains pending in the system under the conditions previously described.

cancel

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

no operand

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

Note: The user receives only one alert response for each job regardless of the number of ALERT commands issued by the user. For example, if the user issues an ALERT * and is alerted that two jobs have output available for him, no additional alerts for these two jobs are returned, regardless of the number of subsequent ALERT commands issued by the user. Information about the jobs, however, is always available with the STATUS command.

STATUS--Determine the Status of a Job

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

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

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

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

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

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

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

Operation	Operand
STATUS	{ J-jobname } { U=userid } major- { terminal-T }

J=jobname

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

U=userid

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

major

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

terminal

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

no operand

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

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

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

BRDCSTR--Request the Broadcast Messages

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

1. The next scheduled RJE closedown at the central system and the various work stations.
2. The next scheduled RJE startup at the central system and various work stations.

3. The installation equipment configuration and its status at the central system and various work stations.

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

Operation	Operand
BRDCSTR	(no operand)

MSGR--Communicate Within RJE

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

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

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

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

M='text'

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

If the U and T keyword parameters are omitted, the message is sent to the central operator.

U=userid

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

T=termid

Indicates that the message is to be sent to the work station specified by termid. If the message cannot be sent when it is received by the central system, it is kept until it can be delivered. If no space is available in the data set reserved for deferred messages, or if the termid specified does not correspond to a work station in the RJE system, the command is rejected, and a response is returned to the sender.

WORK STATION COMMAND EXAMPLES

Example One

Operation	Operand
RJSTART	NEWYORK5

The work station named NEWYORK5 is logically connected to the RJE system as an active work station. Broadcast messages are not sent to the work station since they are not requested. The sequence field is not specified and, as a result, does not accompany the response to this command.

Example Two

Operation	Operand	Sequence
LOGON	PPJ,72C	PPJ70710

If userid PPJ and key 72C are valid, user PPJ is logged on and may begin RJE processing. The sequence field PPJ70710 is returned with the response to this command.

Example Three

Operation	Operand	Sequence
OUTPUT		PPJ0020

The user submitting the command receives all available deferred output from jobs submitted by him, or he receives a message indicating that there is no such output available.

The sequence field is returned with the response to identify the command addressed.

Example Four

Operation	Operand
CONTINUE	NO

The transmission of a discontinued data set is not resumed. The data set is deleted, that is, removed from the system. No sequence information is returned since this field is omitted.

Example Five

Operation	Operand
ALERT	*

The user is alerted when any output in the RJE system is available for him. This command pends in the system until an ALERT / or RJEND command is received from the work station. No sequence information is returned since this field is omitted.

Example Six

Operation	Operand
STATUS	PPJSINFN

The status of job PPJSINEN is returned to the user. No sequence information is returned with the response.

Example Seven

Operation	Operand
MSGR	M='MOUNT VOL=555555 on 292'

The message MOUNT VOL=555555 ON 292 is sent to the central operator. The response to this command indicates whether or not the message was delivered. No sequence information is returned since this field is omitted.

Example Eight

Operation	Operand
LOGOFF	,USE THIS TO END SESSION

When RJE receives this command, the user of the current session is logged off.

The leading comma indicates that a comment is coded. The comment contains information the user finds helpful in identifying the purpose and placement of the command.



MESSAGES SENT TO WORK STATIONS

IHK000I RJSTART ACCEPTED ssssssss

Explanation: A valid RJSTART command with sequence number (ssssssss) has been received from this work station.

System Action: The work station is logically attached to the system and placed in the active state. Before the RJSTART command is acknowledged, the central system sends any messages pending work station startup and any discontinued output. The central system is prepared to accept a LOGON command, a CONTINUE command, an RJEND command, or a request to discontinue output from the work station.

User Response: If a user desires to access the central system, he submits a LOGON command. If no user desires to access the system, the operator may wait for immediate job output and messages directed to the work station. The operator enters the RJEND command to terminate RJE activity at the work station.

IHK001I USER LOGGED ON Userid ssssssss

Explanation: The LOGON command with sequence number (ssssssss) submitted by the user assigned the specified userid has been received and accepted.

System Action: Before the LOGON command is acknowledged, any notify messages pending this LOGON are returned. The work station is placed in the processing state giving the user access to the central system.

User Response: The user may submit jobs for execution in the central system and work station commands requesting job output, message transmission, or job information.

IHK002I USER LOGGED OFF Userid ssssssss

Explanation: The LOGOFF command with sequence number (ssssssss), submitted by the designated user (userid), has been received and accepted.

System Action: The user's session is terminated, and the work station reverts to the active state. The system accepts only those commands which may follow an RJSTART command, that is, LOGON, CONTINUE, or RJEND.

User Response: Same as to message IHK000I.

IHK003I RJEND ACCEPTED ssssssss

Explanation: An RJEND command with sequence number (ssssssss) has been received from this work station.

System Action: All messages currently available for the work station are sent before the work station is logically detached from the RJE system and placed in the inactive state. If the work station is connected via a switched line, the connection is broken.

User Response: None

IHK004I NO JOB(S) IN SYSTEM operation
(jobname) ssssssss
{userid}
{blank}
{termid}

Explanation: The central system contains no job that meets the specifications of the designated command (operation) with sequence number (ssssssss). The command addresses:

jobname - A specific job.

userid - All jobs submitted by the specified user, for which the requesting user is a valid recipient.

blank - All jobs in the system of which the requesting user is a valid recipient.

termid - All jobs to be returned to the specified work station.

System Action: The system takes no further action unless the command is a major or minor ALERT. These commands pend in the system until cancelled, and a message is sent when any job satisfying these requests completes.

User Response: If a jobname is specified, the user should ensure that it is correct.

IHK005I JOB NOT COMPLETE jobname userid
ssssssss

Explanation: The job (jobname) that is specified in an OUTPUT or ALERT command with sequence number (ssssssss) submitted by the user (userid) is in the central system but not complete.

System Action: If an ALERT command has been submitted, the user receives notification when the job completes.

User Response: If job output was requested, the OUTPUT command must be resubmitted after the job completes.

IHK006I INVALID RECIPIENT jobname userid
ssssssss

Explanation: An OUTPUT, ALERT, STATUS, or DELETE command with sequence number (ssssssss) has been submitted by a user (userid) who is not a valid recipient of the specified job (jobname).

System Action: The request is ignored.

User Response: None

IHK007I JOB DELETED jobname userid
ssssssss

Explanation: The job (jobname) specified in a DELETE command with sequence number (ssssssss) submitted by the designated user (userid) has been deleted. If the DELETE command specifies all jobs submitted by this user, a separate message is returned for each job deleted.

System Action: All references to the job and all output from the job are removed from the system.

User Response: None.

IHK008I STATUS jobname userid₁ userid₂
{ SCHED (n) }
{ EXECUTING } ssssssss
{ NORMAL END }
{ ABNORM END }

Explanation: This is the response to the STATUS command with sequence number (ssssssss). The response provides the status of the job (jobname) submitted by a user (userid₁) and naming another user (userid₂) as an alternate recipient.

- SCHED (n) - The job is scheduled as the nth job on the SYS1.SYSJOBQE.
- EXECUTING - The job is executing.
- NORMAL END - The job has completed normally.
- ABNORM END - The job has completed abnormally.

System Action: A response is returned for each job in the central system which satisfies the request.

User Response: None.

IHK009I NOTIFY jobname userid (text)

Explanation: Job (jobname) has completed normally with deferred output. The user (userid), either the originator or an alternate recipient, has requested notification either by specifying NOTIFY in the JED statement or by submitting an ALERT command which addresses the job. Text is any information coded by the originator in the JED NOTIFY parameter.

System Action: None.

User Response: The user may request the job output, either when notified or later, or he may delete it.

IHK010I ABEND NOTIFY jobname userid [text]

Explanation: This is the same as message IHK009I except that the job has completed abnormally.

IHK011I MSG PENDING STARTUP termid
ssssssss

Explanation: The message text specified in a MSGR command with sequence number (ssssssss) has not been sent because the work station (termid) to which it was directed is inactive, and if the message is directed to either a user or a work station, the user is not logged on. The message is sent to the specified work station when the station submits an RJSTART command.

System Action: The message is held at the central system until either the work station initiates startup procedures, or the central operator deletes the message.

User Response: None.

IHK012I MSG QUEUE FOR DELIVERY {userid}
ssssssss {termid}
{CENTRAL}

Explanation: The message text specified in a MSGR command with sequence number (ssssssss) is pending delivery to:

System Action: The system waits for job completion to determine disposition of job output.

User Response: If JED options are desired but an error has caused the JED statement to be ignored, the user must delete the job and resubmit the job entry with a corrected JED statement.

IHK018I ALTERNATE IGNORED ssssssss

Explanation: An alternate recipient is specified in the JED OUTPUT keyword, but either immediate output is specified (in which case, no userid may be coded), or an invalid userid is coded as an alternate recipient. The sequence number of the JED card was ssssssss.

System Action: This error is ignored, and JED statement processing continues as if no userid were specified in the OUTPUT keyword.

User Response: The JED statement must be corrected and the job entry resubmitted if output is to be made available to an alternate. The previously submitted job must be deleted before the corrected job entry is sent to the central system.

IHK019I JOB WAITING DELIVERY jobname
userid ssssssss

Explanation: An OUTPUT or DELETE command, with sequence number (ssssssss), which addresses the specified job (jobname) cannot be serviced because the job is already waiting transmission.

System Action: The command is rejected.

User Response: None.

IHK020I BROADCAST MESSAGES {FOLLOW}
 { END }

Explanation: This message (with the word FOLLOW) is sent immediately before the first broadcast message and (with the word END) after the last broadcast message.

System Action: None.

User Response: None.

IHK040I INVALID USERID operation
 ssssssss

Explanation: The designated command (operation) with sequence number (ssssssss) specifies a userid that is not assigned to a user in the RJE system.

System Action: The command is refused.

User Response: The user corrects the userid and resubmits the command.

IHK041I INVALID PROTECTION KEY LOGON
 ssssssss

Explanation: A LOGON command with sequence number (ssssssss) specifies a protection key that is not assigned with the coded userid.

System Action: The LOGON command is rejected.

User Response: The user corrects the key and resubmits.

IHK042I INVALID TERMID operation
 ssssssss

Explanation: The designated command (operation) with sequence number (ssssssss) specifies a termid that is not assigned to a work station in the RJE system.

System Action: The command is rejected.

User Response: The user corrects the termid and resubmits the command.

IHK043I INVALID JOBNAME operation ssssssss

Explanation: The designated statement (operation) with sequence number (ssssssss) either fails to specify a jobname or specifies a jobname greater than eight characters.

System Action: The statement is rejected. If it is a JOB card, the job is rejected.

User Response: The user corrects the jobname and resubmits.

IHK044I DUPLICATE JOBNAME jobname
 ssssssss

Explanation: The JOB card with sequence number (ssssssss) contains a jobname which is identical to one already in the RJE system.

System Action: The job is refused.

User Response: The user changes the name of the job to a unique name and resubmits.

IHK045I NO JOB CARD

Explanation: A job has been submitted without a JOB card.

System Action: The input stream is flushed until the next JOB or JECL statement is found.

User Response: The user inserts the JOB card and resubmits the job.

IHK046I INVALID KEYWORD VALUE operation
ssssssss

Explanation: An invalid value is specified for a keyword in the statement (operation) with sequence number (ssssssss).

System Action: The statement is ignored. If the error is in a JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is a command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement. The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK047I REQD PARAMETER MISSING operation
ssssssss

Explanation: A required parameter in the operand field is missing or invalid in the subject statement (operation) with sequence number (ssssssss).

System Action: The statement is ignored.

User Response: The user examines statement in error, supplies the missing parameter, and resubmits.

IHK048I ILLEGAL DELIMITER operation
ssssssss

Explanation: A parameter in the operand field of the statement (operation) with sequence number (ssssssss) is not delimited by a comma or, if it was the last parameter, a blank.

System Action: The statement is ignored. If the error is in a JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is a command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement. The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK049I ILLEGAL CONTINUATION operation
ssssssss

Explanation: The statement (operation) with sequence number (ssssssss) which cannot be continued is continued, or a JED statement is improperly continued.

System Action: The statement is ignored. If the error is in a JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is a command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement. The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK050I UNDEFINED KEYWORD operation
ssssssss

Explanation: An undefined keyword is specified in the statement (operation) with the sequence number (ssssssss).

System Action: The statement is ignored. If the error is in a JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is a command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement. The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK051I MULTIPLE USE OF KEYWORD operation
ssssssss

Explanation: A keyword is repeated in the statement (operation) with sequence number (ssssssss).

System Action: The statement is ignored. If the error is in a JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is a command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement. The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK052I UNDEFINED OPERATION operation
ssssssss

Explanation: The statement (operation) with sequence number (ssssssss) specifies an undefined operation. The first 8 characters of the operation field are returned.

System Action: The statement is ignored. If the error is in an intended JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is an intended command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement.

The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK055I INCORRECT TEXT LENGTH operation
ssssssss

Explanation: The text specified in the statement (operation) with sequence number (ssssssss) exceeds the allowable length.

System Action: The statement is ignored. If the error is in a JED statement, the job entry is processed with the assumed system default options.

User Response: If the statement is a command, the user corrects the error and resubmits. If assumed options are not acceptable for job entry processing, he deletes the job. The job entry must be resubmitted with the corrected JED statement. The job residing in the central system as a result of the error must be deleted before the job entry is resubmitted.

IHK056A RJSTART REQUIRED

Explanation: Input other than an RJSTART command has been received from a work station in the inactive state. The work station is logically detached from the system either because an error condition caused the central system to detach it or because an RJEND command was received.

System Action: The input is rejected.

User Response: The user submits a valid RJSTART to begin or resume RJE operation at the work station.

IHK057A LOGON REQUIRED

Explanation: Input other than a CONTINUE, RJEND, or LOGON command has been received from an active work station.

System Action: The input is rejected.

User Response: If the user has input for transmission to the central system, he must submit a valid LOGON command.

.IHK058A LOGON REJECTED userid termid
ssssssss

Explanation: A LOGON command with sequence number (ssssssss) has been submitted by a user (userid) already logged on at another work station (termid). A user can be logged on at only one work station at a time.

System Action: The command is ignored. If another user is logged on at the work station from which this command is received, he remains logged on.

User Response: The user must log off at the indicated work station before resubmitting the command.

IHK059I LINE ERROR

Explanation: An irrecoverable transmission error has occurred on an input or output operation.

System Action: The work station is logically detached from the system. If an output operation is in progress, the output is discontinued. This message is returned when the next RJSTART command is received from the work station.

User Response: All input transmitted to the central system which has not been acknowledged must be resubmitted.

IHK060I ABNORMAL CENTRAL CLOSEDOWN

Explanation: A system failure requiring restart procedures at the work station has occurred at the central installation. This message is returned when the next RJSTART command is received from the work station.

System Action: The system resumes normal operation.

User Response: All input transmitted to the central system which has not been acknowledged must be resubmitted.

IHK061I OUT OF SPACE {SYSIN jobname}
{SYS1.SYSJOBQE}

Explanation: An out of space (overload) condition exists in the central system. All direct access storage space allocated for the resource SYSIN or SYS1.SYSJOBQE is currently in use. The job (jobname) was being received when the overload occurred.

System Action: The central operator is informed of the overload condition. Until space becomes available, all input requiring the depleted resource is rejected.

User Response: The user must wait until space becomes available before submitting more input. If the overload condition persists, he may request that more space be allocated to the resource.

IHK062I SYSIN LIMIT EXCEEDED jobname

Explanation: The job (jobname) requires a SYSIN data set which exceeds the allowable limit specified in the procedure referenced at central start-up.

System Action: The job is refused, and a message is sent to the central operator.

User Response: The user may divide the SYSIN data for the job into smaller units, or he may request that a procedure allowing larger SYSIN data sets be used at the central system.

CENTRAL COMMANDS

The central operator communicates with the RJE system with central RJE commands. These commands provide the additional capabilities needed by the central operator to control and maintain the RJE application and to communicate with RJE users and work stations. If the RJE task is not active when the commands are issued, the commands are not accepted. The restrictions imposed on format and placement of these commands are identical to those for JCL command statements; that is, the central commands are introduced from the keyboard-printer or the system input device. When entered from the system input device, the commands contain the JCL identifier (//) in the first two positions of the command statement.

FUNCTIONS OF CENTRAL COMMANDS

The commands available to the central RJE operator provide a number of capabilities.

1. Commands used to control the RJE application:

START
STOP
2. Commands used to maintain the RJE application:

USERID
CENOUT
SHOW
3. Commands used to communicate in the RJE system:

MSG
BRDCST

Note: An RJE command statement cannot be continued. It must be coded on one card or card image.

START--Start RJE System Process

The START command is used to start operation of RJE at the central installation.

Operation	Operand
START	procname

procname

Specifies the name of the catalogued procedure for Remote Job Entry operation. This procedure name must begin with characters RJE.

STOP--Stop RJE System Process

The STOP command is used to stop operation of RJE at the central installation.

Operation	Operand
STOP	procname

procname

Specifies the name of the catalogued procedure for Remote Job Entry operations. This procedure name is the same as that specified in the START command.

USERID--Modify the RJE User Directory

The USERID command allows the central operator to modify and maintain the RJE user directory. The USERID command provides the following capabilities:

1. A userid/key pair can be added to the user directory.
2. A userid/key pair can be removed from the user directory.

These facilities are provided dynamically and do not require a reassembly of the RJE program. Each userid in the directory must be unique. If the central operator submits a command to add a userid that is currently contained in the user directory, RJE rejects the command and returns a message indicating that the userid is already contained in the directory. When a userid is removed from the directory, all jobs currently in the system associated with that userid are also removed.

Operation	Operand
USERID	user-userid,protection-key ,action-code

user

Specifies the userid which is to be added or removed from the user directory. If this userid is already in the user directory, RJE rejects the command and informs the operator.

protection

Specifies the key assigned to the userid designated in the user parameter. This key need not be unique. That is, the same key may be assigned to several userids.

action

Specifies a coded value which indicates whether the specified userid-key pair is to be deleted or added in the user directory.

ADD indicates that the userid and key are to be added to the user directory.

DELETE specifies that the userid and key are to be deleted from the user directory.

Note: If the addition of a userid and key is desired and no space is available in the user directory, the RJE program must be reassembled to increase the size of the user directory.

CENOUT--Give RJE Output to Local Output Writers

The CENOUT command is used to remove job output in the RJE SYSOUT class and process it with the central installation output writers. This command allows an operator to retrieve output of completed remotely submitted jobs which cannot be transmitted or has not been requested by an RJE user. The RJE system places the output data sets and system messages in the originally specified SYSOUT class. The disposition of the output is the same as that of any other data for that SYSOUT class at the central installation.

Operation	Operand
CENOUT	J=jobname

J=jobname

Specifies the name of the job whose output is to be handled by the central installation output writers. If the job whose output is requested is not complete or the job is not in the RJE system, the command is rejected and an indication is returned to the operator.

Note: The CENOUT command does not pend. Only output of completed jobs is placed in the originally speci-

fied SYSOUT classes. Jobs completing after the command has been processed remain in the RJE SYSOUT class.

SHOW--Display RJE Information

The SHOW command is used to request a keyboard-printer display of desired RJE information. The RJE information which may be displayed with this command is:

1. A list of jobs currently in the RJE system, indicating the status of each of these jobs.
2. A list of work stations constituting the RJE system, indicating the state of each of them.
3. A list of valid userids and their assigned keys, indicating whether each user is currently logged on.
4. A list of all deferred RJE output with an indication of the time each has remained in the system. This indication is a count of central RJE closedowns since the output was created. An option is provided to list only the deferred output for a particular user.
5. A copy of the broadcast messages currently available in the system.
6. A list of all the messages whose transmission is pending a work station startup. This list indicates the work station for which each message is pending. An option is provided to list only those messages pending a particular work station startup.
7. A list of the current values of all line error accumulators associated with all lines supported by RJE. These error accumulators contain data check, intervention required, and non-text time-out counts and the number of transmissions for the line since the last RJE central startup. An option is provided to list only the error accumulators for a particular line.

The information desired is specified with a coded value in the SHOW command operand. Only one parameter may be specified for the operand of each command. If more than one type of available RJE information is wanted, it must be requested with multiple SHOW commands.

Operation	Operand
SHOW	information-code

Values coded in the operand are:

JOBS

Requests a list of RJE jobs at the central installation and their status. The status returned indicates only whether the job is complete.

TERMS

Requests a list of the work stations constituting the RJE system and the state of each work station. The display indicates whether the work station is currently attached to the system.

USERS

Results in a display of a list of all valid userids and their associated keys with indication of whether or not each user is currently logged on.

DEFER

Requests a list of all jobs which have deferred job output pending in the RJE SYSOUT class with an indication, for each job, of the time the output has remained in the system. The indication returned is the number of central closeds occurring since the output was created.

DEFER,user-userid

Requests a list of all jobs associated with the specified user which have deferred output pending in the RJE SYSOUT class with an indication of the time each output has remained in the system. This time is indicated by the number of central closeds occurring since the output was created.

BRDCST

Requests a copy of the current broadcast messages.

MSGS

Requests a copy of all RJE messages whose transmission is pending work station startup. The work station to which each message is directed is indicated in the list.

MSGS,termname-termid

Requests a copy of RJE messages pending for the specified work station. If the termid specified does not correspond to a work station in the system, the command is rejected.

LERB

Requests a list of the current values of all line error accumulators for all communication lines being used for RJE. The list indicates for each line the three error counter values (data check, non-text time-out, and intervention required) and the transmission counter values. These values are cumulative values since the last RJE central startup. They are reset to zero at central startup.

LERB,linename

Requests the error and transmission counts for a particular line. The linename is the name which was specified for the line when the central RJE program was assembled. The central operator receives a message containing the three error counter values and the transmission counter value for the line designated.

MSG--Communicate with RJE Users

The MSG command is used to send messages to the users and work stations constituting the RJE system. The central operator may selectively route a message to:

1. A specific user currently logged on
2. A specific work station
3. A specific user or, if the user is not logged on, a specific work station.
4. All work stations logically attached to the RJE system

In addition, the MSG command provides the capability to remove from the system messages whose transmission is pending a work station startup. This option is normally used either when communication between the central installation and a work station is not possible due to some failure, or when the data set where these pending messages are kept becomes full.

Operation	Operand
MSG	{ [U=userid,] [T=termid,] } M='text' D=termid

U=userid

Specifies the message is to be sent to the user identified by the coded userid. The message is sent to the user if he is logged on. If the user is not logged on and the T keyword is omitted, the message is not sent. A response indicating this condition is returned to the operator. If both the T and U keyword parameters are specified and

the user is not logged on, the message is sent to the work station or pends until work station startup.

T=termid

Specifies that the message is to be sent to the work station identified by the coded termid. If the work station is inactive, the message pends work station startup. Messages pending work station startup are sent when the work station submits an RJSTART command.

M='text'

Specifies the text of the message which is to be sent. The message text must be framed with apostrophes and may include as many as 40 printable characters and blanks. Any apostrophes included as part of the text must be paired; each pair counts as one text character. If the operator omits the U and T keyword parameters, the message is sent to all work stations logically attached to the RJE system. Work stations in the inactive state when the command is issued do not receive the message.

D=termid

Deletes the pending messages for the work station identified by the coded termid. A copy of these messages can be obtained with a SHOW MSGS,termid command before entering the MSG D=termid command.

BRDCST--Maintain the RJE Broadcast Messages

The BRDCST command is used to maintain the broadcast messages. These messages are kept in a data set, on a direct access device, with provisions for up to 100 broadcast messages. Each broadcast message in the data set is numbered to correspond with a numbered slot. These slots are numbered from 0 to 99 and are either active (containing a message) or inactive (containing no message). The BRDCST command provides the central operator with the capabilities to:

1. Insert a new message
2. Add a new message
3. Change an existing message

4. Remove an existing message
5. Collect active messages into the low numbered slots
6. Clear the data set of all existing messages

Operation	Operand
BRDCST	<pre> message-'text' slot-integer[,message-'text'] slot-A+integer,message-'text' collect-PACK clear-DELETE </pre>

message-'text'

Specifies the message that is to be placed in the lowest numbered inactive slot found in the data set. The text may include no more than 40 printable characters and blanks and must be framed in apostrophes. If an apostrophe is included as part of the text, it must be paired; each pair counts as one text character.

slot-integer[,message-'text']

Specifies that a message is to be added or deleted at the slot indicated by its integer value, from 0 to 99. If a message text is specified, the message is placed in the specified slot. If the slot is active, the message already occupying the slot is replaced with the message specified in the command. If the message parameter is omitted, the specified slot is made inactive.

slot-A+integer,message-'text'

Specifies that the message is to be inserted at the designated slot. If this slot is already active and a higher numbered slot is inactive, the message occupying the designated slot and each message between this slot and the inactive slot are moved up one slot, and the new message is inserted. Sequential order is preserved. If neither the specified slot nor any higher numbered slot is inactive, the command is rejected. No blanks are allowed between the coded value A and the slot desired. The plus sign (+) is not coded. For example, the slot parameter is coded as A9 if the operator wants a message inserted in slot 9 of the

broadcast message data set. This format allows the operator to insert a message between two active messages already in the data set.

collect-PACK

The coded value PACK indicates that the operator desires to collect all messages into the lowest numbered slots of the directory. This command is useful if an insert request is refused due to the lack of a higher inactive slot. The content and sequential order of the broadcast messages are preserved.

clear-DELETE

The coded value DELETE is used when the operator desires to remove all messages from the data set. This format is useful when the format and content of the entire broadcast message data set are changed.

Note: A copy of the broadcast message data set (active messages) may be obtained by the central operator with the SHOW BRDCST command.

MESSAGE RESPONSES TO THE CENTRAL OPERATOR

IHK001I USER LOGGED ON userid key

Explanation: A display of assigned userid key pairs has been requested. The userid key pair displayed is assigned to an RJE user who is currently logged on.

System Action: Reporting continues until all assigned userid key pairs are displayed.

Operator Response: None.

IHK002I USER LOGGED OFF userid key

Explanation: A display of assigned userid key pairs has been requested. The userid-key pair displayed is assigned to an RJE user who is currently logged off.

System Action: Reporting continues until all assigned userid-key pairs are displayed.

Operator Response: None.

IHK004I NO JOB(S) IN SYSTEM

Explanation: A display of remotely submitted jobs resident in the central system has been requested. No remotely submitted jobs are in the central system.

System Action: None.

Operator Response: None.

IHK005I JOB NOT COMPLETE jobname userid

Explanation: A display of remotely submitted jobs resident in the central system has been requested. The job (jobname) submitted by the user (userid) is not complete.

System Action: Reporting continues until all remotely submitted jobs are displayed.

Operator Response: None.

IHK007I JOB DELETED jobname

Explanation: The job (jobname) submitted at the central system has placed output in the RJE SYSOUT class.

System Action: The job and its output are deleted.

Operator Response: The operator should tell the programmer who submitted the job not to use the RJE SYSOUT class.

IHK011I MSG PENDING STARTUP NONE
termid

Explanation: The operator has requested either a display of messages pending a work station startup or transmission of a message to an inactive work station. If a display was requested, the requested messages are displayed. NONE indicates that no messages are pending.

System Action: If a display has been requested, reporting continues until all the pending messages requested are displayed. If message transmission has been requested, the message is held until the work station initiates startup procedures, unless the central operator deletes the message.

Operator Response: None.

IHK012I MSG QUEUED FOR DELIVERY {userid}
termid
TERMS }

Explanation: The message specified in the MSG command is awaiting delivery either to the specified user (userid), to a specified work station (termid), or to all active work stations (TERMS).

System Action: The message is transmitted as soon as the work station will accept it.

Operator Response: None.

IHK013I MSG IGNORED {userid}
termid
TERMS }

Explanation: The request for message transmission cannot be serviced because:

userid - The message is directed to a user who is not logged on.

termid - The central system has no space to keep a pending message.

TERMS - No work stations are active.

System Action: The request is ignored.

Operator Response: If immediate action is required, the operator may use the telephone. Pending messages for inactive work stations can be displayed and, if necessary, deleted to make room.

IHK014I MAX JOBS EXCEEDED jobname userid

Explanation: The number of job entries currently maintained by the central system is the maximum specified by the installation. The job entry (jobname) submitted by the remote user (userid) cannot be accepted.

System Action: The job is refused, and a message is returned to the remote user submitting it.

Operator Response: If the condition persists, the central system must be reassembled to support more remote jobs. The operator may alleviate the condition by submitting the CENOUT command. This command causes remotely submitted job output to be written at the central installation. If this is done, the user who submitted the job should be notified.

IHK016I RJE CLOSED DOWN

Explanation: The central RJE system has completed closedown procedures.

System Action: RJE operation is terminated until the next startup. All active work stations are notified of the central closedown and logically detached from the system.

Operator Response: None.

IHK026I CENOUT jobname (class,...class)

Explanation: A request to have the output of the remotely submitted job (jobname) written at the central installation has been accepted. The job output is placed in the listed SYSOUT classes.

System Action: The job output is removed from the RJE SYSOUT class and placed in the indicated SYSOUT classes.

Operator Response: The operator starts output writers for these classes when the output is desired.

IHK027I WORK STATION termid {ACTIVE }
{INACTIVE }

Explanation: A display of RJE work stations has been requested. The message indicates the name of the work station (termid) and whether the work station is logically attached to the central system.

System Action: Reporting continues until all work stations are displayed.

Operator Response: None.

IHK028I DEFERRED OUTPUT {NONE }
{jobname userid n }

Explanation: A display of jobs having deferred output has been requested. The request addresses either all deferred output in the central system or that for a specific RJE user. The jobname, the user who submitted the job, and the number of central closedowns (n) since job completion are displayed for each job addressed. NONE indicates that no deferred output requested is in the central system.

System Action: Reporting continues until all deferred job output addressed by the request is displayed.

Operator Response: None.

IHK029I JOB COMPLETE jobname userid

Explanation: A display of remotely submitted jobs in the central system has been requested. The job (jobname) submitted by user (userid) is complete.

System Action: Reporting continues until all remotely submitted jobs are displayed.

Operator Response: None.

IHK030I DELETED FROM USER DIRECTORY
userid key

Explanation: The request to delete the indicated userid-key pair from the user directory has been serviced. Deletion of this pair leaves space for another userid-key assignment.

System Action: All jobs submitted by this user are deleted.

Operator Response: None.

IHK031I ADDED TO USER DIRECTORY
userid key

Explanation: A request to add the userid-key pair to the user directory has been serviced. The user assigned this userid-key can now access the system.

System Action: The userid-key is placed in the user directory.

Operator Response: None.

IHK032I USER DIRECTORY FULL userid-key

Explanation: A request to add the userid-key pair to the user directory cannot be serviced. The user directory already contains the maximum number of RJE users.

System Action: The request is ignored.

Operator Response: The operator might make space available by deleting a userid-key pair no longer being used. If this is not feasible, he may have the central RJE system reassembled to support more users.

IHK033I MSGS DELETED FOR WORK STATION
termid

Explanation: A request to delete the messages; ending work station (termid) startup has been serviced.

System Action: The pending messages are deleted from the central system.

Operator Response: None.

IHK034I MSG CANNOT BE ADDED TO BRDCST

Explanation: A request to add or insert a message in the system broadcast messages cannot be serviced. Either the data set is full, or, if the message is to be inserted at a specified slot, that slot and all higher numbered slots are active.

System Action: The request is ignored.

Operator Response: The operator can have the broadcast messages displayed,

by submitting a SHOW BRDCST command. He may then add, delete, insert, and pack, as necessary.

IHK035I INVALID SLOT NUMBER BRDCST

Explanation: A slot number not within the range of 0-99 is specified on the BRDCST command.

System Action: The command is ignored.

Operator Response: The operator corrects the slot number and resubmits.

IHK036I BRDCST{NONE }
{nn message}

Explanation: A display of the current broadcast messages has been requested. The slot number (nn) is followed by the message text contained in the slot. Only active slots are displayed. NONE indicates that the data set is empty.

System Action: Reporting continues until the contents of all active slots are displayed.

Operator Response: None.

IHK037I INFORM INACTIVE WORK STATION
jobname userid termid {N}
{O}

Explanation: The job (jobname) submitted by the user (userid) at the work station (termid) has completed. Either a notify message (N) or immediate job output (O) is directed to this inactive work station connected via a switched line to the central system.

System Action: The message or output is held at the central system until the work station (termid) submits an RJSTART command or the user (userid) logs on at another work station.

Operator Response: The operator may telephone the work station (termid) and give its operator this information.

IHK038I INVALID LINENAME

Explanation: A request to display error information for a particular line or line group specifies an undefined linename.

System Action: The request is ignored.

Operator Response: The operator supplies the correct linename and resubmits.

IHK040I INVALID USERID operation

Explanation: The command (operation) specifies a userid which is not contained in the user directory, or, if the command requests addition of a userid to the user directory, the userid is already in the directory.

System Action: The command is ignored.

Operator Response: The operator corrects the userid and resubmits the command.

IHK041I INVALID PROTECTION KEY
userid key

Explanation: A request to delete a userid-key pair in the user directory cannot be serviced. The key specified in the command does not agree with the key contained in the user directory.

System Action: The command is ignored.

Operator Response: The operator supplies the correct key and resubmits the command.

IHK042I INVALID TERMID operation

Explanation: The command (operation) specifies a termid not assigned to a work station in the RJE system.

System Action: The command is rejected.

Operator Response: The operator corrects the termid and resubmits the command.

IHK047I REQD PARAMETER MISSING operation

Explanation: A required parameter in the operand field is missing or invalid in the statement (operation).

System Action: The command is rejected.

Operator Response: The operator examines the statement in error, corrects the parameter, and resubmits.

IHK048I ILLEGAL DELIMITER operation

Explanation: A parameter in the operand field of the command (operation) is not delimited by a comma, or, if the last parameter, a blank.

System Action: The command is rejected.

Operator Response: The operator corrects the command and resubmits.

IHK049I ILLEGAL CONTINUATION operation

Explanation: The command (operation) has continuation indicated with a non-blank character in column 71. Commands may not be continued.

System Action: The command is rejected.

Operator Response: The operator corrects the command and resubmits.

IHK050I UNDEFINED KEYWORD operation

Explanation: An undefined keyword is included in the command (operation).

System Action: The command is ignored.

Operator Response: The operator corrects the error and resubmits.

IHK051I MULTIPLE USE OF KEYWORD operation

Explanation: A keyword is repeated in the command (operation).

System Action: The command is ignored.

Operator Response: The operator corrects the error and resubmits.

IHK055I INCORRECT TEXT LENGTH operation

Explanation: The text specified in the command (operation) exceeds the allowable length. Message text must be from 1 to 40 characters.

System Action: The command is ignored.

Operator Response: The operator corrects the error and resubmits the command.

IHK061I OUT OF SPACE {SYSIN jobname}
 {SYS1.SYSJOBQE}

Explanation: An out of space (overload) condition exists at the central system. All direct access storage space allocated for the resource SYSIN or SYS1.SYSJOBQE is in use.

System Action: The user submitting the input is informed of the condition. Until space becomes available, all input requiring the depleted resource is rejected.

Operator Response: If the overload condition persists, the operator may

request that more space be allocated to the resource.

IHK062I SYSIN LIMIT EXCEEDED jobname

Explanation: The job (jobname) demands a SYSIN data set exceeding that specified in the procedure referenced when the central system was started.

System Action: The job is rejected, and a message is returned to the user submitting the job.

Operator Response: If the job must be processed, the operator, when the central system is started, references a procedure allowing larger SYSIN data sets.

IBM Operating System/Remote Job Entry (RJE) comprises modules tailored to meet the particular RJE requirements of a given application. These modules are tailored in the RJE generation process producing the RJE program for the central system.

RJE GENERATION PROCESS

The RJE generation process consists of normal assembly and link-edit steps controlled by an existing operating system. The user specifies with RJE macros the RJE options and network definitions that he desires. These options and definitions adapt the RJE facilities to the needs and configuration of the installation. The macro instructions are also used to specify inclusion of user-written routines in the central system.

An IBM System/360 Operating System (OS) including RJE capability must be generated before the RJE central system is specified. With this Operating System, the required macro definitions and preassembled RJE modules, distributed with the OS release, are available when the RJE central system is generated.

OPERATING SYSTEM GENERATION CONSIDERATIONS

To incorporate RJE facilities into his operating system, the user, when he generates his OS system, includes OPTION=RJE as a parameter in the SCHEDULR macro instruction. When OPTION=RJE is specified, the necessary RJE and BTAM modules are copied from the MODLIB onto the TELCMLIB (nonresident RJE modules are copied to LINKLIB). These modules are then available for later assembly and link edit of the central RJE system program.

In addition, system generation macros and options are required for system generation:

- IOCTRL. One macro is required to describe each telecommunications control unit (2701 or 2703).
- IODEVICE. One macro is required for each communication line.
- SUPRVSOR. WAIT=MULTIPLE must be specified for RJE operation.

- TELCMLIB. This must be specified to include RJE modules and the telecommunications subroutine library.
- PROCLIB. This macro must be specified for inclusion of a procedure library.
- ASSEMBLR. This must be specified so that the RJE macro can be assembled.
- EDITOR. This must be specified so that the assembled macros can be link edited.
- MACLIB. This must be specified for the assembler to expand the RJE macros.

Complete descriptions of these macros, their formats, and OS system generation procedures are found in the publication IBM System/360, Operating System, System Generation, Form C28-6554.

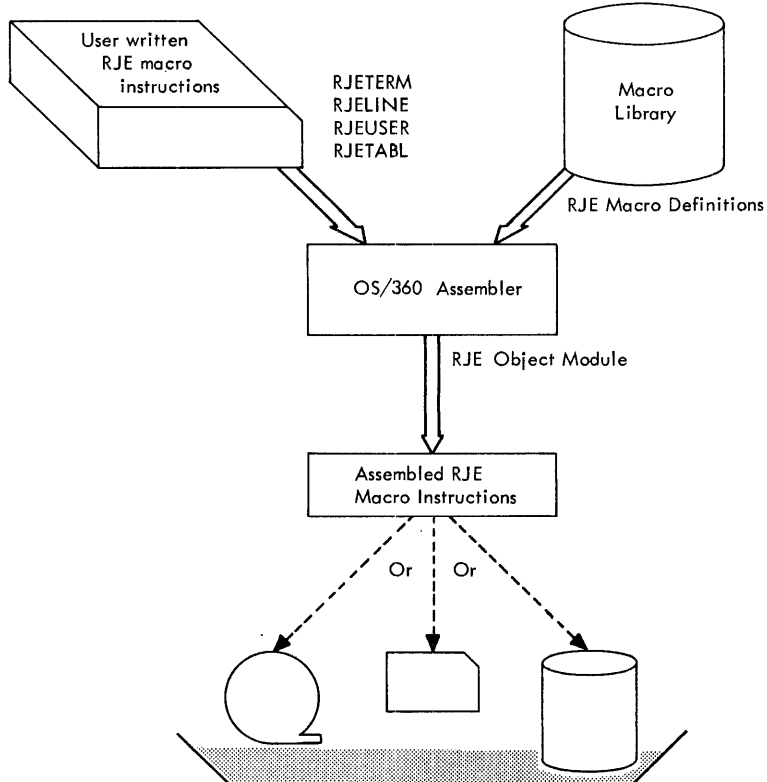
SPECIFYING THE RJE SYSTEM

The RJE system to be supported is specified by the user through four RJE assembly macro instructions:

1. RJETERM. One macro instruction is required for each supported work station.
2. RJELINE. One macro instruction is required for each communication line supported.
3. RJEUSER. One macro instruction is required to indicate the number and identifications of valid users of the RJE system.
4. RJETABL. One macro instruction is required to specify general information such as desired user exits, device association for SYSOUT data, and maximum number of job entries that may reside in the central system at a given time.

With these RJE macros, the user specifies an RJE system to meet his particular data processing requirements and defines the telecommunications network to be supported. The RJE program for the central installation is produced by link editing of object modules, resulting from the assembly of these RJE macros, with preassembled modules on TELCMLIB and with preassembled user routines. The system is generated in two steps: normal assembly and link edit (see Figure 6).

Step 1. Normal Assembly of RJE Macro Instructions



Step 2. Link Edit of Assembled RJE Macro Instructions

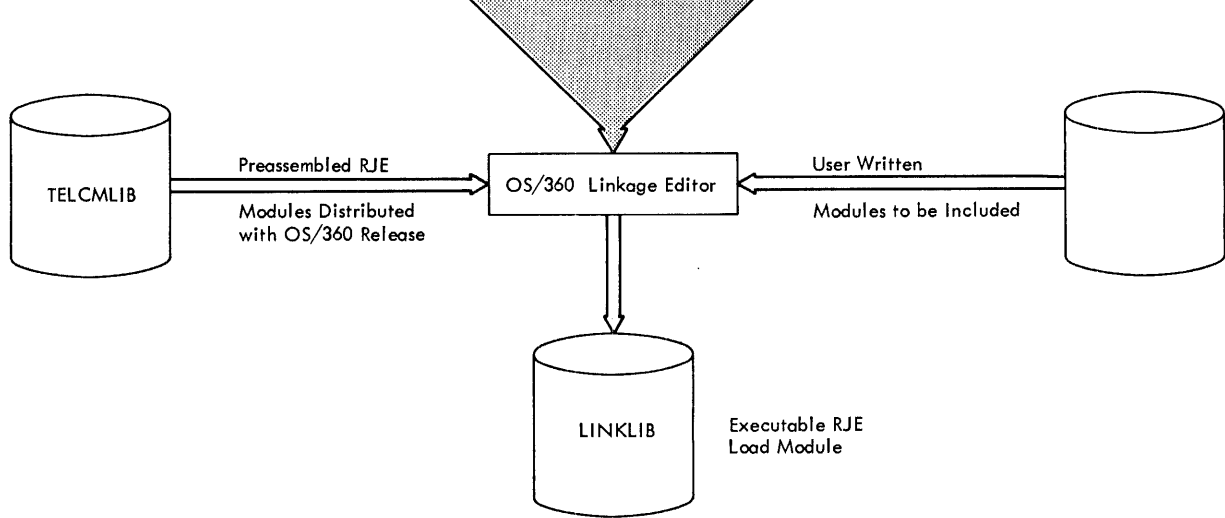


Figure 6. RJE Generation Process

In step one, the RJE macro instructions are expanded by the OS Assembler. The Assembler translates the desired system specified in the macros and creates the modules that tailor the system to the particular application. This step also produces linkages to the distributed preassembled RJE modules, common to all RJE systems, and to the desired user exits.

In the second step, the object modules produced by the Assembler are edited by the Linkage Editor. This editing resolves the linkages created in the first step and produces the executable RJE program ready for use. The linkage editor output (the RJE load module) must be placed in the SYS1.LINKLIB when the RJE generation process is complete.

RJE ASSEMBLY MACRO INSTRUCTIONS

The content of the RJE system to be generated is specified by the RJE macro instructions. The coding conventions and formats of the macros are the same as those for normal assembly macro instructions. Figure 7 provides a summary of RJE Macro instructions.

Name	Operation	Operand
[name]	RJELINE	DDLIN=ddname , DDSYSIN=ddname [, RLN=1] [, RLN=integer] [, LERB=([integer ₁ / 255] , [integer ₂ / 10] , [integer ₃ / 5] , [integer ₄ / 5])] [, ID={chars, termid} , . . .]
[name]	RJETERM	[TYPE=2780] [TYPE=CPU] [, PUNCH=YES] [, PUNCH=NO] [, PRSZ=120] [, PRSZ=132] [, PRSZ=144] [, ID=chars]
[name]	RJEUSER	maxuser=integer [, {userid, key} , . . .]
[name]	RJETABL	JOB=integer , SYSPRT=char , SYSPCH=char , SYSUSER=char , SYSRJE=char [, JOBCARD=routine name] [, JOBACK=routine name] [, COMMERR=routine name]

Figure 7. Summary of RJE Macro Instructions

RJELINE - Describe the Communications Line

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

1. All line connections must be the same, either switched or nonswitched.
2. All work stations within the line group must be of the same type.

Additional explanation of line groups is provided in the OS BTAM manual. Information supplied by this macro provides:

1. Access to line information specified at system generation
2. Identification of line groups, to avoid a need for additional control blocks
3. Threshold values for error counters which cause an error message to be displayed to the central operator when any of the values is reached
4. The polling list for multidrop lines, giving the polling characters of the work stations

Name	Operation	Operand
[name]	RJELINE	DDLIN=ddname , DDSYSIN=ddname [, RLN=1] [, RLN=integer] [, LERB=([integer ₁ / 255] , [integer ₂ / 10] , [integer ₃ / 5] , [integer ₄ / 5])] [, ID=({ chars, termid } , . . .)]

Name Field

name

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

Operand Field

DDLNAME=ddname

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

DDSYSIN=ddname

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

RLN=1

RLN=integer

Specifies the relative line number of this line within the line group. If this keyword parameter is omitted, RLN=1 is assumed.

LERB= ([integer₁], [integer₂],
 225 , 10
 [integer₃], [integer₄])
 5 , 5)

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

- Integer₁ -- transmission threshold
- Integer₂ -- data check threshold
- Integer₃ -- lost data threshold
- Integer₄ -- non-text time-out threshold

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

Specifies the polling character and name of the work station on a multi-drop line and creates the polling list. The chars value is the EBCDIC hexadecimal equivalent of the polling character for the work station. The termid value is the name of the work station specified in the RJETERM macro instruction. If priority is to be given to a multidropped work station, its chars, termid values are repeated in the subparameter list.

Name	Operation	Operand
LINE2	RJELINE	DDLNAME=LINEGRP4, RLN=2, * LERB=(, , 10), DDSYSIN=INPUT42, * ID=(E8, NYC, E7, LA, E8, NYC, E9, CHI)

Figure 8. Example of RJELINE Macro Instruction

Example: Figure 8 shows the RJELINE macro instruction describing a multi-drop line, named LINE2, with three attached 2780 work stations. The line is defined by DD statement LINEGRP4 and is the second line defined in the line group. The SYSIN data set is defined with DD statement INPUT42. The installation desires that an error message be displayed to the operator if 10 lost data errors occur before 255 transmissions. The other assumed threshold values are satisfactory. The attached work stations are named LA, NYC, and CHI and have the respective polling characters X, Y, and Z. Priority is to be given to work station NYC. The RJELINE macro instruction in Figure 8 describes this line for RJE.

RJETERM - Describe a Work Station

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

Name	Operation	Operand
name	RJETERM	TYPE=2780 TYPE=CPU , PUNCH=YES , PUNCH=NO , PRSZ=120 , PRSZ=132 , PRSZ=144 [, ID=chars]

Name Field

name

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

Examples: This macro is coded for an IBM 2780 Data Transmission Terminal, Model 1 (punch and printer) with a 120 character print line connected via a switched line. The termid, that is, the name which identifies the work station the RJE system, is RALEIGH.

RALEIGH RJETERM (no operand required)

If the same work station is connected via a multidrop line, instead of a switched line and its polling character is the letter A, the macro is coded:

RALEIGH RJETERM ID=C1

Operand Field

TYPE=2780

TYPE=CPU

Identifies the type of work station as either a 2780 (IBM 2780 Data Transmission Terminal) or a CPU (an IBM computer with a binary synchronous communication adapter). If the parameter is omitted, the work station is assumed to be a 2780.

If the work station is an IBM System/360 Model 30 with an attached printer having a 132-character print line, and the termid is to be Atlanta the programmer would code:

ATLANTA RJETERM TYPE=CPU,PRTSZ=132

PUNCH=NO

PUNCH=YES

Specifies whether a card punch is available at the work station. (A punch is required at the remote S/360.) If the parameter is omitted, a card punch is assumed.

RJEUSER - Define the User Directory

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

PRTSZ=120

PRTSZ=132

PRTSZ=144

Specifies the length of the print line at the work station. A print line of 120 characters is assumed if the parameter is omitted.

Name	Operation	Operand
[name]	RJEUSER	maxusers-integer [, userid,key ,...]

ID=chars

If specified, indicates that the work station is connected to the RJE system via a multipoint line. The ID keyword value is the EBCDIC hexadecimal equivalent of the polling character for the work station. For example, if the polling character is the letter A, the ID keyword is coded as ID=C1 since C1 is the EBCDIC hexadecimal equivalent of A. Valid polling characters for 2780 work stations are alphabetic. This keyword is not coded if the work station is connected via a point-to-point or switched line.

Operand Field

maxuser-integer

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

userid, key

Designates the user identification (userid) and protection (key) assigned. The userid and key are specified as a pair and are entered in the user directory during the macro expansion.

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

RJEUSER	20,HYE,123,AND,12\$,LOW,1@#,* PDQ,444,LRM,111
---------	--

RJETABL - Furnish Exit, SYSOUT, and Remote Job Information

The RJETABL macro is used to specify:

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

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

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

Operand Field

JOB=integer

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

SYSPRT=char

Identifies a SYSOUT class for printed output at the central installation. All SYSOUT data

sets of remotely submitted jobs must use this character for printed output.

SYSPCH=char

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

SYSUSER=char

Identifies the SYSOUT class for output to be given to a user written routine at a remote System/360 operating in the Remote Job Entry Work Station program. All SYSOUT data sets of remotely submitted jobs must use this character for output to be directed to the user routine.

SYSRJE=char

Identifies the SYSOUT class assigned to RJE at the central installation. This class must be reserved for the use of the RJE only. If locally submitted jobs place output in this class, the output is deleted.

Programmer's Note: If a user specifies SYSOUT data sets other than those for printed, punched, or user exit output, the data set returned to the work station is printed. If user exit output is returned to a work station without a user exit, the output is printed.

JOBCARD=routine name

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

JOBACK=routine name

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

COMMERR=routine name

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

CATALOGUED PROCEDURES FOR RJE

RJE operation requires one or more procedures catalogued in SYS1.PROCLIB. One of these procedures must be referenced when the RJE task is started and stopped at the central system. This procedure contains those JCL statements required by the operating system and the central RJE system.

Example: Figure 9 shows a procedure illustrating these statements and the descriptions keyed to them.

In the first statement, RJE names the procedure and is used as the procedure name on the START command at startup. IHKRJBGJ must be specified as the program name on all RJE procedures. 70K represents a typical RJE region size.

Statements 1 through 4 are required by the routine initiating system tasks and must be coded as shown.

Statements 5 through 11 are required for RJE direct access storage tables and must be coded as shown.

Statements 12 through 15 are the DD statements for the SYSIN data sets. This procedure assumes a four line network. One SYSIN DD statement is included for each line. The xxxxxx is the serial number of the volume reserved for SYSIN data. 23xx represents any OS supported direct access device. The space for any one SYSIN data set is controlled by the value of the secondary allocation parameter in the SPACE parameter (20 in this example). The system provides the secondary allocation fifteen times. Depending upon the requirements of the installation, the secondary allocation parameter may be increased or decreased. In this example, block size is specified as 400. The name specified for the DD statement must be the name designated in the RJELINE assembly macro.

Statements 16 and 17 are the DD statements for the line. This example describes two line groups, each including two lines. The UNIT parameter contains the physical address of the lines.

USER EXITS

Remote job entry provides three exits in the central system allowing the user to insert special processing routines. These routines must save registers when they are entered. The address of an 18 word save area for this purpose is passed

in register 13. When they finish processing, the routines restore the registers to their entry values and return control to the address in register 14.

JOB CARD Exit

The JOBCARD user exit allows a user-written program to examine each remotely submitted JOB statement and alter its operand field. Neither the jobname nor the operation field can be changed. The address of the JOB card is passed to the user routine in register 1. JOB continuation cards are passed to the user routine in the same way by subsequent entries. Control must be returned to the system before further processing of the job entry.

COMMERR Exit

The COMMERR user exit allows a user-written program to assume control after RJE has unsuccessfully exhausted its retries following a line error. When the user gets control via the exit, register 1 contains the address of the Data Event Control Block (DECB) associated with the line in error.

The user may issue any BTAM macro (except OPEN and CLOSE) in this exit. The associated WAIT macro instruction however, degrades the performance of the RJE system. The user written routine also can interrogate the BTAM line error block and take appropriate action. If a multi-dropped work station is permanently in error, CHGNTRY macro instructions may be issued to skip that work station in the polling and addressing lists. If entries are skipped, they are restored to the list when the central system is restarted with the START command.

Control returns to the system after the error is examined and desired action is taken.

JOBACK Exit

The JOBACK user exit allows a user-written program to examine and alter the RJE job acknowledgment message (message IHK017I) before it is sent to the user. This routine also may construct its own message containing up to 59 characters. The additional message is sent following the RJE constructed acknowledgment.

The address of the RJE constructed message is passed to the routine in register 1. The JOBACK routine must provide its own 59 byte buffer to construct an additional message. If no additional message is constructed, the routine re-

1	// RJE	EXEC	PGM=IHKRJBG, REGION=70K	
2	// IEFORDER	DD	DUMMY	
3	// IEFDATA	DD	DUMMY	
4	// IEFPSDI	DD	DSNAME=SYS1.PROCLIB, DISP=(OLD, KEEP)	
5	// IHKFSTDD	DD	DSNAME=SYS1.IHKFSTB, DISP=OLD, DCB=DSORG=DA	
6	// IHKJEDDD	DD	DSNAME=SYS1.IHKJEDTB, DISP=OLD, DCB=DSORG=DA	
7	// IHKUDRDD	DD	DSNAME=SYS1.IHKUDRTB, DISP=OLD, DCB=DSORG=DA	
8	// IHKTDRDD	DD	DSNAME=SYS1.IHKDRTB, DISP=OLD, DCB=DSORG=DA	
9	// IHKTXDD	DD	DSNAME=SYS1.IHKXTTB, DISP=OLD, DCB=DSORG=DA	
10	// IHKMSGDD	DD	DSNAME=SYS1.IHKMSGSL, DISP=OLD	
11	// IHKBRDD	DD	DSNAME=SYS1.IHKBRDSL, DISP=OLD	
12	// DUMDD1	DD	DSNAME=DUMMY1, DISP=(NEW, KEEP),	X
	//		VOLUME=SER=XXXXXX, SPACE=(TRK, (5, 20)),	X
	//		UNIT=23XX, DCB=BLKSIZE=400	
13	// DUMDD2	DD	DSNAME=DUMMY2, DISP=(NEW, KEEP),	X
	//		VOLUME=SER=XXXXXX, SPACE=(TRK, (5, 20)),	X
	//		UNIT=23XX, DCB=BLKSIZE=400	
14	// DUMDD3	DD	DSNAME=DUMMY3, DISP=(NEW, KEEP),	X
	//		VOLUME=SER=XXXXXX, SPACE=(TRK, (5, 20)),	X
	//		UNIT=23XX, DCB=BLKSIZE=400	
15	// DUMDD4	DD	DSNAME=DUMMY4, DISP=(NEW, KEEP),	X
	//		VOLUME=SER=XXXXXX, SPACE=(TRK, (5, 20)),	X
	//		UNIT=23XX, DCB=BLKSIZE=400	
16	// CPUGRP	DD	UNIT=0BA	
	//	DD	UNIT=0BB	
17	// A2780GRP	DD	UNIT=0CA	
	//	DD	UNIT=0CB	

Figure 9. Example of RJE Catalogued Procedure

turns control to the system with zero in register 1. If an additional message is constructed by the routine, the address of the message is passed in register 1 when control returns to the system.

COMMUNICATION SERVICEABILITY FACILITIES

ON-LINE TERMINAL TEST

The on-line terminal test is a facility allowing diagnostic messages to be sent to the central system to test a line or a work station. The operation of this test is transparent to the RJE system. Whenever an on-line terminal test is desired, a diagnostic message is submitted.

Diagnostic messages for on-line terminal tests are entered from an RJE work station in one of two ways, depending upon the work station:

2780: The messages are entered between transmissions (no interruption to the RJE processing occurs).

System/360: The RJE support must be closed down with the RJEND command. A diagnostic program which generates and sends the diagnostic messages to the central system and which receives and processes the responses to these messages must be loaded.

When the test message is received at the central system, BTAM intercepts the message and executes the on-line terminal test routines. When these routines have processed, normal RJE operation for that line resumes at the central system.

If the test was made at an S/360 work station, the RJE support must be reloaded, and startup procedures must be executed if RJE processing is again desired. No special procedure is required at the 2780 after an on-line terminal test. RJE operation continues just as though no test had been conducted. If a user was logged on before the test, he is still logged on after the test; if the work station was inactive before the test, it is still inactive.

Note: Work stations need not be logically attached to the RJE system to execute on-line terminal test procedures since, in order to accept an RJSTART command, RJE is always ready to receive from a work station.

OPERATOR AWARENESS

A BTAM system-to-operator message is displayed for the central operator whenever an irrecoverable communication error occurs. In addition, error counts for each line are displayed for the central operator. BTAM keeps for each line an error count for data check, for intervention required, and for non-text time-out. BTAM also records the number of transmissions occurring on the line. The user may specify threshold values for these counters when the RJE support is assembled. If any one of the three error counters reaches its threshold count before the transmission threshold count is reached, a message is displayed for the central operator. This message identifies the line and gives all three error counts and the transmission count. After the message is displayed, the error counts and the transmission count are added to accumulators, and the counters reset to zero. The central operator may display the value of the accumulators at any time with the SHOW LERB command. The accumulators for one line or for every supported line may be requested. These accumulators are reset to zero each time the central system starts up.

Note: If the transmission count reaches its threshold count before any error count, the counters are added to the accumulators and reset to zero. No message is displayed.

ERROR RECOVERY PROCEDURES

When BTAM has exhausted its number of error retries at the central system, a permanent line error exists. BTAM posts the error to RJE and displays a message to the central operator. At an S/360 work station, when a permanent line error exists, a message is displayed for the remote operator. At a 2780 an alarm is sounded.

The remote operator procedures required after an irrecoverable error depend upon the remote work station and are described in detail in the sections on the individual work stations. In general they involve resubmitting only that portion of the remote input stream for which the central system has not returned a written acknowledgment.

Note: RJE does not inhibit any facility provided for error recovery in IBM binary synchronous communications systems.

SYSTEM RESTART

A restart condition results when an irrecoverable error requiring that the supervisor be reloaded (re-IPL) occurs at the central system. This error can be a machine check, permanent I/O error, power failure, etc.

The RJE system records each complete logical element (either a job entry or a work station command) when it is received. In Figure 10 the logical elements of the input stream are identified. As part of system restart, the RJE system returns a response for each logical element received. The response to each logical element is either an acknowledgment of its receipt, as in the case of a job entry, or a message based on its processing, as in the case of a command.

RJE determines whether each startup follows a normal shutdown or requires restart due to a re-IPL. If the restart procedure is required, RJE sends a message indicating this to each work station as it is logically reattached to the system. This message is sent after all pending responses to input received from the work station are sent. The work station must resubmit any input not acknowledged. Any remote jobs which were executing when the failure occurred are processed at restart time similarly to locally submitted jobs. That is, the remaining portion of the job is processed in the flush mode, and all output, including the diagnostics associated with the flush mode processing as well as any valid output generated before the failure, is returned to the remote work station.

Central Restart Procedure

The procedure followed to restart RJE at the central system includes three steps:

..	RJSTART	}	(commands)
..	LOGON		
..	OUTPUT		
..	JED	}	(job entry)
//NAME	JOB		
//STEP	EXEC		
//DD1	DD		
//DD2	DD		
//SYSIN	DD *		
..	.	}	(command)
..	.		
..	LOGOFF		

Figure 10. Logical Elements of an Input Stream

1. The condition causing the error is corrected.
2. The operator re-IPLs the supervisor.
3. The operator issues the START command for RJE.

These three steps restart the RJE support in the central system. RJE provides the necessary information to the work stations to insure that no information is lost.

Work Station Restart Procedure

Restart procedure is initiated at a work station when it receives a message from the central system indicating that restart procedure is required (usually after a loss of communication). The RJSTART command must be submitted when communication is reestablished. After the work station has received all pending responses, the operator must resubmit only that input for which he has not received a response.

The work station restart procedure after a central system failure is similar to the restart procedure after an irrecoverable line error. The primary difference is that after a system failure, an in-process output data set is written from the beginning rather than from the last valid block. The procedures for specific work stations are described in the sections on remote work stations.

SYSTEM/360 WORK STATION

The IBM System/360 serves as an RJE supported work station. The IBM System/360 BOS/BPS Remote Job Entry Work Station Program is supplied for this function. This program operates in conjunction with the central system and observes the required RJE communication conventions. Either BOS or BPS may be used as a supervisor.

Input submitted at the work station is transmitted to the central system. All JECL statements are sequence checked to reduce unproductive transmissions. Output directed to the work station is routed to a specified output device or passed to a user-written output routine via the user exit provided. The operator has a facility to interrupt receipt of output.

MACHINE AND DEVICE REQUIREMENTS

A System/360 used as a work station requires at least 16K bytes of main storage and, in addition to the minimum configuration required by the BOS or BPS supervisor, a line printer, a card punch, and a 1052 printer-keyboard. The System/360 must be connected to a communication line via an IBM 2701 Data Adapter Unit with Synchronous Data Adapter, Type II, equipped for EBCDIC transparent operation. The dual communication interface special feature is supported. A user-written output routine is required for output operations on any other output device. To support Remote Job Entry operation with a user-written routine, a System/360 with at least 24K bytes of main storage is required.

COMMUNICATION CONSIDERATIONS

The System/360 work station communicates with the central system over a communications line. The 2701 Data Adapter Unit provides the actual attachment of the work station to the line. The work station communicates with the central system by point-to-point contention over either a switched or a nonswitched line. All transmissions between the central system and a remote System/360 are in EBCDIC transparency. Communication with the central system proceeds in three modes: monitor, receive, and transmit.

Monitor mode is entered from either transmit or receive mode. In the monitor mode, the work station is waiting

for input from the line, card reader, or printer keyboard.

Receive mode is entered when there is output available for the work station. In receive mode, the work station reads output from the line. It continues reading from the line until it receives an end-of-data indication from the central system or until the operator discontinues the output. When the end-of-data indication is received or the operator intervenes to discontinue the output, the station enters the monitor mode.

Transmit mode is entered at work station startup and when there is input available at the work station. In transmit mode, the work station writes to the line. It continues writing to the line until it sends a complete job entry or encounters a logical end of file in the input stream. When a logical end-of-file indication is received from the card reader, transmit mode is not entered again until operator intervention indicates that more input is available.

INPUT AT THE WORK STATION

Input is accepted from the card reader or a 1052 printer-keyboard. Acceptable input consists of job entries and work station commands. Work station commands other than the RJSTART command may be entered through either the card reader or the printer-keyboard. The RJSTART command must always be entered at the card reader. However, a correction of a previously entered command may be entered through either the card reader or the printer-keyboard. The only acceptable entries from the printer-keyboard are work station commands and corrections to statements in error. A correction made at the printer keyboard replaces the statement in error. If an error is caused by omission of a statement, the omitted statement can be entered as a correction of the following statement, but the statement replaced by this correction must be resubmitted from the card reader.

The operator can request that all JECL statements entered through the card reader be displayed prior to transmission. They are displayed on either the printer-keyboard or the line printer. The facility and device are selected with the User Program Switch Indicators (UPSI). Specification of this and other facilities requested in this manner is described later (see UPSI Specification).

Sequence Checking

All JECL statements are sequence checked prior to their transmission. This sequence check insures the proper relationship of RJSTART, LOGON, and LOGOFF commands to the other input. In a valid sequence of input from the card reader:

1. The RJSTART command must be the first statement submitted in the input stream at work station startup.
2. The LOGON command, CONTINUE command, RJEND command, or null statement may follow an RJSTART command in the input stream.
3. The LOGON command follows the RJSTART command if the user desires access to the central system. Any valid combination of work station commands and job entries may follow the LOGON command.

Incorrect sequence results in a requirement to correct or bypass the statement in error. The operations specified in each JECL statement also are checked for validity. An invalid operation also results in a requirement to correct or bypass the statement. Errors encountered in the input stream are always displayed to the operator, who then must decide what action is to be taken before operation is resumed.

OUTPUT TO THE WORK STATION

Output directed to the work station is either job output or messages. Job output is directed to the printer, the punch, or a user-written output routine. Each job output data set received is directed to the device associated with the SYSOUT class specified in its DD statement. SYSOUT classes are assigned to devices when the central system is assembled. Output data sets not specified as one of the classes assigned for printed, punched, or user exit output are printed at the work station. Data sets not defined as SYSOUT are written at the central installation.

Carriage control for printer output may be specified by a control character as the first byte of each record. Either machine code or ASA control characters are allowed. If no control characters are specified for the data set, the output is single spaced with a skip to channel 1 when channel 12 is sensed in the carriage control tape. Stacker select for punched output may also be

specified with a control character as the first byte of each record. Again, either machine code or ASA control characters are acceptable. If no control characters are specified, the normal punch stacker is selected.

If the output is to be written on a device other than the printer or the punch, a user exit is provided. Output data sets are given to the user-written output routine for processing if they are identified by the SYSOUT class assigned for user exits. Physical records of up to 400 bytes are passed to the user written routine.

The primary output device for messages is the 1052 printer-keyboard. The secondary device is the line printer. The message device is selected with the UPSI card.

OPERATING PROCEDURES

Work Station Startup

To start RJE operation, the operator loads the RJE Work Station Program. This involves entering in the reader the necessary job control cards followed by the RJSTART command. The RJSTART command may be followed either by input to be sent to the central system or by an end-of-file indicator. If the work station is connected to the central system over a switched line with manual dial, a message is displayed when the operator is to call the central system. If the work station has the autocall special feature installed, this phone number is coded as a parameter on the RJSTART command. When contact is made with the central system, the RJSTART command is transmitted. With the acknowledgment of this command, the operator receives all pending messages and job output directed to users at the work station. When the acknowledgment is received, the work station is logically attached to the RJE system. A user now may access the central system by submitting a LOGON command, or the operator can monitor for output from the central system. The only statements which may follow the RJSTART command are:

1. The LOGON command to allow user access
2. The CONTINUE command to specify disposition of discontinued output
3. The RJEND command to terminate RJE activity of the work station
4. The null Statement to indicate a temporary end of card input

The Null Statement

The null statement is an additional statement provided for the operator of an S/360 work station. It is used to mark a temporary halt in card input. When this statement is read, the card reader is effectively closed, while communication is maintained with the central system. Operator intervention is required to resume input from the card reader. The null statement may be placed in the input stream after a job entry or work station command. It is coded with the identifying characters (..) in columns one and two and all remaining columns blank. The null statement has no effect on a user's session. If a user is logged on when the null statement is read, he remains logged on. When operator intervention causes resumption of input operation, the user can continue to submit input to the central system.

Discontinuing Output

Output can be discontinued with operator intervention. An intervention request is made by entering a non-numeric character through the printer-keyboard. When the message recognizing the request is displayed, the operator responds with the letter D to discontinue output. Once output is discontinued, no output is transmitted to the work station until the disposition of the discontinued output is specified.

Continuing Output

Disposition of discontinued output is specified with the CONTINUE command (see CONTINUE). Output is discontinued if:

1. The remote operator requests discontinuation.
2. A change in form number is found at the central system.
3. An irrecoverable error occurs during an output operation.

If conditions one or two occur, the disposition of the output is specified with the CONTINUE command. Condition three requires error recovery procedures.

Error Recovery Procedures

At a System/360 work station, facilities are provided for recovery from both communication errors and local device errors. Operator intervention may be necessary to correct the condition causing the error. If the error cannot be corrected in an allowable interval, the central system logically detaches the work station from the RJE system. In addition, if the work station is connected over a switched line, the central system breaks the connection.

In the case of errors involving a local I/O device, such as lack of forms in the printer or feed failure in the card reader, normal BOS/BPS messages inform the operator of the need for intervention. The operator's reply to such a message indicates how the error is to be corrected. Recoverable communication errors are handled in the same way.

Irrecoverable communication errors result when communication is lost with the central system because of either line errors or a central failure. In either case, the work station is logically detached by the central system, and restart procedures are necessary. The response received when restart procedures are executed indicates whether the error was due to line error or to central failure.

If the operator desires to terminate RJE operation because of an error, he must reply with an 8, rather than 0 or 1, to disable the telecommunications adapter. If RJE operation is terminated with a reply of 8, all unacknowledged input must be resubmitted.

Restart Procedures

Restart procedures involve regaining communication with the central system and submitting an RJSTART command. If the error occurs during an output operation, output automatically resumes either where it was interrupted (after a line error) or at the beginning of the job (after a central failure).

If the error occurs during an input operation, all unacknowledged input must be resubmitted.

OPERATOR MESSAGES

If an I/O error involving BOS/BPS supported devices occurs, the operator receives the normal BOS/BPS error messages. The operator responds to these messages, if required, after taking the necessary corrective measures.

If errors are found in the input stream during RJE operation, the error condition is displayed for the operator with either a four or five character message on the printer-keyboard. The fifth character, the letter A, indicates that the operator must reply before he can proceed.

RJE messages do not require a reply if the error is made at the printer-keyboard. The operator has the choice of either correcting the error from the printer-keyboard or ignoring the error by entering EOB. If EOB is entered, the statement is ignored.

RJE MESSAGES

6001A--RJSTART Command Required

Explanation: This message indicates that an RJSTART command is required. Either there was no initial RJSTART, the RJSTART was incorrect, or an RJSTART command is required to initiate a restart procedure.

System Action: The system waits for the reply.

Operator Response: The operator must enter a valid RJSTART command in order to resume processing. The operator enters one of the following letter codes to indicate how he desires to correct the error:

- A - The error is to be corrected from the card reader.
- B - The error is to be corrected from the printer-keyboard.

6002 or 6002A--LOGON, RJEND, or CONTINUE Required

Explanation: Input submitted was either in error or out of sequence. A LOGON, RJEND, or CONTINUE command is required. The LOGON is required if input is available for transmission to the central system. The RJEND terminates RJE activity at the work station. The CONTINUE command is entered if output was discontinued.

System Action: The system waits for a reply from the printer-keyboard, or, if the message does not require a reply, for input from the printer-keyboard.

Operator Response: If the message requires a reply, the operator enters one of the following codes to indicate the corrective action taken:

- A - The error is to be corrected from the card reader.
- B - The error is to be corrected from the printer-keyboard.
- C - Bypass input in card reader until a LOGON, RJEND, or CONTINUE command is found.

6003 or 6003A--Invalid JED Continuation, JED-JOB Sequence, or No JOB Card

Explanation: This message indicates that a statement other than a continuation card follows continued JED statement, there is no JOB card following a JED statement, or there is no JOB card.

System Action: The system waits for a reply from the printer-keyboard, or, if the message does not require a reply, for input from the printer keyboard.

Operator Response: If the message requires a reply, the operator enters one of the three codes to indicate the corrective action taken:

- A - The error is to be corrected from the card reader.
- B - The error is to be corrected from the printer-keyboard.
- C - Bypass the job associated with the error in the card reader until a JECL or JOB statement is found.

6004 or 6004A--Invalid JECL Operation

Explanation: This message indicates that a JECL statement with an undefined operation has been submitted. If the operator can recognize the intended operation, he should correct it; if he cannot, he should have the statement bypassed.

System Action: The system waits for a reply from the printer-keyboard, or, if no reply is required, for input from the printer-keyboard.

Operator Response: If the message requires a reply, the operator enters one of three codes to indicate the corrective action taken:

- A - The error is to be corrected from the card reader.
- B - The error is to be corrected from the printer-keyboard.
- C - Bypass input in the card reader until the next JECL or JOB statement is found.

6999A--Operator Intervention Request Recognized

Explanation: This message is displayed when a request for operator intervention can be serviced.

System Action: The system waits for a reply.

Operator Response: The operator enters one of the following codes to indicate the type of intervention desired:

- A - Input is available at the card reader.
- B - Commands are to be submitted from the printer-keyboard.
- D - Discontinue receiving output.
- N - Ignore the request.

6999--Proceed

Explanation: This message is displayed as a result of a B reply to the 6999A message. The work station is ready to receive commands from the printer-keyboard.

System Action: The system waits for input from the printer keyboard.

Operator Response: The operator enters the desired commands by pressing the EOB button after each command. After entering the last command, he presses the EOB button a second time to indicate that he has finished using the printer keyboard.

GENERATING THE RJE WORK STATION PROGRAM

THE RJE ASSEMBLY MACRO INSTRUCTION

The Remote Job Entry Work Station program for a System/360 is constructed by an assembly and link edit of the RJE macro instruction. The assembly of the RJE macro results in an object module. This object module is then link edited with the user-written output routine if the user exit is used. The link edit step creates the executable load module which is loaded into main storage for execution as any other problem program.

Operation	Operand
RJE	TERMID=termid [,UEXIT=YES] [,DISK=YES] [,UEXIT=NO] [,DISK=NO] [,PRT=120] [,PCH=20] [,PRT=132] [,PCH=40] [,PRT=144] [,PCH=42] [,RDR=01] [,DIAL=NO] [,RDR=20] [,DIAL=MAN] [,RDR=40] [,DIAL=AUTO] [,RDR=42] [,INTRFC=A] [,INTRFC=B]

TERMID=termid
 Specifies the RJE name of the work station. This name must be the same name that is specified for the work station when the central system is created. It is used as a standard when this parameter is checked in the RJSTART command. It is the only parameter required if the remaining parameters are correct as assumed.

UEXIT=YES
UEXIT=NO
 UEXIT=YES indicates that a user-written output routine is to be included in the RJE work station program. A System/360 having at least 24K bytes of main storage is required if a user written output routine is included. If the UEXIT=NO keyword is coded or the parameter is omitted, the exit is not provided.

DISK=YES
DISK=NO
 Indicates whether the configuration of the work station is disk-oriented (BOS) or not disk-oriented (BPS). If the parameter is omitted, a BOS system is assumed.

PRT=120
PRT=132
PRT=144
 Specifies the maximum number of print positions available on the line printer. If this parameter is omitted, a print line of 132 characters is assumed.

PCH=20
PCH=40
PCH=42
 Identifies the type of punch available at the work station:

- 20 specifies an IBM 2520 Card Read Punch or Card Punch.
- 40 specifies an IBM 2540 Card Read Punch.
- 42 specifies an IBM 1442 Card Read Punch.

If the parameter is omitted, a 2540 is assumed.

RDR=01
RDR=20
RDR=40
RDR=42
 Identifies the type of card reader available at the work station:

- 01 specifies an IBM 2501 Card Reader
- 20 specifies an IBM 2520 Card Read Punch.
- 40 specifies an IBM 2540 Card Read Punch.
- 42 specifies an IBM 1442 Card Read Punch.

If this parameter is omitted, a 2540 Card Read Punch is assumed.

DIAL=NO
DIAL=MAN
DIAL=AUTO
 Specifies the type of communication line used by the work station:

- NO specifies point-to-point contention communication over a non-switched line.
- MAN specifies point-to-point contention over a switched line with manual dialing.

AUTO specifies point-to-point contention over a switched line with the Auto-call special feature installed on the 2701.

If the parameter is omitted, DIAL=NO is assumed.

INTRFC=A
INTRFC=B

Specifies which interface provided by the 2701 is to be used when the Dual Interface feature is installed. If the parameter is omitted, INTRFC=A is assumed.

UPSI SPECIFICATION

The user indicates the operating options that he desires by setting bits 0-2 in the UPSI card. These options include:

1. The device on which JECL and corrected statements are to be displayed
2. The device on which message output is to be displayed

The desired options are specified by the bit settings:

1. If bit 0 is set on (1), JECL and corrected statements are displayed on the line printer.
2. If bit 1 is set on (1), JECL and corrected statements are displayed on the printer-keyboard.
3. If bit 2 is set on (1), messages are displayed on the printer-keyboard. If bit 2 is not set on (0) messages appear on the line printer.

Note: If neither bit 0 nor bit 1 is set on, there is no display of JECL and corrected statements. If both bit 0 and bit 1 are set on, JECL and corrected statements are displayed on the line printer.

For a complete explanation of the UPSI card, refer to BOS or BPS Programmer's Guide.

USER EXIT INTERFACE

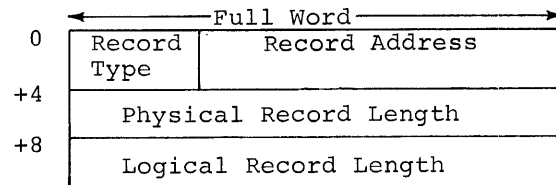
Physical records are passed to a user-written output routine via an exit. This output routine need not save registers upon entry. The user must set up

addressability for his routine and save any information he requires for subsequent entries. The entry point of the routine must be named IHKUSR. This routine receives control whenever output is available for it. The following information is passed to the user's routine:

Register 1 contains the address of a parameter list.

Register 14 contains the return address.

Register 1 contains the address of the parameter list which describes the output passed to the routine. This parameter is aligned on a full word boundary. The format of this parameter list is:



Record Type is the code (hexadecimal representation) indicating the type of record:

- 00 - End of File
- F1 - Fixed blocked records
- F2 - Fixed unblocked records
- F3 - Variable blocked records
- F4 - Variable unblocked records
- F5 - Undefined records
- FF - End of Job

Record Address: The address of the physical record passed to the routine

Physical Record Length. The length (a binary value) of the physical record passed via the user exit

Logical Record Length. The length (a binary value) of the logical records when fixed length records are passed via the user exit

Note: The Logical Record field should be ignored with variable and undefined record types.

SUPERVISOR ASSEMBLY CONSIDERATIONS

Operation of the RJE support at a remote System/360 work station depends upon the following parameters specified in the macro instructions for generating a supervisor:

1. SUPVR Macro Instruction

CR=YES indicates that operator-initiated communication is used with the 1052 printer-keyboard.

2. IOCFG Macro Instruction

DVE=n n must be specified as at least 2 for RJE operation.

BSC=YES must be specified to include binary synchronous communication interrupt handling and error recovery routines in the assembled supervisor.

3. SYMUN Macro Instruction

Since the device assignments are fixed for RJE operation, symbolic units may be assigned at system generation so that no ASSGN cards will be required when the Job Control cards are submitted for RJE operation. The following assignments are used:

SYS001 must be assigned to the card reader used for RJE input.

SYS002 must be assigned to the card punch used for RJE punched output.

SYS003 must be assigned to the line printer used for RJE printed output.

SYS004 must be assigned to the 2701 Synchronous Data Adapter used for RJE communication.

SYSLOG must be assigned to the 1052 printer-keyboard.

For a complete explanation of procedures involved in generating a supervisor, refer to IBM System/360 Basic Operating System, System Generation and Maintenance, Form C24-5060; IBM System/360 Basic Programming Support, Programmer's Guide, Form C24-3354; and IBM System/360, Basic Programming Support, System Generation and Maintenance, Form C24-5061.

The IBM 2780 Data Transmission Terminal (Model 1 or 2) is a supported work station in the RJE system. It provides both input and output binary synchronous capability over a binary synchronous communication line. Model 1 supports card input and printed output. Model 2 supports card input, printed output, and punched output. The auto-turnaround special features required for either model of the 2780 used for RJE processing are:

1. EBCDIC transmission code
2. EBCDIC transparency
3. 120 character print line
4. Auto-turnaround (Model 2 only)

In addition, the following special features are supported, but not required:

1. Multipoint line control
2. Multiple record transmission
3. 144 character print line

For a description of the various switches, lights, and controls, the user is referred to IBM 2780 Data Transmission Terminal--Component Description, Form A27-3005.

OPERATING PROCEDURES

Normal Operation

The 2780 is powered up as specified in IBM 2780 Data Transmission Terminal, Component Description, Form A27-3005, and the mode switch is set to "transmit transparency." If communication is over a switched line, synchronism is established when the connection is made by manual dialing.

To logically attach the 2780 to the central system, the operator places the RJSTART command in the hopper. If no punched output is expected and no additional input is to be sent, nothing else is placed in the reader. If punched output is expected, blank cards are placed behind the RJSTART command. If additional input is to be sent, a LOGON command and the input are placed after the RJSTART command in the reader. In this case, blank cards for punched output follow the last input card.

The operator sets the EOF switch and, if connection is via a switched line,

dials the central CPU. After synchronism is established, the operator presses the start button to transmit the input.

After this input has been received and checked by the central system, a response is returned for each work station command and job entry in the input stream. These responses acknowledge accepted input and explain the refusal of any unaccepted input. Errors in either an RJSTART or a LOGON command cause immediate interruption of the transmission, allowing the operator to correct and resubmit the invalid command. No other errors cause transmission interruption.

If immediate output is pending for the work station, the central system sends it when all input has been read from the hopper. The printer and punch must be ready for receipt of this output. When all available output has been returned to the work station, the alarm sounds unless the reader is ready to transmit. If the reader is ready, the input is transmitted. If the reader is not ready, the audible alarm is reset either automatically when the central system has more output to send or manually with the stop key on the receiving device.

If the central system tries to transmit to a remote 2780 at which the appropriate output device is not ready, the alarm sounds and the "terminal addressed" light comes on. To resume operation, the operator brings the unit to ready status and submits a CONTINUE command.

If the operator wishes at any time to discontinue output, he presses the stop key on the operating device. To continue the output, he submits a CONTINUE command through the card reader, and the output is handled according to the option specified in the CONTINUE card.

When a forms change is required, a message is sent to the 2780, and output is automatically discontinued by the central system. To receive the discontinued output, the operator inserts the correct forms, brings the device to ready status, and submits a CONTINUE command.

Error Recovery Procedures, Non-switched Line

What ever happens, ensure that the printer and reader are ready.

1. Printer failure

- a. If there are no cards in the hopper, submit a CONTINUE command after the problem has been corrected. Output should resume when the error is corrected. If the reader becomes unready after the command is read and the bell rings, the central system has placed the work station in the inactive state, and a restart is required. (See no. 3 below.) If the command is not read, there is an equipment problem at the work station or a problem with data transfer over the communications line.
- b. If there are cards in the hopper when the error occurs, watch the reader. If the cards are read normally, place a CONTINUE command in the input stream after the problem is corrected, but not within a job entry. Output resumes when the CONTINUE command is received and processed by the central system.

If no card is read, there is an equipment problem. The work station is automatically placed in the inactive state by the central system.

2. Reader failure

If normal operation does not resume after the reader problem is corrected and the reader is readied, there is an equipment problem. If the reader becomes unready after the first card is read and the bell rings, the central system has placed the work station in the inactive state. (See no. 3 following.)

3. Probable inactive state

Empty the hopper, ready reader and printer, and submit an RJSTART. If no message is delivered on the printer within the normal response time, there is a positive equipment failure.

Error Recovery Procedures, Switched Line

What ever happens, ensure that the printer and reader are ready. Check the data light on the Data Set. If the data light is off the work station is in the inactive state. (See no. 3 below.)

1. Printer or punch failure

The procedure is the same as that for non-switched unless the auto-answer feature is installed on the 2780. If the autoanswer feature is installed, the recovery period is only 20 seconds if there is no activity on the line.

2. Reader failure

The procedure is the same as that for non-switched unless the auto-answer feature is installed on the 2780. If this feature is installed, the recovery period is only 20 seconds if there is no activity on the line.

3. Probable inactive state

When the operator suspects that the work station has been placed in the inactive state by the central system because of an operational error, he should execute the following procedure to re-establish contact with the central system:

a. Empty the hopper.

b. Check the data light on the Data Set and ensure that the data light is off. If the light is on, hang up.

c. Place the RJSTART command in the hopper. If restart is for a punch failure place after the RJSTART enough blank cards to receive the punched output.

d. Ready the reader and printer.

e. Dial the central system.

f. If command is transmitted, wait for response.

g. If the response is not returned within the normal response time, there is a positive equipment failure.

The IBM 1130 Computing System with the IBM-supplied RJE program is a supported work station. The 1130 RJE program operates under the supervision of the 1130 Disk Monitor System Version 2 and observes the required RJE communication conventions. Output directed to the work station is routed to a specified output device or to a user-written routine.

MACHINE AND DEVICE REQUIREMENTS

The RJE program for an 1130 work station requires an 1131 CPU, including a console printer-keyboard, with a single disk storage drive and at least 8K words of core storage. The minimum configuration consists of a card reader, a card punch, and a line printer. The 1130 System must be connected to a 1200-2400 bit-per-second line via a Synchronous Communications Adapter in binary mode.

A user-written routine may specify output on any available output device. To support a user-written routine, an 1130 System must have at least 16K words of core storage. In an 8K machine, or if no user-written routine is present, data directed to the user exit is stored on disk and can be processed by another program after RJE processing is terminated.

COMMUNICATION CONSIDERATIONS

The 1130 RJE Work Station program provides the standard RJE Communications interface to the RJE communications network using SCAT2 and SCAT3 binary synchronous communications subroutines to provide the following capabilities:

1. Point-to-point contention operation on leased lines
2. Point-to-point operation on switched networks
3. Multi-point operation with the 1130 System as slave

All data transmissions between the central processor and a remote 1130 are in EBCDIC transparent mode except headings which are transmitted in normal

mode. Communication with the central processor proceeds in three modes:

1. monitor
2. receive
3. transmit

Monitor mode is entered from either transmit or receive mode. In monitor mode, the work station waits for input from the line, card reader, or console keyboard.

Receive mode is entered when output is available for the work station. In receive mode, the terminal reads output from the line until it receives an end-of-data indication from the central or until the operator discontinues the output. When an end of data indication is received or the operator intervenes to discontinue the output, the work station enters monitor mode.

Transmit mode is entered at work station startup and when input is available at the work station. In transmit mode, the work station writes to the line. It continues writing to the line until it sends a complete job entry or encounters a logical End of File (null statement or RJEND command) in the input stream.

If monitor mode is entered from transmit mode with a logical End of File indication, transmit mode is not entered again until operator intervention indicates that more input is available. If monitor mode is entered from receive mode with a Discontinue Output indication, receive mode is not entered again until a CONTINUE command is submitted.

Communication Considerations for Switched Lines

If a switched communication line is inactive for a period of approximately 21 seconds, the central RJE program disconnects the line. This can be caused by three situations:

1. No input or output is available for transmission.
2. The remote RJE program cannot accept output because a user-written routine fails to return control within the specified time.
3. The remote RJE program is waiting for an operator response. When

requested to reply to an RJE message, the operator must enter his response within approximately 21 seconds to maintain the connection.

INPUT AT THE WORK STATION

Input is accepted from the card reader, the console keyboard, and from one or more disk storage units.

Job entries and work station commands are acceptable input from the card reader. No JECL statements are sequence checked; however the first statement at work station startup must be an RJSTART command submitted from the card reader.

The only valid input from the console keyboard is work station commands. Input is accepted from the console-keyboard between jobs from the card reader when the operator has indicated that he has such input to submit. The 1130 Work Station Program checks this input only for the JECL identifier (...).

Input is also accepted from one or more disk storage units. A special 1130 RJE control card (.. DATA) is defined to control this function. This control card can be placed in the card input stream or on disk. It contains information allowing the RJE program to read input alternately from the card reader and from the disk. Data to be read from disk must be stored there prior to RJE processing. This data must be stored in 80-character records in 8-bit packed code format (eight records per sector), in consecutive sectors. After reading this input to end of disk data, the RJE program resumes reading from the card reader.

OUTPUT TO THE WORK STATION

Output to the work station consists of job output and messages. Job output, consisting of SYSOUT data sets created by the job, is directed to the printer, the punch, or a user-exit routine. Each job output data set is directed to the device associated with the SYSOUT class specified in the DD statement for the output data set. RJE System Messages are directed to the console-printer or the line printer.

Carriage control for printer output may be specified by a control character as the first byte of each record. Either machine code or ASA control characters are allowed. If characters not

recognized by the equipment or no control characters are specified, the output is single spaced with a skip to channel 1 when channel 12 is sensed in the carriage control tape.

Stacker Select, for punched output, if available may be specified by a control character as the first byte of each record. Either ASA or machine code control characters are accepted. If characters not recognized by the hardware or no characters are specified, stacker 1 is selected.

The 1130 RJE Remote Work Station Program includes a user-exit routine which accepts output data sets directed to it and writes them on disk in an area reserved by the user. This routine may be replaced by a user-written routine to process data directed to the user-exit and to write output to any available device. (A minimum of 16K words of main storage is required if a user-written routine is included.)

If no user-written routine is present, the RJE program writes user-exit data sets consecutively on disk, each data set beginning at a sector boundary. However, if the RJE program is reloaded, data sets previously written on disk are unprotected and may be destroyed since any additional user-exit data sets are written beginning at the first sector of the reserved area.

The primary output device for messages is the console printer. The secondary device is the line printer. The operator selects the message device by setting one of the console switches.

Note: Data directed to disk may later be referenced by a .. DATA statement. To be able to do this, user must define his data set as fixed blocked or unblocked with a logical record length of 80 and no control characters.

OPERATOR COMMUNICATION

If the 1130 RJE Work Station program encounters an error in I/O operations involving devices supported by Disk Monitor Version 2, the operator follows the normal Disk Monitor Version 2 error recovery procedures, except for disk and line errors. In the case of disk and line errors, a message is issued, and the RJE run is aborted or restarted as requested by the operator.

Operator Messages

OCR--Operator Communication Request
Recognized

Explanation: The RJE program is ready to service an operator request. The operator indicates that he wants to communicate with the 1130 RJE Work Station program by pressing the Program Stop key.

System Action: The system waits for the reply.

Operator Response: The operator must enter one of the following codes. For switched lines, the response must be entered within approximately 21 seconds if line activity has ceased.

- A - Continue input from the card reader or disk, whichever is in progress.
- B - Commands are to be read from the console keyboard.
- D - Discontinue receiving output.
- N - Ignore the request.
- E - Exit to the Disk Monitor when processing is complete, that is, when there is no input or output available.
- T - Terminate processing by exiting to the Disk Monitor and dumping core.

Note: This message is also given when internal closedown is initiated. The valid responses then are A, T, or E.

ESTABLISH LINE CONNECTION

Explanation: This message is displayed only at an 1130 work station on a switched line. The operator is to establish a connection with the central system.

System Action: The system continues to check for a completed connection. When the connection is established, the system resumes processing.

Operator Response: The operator must perform the dial-up procedure to establish the connection with the central system.

DATA rrrr000c000f TO DISK AT xaaa, bbbb

Explanation: This message is received only when no user-written routine is present. The RJE program is writing user-exit data to disk. The message codes have the following meanings:

- rrrr - The logical record length in hexadecimal.
- c - The type of control characters used where c may have the following values:
 - 0 - No control characters are used.
 - 1 - System/360 machine code control characters are used.
 - 2 - ASA control characters are used.
- f - The OS/360 record format where f may have the following values:
 - 1 - Fixed unblocked records
 - 2 - Fixed blocked records
 - 3 - Variable unblocked records
 - 4 - Variable blocked records
 - 5 - Undefined records
- x - The disk number.
- aaa - The sector address.
- bbbb - The length of the data set in blocks where there are 40 packed EBCDIC characters per block (16 blocks per sector). The last block need not be filled.

System Action: The user-exit data set is written on disk.

Operator Response: None

PUNCHED OUTPUT--Nonblank Card at Punch
Station

Explanation: A SYSOUT data set is to be punched on a 1442-6 or-7 card read punch unit which is also used to read card input, and a non-blank card is at the punch station.

System Action: The system waits for operation action.

Operator Response : The operator may load blank cards in the punch and press the Program Start key to resume processing. If he wants the output to be punched in the prepunched cards already in the punch unit, he simply presses the Program Start key.

The operator must take action within approximately 21 seconds to maintain line communication. If this time limit is exceeded, the LINE ERROR message is received. The RJE program is restarted if the operator places in the card reader an RJSTART command and a null statement followed by the cards to be punched and responds with an A to the LINE ERROR message.

Error Messages

J01 INVALID CARD

Explanation: This message is issued during work station program generation. The card containing the work station information is invalid or contains invalid information. (See Generating the 1130 Work Station Program.)

System Action: The system exits to the Disk Monitor Supervisor.

Operator Response: The operator must restart the generation and enter a valid card.

J10 INVALID PRINTER

Explanation: Information from the Disk Monitor System indicates that the principal print device is not an 1132 printer or a 1403 printer.

System Action: The system waits for an operator response. If the operator presses the Program Start key, the RJE program exits to the Disk Monitor.

Operator Response: By pressing the Program Start key, the operator directs the RJE program to exit to the Disk Monitor. He may restart the RJE program after assigning either an 1132 printer or an 1403 printer as the principal print device.

J20 RJSTART MISSING

Explanation: The requirement for an RJSTART command was not satisfied.

System Action: The system waits for operator action.

Operator Response: The operator must enter an RJSTART command through the card reader and press PROGRAM START in order to resume processing.

J21 .. DATA INVALID

Explanation: A .. DATA statement contains invalid parameters.

System Action: The system waits for operator intervention.

Operator Response: To continue RJE processing, the operator must use the Operator Communication Request facility. (See OCR=).

J22 INVALID INPUT

Explanation: The input entered from the console keyboard was not a valid work station command.

System Action: The system waits for more input from the console keyboard.

Operator Response: The operator must enter a work station command or press EOF.

J51 LINE ERROR OCR=

Explanation: An irrecoverable error has been encountered while reading or writing on the communication line, or the line cannot be opened.

System Action: The RJE program closes the communication line if it is open and waits for an operator response.

Operator Response: The operator must reply by entering one of the following codes from the console keyboard.

- A - Input is available at the card reader. If this option is selected, the first card in the card reader must be an RJSTART.
- E - Exit to the Disk Monitor.
- T - Terminate RJE processing by exiting to the Disk Monitor and dumping core.

J52 DISK ERROR INPUT OCR=

Explanation: A permanent error has been encountered while attempting to read input from disk. This message is issued only if a user's disk input is being read at the time the error occurs.

System Action: Reading of the input data file is discontinued. Any available output from the central system

is accepted after the operator response has been entered. The system continues according to the operator's response.

Operator Response: The operator must enter one of the following codes. For switched lines, the response must be entered within approximately 21 seconds if line activity has ceased.

- A - Input is available at the card reader.
- B - Commands are to be read from the console keyboard.
- E - Exit to the Disk Monitor when all available output has been processed.
- T - Terminate processing by exiting to the Disk Monitor and dumping core.

J53 DISK ERROR OUTPUT OCR=

Explanation: A permanent error has been encountered while attempting to write data on disk. This message is issued only if user-exit data is being written when the error occurs.

System Action: Output from the central system is discontinued. The system continues as directed by the operator response.

Operator Response: The operator must enter one of the following codes. For switched lines, the response must be entered within approximately 21 seconds if line activity has ceased.

- A - Input is available at the card reader. (Any pending keyboard input is processed first.)
- B - Commands are to be read from the console keyboard.
- E - Exit to the Disk Monitor when all available input and output has been processed.
- T - Terminate processing by exiting to the Disk Monitor and dumping core.

J54 DISK ERROR OCR=

Explanation: A permanent error has been encountered while attempting to read RJE constants or error messages from disk. If this message appears, an RJE error message may be missing.

System Action: The system continues according to the operator response.

Operator Response: The operator must enter one of the following codes:

- E - Exit to the Disk Monitor.
- T - Terminate processing by exiting to the Disk Monitor and dumping core.

J55 END OF DISK AREA OCR=

Explanation: The user has failed to reserve space or has reserved too little space on disk for user-exit output data sets.

System Action: Output from the central system is discontinued. The system continues as directed by the operator response.

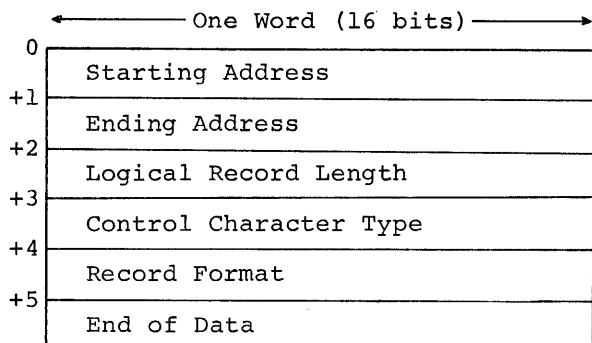
Operator Response: The operator must enter one of the following codes. For switched lines, the response must be entered within approximately 21 seconds if line activity has ceased.

- A - Input is available at the card reader. (Any pending keyboard input is processed first.)
- B - Commands are to be read from the console keyboard.
- E - Exit to the Disk Monitor when processing is complete, that is, when there is no more input or output available.
- T - Terminate processing by exiting to the Disk Monitor and dumping core.

USER EXIT INTERFACE

The RJE support passes physical records to the user-written output routine. The user's routine need not save any registers for the RJE support. The user must name the routine entry point UEXIT and must store this routine in the User Area (after deleting the resident module with the same name) prior to RJE processing.

The user-exit routine receives control when output becomes available for it. Upon entry, the return address is stored in the first word of the routine. Register 1 contains the address of a parameter list describing the output passed to the routine. This parameter list is aligned on an even word boundary. The format of this list is:



Starting Address: The address of the physical record received from the central system.

Ending Address: The ending address+1 of the block received from the central system.

Logical Record Length: The length of logical records when fixed length records are passed.

Control Character Type: The type of control characters being used.

- 1 - System 360 machine code
- 2 - ASA code
- 0 - No control character

OS/360 Record Format: The code indicating the type of record.

- 1 - Fixed unblocked
- 2 - Fixed blocked
- 3 - Variable unblocked
- 4 - Variable blocked
- 5 - Undefined

End of Data: If zero, indicates end of data.

The user-written routine must use the same I/O routines as the 1130 RJE program for printer, punch, console keyboard, and disk. DISKZ is used for disk I/O.

Note: The user-written routine must return control to RJE within approximately 21 seconds in order to maintain the communication line connection. If the user exceeds this time limit, the central RJE program disconnects the line.

JECL FOR THE 1130 WORK STATION

JECL statements used for the 1130 work station are the same as those described under Job Entry Control Language, with one addition. The additional

statement allows the user to alternate the source of his input between disk input and card input.

The format of this statement is:

ID	Operation	Operand
..	DATA	DMS {,C {,D,aaaa[,bbbb]}

.. Is the JECL identifier and must be in columns one and two.

DATA

Must be preceded and followed by at least one blank.

DMS

Identifies the card as an 1130 JECL statement.

C

Indicates that input follow on cards.

D

Indicates that input follows on disk

x is the disk drive number.

aaa is the sector address.

bbbb is a hexadecimal number specifying the length of the disk data file in blocks where there are two blocks per 80-character (16 blocks per sector).

If D is specified, the disk number and the sector address are required, but the block count is optional. When the block count is not specified, the user must indicate the end of data on disk by using a .. DATA statement to transfer reading of data to the card reader or to another disk area. The optional block count for disk data causes the RJE program to read data from disk until the specified number of blocks has been read, unless the end of disk data indication is encountered first. If the RJE program reads the specified number of blanks without detecting end of disk data, reading from disk terminates and reading continues from the card reader.

Data on disk must start at the beginning of a sector and continue on consecutive sectors if necessary. Each sector must contain eight 80-character records in 8-bit code, but the last sector need not be filled.

The .. DATA card is not recognized between a // DD DATA card and the corresponding /* in an OS/360 job.

GENERATING THE 1130 WORK STATION PROGRAM

The object modules for the Remote Work Station program reside in the 1130 Disk Monitor subroutine library. The 1130 Work Station Program is loaded by an XEQ control card.

The user describes the work station configuration by executing once the program named RJE00. This program reads in one data card, supplied by the user, which contains parameters describing line configuration and space reserved for data output on disk, if any. If a parameter is specified, the parameter name and equal sign must be used as shown in the explanation below. If a parameter is omitted, the underlined value is assumed.

```
[Line=P  
Line=S  
Line=M(x,y)] [ ,UEXIT=(address 1,  
address 2)]
```

```
Line=P  
Line=S  
Line=M(x,y)
```

Specifies the type of line connection used by the work station

P Specifies point-to-point communication over a non-switched line.

S specifies point-to-point communication over a switched line.

M(x,y) Specifies a multipoint line where:

x is the polling character.

y is the selection character.

If this parameter is omitted, point-to-point communication over a non-switched line is assumed.

```
,UEXIT=(address 1, address 2)
```

address 1 is the starting address on disk reserved for storing data directed to the user exit.

address 2 is the ending address of the area reserved on disk for storing data directed to the user exit.

Addresses must be in the form xaaa where:

x is the disk drive number.

aaa is the sector address,

The area specified must be reserved by the user prior to RJE processing.

RJE00 stores the information found in the parameters, in an area on disk reserved for common constants. Once RJE00 has been executed, it need not be executed again unless the original information changes.

The final step in preparing the system for processing is the execution of the program RJE. This program uses the information stored on disk by RJE00 and the information in the Disk Monitor system specifying principal I/O devices to load the modules, residing in the system library, corresponding to the user's configuration. Note that the console-printer cannot be the principal print device.

Example 1: Entering Work Station Information

```
// JOB  
// XEQ RJE00  
LINE=M(A,B),UEXIT=(21B0,22B0)
```

The first two cards are the control cards needed to load the program that processes the information in the third card. This card specifies that the RJE work station is on a multi-point line and that its polling character is A and its selection character B. For storing of data to user exit, the user has reserved an area on disk drive 2 starting at sector 1B0 and ending with sector 2B0.

Example 2: Executing the RJE Program

```
// JOB  
// XEQ RJE  
.. RJSTART  
JECL statements and OS/360 jobs  
.. RJEND
```

The first two cards are used by the disk monitor system to load and start execution of the RJE work station program. After these cards, the JECL statements and the OS/360 jobs follow in the proper sequence. An RJSTART command must be the first card.



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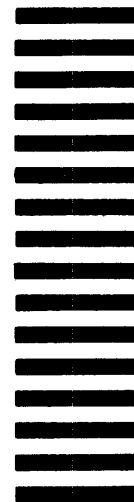
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