

Type III Class A Program

# IBM

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**Power II/RJE: Program Description and  
Operations Manual**  
Program Number 360D-0.5-2.006

IBM System/360 POWER II Remote Job Entry (POWER II/RJE) offers the ability to submit jobs via remote IBM 2780 Data Transmission Terminals for normal batch processing under DOS. This manual describes the general concepts and facilities of RJE. It includes operational and functional characteristics, installation procedures, and maintenance and performance guidelines. Knowledge of System/360 POWER II is a prerequisite to understanding POWER II/RJE (see the POWER II Program Description and Operations Manual, GH20-0737).

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## PREFACE

This manual is designed to present the general concepts, facilities, and details of the operational and functional characteristics of Remote Job Entry under the POWER II system. Sections of this manual describe maintenance and performance guidelines in addition to installation procedures. A complete understanding of POWER II is required.

Managerial personnel who wish to know more about RJE than is provided by the abstract will find a detailed explanation in the section entitled "RJE Concepts and Facilities". General installation operators will find that "RJE Concepts and Facilities" provides an introduction to the following sections, which contain detailed explanations of the POWER/RJE commands, control statements, operating procedures, and messages. Those whose job it is to install and maintain this program should have a thorough understanding of all sections of this manual.

Throughout this manual, the following terms are used extensively: POWER II system, POWER II system generation, and POWER II program. The POWER II program is the result of assembling the POWER macro and defines the POWER II system capabilities. Remote job entry support is an option in the POWER macro. The POWER II system generation includes the assembly of the POWER II program and complementary RJE components, which are assembled separately. These components are link-edited to create the program elements of the POWER II system.

The two POWER II disk files, QFILE and DATAFIL, are elements which complete the basic POWER II system. The full POWER/RJE system also includes the local unit record devices and remote work stations from which input, and to which output, is processed. Generally the full POWER/RJE system will be intended when the term POWER system is used. Where the word POWER is used, the POWER II system is implied. The word task is also used extensively. It has special meaning in the POWER system and does not imply the need for a multitasking capability in the DOS supervisor. RJE system refers to the tasks and facilities of the POWER/RJE system which provide remote job entry capability.

The RJE user should be familiar with the concepts and terminology introduced in POWER II (360D-05.2.006) Program Description and Operations Manual (GH20-0737) and in the following IBM System/360 Disk Operating System manuals:

Concepts and Facilities (GC24-5030)

System Control and System Service Programs (GC24-5036)

Operating Guide (GC24-5022)

The installation programmer responsible for creation and maintenance of the POWER system should be familiar with the following IBM System/360 Disk Operating System manuals:

Assembler Language (GC24-3414)

System Generation (GC24-5033)

Basic Telecommunications Access Method (GC30-5001)

The publication relevant to programming and operation of the IBM 2780 Data Transmission Terminal work station is:

IBM 2780 Data Transmission Terminal--Component Description (GA27-3005)

Several conventions are followed in illustrating the format and coding of the Job Entry Control Language, central installation commands, and remote work station commands:

- Uppercase 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.
- Lowercase 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; they may be omitted at the programmer's discretion. Any item or group of items not within brackets must be coded.
- Braces, { } 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 POWER system automatically assumes that the underlined item is the programmer's choice if none of the items is coded.
- Ellipses, ..., indicate that the preceding item or group of items can be coded more than once in succession.

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## INTRODUCTION

Operating in conjunction with POWER II, this program offers the user the capability of submitting jobs via remote IBM 2780 Data Transmission Terminals for processing on a System/360 under DOS. The program will support up to five terminals on as many leased or dial-up lines.

RJE operates in the same foreground partition as POWER II (F1 or F2). Jobs submitted remotely may be assigned a specific priority and directed to either batch partition for processing. Output may be directed to either local devices, a remote 2780 terminal, or a hold queue for disposition at a later time. The remote user can communicate with the central system to send and receive messages and to obtain job status.

RJE is an enhancement to POWER II. Thus, all the functions and facilities of POWER II remain available to the system.

RJE is written in Assembler Language and requires a minimum of 38K of core which includes BTAM and POWER II requirements. An RJE system tailored to the user's needs can be generated together with his POWER II system through the use of macros.

## CENTRAL SYSTEM

- IBM System/360 Model F30 (64K) with interval timer and decimal arithmetic features and whatever unit record, tape, and direct access storage devices are required to support DOS
- Disk space for the POWER II data files
- An IBM 2701 Data Adapter Unit with Synchronous Data Adapter - Type II, or an IBM 2703 Transmission Control, with binary synchronous features, equipped for EBCDIC code and full transparency operation. The number of control units depends on user requirements.

## REMOTE WORK STATIONS SUPPORTED

The IBM 2780 Data Transmission Terminal (Model 1 or 2) may be used as an RJE work station. It can be connected to the central System/360 by a switched or nonswitched point-to-point contention line.

The following special features are required:

- EBCDIC transmission code
- EBCDIC transparency
- Print line (either 120-character or 144-character)
- Extended (Enquiry-ENQ) retry transmission
- AutoTurnaround (required only for Model 2)

In addition, the following IBM 2780 special feature is supported:

- Multiple record transmission

## PROGRAMMING REQUIREMENTS

- POWER II (360D-05.2.006)
- DOS Release 21 or higher
- DOS Assembler
- DOS BTAM

The POWER/RJE system requires the DOS supervisor to have been generated with MPS=YES or BJF, TP=BTAM or QTAM, and CCHAIN=YES.

## SUMMARY OF CAPABILITIES

### CENTRAL SYSTEM

- Local POWER II functions coexist with RJE function.
- The central installation operator controls POWER II system activity. He may display job status, release jobs from hold status, alter job priorities, delete jobs from queues, terminate jobs in process, and start or stop given reader, writer, or RJE system components.
- The central installation operator may inquire whether an RJE task is inactive, active, or processing.
- User requirements are defined by the POWER II system generation.
- "Warm" start support is provided.
- System security is provided through terminal and user identification.
- Users' and telecommunication lines may be added to or deleted from RJE without generating the entire POWER II system. Only the appropriate generation components need to be assembled and link-edited with the POWER II system again.
- Tape intermediate storage may be used for output queues.
- Up to five TP lines may be active at one time.

### REMOTE WORK STATION

- The remote work station user benefits from central system capabilities.
- Jobs may be submitted for batch or SPI processing in either or both the background or foreground 2 partition.
- Job status may be obtained or changed, and jobs may be deleted from the system.
- The user may defer output delivery and may request printer or punch output to conform to special forms considerations.
- Remote job output may be requested only by the user submitting the job or may be directed by the remote user to the central system for output processing.
- Output can be discontinued, restarted, or canceled.



- The remote work station user may send messages to and may receive messages from the central installation.

#### RESTRICTIONS

- The optional multipoint line control feature on the IBM 2780 is not supported.
- Restrictions to POWER II apply also to job entries from the RJE system.

## RJE CONCEPTS AND FACILITIES

### RJE TELECOMMUNICATIONS CONCEPTS AND TERMINOLOGY

This section describes the basic characteristics and operational concepts of the Remote Job Entry capability in the POWER 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 capability of the POWER system is a specific application of a computer-based telecommunications system under DOS/360. The particular telecommunications system used for RJE is characterized by a number of work stations 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. Data transmission in the RJE system uses binary synchronous communication in the EBCDIC transparent mode of transmission, which allows transmission of the full EBCDIC character set as data.

The RJE system uses the DOS/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 to accomplish communication with the central processor, called the central system. The system, however, may include work stations attached to the central location by local lines. Regardless of location, all supported work stations are classified as "remote", since they are attached to the central system by an IBM 2701 Data Adapter Unit or an IBM 2703 Transmission Control.

### 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 manual, 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, depending on the type of line connection between them. The connections possible are point-to-point on switched and nonswitched lines. The RJE system permits communication using either type of connection. The RJE system does not support multipoint connections. The work station always initiates the physical and logical connection between work station and central system in the RJE environment. 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. In the RJE communications environment, the central system never initiates communications with a work station. The central system breaks the logical connection only after receiving a disconnect sequence or an RJEND command from the work station. (Refer to "Work Station Commands" for a description of the RJEND command.)

#### GENERAL CONCEPTS

For an IBM System/360 with attached communication lines, the POWER II system with RJE provides an efficient and convenient method for remote work stations to enter jobs into the job stream. Once a job has been entered into the job stream, execution of the job proceeds under the supervision of the Disk Operating System. All data files required by the job are subject to DOS specifications as though the job were submitted locally. The remote user may direct the RJE system to return job output to the terminal, to write it at the central installation, or to hold it in the output queue. RJE provides fast access to computer services for users in all parts of the communications network by making available batch-computing facilities at the remote source.

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 work station commands. Commands may also be entered by the central operator.

The POWER II SPOOL functions may be divided into two classes:

1. The creation of input queues and the writing of output from the output queues
2. The execution of jobs in the input queues and the creation of the output queues

When RJE operations are active, they provide the first function class for remote job entry users and use the facilities of the second function class in the POWER system. This type of operation allows RJE and the POWER II SPOOL functions to coexist when RJE is active. (See "The RJE Task".)

The central installation operator activates the POWER II system in a foreground partition and starts background execution as specified for POWER alone. Although active local reader and writer tasks are not necessary for RJE activity, the central installation operator may also start them for local job entry. Local reader/writer activity is independent of RJE activity.

The ability to accept input automatically from remote work stations greatly increases the need for strong system discipline. For example, if a remote job requiring data files at the central installation is to be submitted, the volumes containing the data files must be available for prompt mounting. Otherwise, the system job flow can be upset or interrupted. Jobs which jeopardize the central installation operations, such as alterations to system libraries, should be closely controlled.

#### RJE FACILITIES

In addition to those facilities provided by DOS and POWER, the RJE user is provided with the following capabilities:

- He can submit a job via a 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 optional addition of control statements requesting special POWER processing.
- Jobs may be submitted for batch processing in either the background or foreground 2 partition.
- Using the command language provided, the RJE user can request services not otherwise available in the remote environment. The work station commands are:

RJSTART	-	Attach a work station to the RJE system.
RJEND	-	Detach a work station from the RJE system.
LOGON	-	Attach a user to the RJE system.
LOGOFF	-	Detach a user from the RJE system.
OUTPUT	-	Retrieve selected job output.
CONTINUE	-	Continue interrupted in-process output.
DELETE	-	Delete for this user a selected job or all jobs from the RJE system.
STATUS	-	Retrieve selected job status.
BRDCSTR	-	Retrieve broadcast messages containing system status from the central system.
MSGR	-	Send a message to the central operator.

- The user can specify how the job output is to be returned.
- He can direct job output to himself or to the central system for output processing. Only the user who submits the job can receive job output.
- The remote operator can discontinue in-process output, delete output, or continue it at a later time by command.

- The user can request printer and punch output to conform to special forms considerations.
- The central operator, using commands provided, can supervise the central system and communicate with remote users. The commands for RJE are:

Start	-	Begin RJE task operation at the central installation.
Stop	-	Cease RJE task operation at the central installation.
Go	-	Reactivate an RJE task.
Broadcast	-	Maintain information in the message queue or send a message to a work station.
Inquire	-	Display information pertaining to RJE activity.

See description of POWER II control statements and commands for a complete explanation of these commands.

#### WORK STATION STATES

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. A specific work station is in only one state at a time. The transition between states is controlled by the work station through various RJE 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, the RJE system is ready to service the work stations. At this time all work stations appear in the inactive state.

#### INACTIVE STATE

A work station is in the inactive state when it is logically detached from the RJE system. 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. The central system assumes that an inactive work station does not want to participate in RJE activities, and consequently, 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.

#### ACTIVE STATE

Work stations enter the active state when the central system receives a valid RJSTART command from an inactive work station. Active work stations are logically attached to the RJE system. The central system may not initiate transmissions to active work stations except when broadcast messages are requested. Broadcast messages are transmitted

to active work stations only if requested by the work station operator in the RJSTART command. Another way in which the work station enters the active state occurs when the central system receives a valid LOGOFF command (from a work station in the processing state). The current user is detached from the RJE system, but the work station reverts to the active state and remains logically attached to the central system. The central system is conditioned to receive only a LOGON or RJEND command from an active work station. If any other input is sent from an active work station, it is rejected, and an error message is returned to the work station.

#### 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 access to the RJE system. The LOGON command defines the beginning of a user session. During a user session, job entries and the work station commands RJEND, LOGOFF, OUTPUT, CONTINUE, DELETE, STATUS, BRDCSTR, and MSGR are acceptable input from the work station. In addition, the central system transmits work station output and user output to a processing work station. Work station output comprises responses to work station commands and error messages. User output is that output which is returned only if the user is logged on at the work station and may be returned only when requested by the user.

If the work station transmits any of those control statements which specify a change of state, it assumes the new state. A LOGOFF or RJEND work station command will cause the work station to assume an active or inactive state, respectively.

#### WORK STATION OPERATION

##### WORK STATION STARTUP

The remote work station user readies his terminal for transmission to the central installation. A work station starts up in the RJE system by submitting the RJSTART command to identify it to the system. If the RJE task for that line has not been initiated by the central installation operator, the command will not be acknowledged. If the RJE task for that line has been initiated, the RJE task will examine the RJSTART command for validity. This command, if valid, places the work station in the active state. A user now may gain access to the system from this work station by logging on, or the work station may simply wait for work station output (broadcast messages) directed to it. Of course, before sending the command to the central system, the work station must be brought online, as outlined in the sections of this manual dealing with remote work station operating procedures. The procedure for attaching the work station is the same for all work stations, that is, 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 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 for another work station.

If closedown is initiated by the stop command when the work station is in the active or processing state, a message is sent to the work station indicating that the RJE task has been terminated.

#### USER ACCESS

A user gains access to the RJE system by submitting the LOGON command at an active work station. This procedure ensures that only valid users have access to the RJE 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. 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. A user may be logged on as many as two work stations at one time. In this manner, he may use one work station for job entry submission and the other work station for output retrieval.

#### System Security

The system is protected from unauthorized access through the use of an identification sequence in the RJSTART and LOGON commands (see "Work Station Commands"). Verification of a valid work station is established by the terminal identification (termid) in the RJSTART command. Verification of valid RJE users is established at LOGON time with the user identification (userid). Output from a remotely submitted job is further protected in that it may be requested only by the originator. The termids and userids for the RJE system are defined by the POWER/RJE system generation.

#### 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 a Remote Job Entry system. It is a combination of the job to be executed at the central system and the optional Job Entry Control Language (JECL) statements. These optional statements specify certain actions to be taken in processing the job by POWER. If JECL statements are not specified, system options are assumed when the job entry is received. The job name, found in the DOS JOB statement or the optional JECL JOB control statement, identifies the job entry to RJE. This feature allows the RJE user to request and receive job output and job information by job name -- a name which the user specified. RJE operations do not require individual job names. The system qualifies all job names with job numbers. If two job entries have the same job name, the user may request job output by job name and job number. (See "POWER II Job Entry Control Language".)

#### Work Station Commands

The user makes specific requests of the RJE system, using work station commands. Work station commands are entered through the card reader, and 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 "Work Station Commands".

## 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 the execution of remotely submitted jobs. Job output consists of SYSLST and SYSPCH files when assigned to a unit record device and other files assigned the same devices. If the DOS LOG option was specified for the job, job management messages, including diagnostics of job control statements, are also returned to the work station.

### Output Control

Output at the work stations involves a number of options which are specified in JECL statements and work station commands:

- The output may be directed to a work station as soon as the job is completed and the work station is available to receive it. The user who submitted the job must be logged on that work station and must submit an OUTPUT command to indicate he is ready to receive job output.
- The output is held at the central system until the work station user requests it.
- The remote user can request multiple copies of his output, using JECL statements.
- Output may be directed to unit record devices at the central installation.

Details of JECL statement specifications for output control are given in the section "POWER II Job Entry Control Language".

### Messages

Messages received at a work station include responses to input from the work station, diagnostic messages, and broadcast messages maintained by the central operator and sent to a work station upon request. The broadcast messages include any information considered desirable by the installation, for example, closedown of the central system, loss of a central resource, or addition of a central resource. These messages appear on the printer between job output. Broadcast messages appear only when requested by the work station operator. Detailed specifications for messages are given under "Messages".

## PRIORITY SCHEDULING

Priority scheduling as a generation option in the POWER program may be used also for remote job entries. The job priority is specified as a parameter in the POWER JECL statements which may optionally identify job entries.

## JOB ACCOUNTING

Limited job accounting is provided as a user option by the POWER system. This option, if elected, applies to all jobs processed by the POWER system, including those submitted by remote work station users. However, the job accounting information does not distinguish between locally and remotely submitted jobs.



## THE RJE TASK

Before reading this section, the user should be familiar with the concepts and facilities of POWER. The POWER system generation with RJE capabilities is divided into five basic parts:

1. POWER program
2. BTMOD
3. RJE blocks
4. RJE block name list
5. userid list

Each part is generated separately.

1. The POWER program is assembled with RJE operands which have been added to the POWER macro to provide the RJE support. RJE support requires the POWER program to be assembled with local reader capability. During the POWER program assembly, the module IO2780 is created to interface with BTMOD for RJE tasks accessing the IBM 2780. Macros required to support RJE operands are provided as part of the RJE program materials. The macros, however, require the POWER II macros to have already been placed in the source statement library.
2. The BTMOD used must be named RJBTMOD and must be generated with the following operands: ERLOGIC=E, CANCEL=NO, BSCS=YES, DECBEXT=NO, SEPASMB=YES. SWITCH=YES or SWITCH=NO may be specified. Also, IJLMWAIT must be defined as an external symbol. The RJBTMOD macro that will cause the required BTMOD to be generated is provided by the RJE program materials. This macro relieves the user of the responsibility of generating the correct BTMOD.
3. The RJE block defines the device-dependent characteristics of a terminal type for a line and contains the DECB, DTFBT, I/O area, and additional device-dependent characteristics required to access that terminal type on that line. The RJEBLK macro, used to create the RJE block, is part of the RJE program materials.
4. The RJE block name list must contain the name of each RJE block to be used. Each entry will generate an external reference. If the external reference is not resolved by the linkage editor, no attempt will be made to load that RJE block. The RJBLKLIST macro, used to create the RJE block name list, is part of the RJE program materials.
5. The userid list specifies the valid userids. A userid may be from one to eight alphanumeric character(s). A maximum of 100 userids will be accepted. Duplicate userids will not be checked. The userid list also contains termids as though they were a userid. The RJUSERS macro, used to create the userid list, is part of the RJE program materials.

When the operator initiates the first RJE task, the start command processor reserves two program buffers for the RJE task and the RJE block associated with the specified line, and reserves two data buffers for accessing the POWER input/output queues. A track group is obtained for line turnaround. The IO2780 module is loaded into three contiguous program buffers, and linkages are resolved. The DTFBT and DECB are

relocated, and the DTFBT is OPENed. The task just initiated is now waiting for line activity.

Figure 1 illustrates the communication and transfer-of-control routes for the RJE task as it fits into the POWER system. The RJE task receives control from the task handler for the POWER system and passes control to the IO2780 module for DOS teleprocessing functions. In turn, BTMOD performs the required line activity.

Because half-duplex communications and the IBM 2780 require the line to be transmitting in only one direction at a time, the RJE task may perform as a reader, a writer, or a line monitor, depending on the work station requests.

The operator initiates a second line in the same manner as the first. The command processor loads another copy of the RJE task, which is distinguished from the first by the RJE block it is required to use. The IO2780 module, being reentrant, is not loaded again, and the DTFBT and DECB in the second RJE block are relocated as before. The DTFBT is OPENed, and the RJE task for the second line is ready to handle line activity.

The RJE task interfaces with the input and output queues in the same manner as POWER reader/writer/execution processor tasks. As a result, remotely submitted jobs are completely under the control of the POWER execution processors and central installation operator action while executing. Output to be returned to the work station is under the control of the remote work station operator.

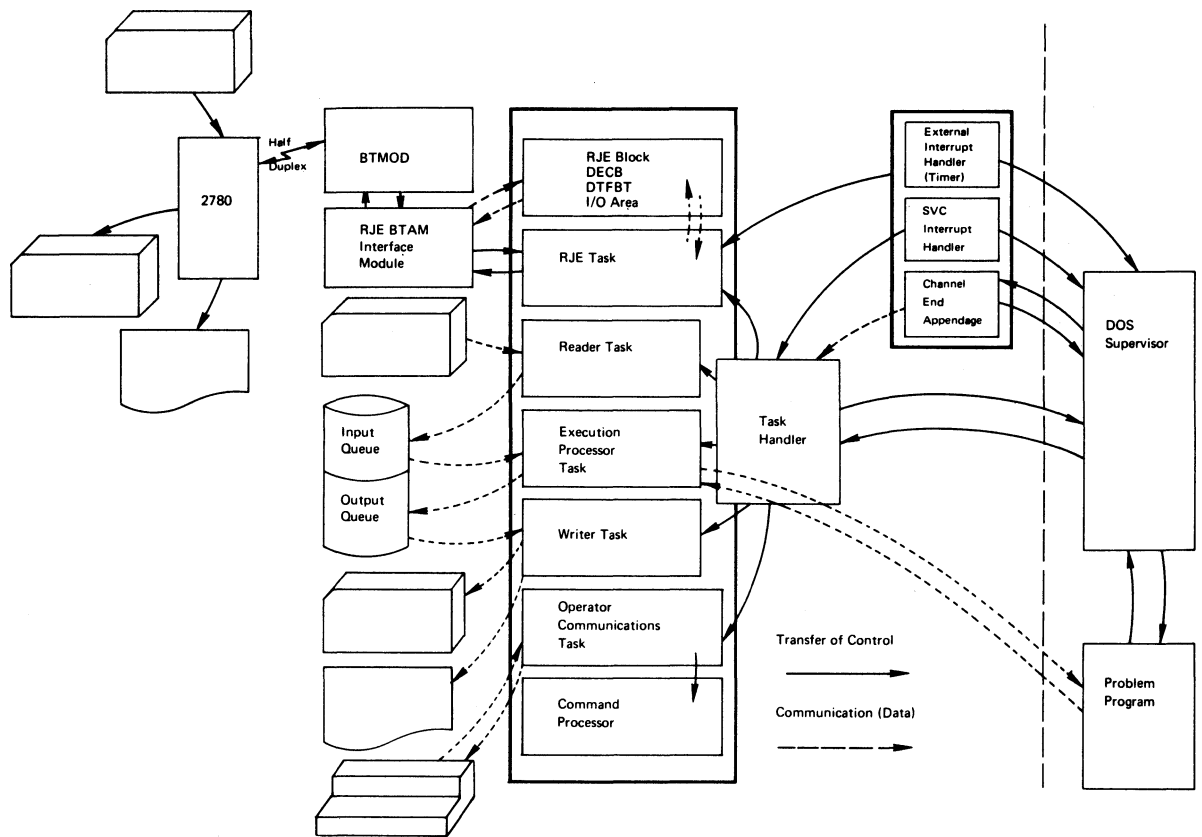


Figure 1. POWER II system overview

RJE requires that the System/360 have the timer feature. The timer is used by RJE tasks to limit wait time for intervention-required responses. However, the user is not required to assign the timer to the POWER partition. Timer assignment may be to any other partition or need not be assigned, and RJE use of the timer is independent of use by any other partition.

## DESCRIPTION OF POWER II CONTROL STATEMENTS AND COMMANDS

This section is divided into three parts:

- Description of the POWER II Job Entry Control Language
- Description of central installation console commands for RJE management
- Description of RJE work station commands

Although the Job Entry Control Language is not required in order to use POWER from a remote work station, this language provides additional flexibility and control. JECL statements may be used optionally to perform the following functions:

- Assign priorities
- Hold the job in the reader queue
- Provide SPOOLing output to tape instead of SPOOLing it to disk
- Request no interception of unit record print or punch output
- Direct jobs to the background or foreground 2 for processing
- Return output immediately to the work station if the work station is processing job output for the same user
- Hold output until an OUTPUT work station command is issued
- Process output at the central system

The central operator communicates with the POWER system by means of central installation console commands. These commands provide the capabilities needed by the central operator to control and maintain the RJE system.

- B - Broadcast to RJE
- G - Reactivate an RJE task
- I - Inquire about RJE activity
- P - Stop an RJE task
- S - Start an RJE task

RJE work station commands provide a convenient means of requesting RJE system facilities for the remote environment. Work station commands perform the following functions:

Define work station state

- RJSTART
- RJEND
- LOGON
- LOGOFF

## Manipulate job output

OUTPUT

CONTINUE

DELETE

## Provide job and system information

STATUS

BRDCSTR

## Communicate with central system

MSGR

## POWER II JOB ENTRY CONTROL LANGUAGE

A job entry is defined for the POWER system as the collection of input from the reader which is logged by the system under a single job name. There are two methods of creating a job entry:

1. DOS Job Control Language
2. POWER Job Entry Control Language (JECL)

When DOS Job Control Language is used, the // JOB jobname and /& statements delimit a job entry. The job name in the // JOB jobname statement is used to log a job entry. When JECL is used, the \* \$\$ JOB jobname and \* \$\$ EOJ statements delimit a job entry. The job name in the \* \$\$ JOB jobname statement is used to log a job entry. A job number is assigned to a job entry by the POWER system when the job entry is logged, and the POWER system places output from the job entry in the appropriate output queues under the job name and job number of the job entry. The operator must state the job name (and, optionally, the job number) when using operator commands to control the job entry. Warning: Using the jobname ALL may cause conflicts in the use of certain POWER commands. Use of ALL as a jobname should be avoided.

JECL does not require changes to DOS job control statements, and JECL does not replace DOS job control statements which are required for executing the job or job step. JECL, independent of DOS job control, provides a convenient means for the user to specify how the POWER system is to handle the job entry. Job entry control statements may be used to handle the job entry. Job entry control statements may be used to optionally perform the following functions:

- Assign priorities
- Hold a job entry in the reader queue
- Provide SPOOLing output to tape instead of SPOOLing it to disk
- Request no interception of unit record print or punch output
- Direct jobs from remote work stations to the background or foreground 2 for processing
- Return output to the work station if the work station is processing other job output for the same user

- Hold output until an OUTPUT work station command is issued
- Process output at the central system

In an RJE system either DOS Job Control Language or JECL may be used to delimit a job entry. Job entries may be alternately delimited by JECL and DOS job control statements. Examples of JECL usage are given at the end of this section.

The Job Entry Control Language consists of four types of statements: JOB, PRT, PUN, and EOJ. Each statement except the EOJ statement consists of five fields: identification, operation, operand, comments, and sequence. The EOJ statement consists of four fields: identification, operation, comments, and sequence. These statements are entered on punched cards.

The identification field contains the identifying characters, \* \$\$, which are placed in card columns 1 through 4.

Statement	Columns 1-4	Columns 5-71			Columns 73-80
JOB	* \$\$	JOB	Operand	Comments	Sequence
PRT	* \$\$	PRT	Operand	Comments	Sequence
PUN	* \$\$	PUN	Operand	Comments	Sequence
EOJ	* \$\$	EOJ		Comments	Sequence

Note: The comments and sequence fields are optional.

Blanks preceding and following the operation field are optional. The operand field contains one or more positional parameters of information separated by commas. Positional parameters are described as values for which information must be substituted. These parameters must be declared in a specific order.

The operand field has no fixed length. A blank terminates the operand field; therefore, none of its parameters may contain embedded blanks. If trailing parameters are omitted, trailing commas may be omitted also. If the operation requires an optional operand field and no parameters are specified, the entire operand field may be omitted. If in this case a comments field is present, the omitted operand field is indicated by a comma preceded and followed by blanks. (See example 4 of "The JOB Statement" for an illustration of an omitted operand field.)

The comments field may contain any information considered helpful by the person who codes the control statement. It has no fixed length.

The sequence field contains up to eight characters optional information used for control statement identification. The sequence field is positionally dependent and must be coded in the last eight columns (73-80) of the control statement. Column 72 of the JECL statement is reserved. Continuation statements are not permitted; all fields must be contained on one punched card.

Because JECL statements begin with an asterisk, DOS will treat the job entry control statements as comments when the POWER system is not used. When JECL is used with the POWER system, the job entry control statements are removed from the job stream by POWER prior to job execution.

## THE JOB STATEMENT

ID	Operation	Operand
* \$\$	JOB	[jobname],[hold],[priority],[partition]

The JOB statement must be placed between jobs or job steps to correctly specify a job entry.

jobname: specifies the name by which the job entry is known to the POWER system. If the job entry contains several DOS jobs, they will all be logged in the POWER system by the jobname in the JECL JOB statement. The jobname may be from 1 to 8 alphameric characters. If jobname is not specified, the POWER system will assign AUTONAME as the jobname.

hold: specifies that the job entry is to be held in the input queue until it is released by the central operator. Hold is specified with the character H. If hold is not specified, the job entry will be placed in the input queue on a first-in, first-out basis within its priority classification.

priority: specifies the priority assigned to this job entry. Priority is specified as a single numeric character from 0 to 9. Nine is the highest priority. If the priority is not specified, the POWER system will assign to the job entry a priority based on the PRIORITY generation option. If PRIORITY=NO, the contents of this parameter are ignored.

partition: specifies, for jobs submitted from RJE work stations, the partition to which the job entry is assigned for execution. Partition is specified as either BG or F2. If partition is not specified, BG is assumed. If F2 is specified, the POWER system should have been generated to support the foreground 2 partition. Otherwise, the job will be processed in the background partition.

Example 1:

```
* $$ JOB PAYROLL,,0
```

This job entry will be logged by the jobname PAYROLL and will be placed in the lowest priority class.

Example 2:

```
* $$ JOB TEST,H
```

This job entry will be logged by the jobname TEST and will be placed in the hold state in the generation default priority class. The central operator must release it from the hold state before it may be executed.

Example 3:

```
* $$ JOB ASSEMBLY,,2,F2
```

This job entry will be logged by the jobname ASSEMBLY and will be placed in priority class 2 (only 1 and 0 are lower). The job entry will be executed in the foreground 2 partition.

Example 4:

```
* $$ JOB          COMMENTS FIELD
```

This job entry will be logged by the jobname AUTONAME and will be placed in the generated default priority class.

## THE PRT STATEMENT

ID	Operation	Operand
* \$\$	PRT	[disposition] , [forms-number] , [number-of-copies] , [devaddr-of-tape] , [number-of-lines-before-msg] , {linetab}

The PRT statement must follow the JECL JOB statement. It may either precede or follow the PUN statement. Only one PRT statement is permitted for a job entry, and it pertains to all printer output intercepted by the POWER system for that job entry. For example, if the job entry consists of more than one DOS job and SYSLST is assigned to a printer, output from all the jobs is handled in accordance with the PRT statement operands. If the PRT statement is not included in the job entry, the default values of the PRT statement operands are assumed.

disposition: specifies the disposition of the printed output during and after execution of the job entry. The disposition specification options are listed below:

### Option Meaning

- D SPOOL output to disk intermediate storage.
- T SPOOL output to tape intermediate storage. This specification requires tape output writer capabilities to have been generated in the POWER system. If T is specified and tape output writer capabilities were not generated in the system, D is assumed. If T is specified, the devaddr-of-tape parameter must be specified also.
- N Do not intercept print requests. This specification allows direct writer capabilities. If a print writer task has been started, care should be exercised that print requests are not made to the same device.
- R For RJE, return output to the terminal.
- H Hold the output until requested by the user.

If the disposition specification is omitted, D is assumed. Note that only a disposition of R or H will permit the output to be returned to the user. D, T, and N will cause the output to be processed at the central system.

forms-number: specifies the type of forms to be used according to installation requirements. Forms-number is specified by one to four alphanumeric characters. If forms-number is not specified, the forms-number is assumed to be blanks. When the print writer task or the RJE task prepares to process output from a job entry, it will determine whether this forms-number agrees with the forms-number of the last job entry. If the numbers agree, the print writer task or RJE task processes the output. If the numbers do not agree, the print writer task writes a message to the operator to inform him that a change to the forms-number specified is required. The print writer task will wait for the operator to activate the task when the change of forms has been completed. When output is returned to a work station, change-



of-forms messages, if required, are sent to the work station. The work station operator should respond with the CONTINUE sequence.

number-of-copies: specifies the desired number of copies of printer output from the job entry. If the number-of-copies is not specified, one is assumed. Number-of-copies is specified by one or two numeric characters. If 0 or 00 is specified, one copy will be produced. Number-of-copies may not be specified if disposition is specified as T. If additional copies are required when disposition is T, the tape writer may be restarted.

devaddr-of-tape: specifies the cuu hardware address of tape drive to be used for tape SPOOLing when the job is being executed. This parameter may be used only when the disposition was specified as T and precludes the use of number-of-copies. cuu is specified as the hexadecimal characters representing the channel and unit address of the tape drive. No default is permitted. The devaddr-of-tape may not be one which is used for punch output.

number-of-lines-before-msg: specifies the number of print records intercepted before a warning message is sent to the central installation operator. This parameter is specified with one to six numeric characters and overrides, for this job entry only, the value specified by the STDLINE generation parameter. If number-of-lines-before-msg is not specified, the value specified by STDLINE is used. This parameter is used only for disk SPOOLing.

linetab: specifies the carriage control tape format to be used when print requests are intercepted. This parameter is specified as 26 numeric characters and overrides, for this job entry only, the LINETAB generation parameter. If linetab is not specified, the generated specification is used. Linetab specifies the print lines between the first carriage control tape channel punched and the other punches and the end of the page. Linetab is specified as  $d_0 d_1 \dots d_{11} d_{12}$  where  $d_0$  is the number of lines from the channel 12 punch to the first punch;  $d_1$  specifies the number of lines between the first punch and the channel 1 punch;  $d_2$  specifies the number of lines between the first punch and the channel 2 punch; and so forth. If channel 1 is the first punch, the distance is expressed as 00. If a channel is not punched, a 00 should be specified for that channel. Otherwise,  $d_n$  is specified as two numeric characters. If LINETAB is not generated for the POWER system, the LINETAB override option in the PRT statement is not checked.

Example 1: Printer output requiring special forms

```
* $$ PRT ,32A,,,100000040000000000000000056
```

In this job entry, the printer output will be SPOOLED to disk and will require the installation's special form 32A. One copy is required and the STDLINE value is used. The carriage control tape defines a page as 66 lines long. Channel 3 is punched four lines below channel 1. No skips, other than to channels 1 and 3, will be issued.

Example 2: Direct writer

```
* $$ PRT N
```

In this job entry, printer requests will not be intercepted.

Example 3: Printer output SPOOLED to tape

```
* $$ PRT T,,283
```

In this job entry, output is SPOOLED to tape drive 283 during job execution.

Example 4: Printer output to be returned to the remote work station.

```
* $$ PRT R,,2
```

The user at the remote work station requests that the printer output be returned to him and that two copies are to be produced.

#### THE PUN STATEMENT

ID	Operation	Operand
* \$\$	PUN	{disposition} , {card-number} , {number-of-copies} , {number-of-cards-before-msg}

The PUN statement must follow the JECL JOB statement. It may either precede or follow the PRT statement. Only one PUN statement is permitted for a job entry, and it pertains to all punch output intercepted by the POWER system for that job entry. For example, if the job entry consists of more than one DOS job and SYSPCH is assigned to a card punch, output from all the jobs is handled in accordance with the PUN statement operands. If the PUN statement is not included in the job entry, the default values of the PUN statement operands are assumed.

disposition: specifies the disposition of the punched output during and after execution of the job entry. The disposition specification options are listed below:

#### Option Meaning

- D SPOOL output to disk intermediate storage.
- N Do not intercept requests. This specification allows direct writer capabilities. If a punch task has been started, care should be exercised that punch requests are not made to the same device.
- R For RJE, return output to the terminal.
- H Hold the output until requested by the user.

If the disposition specification is omitted, D is assumed. Note that only a disposition of R or H will permit the output to be returned to the user. D and N will cause the output to be processed at the central system. The user should not request punch output to be returned to the work station if the work station does not have a punch component.

card-number: specifies the type of forms to be used according to installation requirements. Card-number is specified by one to four alphanumeric characters. If card-number is not specified, the card-number is assumed to be blanks. When the punch writer task or RJE task prepares to process output from a job entry, it will determine whether this card-number agrees with the card-number of the last job entry. If the numbers agree, the punch writer task or RJE task processes the output. If the numbers do not agree, the punch writer task writes a message to the operator to inform him that a change to the card-number specified is required. The punch writer task will wait for the operator to activate the task when the change of card-number has been completed. When output is returned to a work station, change of card-number messages, if required, are sent to the work

station. The work station operator should respond with the CONTINUE sequence.

number-of-copies: specifies the desired number of copies of punch output from the job entry. If number-of-copies is not specified, one is assumed. Number-of-copies is specified by one or two numeric characters. If 0 or 00 is specified, one copy will be produced.

number-of-cards-before-msg: specifies the number of punch records intercepted before a warning message is sent to the central installation operator. This parameter is specified with one to six numeric characters and overrides, for this job entry only, the value specified by the STDCARD generation parameter. If number-of-cards-before-msg is not specified, the value specified by STDCARD is used.

Example 1: Punch output requiring special forms

```
* $$ PUN ,6509
```

In this job entry, the punch output will be SPOOLED to disk and will require the installation's special cards 6509. One copy is required and the STDCARD value is used.

Example 2: Direct writer

```
* $$ PUN N
```

In this job entry, punch requests will not be intercepted.

Example 3: Punch output to be returned to the remote work station

```
* $$ PUN R,,2
```

The user at the remote work station requests that the punch output be returned to him and that two copies are to be produced. For an IBM 2780, a Model 2 is assumed.

#### THE EOJ STATEMENT

ID	Operation	Operand
* \$\$	EOJ	(no operand)

The EOJ statement marks the end of the job entry and must be placed at the end of a DOS job or job step. No operand is required.

#### Examples of JECL Usage

Example 1: JECL used to define jobs.

Figure 2 shows three DOS jobs taken from a hypothetical job stream. Job number 1 will be placed in the generated default priority reader queue. Job 2 is defined by JECL, which specifies that the job is to be placed in priority reader queue 5. Job 3, like job 1, has no JECL and is placed in the generated default priority reader queue by default.

Example 2: JECL used to define job steps as jobs to the POWER system.

In Figure 3, the job, UPDATE, contains four job steps which are identified by four EXEC statements. The user requires multiple copies of the print output from steps 3 and 4. JECL was also used to define the third job. The JECL JOB statements defaulted to the same priority used by the job entries which were not enclosed with JECL statements.

For this example, the operator was not required to stop the printer to set up multipart forms, and there was no interruption of output processing.

Example 3: JECL used to define multiple DOS jobs as a single job to the POWER system.

In Figure 4, there are two POWER jobs. The first job is a DOS card-to-tape utility job where the input contains DOS job control statements. Without using JECL, POWER would interpret the DOS JOB statements as defining a new job. Therefore, JECL would be required to run this job under POWER.

	POWER JOB	DOS JOB
<pre>// JOB TAPE TO TAPE // ASSGN // ASSGN // UPSI // EXEC TPTP // UTT // END /* /ε</pre>	1	1
<pre>* \$\$ JOB TEST,,5 // JOB ASSEMBLE TEST // EXEC ASSEMBLY       .       .       . /* /ε * \$\$ EOJ</pre>	2	2
<pre>// JOB SORT       .       .       . /ε</pre>	3	3

Figure 2. JECL - example 1

	POWER JOB	DOS JOB
<pre> * \$\$ JOB UPDATE // JOB UPDATE . . . // EXEC CDDK . . . /* * . . . // EXEC PREPARE * \$\$ EOJ </pre>	1	
<pre> * \$\$ JOB RECONCIL * \$\$ PRT ,,2 . . . // EXEC MATCH MERGE . . . * \$\$ EOJ * \$\$ JOB NEWLIST * \$\$ PRT ,,4 // EXEC LIST /ε * \$\$ EOJ </pre>	2	1
<pre> * \$\$ JOB PRINT * \$\$ PRT ,,4 // JOB SSERV // EXEC SSERV . . . /* /ε * \$\$ EOJ </pre>	3	
<pre> * \$\$ JOB PRINT * \$\$ PRT ,,4 // JOB SSERV // EXEC SSERV . . . /* /ε * \$\$ EOJ </pre>	4	2
<pre> * \$\$ JOB PAYROLL,1          CONFIDENTIAL * \$\$ PRT T,270A,283        CONFIDENTIAL * OPERATOR -- THIS JOB IS COMPANY CONFIDENTIAL -- // JOB PAYROLL FOR WEEK ENDING 4/18/69 // EXEC PAYROLL . . . /* /ε * \$\$ EOJ </pre>	5	3

Figure 3. JECL - example 2

	POWER JOB	DOS JOB
<pre>* \$\$ JOB CDTP // JOB CDTP . . . // EXEC CDTP . . . /* /ε</pre>	1	1
<pre>* \$\$ EOJ * \$\$ JOB TRAINER,H,1 // JOB STUDENT1 // EXEC ASSEMBLY . . . /* /ε // JOB STUDENT2 // EXEC ASSEMBLY . . . /* /ε // JOB STUDENT3 . . . /ε // JOB STUDENTN . . . /ε * \$\$ EOJ</pre>	2	2
		3
		4
		N

Figure 4. JECL - example 3

The second job, a low-priority class, consists of student jobs. The installation requires these jobs to be run after all others. Therefore, they are placed collectively in the hold state when they are submitted as one POWER job. When they are later released by the central installation operator, the output will be held until the last DOS job within the collection has been completed.

Example 4: JECL in the RJE environment.

Each of the above examples might have been submitted from a remote work station. The JECL and appropriate defaults to POWER system options would be exactly the same, except that all the jobs would be submitted for background execution and output would be processed at the central installation. Figure 5 shows how Figures 2, 3, and 4 might look if the output were required at the work station and if some jobs were assigned to the foreground 2 partition as well as the background partition for processing. JECL has been used for all jobs to state disposition of the output.

	POWER JOB	DOS JOB
<pre>* \$\$ JOB TAPE * \$\$ PRT R // JOB TAPE TO TAPE . . . /ε * \$\$ EOJ</pre>	1	1
<pre>* \$\$ JOB TEST,,5 * \$\$ PRT R * \$\$ PUN R // JOB ASSEMBLE TEST // EXEC ASSEMBLY . . . /ε * \$\$ EOJ</pre>	2	2
<pre>* \$\$ JOB SORT * \$\$ PRT H // JOB SORT . . . /ε * \$\$ EOJ</pre>	3	3
<pre>* \$\$ JOB PRINT * \$\$ PRT R,,4 // JOB SSERV . . /ε * \$\$ EOJ</pre>	4	4
<pre>* \$\$ JOB PAYROLL,,1 CONFIDENTIAL * \$\$ PRT T,270A,283 * OPERATOR -- THIS JOB IS COMPANY CONFIDENTIAL // JOB PAYROLL // EXEC PAYROLL // EXEC PAYROLL . . . /ε * \$\$ EQJ</pre>	5	5
<pre>* \$\$ JOB UPDATE,,,F2 * \$\$ PRT R // JOB UPDATE . . . // EXEC CDDK . . . /*</pre>		

Figure 5. JECL - example 4 (page 1 of 2)

	POWER JOB	DOS JOB
<pre>// EXEC DSORT . . . /* . . . // EXEC PREPARE * \$\$ EOJ</pre>	6	6
<pre>* \$\$ JOB RECONCIL,,,F2 * \$\$ PRT R,,2 . . . // EXEC MATCH MERGE * \$\$ EOJ</pre>	7	
<pre>* \$\$ JOB NEWLIST,,,F2 * \$\$ PRT R,,4 // EXEC LIST /ε * \$\$ EOJ</pre>	8	
<pre>* \$\$ JOB CDTP * \$\$ PRT R // JOB CDTP . . . // EXEC CDTP . . . /* /ε * \$\$ EOJ</pre>	9	7
<pre>* \$\$ JOB TRAINER,H,9 * \$\$ PRT R // JOB STUDENT1 // EXEC ASSEMBLY . . . /ε // JOB STUDENT2 . . . /ε // JOB STUDENT3 . . . /ε // JOB STUDENT4 . . . /ε * \$\$ EOJ</pre>	10	8
		9
		10
		11

Figure 5. JECL - example 4 (page 2 of 2)



## CENTRAL INSTALLATION CONSOLE COMMANDS

The central installation console commands provide operator control over RJE task management.

These commands complement the POWER II console commands, and the manner in which the operator enters these commands is identical to the method described in the POWER II Program Description and Operations Manual. A brief description follows.

To initiate operator communication with the POWER system, the operator must depress the request key on the IBM 1052 Printer-Keyboard (SYSLOG). DOS will type:

DOS: AR 1I60A READY FOR COMMUNICATIONS

OPERATOR REPLY: AR Any POWER or DOS operator command may be entered.

The balance of the communication between the POWER system and the central system operator, for this command, will be prefixed with \$OP. The commands may be typed in either uppercase or lowercase.

The format of the console commands consists of two fields, the operation field and the operand field. The operation field consists of a single letter operator which defines the function to be performed. The operation field may be preceded by no blanks, one blank, or more than one blank. The operation field must be followed by at least one blank.

The operand field contains one or more positional parameters or information separated by commas. Positional parameters are described as values for which information must be substituted. A blank or end-of-block character (alter code 5) terminates the operand field. The single exception is the broadcast command, where blanks may appear as part of the text operand.

The following commands are valid for RJE task management.

- B - Broadcast to RJE
- G - Reactivate an RJE task
- I - Inquire about RJE activity
- P - Stop an RJE task
- S - Start an RJE task

**BROADCAST** - Broadcast to one or all terminals or users information pertinent to system operations.

Operation	Operand	
B	M, { termid userid ALLUSERS} 'msg'	Message option
B	L, { termid [,nr] userid [,nr] ALLUSERS[,nr] ALL}	Delete option
B	D, { termid [,nr] userid [,nr] ALLUSERS[,nr] ALL}	Display option

**M, L, D:** specifies the broadcast command option desired. **M** will cause the specified message to be added to the specified message queue element. **L** will cause the specified message or all of the messages in a specified message queue element to be deleted. **D** will cause the specified message or all of the messages in a specified message queue element to be displayed on SYSLOG.

**termid, userid, ALLUSERS, ALL:** specifies the element in the RJE message queue to which the broadcast command option applies. Termid and userid are valid if they are entries in the userid list (see "Userid List Generation") which is created when POWER/RJE is generated. ALLUSERS specifies those messages to be broadcast to all users. ALL specifies the entire message queue.

**'msg':** specifies the message to be sent to the designated termid, userid, or all who request broadcast messages. The message may consist of from one to forty characters enclosed in single quotation marks. Because msg is enclosed with quotation marks, two quotation marks must be used to represent one in the message text. The additional quotation marks are counted as part of the message length.

**nr:** specifies the number of a specific message in a given element of the RJE message queue. nr is specified as one or two numeric characters from 1 to 99. If this operand is omitted, all of the messages for the specified userid, termid, or ALLUSERS are assumed.

The broadcast command is used to permit the central installation operator to communicate with remote work station users. Messages may be directed to a specific user by specifying his userid or termid, or they may be directed to all users by specifying ALLUSERS. The former type of message is termed a specific message and the latter is termed a general message. An element in the RJE message queue exists for each valid userid when the message queue is created. An additional element exists for all general messages, the ALLUSERS queue. Messages are chained for the element to which they belong.

For example, messages going to the userid FINANCE are collected in the message chain for the element FINANCE. General messages are collected in the message chain for the element ALLUSERS. When FINANCE requests broadcast messages, the contents of the element ALLUSERS are displayed at the remote work station, then the contents of the element FINANCE are displayed at the remote work station. The messages for the element FINANCE are deleted, but the messages for the element ALLUSERS are retained. This feature of the message queue permits permanent messages for all users and temporary messages for a specific user to be entered and maintained.

The broadcast command permits the central system operator to maintain the message queue. The display option may be used to display a specific message within an element or all the messages belonging to an element. In addition, by specifying ALL as the second operand, the entire message queue may be displayed. The display option causes the message or messages to be displayed on SYSLOG. The element name for each message, the message number, the message originator, and the date and time at the central system when the message was entered are displayed.

The delete option is specified in the same manner as the display option. Deleting a specific message from a message chain will cause the messages in the chain to be renumbered.

Operator's note: The RJE message queue elements are determined by the userid list which is in existence when the message queue is created. The elements in the message queue are not automatically amended to reflect changes in the userid list. Therefore, the entire message queue must be deleted and active messages must be reentered to permit the message queue to reflect any changes in the userid list.

To perform all of its functions, the broadcast console command requires a data buffer. If a data buffer is not available when the command is issued, the broadcast command processor will notify the operator, and the command will be ignored.

Examples:

- B M,NEWYORK,'RJE CEASES AT 1400 EST TODAY, 4/18/69'  
Enter a specific message with 37 characters in message text
- B M,ALLUSERS,'EXT "2284" IS NO LONGER "ACTIVE"''  
Enter a general message with 36 characters in message text.
- B D,NEWYORK           Display all messages to New York.
- B D,DENVER,3           Display message 3 to Denver.
- B D,ALLUSERS           Display general messages.
- B D,ALL                Display all messages in the message queue.
- B D,ALLUSERS,4        Display general message 4.
- B L,CHICAGO            Delete all messages to Chicago.
- B L,STPAUL,1           Delete message 1 to St. Paul.
- B L,ALLUSERS           Delete all of the general messages.
- B L,ALLUSERS,6        Delete general message 6.
- B L,ALL                Delete the entire message queue.

GO - Reactivate an RJE task.

Operation	Operand	
G	RJE,lineaddr	RJE option

RJE: specifies that the command is directed to an RJE task.

lineaddr: specifies the line for which the RJE task was started in the cuu format, where

c = channel address

uu = unit address

This command is used to reactivate an RJE task which is waiting for an operator response to an informative message.

The POWER system does not acknowledge the go command with a message to the operator.

Examples:

G RJE,022

G RJE,030

INQUIRE -- Inquire about RJE task states.

Operation	Operand	
I	U,userid T,termid L,lineaddr	Specific option
I	ALL	ALL option

U,userid: specifies a valid userid as defined by the POWER system generation. Userid may be from one to eight alphameric characters.

T,termid: specifies a valid termid as defined by the POWER system generation. Termid may be from one to eight alphameric characters.

L,lineaddr: specifies the line for which an RJE task is or may be started in the cuu format, where

c = channel address

uu = unit address

Inquire Command Specification	WORK STATION STATES						REPORT ITEMS INCLUDED		
	Not Attached	Not Supported	Not Initiated	Inactive	Active	Processing	line address	termid	userid
line address		X					X	N	N
			X				X	N	N
				X			X	N	N
					X		X	X	N
						X	X	X	X
termid	X						N	X	N
					X		X	X	N
						X	X	X	X
userid	X						N	N	X
						X	X	X	X

X = item is included in the report.  
N = item is specified in the report as "NONE".

The ALL option of the Inquire command creates a report for each RJE Block Name List Entry in accordance with the line address specification above.

Figure 6. Work station states in response to inquire command

ALL -- specifies a general request for RJE task status.

The inquire command is used to provide the central installation operator with status information for a specific RJE task or all RJE tasks. The POWER system responds with a report which includes, for each task specified, the task designation, termid, userid, and status. The status is one of the following: PROCESSING, ACTIVE, INACTIVE, NOT INITIATED, or NOT SUPPORTED.

The NOT INITIATED status is returned in response to a specific request designating the lineaddr. The termid and userid are not applicable to this status report. For the purpose of the inquire command, NOT INITIATED indicates that a start command was not issued for the designated lineaddr.

The INACTIVE status is returned in response to a specific request designating the lineaddr. The termid and userid are not applicable to this status report. INACTIVE indicates that the RJE task was initiated but has not received an RJSTART statement to activate the line.

The ACTIVE status may be returned for any specific request except U,userid. The userid is not applicable to this status report. ACTIVE indicates that an RJSTART statement has been received, line activity is taking place, and a terminal session is underway. However, a user has not issued a LOGON command, and a user session is not taking place.

The PROCESSING status may be returned for any specific request. PROCESSING indicates a user session is underway.

The NOT SUPPORTED status may be returned for a specific line where no RJE block is associated with the line.

A general request (ALL) will determine the status of all valid terminal designations as defined by the POWER system generation. The fields of the status report, where applicable according to status, will be completed.

See Figure 6 for items which are included in the report.

Examples:

```
I  U,AAA
I  T,NEWYORK
I,  L,030
I  ALL
```

STOP -- Stop an RJE task.

Operation	Operand	
P	RJE,lineaddr	RJE option

RJE: specifies that the command is directed to an RJE task.

lineaddr: specifies the line for which the RJE task was started in the cuu format, where

c = channel address

uu = unit address

The stop command is used to deactivate an RJE task. All program and data buffer space used by the stopped task is returned to the POWER system for other use. If an RJE task was preparing a job entry in the input queue, the stop command causes termination of further input processing. The job entry being placed in the input queue must be reentered. If the RJE task was punching or printing job output, the stop command causes termination of further output processing. The output is not deleted from the output queue; it is placed in the hold state.

Unless an emergency exists, the operator should use the inquire command to determine the work station state before stopping an RJE task. The stop command must be used for each RJE task before the POWER partition is ended with the end command. (See the POWER II Program Description and Operations Manual.)

The POWER system will reply to the operator, acknowledging the stop command. If the stop command is issued for a task which was not initiated, a message is sent to the operator.

Examples:

```
P  RJE,031
P  RJE,022
```

START - Start an RJE task.

Operation	Operand	
S	RJE,lineaddr,type	RJE Option

RJE: specifies that the command is directed to initiate an RJE task.

lineaddr: specifies the line for which the RJE task is to be started in the cuu format, where

c = channel address

uu = unit address

type: specifies the work station device type for which the RJE task is to be associated. Because only the IBM 2780 is supported, type must be specified as 2780.

The start command is used to initiate RJE tasks. The POWER system will reply if the RJE task was successfully initiated or will indicate the reason for unsuccessful RJE task initiation.

Examples:

```
S RJE,035,2780
```

```
S RJE,020,2780
```

Operator's note: To initiate an RJE task under simulation, see "Local Testing of the RJE System" for the format of the start command.

#### WORK STATION COMMANDS

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

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

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

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

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

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

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

Use of the sequence field becomes especially useful in RJE, since a number of similar commands may be submitted from the work station. RJE returns the sequence field in all responses and diagnostics for work station command statements. The sequence field correlates the statement entered with the response received. With the use of the sequence field, therefore, the user can easily determine which statement is addressed by each response.

Columns 1-4	Columns 6-71		Columns 73-80
* ..	Operation	Operand	Comments Sequence

Note: Comments and sequence fields are optional.

#### FUNCTION 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 entries and associated output:

OUTPUT  
CONTINUE  
DELETE

3. Commands used to provide job and system information:

STATUS  
BRDCSTR

4. Command used to communicate with central system operator:

MSGR

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

A complete description of the work station commands and their operands follows. These commands are summarized in Figure 7.



ID	Operation	Operand
* ..	RJSTART	termid [,BRDCST]
* ..	RJEND	(no operand)
* ..	LOGON	userid
* ..	LOGOFF	(no operand)
* ..	OUTPUT	[ jobname[, jobnumber] ALL ]
* ..	CONTINUE	[ BEGIN NO HOLD ]
* ..	DELETE	queue, { jobname[, jobnumber] ALL }
* ..	STATUS	queue, { jobname[, jobnumber] HOLD Pn ALL }
* ..	BRDCSTR	(no operand)
* ..	MSGR	M, 'text'

Figure 7. Summary of work station commands

**RJSTART** -- Attach a work station to 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 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 after a valid RJSTART command is received. Once the work station is logically attached, users may gain access to the central system by logging on at the work station.

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

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

**BRDCST**: specifies that a copy of the broadcast messages for the specified termid is desired before the work station continues RJE processing. If this parameter is omitted, no messages will be broadcast at this time.

**Note**: The RJSTART command must be the first statement submitted at an inactive 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. 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. To ensure successful termination, the operator should not take his work station offline before he has received the message indicating that the RJEND command was accepted. No further communication occurs until the work station resumes RJE activity with an RJSTART command.

ID	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 in the LOGON command, RJE guarantees that only valid users can submit input or request output from the system. The LOGON command remains in effect until another LOGON, a LOGOFF, or an RJEND command is issued.

ID	Operation	Operand
* ..	LOGON	userid

userid: specifies the name assigned to the user by the installation. If the userid specified in this parameter is not valid, RJE rejects the command, and a corrected statement must be submitted. The userid may consist of from one to eight alphanumeric characters.

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

Programmer's note: A user may be logged on two work stations at one time to permit the use of one line for input and another line for output, two lines for output, or two lines for input.

LOGOFF -- End a session

With the LOGOFF command, the user indicates that he has completed his session. After receiving a LOGOFF command, RJE refuses job entries from the work station until another LOGON command is submitted. Output to be returned to a user may be returned only during the user session.

ID	Operation	Operand
* ..	LOGOFF	(no operand)

Note: If the central system receives a valid LOGON command from a work station with a session in progress, the central system logs off the current user and logs on the user identified in the LOGON command. If the central system receives an RJEND command from a work station with a session in progress, it logs off the user and logically detaches the work station. In this manner, the work station operator may omit the LOGOFF command when changing user sessions or detaching 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, the job will not be in the output queues and RJE returns a message indicating the job is not found. The OUTPUT command must be resubmitted after the job has completed. The OUTPUT command provides two 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 major request) all deferred output created by jobs submitted by him.

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

This command may be used only during a user session.

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

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

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

ALL: specifies that RJE is to return to the user all the available output created by jobs that the user, identified in the current LOGON command, has submitted.

Note: A user cannot receive job output from another user's job. 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 output with the CONTINUE command. Output may be discontinued under one of the following conditions:

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

The CONTINUE command must be transmitted before a system time-out occurs or the work station will be detached from the RJE system. If the work station is detached, the interrupted output is saved, and the user may or may not receive the appropriate ending message, depending upon the output component involved in the interrupted transmission. If the output was interrupted because of a transmission failure, the work station is automatically detached from the RJE system and interrupted output is saved. If the work station is detached, the user must resubmit an RJSTART command and a LOGON command to reinstate his user session. The interrupted output must be requested via an OUTPUT command. The output will be transmitted from the beginning. Interruptions which require the CONTINUE command will cause the input stream to be flushed in preparation for the transmission of the CONTINUE command, and a message will be written to the work station printer.

The CONTINUE command provides four capabilities:

1. The user can request the transmission of the entire interrupted output from the beginning.
2. The user can specify that transmission of the output be resumed with the record which was being written when the output was discontinued.
3. The user can specify that he does not desire the output and can direct RJE to delete it.
4. The user can specify that the output is to be held until called for at some later time.

ID	Operation	Operand
* ..	CONTINUE	BEGIN NO HOLD

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

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

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

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

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

**DELETE** -- Remove a job from the specified queue

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

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

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

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

xx = BG  
F2

yyy = RDR  
PRT  
PUN

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

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

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

STATUS -- Determine the status of a job

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

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

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

jobname, jobnumber, priority, H if the job is in the hold state, number of logical records for this job entry for the queue specified, and the disposition of the job entry in the RDR, PRT, and PUN queues as specified by the JECL.

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

JOB NOT FOUND or QUEUE IS EMPTY

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

ID	Operation	Operand				
* ..	STATUS	queue, <table border="1"><tr><td>jobname [,jobnumber]</td></tr><tr><td>HOLD</td></tr><tr><td>priority</td></tr><tr><td>ALL</td></tr></table>	jobname [,jobnumber]	HOLD	priority	ALL
jobname [,jobnumber]						
HOLD						
priority						
ALL						

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

xx = BG  
F2

YYY = RDR  
PRT  
PUN

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

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

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

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

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

BRDCSTR -- Request the broadcast messages

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

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

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

ID	Operation	Operand
* ..	BRDCSTR	(no operand)

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

MSGR -- Communicate within RJE

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

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

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

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

Example 1: Initiating work station operation and a user session.

```
* ..      RJSTART      SEATTLE,BRDCST      STMNT 1
* ..      LOGON DIST3                                STMNT 2

      Jobs from District 3

* ..      STATUS BGRDR,ALL                        STMNT 3
* ..      LOGOFF                                           STMNT 4
* ..      LOGON DIST3A                                STMNT 5

      Jobs from District 3A

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

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

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

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

      JOBS from Class 6

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

Example 2 assumes that Class 2 has previously submitted jobs for processing. The work station is logically attached to the RJE system with STMNT 1 and logically detached with STMNT 17. Note that STMNT 17 also defines the end of Class 2's second session; no LOGOFF command is required. Class 2 has two user sessions: The first begins with STMNT 2 and ends with STMNT 7, and the second begins with STMNT 11 and ends with STMNT 17. During the first session, three general requests are made for status reports of jobs submitted for processing



in the background partition. STMNT 6 requests any messages for Class 2. When these messages are transmitted, they are deleted from the message queue.

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

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

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

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

Transmission is interrupted by the work station operator

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

PAYROLL logically attaches the work station using its own userid as termid in STMNT 1 and begins its user session with STMNT 2. Note that the LOGON command is still required with the proper userid. The work station operator has check forms on the printer when the session begins. STMNT 3 requests the output from the job PAYCHECK, which should be printed on the blank check forms. The work station operator determines from the first check printed that the check forms are not aligned properly with the printed output, and he turns off the printer. The RJE task transmitting the output receives the signal that intervention is required at the work station. The RJE task flushes the work station reader in preparation for the CONTINUE command and writes a message on the work station printer indicating that the CONTINUE command is required to resume transmission. The task prepares to read from the work station reader. The work station operator properly aligns the blank check forms and requests that the output be restarted (STMNT 4). If the job PAYCHECK had a program failure resulting in a dump of main storage, the operator might change forms and use STMNT 4 to get the dump, or he might reply with \* .. CONTINUE NO, which would delete the output from the print queue.

Example 4: Transmission failure while submitting job entries.

```
* ..      RJSTART DATAPROC                 STMNT 1
* ..      LOGON PROGR1                     STMNT 2
```

From programmer 1

Job 1

Job 2

Transmission failure during submission of Job 2

When a transmission failure occurs, the work station operator must reestablish the line. This action requires an RJSTART command to

logically attach the work station once more, and the interrupted input must be resubmitted. One approach follows:

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

From Programmer 1

Job 3

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

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

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

Example 5: Transmission failure while receiving output.

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

Transmission failure during printing of Job 2

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

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

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

## POWER II OPERATING PROCEDURES

This section provides operator information for RJE task startup, shutdown, and exception handling at the central installation and at the remote work station. The operator may wish to refer to Appendices A, B, C, and D, where POWER and RJE commands and control statements are summarized.

### CENTRAL INSTALLATION OPERATING PROCEDURES

#### STARTUP PROCEDURES

POWER startup procedures may be divided into three steps: step 1, POWER partition initiation; step 2, reader/writer/RJE task initiation; and step 3, processing partition initiation. RJE tasks may be initiated any time after step 1 has completed. To start the RJE task, the operator issues the RJE option of the start command. (See "Central Installation Console Commands".) A DOS ASSGN statement for each line is not used; the start command processor will dynamically assign the task to the line to be started. Line groups are not permitted.

#### NORMAL OPERATION

During normal operations, messages to the operator occur which provide information or request manual intervention. The operator should consult "Messages" in this manual, the POWER II Program Description and Operations Manual, or the DOS Operating Guide for the appropriate action required.

#### SHUTDOWN PROCEDURES

Normal shutdown procedures are initiated when the POWER system is no longer required at the end of the day or when jobs which may not be run in the POWER environment must be run. If RJE tasks have been initiated, the operator should use the inquire command to determine the status of each RJE task. RJE tasks which are active or processing have work stations logically attached to the POWER system. The work station operators should be informed that shutdown procedures are about to begin so they may properly detach their work stations. The RJE tasks must be stopped with the RJE option of the stop command before use of the end command, which will cause the POWER partition to shut down normally.

Abnormal shutdown procedures are initiated when a catastrophic error requires an emergency halt. The operator may use the kill command, which produces an immediate stop of POWER partition activity and a dump of all of main storage. The DOS supervisor will be restored dynamically for normal DOS operation. See the POWER II Program Description and Operations Manual for information regarding the end and kill commands.

#### RJE TASK RESTART PROCEDURES

A restart condition can result from a problem encountered by an RJE task or the entire POWER system. Restart conditions generally arise from a hardware malfunction or an irrecoverable I/O error. Each RJE task will attempt I/O error recovery before informing the operator

of the error condition. A BTAM system-to-operator message is displayed for the central operator whenever an irrecoverable communication error occurs. When BTAM has exhausted its 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. When a permanent line error exists at an IBM 2780, an alarm is sounded, and the RJE task terminates.

If the problem was an irrecoverable I/O error, the operator may be required to restart the RJE task with the start command. However, unless the conditions causing the error are corrected, the task may not respond. At this point, the operator may assume that the line assigned to the task is down until the POWER partition itself is restarted.

If a POWER system failure occurs or if it is determined that restarting the POWER partition is required to restart a task, normal shutdown procedures should be followed, if possible. If the POWER system cannot be shut down normally, the DOS supervisor should be re-IPLED before beginning POWER startup. Power startup procedures should be followed to reinitiate the POWER partition. These procedures should allow the POWER partition to warm-start unless reformatting the POWER files is required to correct the error. If the POWER system is warm-started, jobs executing in batch partitions, which the POWER system supports, will be restarted automatically when those partitions are started after POWER initiation. All RJE tasks must be restarted as though initial startup were taking place. Operators of work stations logically attached during shutdown or during the system failure should be informed that restart procedures are taking place.

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

#### REMOTE WORK STATION OPERATING PROCEDURES

##### IBM 2780 DATA TRANSMISSION TERMINAL

The IBM 2780 Data Transmission Terminal (Model 1 or 2) is a supported work station in the RJE system. It provides input and output capability over common-carrier communication lines via binary synchronous communications procedures. Model 1 supports card input and punched output. The special features required for either model of the 2780 used for RJE processing are the following:

1. EBCDIC transmission code
2. EBCDIC transparency
3. Print line (either 120-character or 144-character)
4. Automatic turnaround (Model 2 only)
5. Extended (Enquiry-ENQ) retry transmission

In addition, the following special feature is supported, but not required:

Multiple record transmission

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

For work stations on switched lines, the AutoAnswer special feature may be desired to permit the central installation to automatically cause the IBM 2780 to disconnect. During RJE operations, AutoAnswer on the data set and the IBM 2780 control panel should be disabled to extend the time-out period for recovery purpose. However, having this feature installed adds the necessary hardware to cause the IBM 2780 to respond to the mandatory disconnect signal (DLE,EOT) sent by the central installation.

## NORMAL OPERATION

### Transmitting Input

After powering up the IBM 2780 according to procedures in the IBM 2780 manual, an RJSTART card is placed in the card reader. A LOGON card and input follow the RJSTART.

When the input has been placed in the reader, the mode switch is placed in the "transmit transparent" position, and the printer must be readied. If there are no blank cards following the input data (no punched output is expected), the EOF button must be pressed. If punched output is expected, the AutoTurnaround feature must be activated by pressing the AutoTurnaround button (the button will light when active). If the connection is via a switched line, the number must be dialed at this time. After the line connection is made, the start key must be pressed to transmit the data.

The audible alarm will be triggered either by reading a blank card (by the AutoTurnaround feature on the Model 2), by reading the last card if the EOF key has been pressed, or when the IBM 2780 sends an EOT signal when line turnaround via RVI has been effected. This alarm will sound until it is turned off, either by receiving output from the central system or by operator intervention. If line turnaround is triggered by running out of cards (implies no AutoTurnaround), only the printer will be ready to receive output.

### Receiving Output

When the IBM 2780 receives an EOT after receiving a complete transmission, the audible alarm sounds unless the reader is in ready status. The alarm is turned off when the IBM 2780 receives an ENQ from the central system signifying more output, or when the operator presses the stop key causing the IBM 2780 to drop ready status. The start keys for the printer and reader/punch must be pressed to return the IBM 2780 to ready status.

### Discontinuing Output

Output in progress may be discontinued at any time by pressing the stop key (on the reader/punch). After output has been discontinued, the central system will attempt to write a message, will flush the reader, and will accept only a CONTINUE command. The CONTINUE command allows four options, so that discontinued output may be either:

1. Restarted from the beginning
2. Continued with the output data block containing the last block transmitted
3. Deleted by the options specified in the CONTINUE command
4. Held in the output queue until requested via an OUTPUT command

## SPECIAL FORMS OUTPUT

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

### Printer

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

### Punch

For punched output, the required blank cards must be placed in the hopper (if AutoTurnaround is to be triggered). If AutoTurnaround is not active, a CONTINUE statement should be submitted to trigger the AutoTurnaround feature. After the CONTINUE command is received, the central system transmits the output to the punch. If the punch is not ready, output is discontinued, and a CONTINUE command is required to continue transmitting. There can be no punched output if the AutoTurnaround feature is not active.

## PREPARING MORE INPUT

While output is being written on the printer, the operator may load and ready the reader to send more input (unless AutoTurnaround is active). Since the work station is already in the processing state (see "Work Station States"), no RJSTART command is submitted. Unless the work station is in the active state, or unless the work station is in the processing state and a new user desires access to the system, no LOGON command is required. When the output to the printer is finished, the IBM 2780 may send input. If the output is being received at the punch (or the printer, if AutoTurnaround is active), the operator must wait until the output has been completed. Then, after removing the punched output (if any) and blank cards, the operator may reload and prepare the reader to transmit input. On a switched line the reader must be readied within approximately three minutes to prevent the central system from disconnecting the line.

## ERROR RECOVERY PROCEDURES

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

### THREE-MINUTE TIME-OUT

When an IBM 2780 attached to a switched line stops transmitting input or receiving output for any reason (for example, all input transmitted, all output received, card jam, forms checks, discontinue operation, etc.), a three-minute time-out period is initiated. If no further transmission in either direction occurs during this time-out period, the system will disconnect the IBM 2780. A reconnection and an RJSTART card are required to resume RJE activity at this time. Any partially submitted job (for example, in the case of a card jam) must be completely resubmitted. If the AutoAnswer feature is active

for the work station, this three-minute limit is reduced to 21 seconds. AutoAnswer should normally be off while operating RJE.

#### FAILURE DURING INPUT

When the IBM 2780 card reader fails (jams, etc.), the condition should be corrected and the card reader and printer brought to ready status. On a switched line recovery must be made within approximately three minutes for input to be resumed according to the error recovery procedures defined in the IBM 2780 manual. If the time required to ready the reader exceeds three minutes on a switched line, an RJSTART and a LOGON command are required to resume input operations, and all unacknowledged input must be resubmitted. If the AutoAnswer feature is present and active on a switched line, the line will be disconnected within 21 seconds, not three minutes, if recovery is not made within that time. For this reason, the AutoAnswer feature should normally be off while operating RJE.

#### Input Stream Flushed

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

CARD FORMS formid NEEDED FOR JOB jobname - REPLY WITH CONTINUE  
COMMAND

CONTINUE COMMAND REQUIRED FOR { PRINTER  
PUNCH }

INVALID/MISSING TERMID/USERID

INVALID RJE WORK STATION COMMAND

INVALID RJE WORK STATION COMMAND - NO USER LOGGED ON

PRINT FORMS formid NEEDED for Job jobname - REPLY WITH CONTINUE  
COMMAND

TWO userid USERS ARE ALREADY LOGGED ON

The recovery procedures for each of these messages are described in the section "Messages to the Remote Work Station Operator".

#### FAILURE WHILE RECEIVING OUTPUT

#### Unit Failure

When the printer or punch fails, the condition should be corrected. On a switched line, if the problem can be corrected and the IBM 2780 can be brought to ready status within three minutes, a CONTINUE command may be transmitted, and the output will resume according to the option specified in the CONTINUE command. If recovery requires more than three minutes, the connection must be reestablished and an RJSTART command must be transmitted. The interrupted data can then be transmitted from the point of interruption. On a nonswitched line there is no time limit, and the output may be requested via a CONTINUE command. If the failure causes an irrecoverable error, the output is placed in the hold state. Output in the hold state may be returned to the work station user or may be processed at the central system. The work station user must submit an OUTPUT command to retrieve the

output. The central system operator must use the release console command to cause the output to be processed at the central system.

Note: If punched output is to be received, blank cards must follow the CONTINUE command to trigger the AutoTurnaround feature.

#### Unit Not Ready

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

#### Carriage Control Limitation

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

#### Central Failure

If the central system fails while output is in progress, the terminal is placed in an inactive status. When the central system comes back online, submit an RJSTART command, log on, and retrieve the output, using an OUTPUT command. If the central system fails while input is in progress, the terminal is placed in an inactive status. The work station operator should begin the interrupted user session with a STATUS command to obtain acknowledgment of jobs entered prior to the central system failure.

#### TESTING THE RJE SYSTEM

If it is desirable to test the system to check that transmissions are being received, a message may be sent to the central operator requesting him to send the work station a message. If the work station operator receives it on the printer, the system is working properly.

#### RECOMMENDED OPERATING SUGGESTIONS

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

1. The RJSTART and LOGON commands may be submitted separately to ensure that they are correct.
2. Job input streams should be limited to a few jobs in order to reduce the number that must be resubmitted in case of an input error that requires the central system to flush the entire input stream. The RJE system will acknowledge job entries only in response to a STATUS command.
3. Remote Job Entry operations on the IBM 2780 are in "transmit transparency" mode at all times.
4. If punched output is expected, it is recommended that the AutoTurnaround feature be triggered by blank cards and that the user wait for the output. The end of output is signaled by the audible alarm, and at this time more input may be submitted if desired. If it is urgent that more input be



submitted, discontinue output, and reply with the hold operand in the CONTINUE command. Then the desired input can be submitted. The AutoTurnaround feature must be used to get punched output.

5. Unless it is certain that no punched output is going to be sent, the following steps should be performed before submitting input:
  - a. Press the STOP button.
  - b. Press the NPRO button (to flush cards).
  - c. Set mode switch to OFFLINE and back to TSM TRSP (to drop ready status on the printer and the punch).
  - d. Ready the printer.
  - e. Place the input cards and blank cards in the hopper.
  - f. Press the AutoTurnaround and the START buttons, respectively.
6. The following is the procedure which must be followed by the operator at the IBM 2780 on a switched line after receiving the error message on the printer as the result of an input error.
  - a. Press the STOP button.
  - b. Remove the IBM 2780 data set receiver and press the TALK pushbutton.
  - c. Do a nonprocess runout of the card reader.
  - d. Locate the card in error, as indicated by the message.
  - e. Insert the corrected card, as indicated by the message.
  - f. Load the corrected and remaining cards into the reader.
  - g. Turn the mode switch to OFFLINE and then back to TSM TRSP.
  - h. Press the START button on printer.
  - i. Press IBM 2780 data set DATA pushbutton.
  - j. Press EOF button.
  - k. Press the START button two times.

Transmission will recontinue. For an IBM 2780 on a nonswitched line, the above steps apply except for references to the data set.

7. If it is certain that no punched output is expected (always the case for a Model 1), follow steps a through d, under item 5 above, and then place the input cards in the hopper, press the EOF and START buttons, respectively.
8. For expected punched output, when AutoTurnaround has not been used, place blank cards in the hopper and press the AutoTurnaround and START buttons to ready the punch for the output that is to be received.

9. Unattended IBM 2780 operation is not recommended. On a switched line, the operator must correct an input failure (card jam, etc.) within three minutes or the entire job must be resubmitted. Although no recovery time limit exists for work station failures on a nonswitched line, the line remains logically attached to the work station until the error is corrected or until the time specified in the TIME1 or TIME2 generation parameters has elapsed. During this period other work stations on the line are denied access to the system.



YYYY = device type of the RJE task or specified by the inquire command.

aaaaaaaa = termid currently associated with the RJE task or specified by the inquire command.

bbbbbbbb = userid currently associated with the RJE task or specified by the inquire command.

See the description of the inquire command in "Central Installation Console Commands" for details regarding the work station state report. This message is repeated when ALL is specified until the state of each RJE task represented by each RJE block name list entry has been reported.

Default: None

\$OP BRDCST MSGS FOR element

element = a userid or ALLUSERS

Cause: This message is the first line of a report of broadcast messages requested by the display option of the broadcast command. After this message the following messages will appear:

Action:1. \$OP NR SENDER DATE TIME MESSAGE

This message is a second heading, which identifies the columnar messages which follow. NR identifies the number of the message in the element. SENDER identifies the originator. DATE and TIME reflect the date and time at the central system when the message was entered. MESSAGE identifies the message text.

2. \$OP message from RJE Message Queue

The message or messages are printed now and provide the information identified by the second heading.

Default: None

\$OP BROADCAST CANCELLED

Cause: A disk error occurred during the processing of this command.

Action: Retype the command.

Default: The command is ignored.

\$OP DATA DISK(S) FILLED

Cause: In response to the message option of the broadcast command, the command processor requested a track group, and none is available.

Action: Normal activity by output writers should make track groups available. Then the command should be retyped. (1) the operator may start additional writer tasks. (2) The operator may delete jobs in either the output queue or the input queue.

Default: The command is ignored.

#### \$OP DEVICE xxx INVALID

xxx = device address in the cuu format.

Cause: The device indicated by xxx is not supported by the DOS supervisor; that is, it is not a valid PUB (physical unit block in the DOS supervisor) entry. Task initiation is terminated.

Action: Retype the command with the correct device address.

Default: The command is ignored.

#### \$OP INCONSISTENT CTL UNT

Cause: During RJE task initiation, the control unit corresponding to the line address in the start command was found to be neither an IBM 2701 nor an IBM 2703. Only an IBM 2701 or IBM 2703 may support binary synchronous communications. Task initiation is terminated.

Action: Check the line address to ensure that it specifies an IBM 2701 or an IBM 2703 which supports binary synchronous communications.

Default: The command is ignored.

#### \$OP INVALID COMMAND

Cause: The console command typed immediately prior to this message did not conform to the required command format. (See "Central Installation Console Commands".)

Action: Retype the command with the correct format.

Default: The command is ignored.

#### \$OP INVALID MSG NR

Cause: The number of the RJE message to be displayed or deleted by the broadcast command was specified incorrectly or was not within the range of messages for the message queue element specified. See the broadcast command in "Central Installation Console Commands".

Action: Retype the broadcast command, correctly specifying the message number.

Default: The command is ignored.

#### \$OP INVALID OPERAND

Cause: The broadcast command first or second operand was incorrect or specified an invalid userid.

Action: Retype the command, specifying the correct operand.

Default: The command is ignored.

#### \$OP INVALID RJE COMMAND

- Cause: The RJE option of the stop or go command was not specified correctly. See "Central Installation Console Commands" for the correct format.
- Action: Retype the command in the correct format.
- Default: The command is ignored.

#### \$OP INVALID TEXT

- Cause: The text operand in the message option of the broadcast command was not valid.
- Action: See the broadcast command in "Central Installation Console Commands", correct the error, and retype the command.
- Default: The command is ignored.

#### \$OP MSG QUEUE BUSY

- Cause: The request for the RJE message queue by the broadcast command processor is denied because an RJE task is currently processing messages for a remote work station.
- Action: Retype the broadcast command.
- Default: The command is ignored.

#### \$OP NO AVAILABLE BUFFER

- Cause: During RJE task initiation, a sufficient number of program buffers or a data buffer was not available for assignment to the RJE task. Task initiation is terminated.
- Action: (1) Cancel or stop an active reader, writer, or RJE task; then retype the start command for the RJE task whose task initiation was terminated because of insufficient buffers. (2) If an active task may not be stopped at this time to provide the necessary buffers, defer starting the RJE task whose task initiation was terminated until action option (1) can be applied.
- Default: Action option 2

#### \$OP NO AVAILABLE DTF

- Cause: The RJE task being started does not have either an RJE block name for the RJE task in the RJE block name list or the RJE block was not link-edited with the POWER system. Task initiation is terminated.
- Action: Check the start command (RJE option) for line address and device type. (1) If either line address or device type in the start command previously typed was incorrect, retype the start command. (2) If both line address and device type are correct, the RJE block name list (RJBLKLIST) assembly and the link-edit map of the POWER system should be checked for the indicated RJE block. See "Modifying the RJE Block Name List and RJE Blocks".

Default: The command is ignored.

#### \$OP NO AVAILABLE TIB

Cause: The maximum number of RJE tasks active concurrently (see the MAXRJS generation parameter in the "Quick Reference List of POWER II Program Generation Parameters") has been exceeded with the previous start command. Task initiation is terminated.

Action: (1) Defer current RJE task initiation until an initiated RJE task may be stopped; then follow action option 2.  
(2) Stop an initiated RJE task and start the required RJE task.

Default: Action option 1

#### \$OP NO BROADCAST MSGS PRESENT

Cause: In response to the display option of the broadcast command, the command processor determines that there are no messages in the RJE message queue.

Action: None

Default: None

#### \$OP NO BUFFERS

Cause: The broadcast command requires a data buffer to perform the requested function, and none is available.

Action: (1) A data buffer can be made available by stopping an active task. (2) If a task may not be stopped, defer issuing the broadcast command until a data buffer can be made available.

Default: The command is ignored.

#### \$OP NO RJE TRACK GROUP

Cause: During initialization for an RJE task, the track group required by the task to accomplish line turnaround was not available. The start command is ignored.

Action: A track group should be made available before an attempt is made to start the RJE task again. The operator has three options in regard to making a track group available: (1) Wait until track groups used by a job entry are freed by an active writer task; then retype the start command. (2) Start a print or punch writer task to process job entries in the selected output queue; then apply option 1. (3) Select a job entry, in either an input or output queue, which may be deleted. Delete it and activate the waiting task. If a job entry may not be deleted, action option 1 or 2 must be used to provide a track group.

Default: The command is ignored.

\$OP RJE ID - NO MATCH

Cause: The line address specified in the RJE option of the stop and go commands either specified an unsupported line address or the line address does not correspond to an active RJE Task. The stop or go command is not effective.

Action: Retype the stop or go command, specifying the correct action line address.

Default: The command is ignored.

\$OP UNIT IN USE

Cause: Another RJE task has been initiated which is using the line address in the last start command typed. Task initiation is terminated.

Action: None

Default: The command is ignored.

\$OP USERID/TERMINID NOT IN DIRECTORY

Cause: The userid or terminid in the broadcast command is not a valid entry in the RJE message queue directory. The userid list may have been altered since the RJE message queue was constructed.

Action: None

Default: The command is ignored.

\$OP xxx yyyy IS STARTED

xxx = line address for an RJE task

yyyy = device type for an RJE task

Cause: RJE task initiation has been completed successfully for the indicated RJE task. Messages from the tasks will be prefixed with RJExxx, where xxx is the line address indicated in the message above.

Action: None

Default: None

RJExxx DATA DISK(S) FILLED

xxx = line address for the RJE task

Cause: While receiving a job entry from a remote work station, the indicated RJE task determined that there was insufficient DATAFIL space for the job entry; a system overload condition exists. This message requires a reply.

Action: (1) Reply with the stop command to terminate the RJE task until DATAFIL space can be made available later. (2) Reply with the go command to continue processing, if DATAFIL space has become available through other task activity. (3) De-



lete jobs from any of the queues to provide DATAFIL space. The RJE task must be reactivated with the go command. (4) Start a local writer task to process jobs in any one of the output queues. Completion of a single job output will free enough DATAFIL space for selection of action option 2.

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

RJExxx DTF DID NOT OPEN

xxx = line address for the RJE task

**Cause:** During RJE task initiation, the DTFBT in the RJE block failed to OPEN successfully. This type of failure may be caused by any of several conditions, and Basic Telecommunications Access Method should be consulted. A check should be made to determine that the IBM 2701 or IBM 2703, indicated by the line address in the start command, supports binary synchronous communications and otherwise conforms to the hardware specifications in the program abstract. A check should also be made to determine that the appropriate control units have been turned on. Task initiation is terminated.

**Action:** Retype the start command after the appropriate checks have been made. If, after subsequent attempts, the message is repeated, call an IBM Field Engineering Representative.

**Default:** The command is ignored.

RJExxx MSG FROM aaaaaaaaa 'message text'

xxx = line address for the RJE task

aaaaaaaa = userid for user who transmitted the message

**Cause:** User aaaaaaaaa, who is logged via the indicated RJE task has sent a message to the central system operator.

The message text is enclosed in single quotes.

**Action:** None

**Default:** None

RJExxx NO JOB Q SPACE

xxx = line address for the RJE task

**Cause:** While receiving a job entry from a remote work station, the indicated RJE task determined that there was insufficient QFILE space in the reader queue to complete the processing of the job entry; a system overload condition exists. This message requires a reply.

**Action:** (1) Reply with the stop command to terminate the RJE task until QFILE space can be made available later. (2) Reply with the go command to continue processing, if QFILE space has become available. (3) Delete jobs from the reader queue

to provide QFILE space. The RJE task must be reactivated with the go command.

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

RJExxx yyyy TASK HAS BEEN TERMINATED

xxx = line address for the RJE task

yyyy = device type for the RJE task

**Cause:** The specified RJE task has completed task termination processing, which included releasing buffers assigned to the task. RJE task termination takes place when the central system operator has requested task termination via the stop command, when the RJEND generation parameter specified EXIT and an RJEND work station command was received, or when the task has determined that irrecoverable error conditions prevent further task activity.

**Action:** The task may be started again via the RJE option of the start command.

**Default:** None

#### MESSAGES TO THE REMOTE WORK STATION OPERATOR

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

The messages are listed below in alphabetical order.

#### ABNORMAL CENTRAL SHUTDOWN

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

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

**Default:** None

BROADCAST MESSAGES FOR  $\left\{ \begin{array}{l} \text{termid} \\ \text{userid} \end{array} \right\}$

termid  
userid depends upon the requester and the work station status.

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

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

Default: None

CARD FORMS formid NEEDED FOR JOB jobname - REPLY WITH CONTINUE COMMAND

formid = requested forms identification

jobname = job entry name

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

Action: (1) Reply with the CONTINUE operand NO to delete the job from a punch output queue. (2) Reply with the CONTINUE operand BEGIN, or no operand, when the proper forms have been placed in the appropriate output component and the component has been readied. (3) Reply with the CONTINUE operand HOLD when job output processing is to be delayed until the required forms are available.

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

CONTINUE CARD REQUIRED TO CONTINUE

Cause: A CONTINUE command is required to reactivate the RJE task which was halted by a transmission interruption while delivering broadcast messages.

Action: Any form of the CONTINUE command will reactivate the task after the reason for the interruption has been corrected.

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

CONTINUE COMMAND IS REQUIRED FOR { PRINTER  
PUNCH }

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

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

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

EOT NOT EXPECTED

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

Action: Refill and activate work station reader with more RJE input.

Default: The RJE task is placed in the wait state until the work station reader is activated. A significant delay in activating the reader may cause a time-out condition in the telecommunications system. If a time-out does occur, the job entry in process must be retransmitted. The STATUS command should be used to acknowledge previous job entries.

INTERVENTION REQUIRED ON READER

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

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

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

INVALID RJ DELETE COMMAND sequence-field

Cause: A DELETE command was incorrect.

Action: Resubmit a corrected DELETE command.

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

INVALID RJ STATUS COMMAND sequence-field

Cause: A STATUS command was incorrect.

Action: Resubmit a corrected STATUS command.

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

INVALID RJE WORK STATION COMMAND sequence-field

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

Action: (1) The invalid command should be corrected. The corrected command and the input following the invalid command should be resubmitted. (2) If the work station was in the active or processing state, an RJEND command may be transmitted to detach the work station.

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

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

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

Action: (1) A valid LOGON command must be transmitted preceding the invalid command. All input beginning with the invalid command should be retransmitted. (2) An RJEND command may be transmitted to detach the work station.

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

INVALID/MISSING TERMID/USERID sequence-field

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

Action: (1) The invalid RJSTART or LOGON should be corrected. The corrected command and all input following it should be resubmitted. (2) If the command was a LOGON command, an RJEND command may be used to detach the work station.

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

JOB jobname NOT FOUND sequence-field

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

Action: None

Default: None

NO BROADCAST MESSAGES FOR userid

userid - may be the current termid instead, depending upon the work station status.

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

Action: None

Default: None

NO OUTPUT WAITING

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

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

Default: None

PRINT FORMS formid NEEDED FOR JOB jobname - REPLY WITH CONTINUE COMMAND

formid - requested form identification

jobname - job entry name

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

Action: (1) Reply with the CONTINUE operand NO to delete the job from a print output queue. (2) Reply with the CONTINUE operand BEGIN, or no operand, when the proper forms have been placed in appropriate output component and the component has been readied. (3) Reply with the CONTINUE operand HOLD

when job output processing is to be delayed until the required forms are available.

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

#### QUEUE IS EMPTY

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

Action: None

Default: None

#### RJEND PROCESSED

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

Action: None

Default: None

#### STATUS OF queue QUEUE FOR USER userid

queue is specified in xxyy format, where

$$xx = \begin{Bmatrix} BG \\ F2 \end{Bmatrix} \quad yyy = \begin{Bmatrix} RDR \\ PRT \\ PUN \end{Bmatrix}$$

userid is userid for user requesting status information.

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

Action: The second heading is:

JOB NAME NUMBER PR COUNT RDR PRT PUN

The first line following the second heading may be one of the three following messages:

1. QUEUE IS EMPTY

This message indicates there are no jobs for the user in the specified queue.

2. JOB jobname NOT FOUND sequence-field

This message indicates that the specific job name was not found while searching the specified queue. This message may occur in the status report only when a specific status request has been made.

3. This message contains seven fields, which report the status of the job entry named in the message. The first field is the name of the job entry. The second field is the number assigned to the job entry when it was logged into the POWER system. The third field is the priority number of the job entry in the reader queue. The fourth field is the count of input or output records for the job entry in the specified queue. The fifth, sixth, and seventh fields are, respectively, the reader, print, and punch queue hold status of the job entry. The reader queue hold status is H if the job is held or blank if it is not held. The print queue and punch queue hold status is H if the output is held or to be held, R if the job entry output is to be returned to the work station, or blank if the disposition of the job output is neither H nor R.

Default: None

#### TWO userid USERS ARE ALREADY LOGGED ON sequence-field

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

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

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

#### USERID/TERMINID NOT IN DIRECTORY

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

Action: None

Default: None



## INTRODUCTION TO POWER II SYSTEM GENERATION

The ten steps listed below are not the only way to a successful POWER generation, but the user may find that they help to avoid wasted effort. Prior to step 1, the user should be sure his DOS system meets the following requirements.

1. DOS supervisor must have been generated with:
  - a. MPS=BJF or YES
  - b. TP=BTAM or QTAM
  - c. CCHAIN=YES
2. DOS support for BTAM must be present.

Because the user plans to use RJE, he should be sure that his central system and the telecommunications network meet the hardware specifications found in the Introduction.

Steps 1 through 5 involve defining the contents of the user's POWER system and the central system resources that may be allocated to the POWER system. Steps 6 through 10 describe assembling, cataloging, and link-editing the system. The user may find Figure 9 a helpful outline of the ten steps.

### Step 1

The user should place the RJE macros (see Figure 8) in the DOS source statement library.

Name	Type Macro	Card ID	Source Stmt Library Space in Blocks	Description
PRJETYPE	INNER	RJTY	425	Creates RJE console command processor overlays
PRJECOM	INNER	RJCO	500	Creates RJE monitor overlays for the RJE task
PRJERDR	INNER	RJRD	180	Creates reader overlays for RJE task
PRJEPRT	INNER	RJPT	150	Creates printer writer overlays for RJE tasks
PRJEPUN	INNER	RJPN	140	Creates punch writer overlays for RJE task
RJIO2780	INNER	RJ80	230	Creates the IO2780 phase which interfaces the RJE task and the BTMOD
RJIO2540	INNER	RJXX	130	Creates the IO2540 phase which may be used for local testing of RJE program. (See "Maintenance".)
TPIO	INNER	TPIO	25	Creates the interface between the RJE task and I/O interface routine
TTIME	INNER	TTIM	10	Creates timer interface between the RJE task and the timer routines
RJEBLK	EXTERNAL	RBLK	40	Creates the DECB, DTFBT, IOAREA, and device-dependent characteristics used by RJE
RJBLKLST	EXTERNAL	RJBL	100	Creates the list of RJEBLK names, used for initializing the RJE task
RJUSERS	EXTERNAL	RJUS	65	Creates the userid and termid lists
RJBTMOD	EXTERNAL	RJBT	10	Calls the BTMOD macro to create a BTMOD according to POWER specifications
Total blocks for RJE			1995	

Figure 8. RJE macros. The first nine macros are used in the generation of the POWER program. The last four macros are used to generate the remaining RJE components.

### Step 2

The user should now determine what disk space the central installation can provide for the POWER system. Also, the user should determine whether the POWER system will occupy foreground 1 or foreground 2. If the system will occupy foreground 1, will it support batched jobs in foreground 2 as well as in the background? The user

should determine the number of reader, writer, and RJE tasks which may be active at one time. The user should also check the number of logical unit blocks available in the POWER partition. The POWER system will require one LUB for the QFILE, one for each DATAFIL module, and one for each active reader, writer, or RJE task. An extra LUB is required for each tape writer. The SYS000 LUB will be used by the POWER accounting routine. In addition, the user should note the number of unit records and tape units which may be used at one time by the POWER system. During POWER/RJE generation, the POWER manual should be consulted regarding the POWER generation parameters. Looking ahead at the POWER generation parameter in "POWER II Program Generation Parameters" may also clarify the choices. The ultimate objective of step 2 is to determine how the POWER system will be used.

### Step 3

Now the user is ready to examine in detail "POWER II Program Generation Parameters". The user must now translate his use of the POWER system into the POWER macro operands which will define his system.

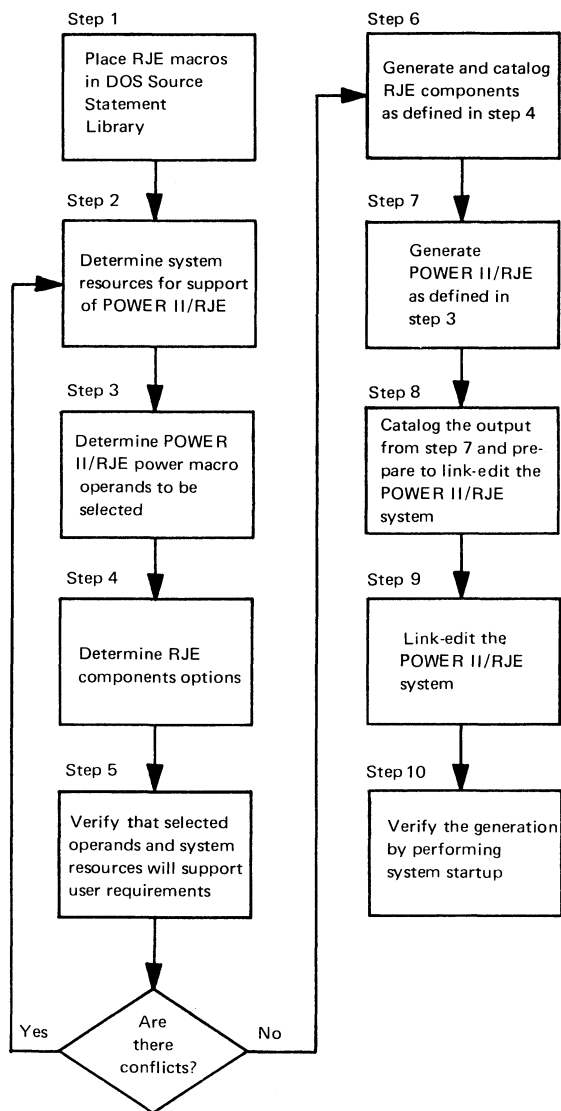


Figure 9. POWER II/RJE system generation steps

Step 4

The user who plans to include RJE must now describe his telecommunications system in terms of the RJE components explained under "RJE Components Generation". The user should also establish valid user and terminal identification names. The required RJE block names will be dictated by the RJE blocks the user needs. However, the user may also plan for expansion by using names of RJE blocks which may be added later. How the appropriate additional RJE blocks are added to the system in the future is discussed under "Maintenance".

### Step 5

To this point, the user has not generated any RJE components, but he has described in detail what his POWER system will contain. Now is the time for the user to verify that the available system resources disk space and main storage space meet his POWER design. Using the tables and guides in "Storage Requirements", the selected POWER macro operands (including defaulted parameters), and the required RJE components, the user can measure the proposed POWER system (see "Storage Estimates"). If there are no conflicts, the user is ready to proceed to step 6 and begin the final generation process. If there are conflicts, they should be resolved before proceeding. The user may wish to return to step 3 to reselect POWER macro operands or even return to step 2 for a restatement of resources and proposed use of the POWER system.

### Step 6

The user should now assemble the RJE components he defined in step 4. Figure 10 and a review of "RJE Components Generation" will help the user complete this step. The object of step 6 is to complete RJE component assemblies and to catalog the object modules in the DOS relocatable library. Also, the user should now prepare the linkage editor INCLUDE statements required for each RJE block when the POWER system is link-edited in step 8.

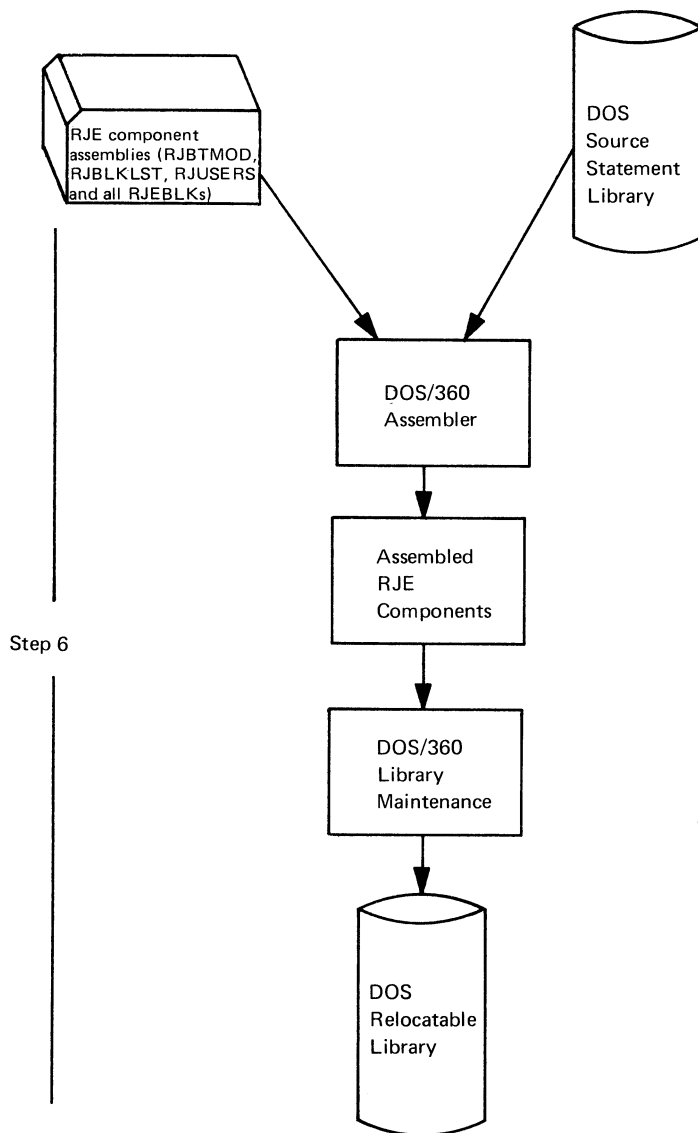


Figure 10. Generating POWER II and RJE components

Step 7

The user is now ready to assemble the POWER macro operands he selected. (See Figure 11.) The POWER program generation can produce DOS job control statements, which make steps 8 and 9 extremely easy. For the first generation, the user may wish to specify, for the POWER macro, JCL=YES and assign SYSPCH to a card punch. This parameter will provide him with the job statements necessary to link-edit the POWER system. The user need only take the punched card output from the POWER macro assembly, remove the first 15 cards, and set them aside momentarily. The next card should be blank and should be discarded. The user should now go to step 8.

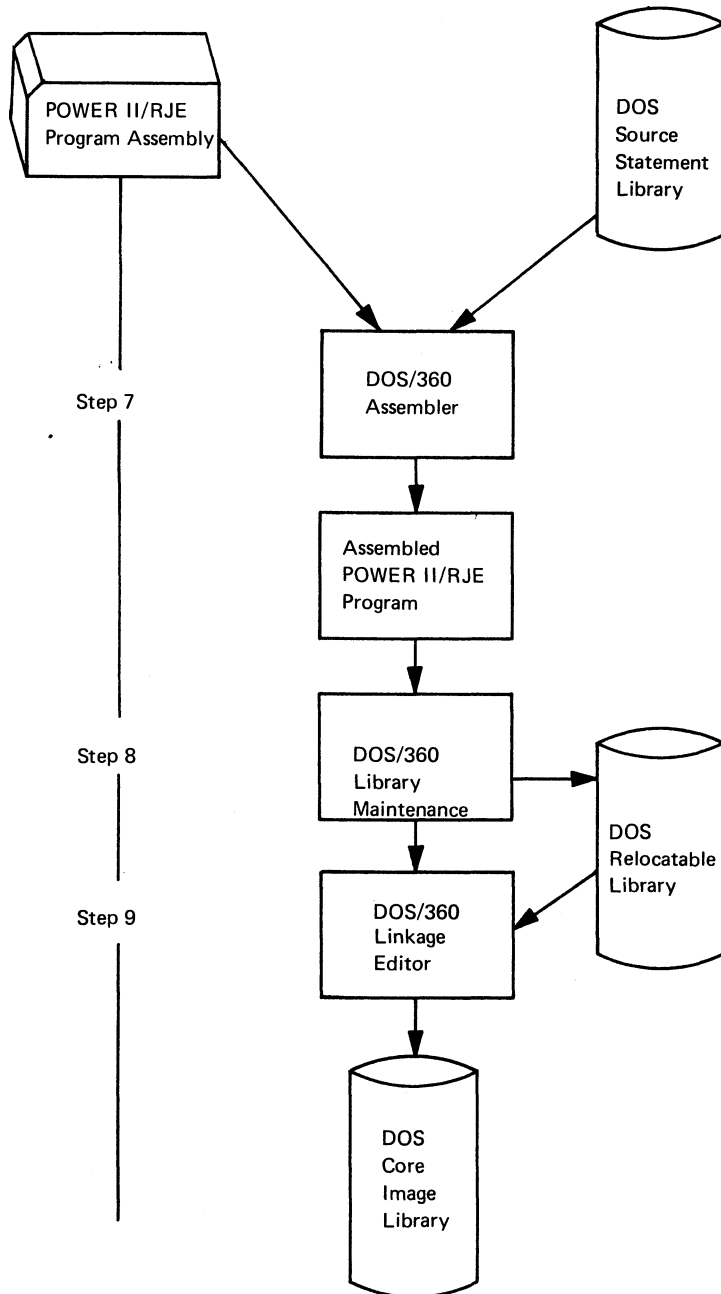


Figure 11. POWER II/RJE program assembly

Step 8

The RJE user should examine the 15 cards he has set aside for 5 cards which should be replaced by the INCLUDE statements he prepared in step 6. These 5 cards are:

```

*****
*
*           PLACE RJEBLK INCLUDE CARDS HERE
*
*****
  
```

This small deck, when complete, should be placed behind the remainder of the punched output from the POWER macro assembly, and the combined decks placed in the card reader (SYSIN). The job stream is now ready

to complete steps 8 and 9. The first job will catalog the POWER program and the required linkage editor statements in the DOS relocatable library. The second job will link-edit the entire POWER system into the special FGP sublibrary and the B-transients into the transient sublibrary of the DOS core image library.

The exception to the above procedure for step 8 occurs when the POWER system is required to reside in the foreground 2 partition. To meet this requirement, the user must change the ACTION statement, which should be the fifth card of the 15 set aside, to indicate F2 instead of F1.

#### Step 9

The user should check the linkage editor reports to verify that steps 6 through 9 have been completed successfully. This report and the card decks should be saved for possible future reference.

#### Step 10

The POWER system should now be ready for use. The user should perform the startup procedures described in "POWER II Operating Procedures" and should run some test jobs to verify that the POWER system has been installed successfully.



## POWER II PROGRAM GENERATION PARAMETERS

This section explains the functions and options of the parameters associated with the POWER macro which is used to create the POWER program with RJE. This section is divided into two parts:

- Quick Reference List of POWER Program Generation Parameters
- Detailed Description of POWER Program Generation Parameters

The parameters will use the same coding conventions described in the Introduction to this manual. Parameters may be continued as specified by the IBM System/360 Disk Operating System Assembler Language manual. The user specifies the POWER macro by coding:

name            POWER            selected-operands

name: specifies any name the user wishes. This name will be used as the relocatable library module name in the generated CATALR statement (and INCLUDE statement if JCL=YES). If name is omitted, the module name is POWER.

selected-operands: are those specified by the user in defining and tailoring the POWER system to his needs. Default values, if applicable, are underscored and these parameters need not be coded if they are selected. The remainder of this section describes these parameters.

### QUICK REFERENCE LIST OF POWER II PROGRAM GENERATION PARAMETERS

<u>Operands</u>	<u>Explanation</u>
ACCOUNT = $\left\{ \begin{array}{l} \text{YES} \\ \underline{\text{NO}} \\ \text{name} \end{array} \right\}$	Specifies user-written accounting routine which is called after job execution. Name is a B-transient (\$\$B ...) which interfaces with POWER JCT. YES specifies that account records will be maintained by POWER.
ADDITR = $\left\{ \begin{array}{l} \underline{10000} \\ n \end{array} \right\}$	Specifies additional records intercepted before second message to operator. n is 1 to 5 numeric characters.
AUTOSTR = $\left\{ \begin{array}{l} \underline{\text{NO}} \\ \{ \text{[rdr]}, \text{[n]}, \text{[prt]}, \text{[n]}, \text{[pun]}, \text{[nn]} \} \end{array} \right\}$	Specifies whether autostart of reader/writer tasks and automatic buffer requests are supported. rdr, prt, and pun specify the physical address of the unit record device for the task to be started. n is the automatic buffer request, which may be 1 or 2. Buffer request is also valid if unit record device address (autostart of task) is not specified.
DBLK = $\left\{ \begin{array}{l} \underline{1024} \\ n \end{array} \right\}$	Specifies DATAFILE block size. n may be any number greater than the QBLK specification to the maximum track size.

<u>Operands</u>	<u>Explanation</u>
DISK = { $\frac{2311}{2314}$ }	Specifies the direct access device used for QFILE and for all extents of DATAFIL. Either an IBM 2311 or IBM 2314 may be specified.
F2 = { $\frac{NO}{YES}$ }	Specifies whether foreground 2 will be supported as a batch partition under the POWER system.
JCL = { $\frac{NO}{YES}$ }	Specifies whether job control statements will be punched by DOS assembler. If NO is specified, a CATALR statement, link-edit calling module, and object deck only are punched.
LINETAB = (d <sub>0</sub> , d <sub>1</sub> , ..., d <sub>11</sub> , d <sub>12</sub> )	Specifies the print lines between the first carriage control tape channel punched and the other punches and the end of the page. d <sub>0</sub> is the number of lines from the channel 12 punch to the first punch; d <sub>1</sub> specifies the number of lines between the channel 1 punch and the first punch; d <sub>2</sub> specifies the number of lines between the channel 2 punch and first punch; and so forth. If channel 1 is the first punch, the distance, d <sub>1</sub> , is expressed as 00. If a channel is not punched, a 00 should be specified for that channel. Otherwise, d <sub>n</sub> is specified as two numeric characters. If LINETAB is not specified, the LINETAB override option of the PRT JECL statement is not checked.
MAXBUFS = { $\frac{7}{n}$ }	Specifies the maximum number of data buffers the POWER system will manage. n may be any number 3 to 99. Each RJE task when active will require two data buffers.
MAXCCB = { $\frac{3}{n}$ }	Specifies the maximum number of unit record tape devices the POWER system may use at one time. n may be any number to 26.
MAXRW = { $\frac{3}{n}$ }	Specifies the maximum number of reader/writer tasks which may be active concurrently. n may be any number to 26.
MAXRJS = { $\frac{0}{n}$ }	Specifies the maximum number of RJE tasks which may be active concurrently. n may be any number up to 5. If MAXRJS is not specified, RJE will not be generated.
NTRKGP = { $\frac{200}{n}$ }	Specifies the maximum number or track groups which the POWER system will manage. n may be any number from 200 to 1000.
NUMDDKS = { $\frac{1}{n}$ }	Specifies the maximum number of disk volumes on which the DATAFIL may reside. n may be any number from 1 to 5.

<u>Operands</u>	<u>Explanation</u>
PRIORTY = $\left\{ \begin{array}{c} \underline{\text{NO}} \\ n \end{array} \right\}$	Specifies whether priorities 0 to 9 will be part of system. NO specifies no priority capability. n, a numeric character 0 through 9, specifies the default when priority is not specified in JECL statements. Nine is the highest priority.
QBLK = $\left\{ \begin{array}{c} \underline{260} \\ n \end{array} \right\}$	Specifies the QFILE block size. n may be any number from 260 to the DBLK specification.
RDRCLOS = $\left\{ \begin{array}{c} \underline{\text{PAUSE}} \\ \text{GO} \\ \text{EXIT} \end{array} \right\}$	Specifies the action the reader task should take when end-of-file and end-of-job are encountered simultaneously. PAUSE requires the operator to activate the reader task. GO causes a standard DOS I/O intervention-required message to occur. EXIT causes the reader task to permanently stop, releasing all allocated buffers.
RDREOF = $\left\{ \begin{array}{c} \text{GO} \\ \underline{\text{PAUSE}} \end{array} \right\}$	Specifies the action the reader task should take when end-of-file but not end-of-job is encountered. PAUSE requires the operator to reactivate the reader task. GO causes a standard DOS I/O intervention-required message to occur.
READER = $\left\{ \begin{array}{c} \underline{\text{TYPE1}} \\ \underline{\text{TYPE2}} \\ \text{BOTH} \\ \text{NO} \end{array} \right\}$	Specifies which reader device type will be used. When TRYE1 is specified, only IBM 2540s and IBM 2501s may be used for readers; when TYPE2 is specified, only IBM 1442s and/or IBM 2520s may be used for readers; when BOTH is specified, any card reader may be used for readers; when NO is specified, reader capability is not available. NO may be specified if RJE support is required.
RJEND = $\left\{ \begin{array}{c} \underline{\text{NO}} \\ \text{EXIT} \end{array} \right\}$	Specifies the action the RJE task should take when an RJEND work station control statement is received from the work station. EXIT specifies that the task will permanently stop. NO specifies that the task will wait for the next work station call.
RJE2780 = $\left\{ \begin{array}{c} \underline{\text{NO}} \\ \text{YES} \end{array} \right\}$	Specifies that the IBM 2780 is to be supported as a remote work station.
STDCARD = $\left\{ \begin{array}{c} \underline{720} \\ n \end{array} \right\}$	Specifies the standard number of generated cards which a batch partition may create before a warning message to the operator occurs. n may be any number up to 99999.
STDLINE = $\left\{ \begin{array}{c} \underline{10000} \\ n \end{array} \right\}$	Specifies the standard number of generated lines which a batch partition may create before a warning message to the operator occurs. n may be any number up to 99999.

<u>Operands</u>	<u>Explanation</u>
SVCCODE = $\left\{ \frac{200}{n} \right\}$	Specifies any SVC code which must be used for the POWER partition; n must not be used by DOS or by any other special program such as CS/30 or CS/40.
TAPE = $\left\{ \frac{NO}{YES} \right\}$	Specifies whether tape writers are to be supported.
TIME1 = $\left\{ \frac{30}{n} \right\}$	Specifies the time in seconds which may elapse before work station must respond to error recovery initiated by an RJE task. n must be a multiple of 10 from 10 to 180.
TIME2 = $\left\{ \frac{180}{n} \right\}$	Specifies the time in seconds which may elapse before an intervention-required condition must be corrected at the remote work station. n must be a multiple of 10 from 10 to 300.
TRACKGP = $\left\{ \frac{10}{n} \right\}$	Specifies the number of tracks which are to be used for allocation of a track group. For IBM 2311, n may be 1, 2, 5, or 10. For IBM 2314, n may be 1, 2, 4, 5, 10, or 20.

#### DETAILED DESCRIPTION OF POWER II PROGRAM GENERATION PARAMETERS

The POWER macro parameters may be divided into four basic types or groups:

1. Queue and disk management parameters

DBLK  
DISK  
NTRKGP  
NUMDDKS  
QBLK  
TRACKGP

2. Task and job management parameters

ACCOUNT  
ADDITR  
AUTOSTR  
F2  
LINETAB  
MAXBUFS  
MAXCCB  
MAXRW  
PRIORITY  
RDRCLOS  
RDREOF  
READER  
STDCARD  
STDLINE  
TAPE

### 3. RJE management parameters

MAXRJS  
RJEND  
RJE2780  
TIME1  
TIME2

### 4. Special parameters

JCL  
SVCCODE

Each of the parameters except the RJE management parameters is described in detail in the POWER manual. RJE requires certain system resources which must be accounted for during POWER/RJE system generation. Each RJE task requires two data buffers. The broadcast console command also requires a data buffer. Therefore, the MAXBUFS generation parameter must include these RJE needs.

#### RJE MANAGEMENT PARAMETERS

MAXRJS =  $\left\{ \begin{array}{c} 0 \\ n \end{array} \right\}$

This parameter specifies the maximum number of RJE tasks which may be active concurrently. n may be from 1 to 5. If MAXRJS is not specified, RJE will not be generated. If the operator attempts to start an RJE task after the maximum is reached, the system will inform the operator that no more tasks may be started. This operand does not affect the MAXRW specification.

RJEND =  $\left\{ \begin{array}{c} \text{NO} \\ \text{EXIT} \end{array} \right\}$

This parameter specifies the action the RJE task should take when an RJEND statement is received from the work station. EXIT specifies that the task will permanently stop. NO specifies that the task will wait for the next work station call. For switched lines where any work station does not have the AutoAnswer feature, it may happen that the work station does not disconnect properly. Therefore, it may be desirable to have RJEND=EXIT to permit the task to terminate. In the meantime, the work station operator can manually disconnect the work station line.

RJE2780 =  $\left\{ \begin{array}{c} \text{NO} \\ \text{YES} \end{array} \right\}$

This parameter specifies that the IBM 2780 is to be supported as a remote work station terminal.

TIME1 =  $\left\{ \begin{array}{c} 30 \\ n \end{array} \right\}$

This parameter specifies the time in seconds which may elapse before a work station must respond to error recovery procedures initiated by the RJE task. If the specified time elapses, the RJE task will terminate. n must be a multiple of 10, from 10 to 80.

TIME2 =  $\left\{ \begin{array}{c} 180 \\ n \end{array} \right\}$

This parameter specifies the time in seconds which may elapse before an intervention-required condition must be corrected at the remote

work station. If the condition is not corrected within the time specified, the RJE task will detach the work station. Interrupted output will be saved; interrupted job input will not be entered into the POWER system reader queue.

On a switched line, the work station will be disconnected. This feature permits other work stations to use the RJE system facilities and prevents the RJE task from being tied up.

n must be a multiple of 10, from 10 to 300.

Example

```
// JOB ASSEMBLE POWER/RJE
// EXEC ASSEMBLY
POWERRJE POWER ACCOUNT=YES, X
                AUTOSTR=(00C,2,00E,2), X
                F2=YES, X
                MAXBUFS=30, X
                MAXCCB=10, X
                MAXRW=5, X
                PRIORITY=2, X
                TAPE=YES, X
                MAXRJS=5, X
                RJE2780=YES
                END
/*
/ε
```

The object deck produced by the above job may be placed in the relocatable library by using the following job:

```
// JOB CATALOG LOCAL POWER
// EXEC MAINT

punch output from POWER assembly
/*
/ε
```

## RJE COMPONENTS GENERATION

The POWER/RJE system generation is divided into five basic components: (1) the POWER program generation, (2) the special BTMOD generation, (3) the generation of the RJE blocks, (4) the RJE block name list generation, and (5) the userid list generation. These components must be placed in the DOS relocatable library prior to link-editing the POWER/RJE system.

The POWER program is generated by specifying the RJE operands in addition to central system requirements in the POWER macro. For a description of the RJE operands, see "RJE Management Parameter" under "Detailed Description of POWER II Program Generation Parameters". The other parts of the POWER system generation are described below. Each is assembled separately. Note that no embedded blanks are permitted in any operand or operand sublist.

### BTMOD GENERATION

The special BTMOD may be generated by assembling the macro RJBTMOD, which may not be labeled. RJBTMOD has only one operand:

SWITCH = YES  
          NO

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

A sample job to generate the special BTMOD follows:

```
// JOB GENERATE RJE BTMOD
// EXEC ASSEMBLY
RJBTMOD
END
/*
/ε
```

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

```
// JOB CATALOG RJE BTMOD
// EXEC MAINT

punched output from RJBTMOD assembly

/*
/ε
```

### RJE BLOCK GENERATION

The RJE block defines the device-dependent characteristics of a terminal type for a line and contains the DECB, DTFBT, I/O area, and additional device-dependent characteristics required to access that

terminal type on that line. The name for each RJE block will be created in the following format:

Dcuutype, where

cuu is the line address at the central installation

type specifies the terminal type

Example:

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

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

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

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

SWITCH = { YES } YES indicates the work station is on a switched line. NO indicates the work station is on a leased line.  
          { NO }

DEVICE = { 2780 } DEVICE specifies the type of work station the RJE block is to support. Only 2780 may be specified.

MRT = { NO } MRT indicates the presence of the multiple record transmission feature on the IBM 2780 terminal. YES indicates the feature is present; NO indicates the feature is not present. This parameter affects the number of print records which are transmitted to the IBM 2780 in a transmission block. Therefore, if the RJE block is for a switched line and some IBM 2780s using the line do not have the multiple record transmission feature, YES should not be specified.  
          { YES }

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

CU = { 2701 } as specified for the DTFBT  
      { 2703 }

MODELST = as specified for the DTFBT

RETRY = { 7 } as specified for the DTFBT  
          { n }

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



A sample assembly job follows:

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

The object deck which contains the proper CATALR statement may be placed in the relocatable library using the following job:

```
// JOB CATALOG D0232780
// EXEC MAINT
```

punched output from RJEBLK assembly

```
/*
/ε
```

#### RJE BLOCK NAME LIST GENERATION

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

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

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

See "RJE Block Generation" for the exact format of the RJE block name. The maximum number of block names per parameter is 14. The maximum number of block names is 100. At least one BNLSTn parameter must be specified. If only one block name is specified, the parentheses are not required.

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

An example of a job to assemble an RJBLKST follows:

```
// JOB ASSEMBLE RJBLK NAMES
// EXEC ASSEMBLY
  RJBLKLST BNLST1=(D0S232780),BNLST5=(D0312780,D0332780), x
          BNLST4=(D0302780,D0322780,D0342780)
  END
/*
/ε
```

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

```
// JOB CATALOG RJE BLOCK NAMES
// EXEC MAINT
```

punched output for RJBKST assembly

```
/*
/ε
```

#### USERID LIST GENERATION

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

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

where n is a numeric character from 1 through 8, for example, LIST1, LIST4, etc.

userid may be from one to eight alphameric characters.

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

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

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

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

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

```
// JOB CATALOG RJUSERS
// EXEC MAINT
```

punched output from RJUSERS assembly

```
/*
/ε
```

## STORAGE ESTIMATES

### DISK STORAGE ESTIMATES FOR DATAFIL AND QFILE

Enough disk space is required to accommodate local and remote usage. The amount of the space needed depends on user requirements. These requirements may be determined from experience by using disk extents which are much larger than necessary. After a reasonable period of time in which operational batch-processing activity and operational job mixes have been observed, the disk extents may be reduced to the operational maximum. Typically, one IBM 2311 Disk Storage Drive or IBM 2314 Direct Access Storage Facility disk pack is required.

Multiple extents and multiple disk volume support are provided to a maximum of five extents for the DATAFIL. Only one extent is supported for the QFILE. Split cylinders are not supported.

### MAIN STORAGE ESTIMATES

Main storage in the POWER partition is divided into two broad areas, fixed and variable. The fixed area contains the amount of space DOS uses in the foreground partition, the console command overlay area, and the resident POWER program. When RJE is part of the POWER system, the fixed area also contains the RJE BTMOD, the RJE block name list, and the userid list.

The variable area is divided into program and data buffers and is managed by the POWER system during POWER operation. Reader/writer/RJE tasks reside in the program buffer area, and the data buffers they require reside in the data buffer area. When a task has been stopped, it will return to the POWER system the program and data buffers that it used. These relinquished buffers are then available for use by another task.

Figure 12 depicts the POWER partition when RJE is generated as part of the POWER system.

The size of the fixed area is totally dependent on the POWER system generation. For example, more space is required when F2=YES than when F2=NO. The size of the variable area is dependent upon the MAXRW, MAXRJS, and MAXBUFS generation parameters and upon the amount of space actually available for the variable area in the POWER partition during program execution. The program buffers will always lie between the fixed area and the data buffers; data buffers are always between the program buffers and the end of the POWER partition.

During program initialization, the POWER system will allocate data buffers from the main storage area between the program buffers and the end of the partition until either the maximum number of buffers (the MAXBUFS generation parameter) or the end of the partition is reached. If the user provides a partition which is smaller than that required by the POWER system, those data buffers that may exist will be managed by the POWER system. It is not necessary to provide more space than the POWER II system can use. If more space is provided for the POWER partition than the POWER system can manage, as determined by the generation parameters, the additional space will go unused.

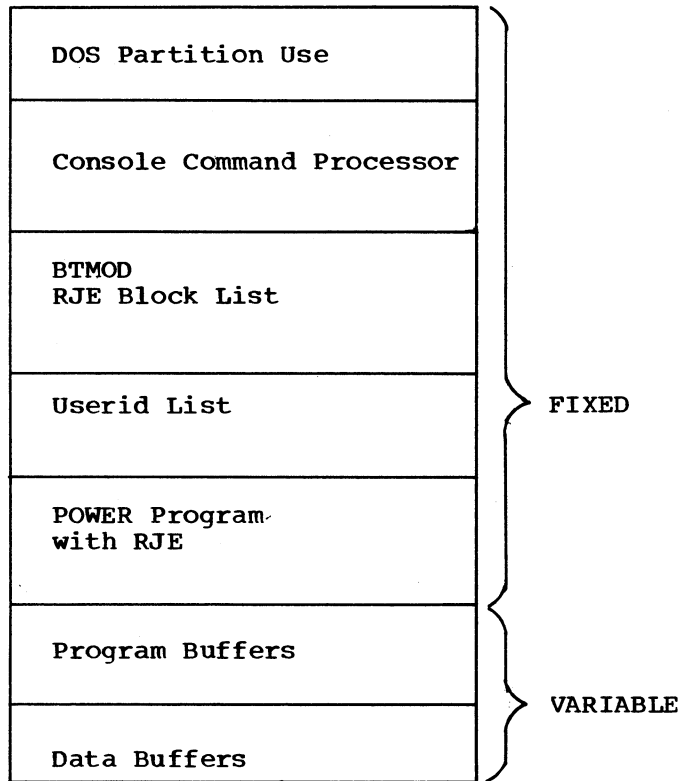


Figure 12. Map of main storage in the POWER II system partition

Discussion of the method of determining the size of the POWER partition for a given POWER system is divided into two parts; calculating the size of the fixed area and calculating the maximum size of the variable area.

#### CALCULATION OF THE FIXED AREA

The fixed area contains the space used by DOS in the foreground partition (120 bytes), the console command processor overlay area (1024 bytes), the RJE components, and the POWER program. The first two areas have fixed lengths and are already entered in Figure 13.

The calculation of the size of the RJE components area and the POWER program area is described below.

#### Calculation of the RJE Components Area

The RJE components area consists of the RJE BTMOD, the RJE block name list, and the userid list. If RJE is not supported, a zero should be entered in Figure 13 for the size of these components.

If RJE is supported, the size of the BTMOD depends on the SWITCH generation parameter. If YES was specified, the RJE BTMOD is approximately 12K. If NO was specified, the RJE BTMOD is approximately 11K. For the exact size, the user should check the BTMOD assembly listing.

The size of the RJE block name list is 24 bytes plus 16 bytes for each entry. If eight RJE block names were used, the RJE block name list is 152 bytes, or approximately 1/6K.

Calculation of Fixed Area	
DOS partition use (120 bytes)	1/8K
Console command processor	1K
RJE BTMOD (enter 0 if no RJE)	___K
RJE block name list (enter 0 if no RJE)	___K
RJE userid list (enter 0 if no RJE)	___K
Resident POWER program	___K
Total Fixed Area	_____K
Calculation of Maximum Variable Area	
Program buffer area	___K
Data buffer area	___K
Total Variable Area	_____K
Total Size of POWER System Partition	_____K
Rounded to Next 2K Boundary	_____K

Figure 13. Calculation of POWER II system partition size

The size of the userid list is 24 bytes plus 16 bytes for each entry. If 20 userids are supported, the userid list is 344 bytes, or approximately 1/3K.

#### Calculation of POWER Program Area

The size of the POWER program area depends upon the POWER macro generation parameters which are listed below.

ACCOUNT  
 AUTOSTR  
 F2  
 LINETAB  
 MAXBUFS  
 MAXCCB  
 MAXXRW  
 MAXRJS  
 NTRKGP  
 NUMDDKS  
 PRIORITY  
 READER  
 TAPE

In calculating the POWER program size, the user should account for the default specifications of those operands not declared, as well as the specifications of those declared. Figure 14 shows the effect each parameter has on a reader/writer/RJE POWER program.

READER=BOTH	
READER=TYPE1	11,000
READER=TYPE2	
F2=YES	690
LINETAB=NO	
F2=NO	180
F2=YES	440
MAXRW=n	
n x 32 =	-
MAXRJS≠0	
(MAXRJS x 470) + 1520	-
ACCOUNT=YES	120
ACCOUNT=B-transient	80
TAPE=YES	900
PRIORITY=NO	240
NUMDDKS=n	
n x 96 =	-
MAXCCB=n	
n x 36 =	-
MAXBUFS=n	
n x 4 =	-
AUTOSTR=NO	
(See Figure 15)	-
NTRKGP=n	
$((n + 7)/8) + 5(1 + 3p + 3q) =$	-
p=1 when F2=NO	
p=2 when F2=YES	
q= MAXRJS parameter	

Figure 14. POWER II program main storage estimates

Reader	N	N	Y	N	Y	Y	Y	N
Printer	N	Y	N	Y	N	Y	Y	N
Punch	Y	N	N	Y	Y	N	Y	N
Storage required in bytes	32	32	32	56	56	56	80	0

N indicates device is not included in AUTOSTR parameter.  
Y indicates device is included in AUTOSTR parameter.

Figure 15. AUTOSTR storage estimates. Read down for the AUTOSTR parameter autostart option specification. The autobuffer option of the AUTOSTR parameter does not affect the storage estimates. In a writer-only system, only the printer and punch may be autostarted. RJE requires a reader/writer system.

After calculating the size of the POWER program using the appropriate tables, the user should round the sum up to the nearest 1024 boundary. For example, if the POWER program size is calculated to be 11982 bytes, the user should round the sum up to 12288 bytes, which is the next highest 1024 boundary. 12K, which is equivalent to 12288 bytes, should be entered in Figure 13. An example showing the calculations of the POWER partition size is provided at the end of this section.

#### CALCULATION OF MAXIMUM VARIABLE AREA

The calculation of the variable area is divided into a calculation of the program buffer area and a calculation of the data buffer area.

##### Calculation of the Program Buffer Area

Each program buffer is 1024 bytes. For a system without RJE, the maximum number of program buffers required is the maximum number of reader/writer tasks which may be active (the MAXRW generation parameter). A system in which four reader/writer tasks may be active at one time (MAXRW=4) requires four program buffers. The maximum program buffer area will be 4096, or 4K.

For a system with RJE, the maximum number of program buffers required is a function of the MAXRW and MAXRJS generation parameters. If Pmax is the maximum number of program buffers,

$$P_{max} = MAXRW + 2(MAXRJS) + 3$$

An RJE task will require two program buffers and the IO2780 phase, which uses three contiguous program buffers. (See "The RJE Task".) If MAXRW=4 and MAXRJS=3, Pmax = 4+6+3, or 13, and 13312 bytes, or 13K, is the maximum program buffer area required.

##### Calculation of Data Buffer Area

The maximum number of data buffers is expressed by the MAXBUFS generation parameter. The size of each data buffer is expressed by the DBLK generation parameter. The value of the MAXBUFS parameter multiplied by the DBLK parameter is the size of the data buffer area.

If MAXBUFS=12 and DBLK=1024, the size of the data buffer area is 12288, or 12K.

The total of the space required for program buffers and for data buffers is the maximum space required for the variable area.

#### TOTAL SIZE OF POWER SYSTEM PARTITION

The total fixed area and the total variable area may now be added together. Because DOS requires that the partition size be a multiple of 2048 bytes, the POWER partition size should be rounded up to the next 2K boundary.

#### EXAMPLE OF CALCULATING POWER PARTITION SIZE

The following example of calculating POWER partition size uses the POWER assembly example in "POWER II Generation Parameters". The sample generations for RJBLKST, RJUSERS, and RJBTMOD in "RJE Components Generation" are also used. Figure 16 is the result of the calculations in this example.

The following calculations are for the RJE components: RJBTMOD, RJBLKST, and RJUSERS. Under "RJE Components Generation" the RJBTMOD example was for a BTMOD which supported switched lines. For the purpose of this example, assume that RJBTMOD generated a BTMOD which was 12288 bytes, or 12K bytes. The example of the RJBLKST generation provides for six RJE block names. The amount of space required by the RJBLKST is:

$$(6 \times 16) + 24 = 120 \text{ bytes, or approximately } 1/8\text{K}$$

The example of the RJUSERS generation provides for 18 RJE usersids. The amount of space required by RJUSERS is:

$$(18 \times 16) + 24 = 312 \text{ bytes, or approximately } 3/8\text{K}$$

For the resident POWER program, the explicit parameters are:

```
ACCOUNT=YES
AUTOSTR=NO and provides support for autostart of
    reader and printer
F2=YES
MAXBUFS=19
MAXCCB=10
MAXRW=5
MAXRJS=5
PRIORITY=NO
TAPE=YES
```

The implicit parameters are:

```
DBLK=1024
LINETAB=NO
NTRKGP=200
NUMDDKS=1
READER=TYPE1
```

The operands above are the only ones in the POWER macro which affect the POWER partition size. The size of the resident POWER program is calculated as follows:



READER=TYPE1	11,000
ACCOUNT=YES	120
AUTOSTR=NO	56
F2=YES	690
MAXBUFS=30	
30 x 4	120
MAXCCB=10	
10 x 36 =	360
MAXRW=5	
5 x 32 =	160
MAXRJS=5	
(5 x 470)+1520=	3870
NTRKGP=200	
((200+7)/8)+5)(1+6+15)=	660
NUMDDKS=1	
1 x 96 =	96
PRIORITY=NO	240
TAPE=YES	900
	<hr/>
Total	18272
Rounded up to next 1024 boundary	18432 or 18K

The program buffer area is calculated as follows:

$$P_{max} = MAXRW + 2(MAXRJS) + 3 \text{ for RJE}$$

$P_{max}$  is the maximum number of program buffers.  $P_{max} = 5 + 2(5) + 3 = 18$

The size of the program buffer area is:

$$18 \times 1024 = 18432 \text{ or } 18K$$

The data buffer area is calculated as follows:

$$\begin{aligned} MAXBUFS \times DBLK &= \\ 30 \times 1024 &= 30720 \text{ or } 30K \end{aligned}$$

The total fixed area is 31-5/8K, and the total variable area is 48K. The total space required by the POWER partition is 79-5/8K, which is rounded up to the nearest 2K boundary. Therefore, the user should provide 80K for the POWER partition to use. The reader should note that this example is for a POWER/RJE system which has nearly all of the options selected.

Calculation of Fixed Area	
DOS partition user (120 bytes)	1/8K
Console command processor	1K
RJE BTMOD	12K
RJE block name list	1/8K
RJE userid list of valid users	3/8K
Resident POWER program	18K
	_____
Total Fixed Area	<u>31-5/8K</u>

Calculation of Maximum Variable Area	
Program buffer area	18K
Data buffer area	30K
	_____
Total Variable Area	<u>48K</u>

Total Size of POWER System Partition	<u>79-5/8K</u>
Rounded to Next 2K Boundary	<u>80K</u>

Figure 16. Example of calculation of POWER II partition size

## LINK-EDITING THE POWER II SYSTEM

The link-edit step in generating a POWER system is the final step in the POWER system installation. The linkage editor creates the POWER system load modules in the core image library from the generated parts of the system which have been placed in the relocatable library. Although different copies of the POWER generation parts may reside in the relocatable library, only one POWER system may exist in the core image library. See Figures 17 and 18 for the names of the POWER program phases which make up the POWER system. If RJE is supported, the user has also included in the link-edit job the names of the RJE blocks which are to be a part of the POWER system.

The POWER system should not be link-edited during POWER operation. The results are unpredictable.

### POWER System with RJE

When the POWER system supports RJE, the following link-edit job may be used:

```
// JOB LINK EDIT POWER/RJE
// OPTION CATAL
ACTION Fn (where Fn=F1 or F2)
```

```
INCLUDE name
POWER
```

Place RJE block INCLUDE statement(s) here

```
ENTRY INIT
/* END OF LINK EDIT INPUT
// EXEC LNKEDT
/6
```

In the INCLUDE statement above, name is the same as that specified as the label of the POWER program assembly. If none was specified, POWER is the defaulted relocatable library name. The relocatable library calling module resulting from the POWER program assembly contains the proper link-edit cards for the phases which will make up the POWER system when RJE is supported. The single exception occurs for INCLUDE statements for RJE blocks. These statements must follow the INCLUDE statement for the POWER program relocatable library module name and must precede the ENTRY statement.

The link-edit calling module which is created by the POWER program assembly must be used to cause the POWER system program components to conform to the main storage map in Figure 12. The calling module is created with the POWER program object deck and is placed in the relocatable library book with the POWER program object deck.

If JCL=YES was specified during the POWER program assembly, the link-edit job above will be punched with the link-edit book and object deck. See Steps 7 and 8 in "Introduction to POWER II System Generation" for the placement of the link-edit job in the punched output. JCL=YES will cause the ACTION statement to be punched with F1 specified. The proper relocatable library name will be punched in the INCLUDE statement for the POWER program relocatable library module. The user must prepare INCLUDE statements for each RJE block.

The linkage editor should resolve all external symbols except those referencing RJE block names which are not to be included in the POWER system. INIT should be marked as an unreferenced symbol.

Phase Name	Type	Purpose	Length
FGPSPOOL	Resident POWER program	POWER supervisor Execution processors POWER services	Variable
FGPTYPN0	Overlay	Console command proc.	1024 max
FGPTYPS0	Overlay	Console command proc.	1024 max
FGPTYPD0	Overlay	Console command proc.	1024 max
FGPTYPR0	Overlay	Console command proc.	1024 max
FGPTYPL0	Overlay	Console command proc.	1024 max
FGPTYPL1	Overlay	Console command proc.	1024 max
FGPTYPR0	Overlay	Console command proc.	1024 max
FGPSPOLT	Overlay	Local print writer task	1024 max
FGPSPOLO	Overlay	Local print writer task	1024 max
FGSPOL1	Overlay	Local print writer task	1024 max
FGSPOL2	Overlay	Local print writer task	1024 max
FGSPOL3	Overlay	Local print writer task	1024 max
FGSPOL9	Overlay	Purge phase	1024 max
FGSPOLP	Overlay	Local punch writer task	1024 max
FGSPOL5	Overlay	Local punch writer task	1024 max
FGSPOL6	Overlay	Local punch writer task	1024 max
FGSPOL7	Overlay	Local punch writer task	1024 max
FGSPOL8	Overlay	Local punch writer task	1024 max
\$\$BWTRCD	B-transient	POWER initialization	1200 max
\$\$BWTRTP	B-transient	and DOS restoration	1200 max
(If TAPE=YES)			
FGPSPOLE	Overlay	Tape writer	1024 max
FGSPOLF	Overlay	Tape writer	1024 max
FGSPOLR	Overlay	Reader task	1024 max
FGSPOLB	Overlay	Reader task	1024 max
FGSPOLC	Overlay	Reader task	1024 max
FGSPOLD	Overlay	Reader task	1024 max
(If PRIORITY≠NO)			
FGPTYPA0	Overlay	Console command proc.	1024 max
FGPTYPA1	Overlay	Console command proc.	1024 max
FGSPOL4	Overlay	Reader task	1024 max
(If ACCOUNT=YES)			
\$\$BACCTG	B-transient	Accounting routine	1200 max

Figure 17. POWER II system phases

Phase Name	Type	Purpose	Length
FGPTYB0	Overlay	Console command processor	1024 max
FGPTYB1	Overlay	Console command processor	1024 max
FGPTYB2	Overlay	Console command processor	1024 max
FGPTYB3	Overlay	Console command processor	1024 max
FGPTYPIO	Overlay	Console command processor	1024 max
FGPTYPP1	Overlay	Console command processor	1024 max
FGPTYPS1	Overlay	Console command processor	1024 max
FGPTYPS2	Overlay	Console command processor	1024 max
FGPPRJEA	Overlay	Work station command processor	1024 max
FGPPRJEB	Overlay	Work station command processor	1024 max
FGPPRJEC	Overlay	Work station command processor	1024 max
FGPPRJED	Overlay	Work station command processor	1024 max
FGPPRJEE	Overlay	Work station command processor	1024 max
FGPPRJEI	Overlay	Work station command processor	1024 max
FGPPRJEJ	Overlay	Work station command processor	1024 max
FGPPRJEM	Overlay	Work station command processor	1024 max
FGPPRJE0	Overlay	Work station command processor	1024 max
FGPPRJEK	Overlay	RJE task monitor	1024 max
FGPPRJEN	Overlay	RJE task reader	1024 max
FGPPRJEX	Overlay	RJE task reader	1024 max
FGPPRJEY	Overlay	RJE task reader	1024 max
FGPPRJE4	Overlay	RJE task reader when PRIORITY#NO	1024 max
FGPPRJEG	Overlay	RJE task punch writer	1024 max
FGPPRJEH	Overlay	RJE task punch writer	1024 max
FGPPRJEQ	Overlay	RJE task punch writer	1024 max
FGPPRJEU	Overlay	RJE task print writer	1024 max
FGPPRJEV	Overlay	RJE task print writer	1024 max
FGPPRJEW	Overlay	RJE task print writer	1024 max
IO2780	Overlay	RJE BTAM interface module	3072 max
IO2540	Overlay	RJE local testing module	3072 max

Figure 18. RJE system phases

## CASE STUDY

For the environment that the POWER system creates, there can be no meaningful sample problem of POWER operations. However, in this section a hypothetical case study has been provided to assist the user in understanding the decisions which might be required in defining his needs and installing the resultant POWER system with RJE.

The emphasis in this case is on the RJE system and system discipline factors. For local POWER system considerations, consult the POWER manual.

This user has the following telecommunications environment:

### Work Stations

Six IBM 2780s on switched lines  
Two IBM 2780s on leased lines

### Central Installation

IBM 2701s to support two IBM 2780s on leased lines for the RJE system  
IBM 2701s to support four IBM 2780s on switched lines for the RJE system

### Step 1

RJE macro source statements are placed in the source statement library.

### Step 2

The telecommunications system in this case can support a maximum of six IBM 2780s; however, the RJE system may support only five active IBM 2780s at one time. The user may decide to alternate one RJE task between two leased lines and allow the switched IBM 2780s to share four lines, or he may choose to have two RJE tasks dedicated to the leased terminals and allow the six switched IBM 2780s to share three lines.

The user may decide to have no more than three RJE tasks active at one time. The number of RJE tasks active at one time depends on user needs. In this case, the user has chosen to have five RJE tasks active at one time.

In determining the required amount of data buffers, the user must plan on RJE needs as well as on local task and execution processor needs.

In this case, the user is satisfied that one 2311 disk pack will meet his remote and local needs for QFILE and DATAFIL space.

### Step 3

The user has selected the POWER macro operands in the example in "POWER II Program Generation Parameters".

### Step 4

The user now describes his telecommunications system in terms of the RJE components explained in "RJE Components Generation". The examples for RJBTMOD, RJBLKST, and RJUSERS satisfy the requirements

for this case. The user defines each line with the appropriate RJEBLK parameters.

#### Step 5

The user follows the procedures in "Storage Estimates" for estimating the amount of main storage space required by his POWER system. The actual calculations are performed in the example in "Main Storage Estimates". An 80K POWER partition is required. Assuming in this case that the user has a 12K supervisor which meets the POWER requirements and a Model H40 (256K), he has 164K to divide between the background and foreground 2 partitions.

#### Step 6

The user now assembles the RJE components and places them in the relocatable library. For each RJE block, the user prepares an INCLUDE statement, which will be used in link-editing the POWER system.

#### Steps 7, 8, and 9

The user assembles the POWER program and places it in the relocatable library. The final step is link-editing the POWER system. The INCLUDE statements for the RJE blocks should be placed in the line-edit job as described in "Link-Editing the POWER II System". After link-edit, the user is ready to start the POWER partition.

## MAINTENANCE

This section contains topics which are of specific interest to the systems programmer who is responsible for installation and maintenance of the POWER system. The topics are listed below:

- Preparing a Super BTMOD
- Modifying the RJE Userid List
- Modifying the RJE Block Name List and RJE Blocks
- Local Testing of the RJE System
- User Modifications to the POWER II System

### PREPARING A SUPER BTMOD

Because of relocatable library space considerations, some installations may wish to use a single BTMOD to satisfy all of their teleprocessing needs. The following paragraphs define the BTMOD specifications required by the RJE system. A BTMOD which conforms to these specifications may also be generated with additional capabilities to satisfy a user's other requirements, thus permitting a single BTMOD to satisfy all of his needs.

The following BTMOD generation parameters must be specified: ERLOGIC=E, CANCEL=NO, BSCS=YES, and DECBEXT=NO. SWITCH may be specified as either YES or NO depending upon the user telecommunications system. Other BTMOD operands may be generated to suit the user's needs.

The super BTMOD must be named RJBTMOD to resolve external symbol linkages between the POWER system and BTMOD. In addition, the POWER system with RJE requires that the label IJLMWAIT, which is defined in the assembled BTMOD, must be defined also as an external symbol to resolve linkages between BTMOD and the POWER/RJE system. This definition may be accomplished by using an ENTRY IJLMWAIT statement in the BTMOD assembly.

### MODIFYING THE USERID LIST

Modification of the RJE userid list may be required when userids are to be added to or deleted from the list. (See "Userid List Generation".)

The appropriate changes are reflected in the new LISTn parameter specifications. The RJUSERS macro is reassembled and placed in the DOS relocatable library. Finally, the POWER system is link-edited again.

Changes to the RJE userid list may affect the entries in the RJE message queue. An element exists in the message queue for each valid userid when the message queue is built. It is recommended that when the RJE userid list of valid users has been modified, the RJE message queue should be deleted. (See the description of the broadcast command in "Central Installation Console Commands".) Any messages in the queue at the time of deletion should be reentered when the POWER system containing the modified userid list is started/up.



## MODIFYING THE RJE BLOCK NAME LIST AND RJE BLOCKS

The RJE block name list may require modification whenever RJE blocks are added to or removed from the POWER system. If an RJE block name has been included in the RJBLKLIST and no RJE block by that name is part of the POWER system, the name is considered fictitious and is indicated by unresolved external symbols when the POWER system is link-edited. Fictitious RJE blocks are considered unsupported and do not interfere with the POWER system RJE operation. Therefore, if an RJE block is to be removed from the system, the user need only remove the INCLUDE statement referring to the deleted RJE block and link-edit the POWER system again. If the user has foreseen the possible addition of RJE blocks, the names of these blocks may be included in the initial generation of the RJBLKLIST macro. If an RJE block is to be added to the system and a name already exists in the RJE block name list, the INCLUDE statement for the RJE block should be added to the POWER system link-edit job and the system should be link-edited again.

If an RJE block is to be added to the system with a name which is not already in the RJBLKLIST, the RJBLKLIST must be reassembled to include the name of the new RJE block. The new RJBLKLIST must be placed in the DOS relocatable library, and the new RJE block must be assembled and placed in the relocatable library. When the above has been accomplished, the POWER system should be link-edited. Link-editing the POWER system, at this point, causes resolution of the RJBLKLIST external symbol for the new RJE block.

The user should not delete an RJE block from the core image library without link-editing the POWER system again. The RJBLKLIST must always reflect the presence or absence of supported RJE blocks. If POWER attempts to load an RJE block which has been deleted from the core image library but appears to the RJBLKLIST as a part of the POWER system, the POWER partition will terminate abnormally. Abnormal termination, caused by a phase-not-found condition, will not allow POWER to restore the DOS supervisor for normal operation, and the DOS supervisor must be re-IPLed.

## LOCAL TESTING OF THE RJE SYSTEM

### RESTRICTIONS

Successful installation of the RJE system can truly be tested only when a work station is attached to the POWER system. However, a means for local testing has been provided for users who have an IBM 1403 Printer and an IBM 2540 Card Read Punch attached to the central installation System/360. This type of local testing will test only the ability of an RJE task to function in the POWER environment; teleprocessing communications will not be tested, and DOS BTAM support will not be used in the test.

Instead, an IBM 1403 and an IBM 2540 will be accessed by the IO2540 phase using PIOCS. This phase simulates, for the RJE tasks, the operations performed by the IO2780 phase which normally interfaces with the BTMOD to perform teleprocessing input and output. During the test, local readers and writers should not be active. The test may begin at any point during POWER operation, and normal POWER operation may be resumed after the test is completed. Because the test serves to test an RJE task, only one task should be activated during the test.

## TEST STARTUP

The following DOS job control statements should be included in the POWER partition initiation job control:

```
// ASSGN SYSPCH,X'cuu'  
// ASSGN SYSLST,X'cuu'
```

SYSPCH must be assigned to the IBM 2540 Card Read Punch, and SYSLST must be assigned to the IBM 1403 Printer. The card reader will be assigned dynamically by the RJE start command processor.

The POWER partition is started in the manner specified in the POWER II manual. All readers, writers, and RJE tasks should be stopped prior to beginning the test. Batch partitions may continue processing.

To begin the test, the operator types the RJE option of the start command as follows:

```
S RJE,lineaddr,type,2540,cuu
```

Lineaddr and type have the same meaning during the test as they would when an RJE task is being started. Lineaddr and type must specify a supported line and device type as they normally would. cuu specifies the address of the IBM 2540 card reader. For example, if 030 is a supported line in the RJE system, 2780 is the supported device type, and 00C is the IBM 2540 card reader, the command would be typed:

```
S RJE,030,2780,2540,00C
```

If the lineaddr and device type are incorrect, the appropriate diagnostic messages will appear on the console typewriter as they would under nontest conditions. The 2540 positional operand indicates the request for local testing.

The card reader must be readied to begin the test session. During the test, messages appear on the console typewriter for the same causes as they would in a nontest environment, and "Messages" in this manual or the DOS Operating Guide should be consulted.

When the indicated RJE task has been started successfully, the normal message

```
$OP XXX,YYYY IS STARTED
```

will be typed. All RJE management console commands may be used in the normal manner.

## TEST OPERATIONS RJE

When the task has completed initialization, a read will be executed to the IBM 2540 card reader. The RJE task will expect input from the card reader to be in the same form that is required for an IBM 2780. All RJE printer output will be processed on the IBM 1403 and all RJE punch output will be processed on the IBM 2540 Card Read Punch.

Regarding batch partition execution, partition operation during the test will function in the normal manner. That is, if the batch partitions are started, they will process job entries in the reader queue and place output in the output queues.

#### ENDING THE TEST

The RJE test may be ended at any time by typing the RJE option of the Stop command for the RJE task being tested. The RJE system will be restored for normal POWER and RJE operations. If an intervention required condition exists at the IBM 2540 card reader, the reader must be readied to complete termination of the test.

#### USER MODIFICATIONS TO THE POWER II SYSTEM

The POWER system is a complex programming system involving critical interfaces with the Disk Operating System and the hardware DOS supports. The user should not attempt to make modifications to the POWER system. Such modifications, while providing a local feature, may impair efficient operation of the POWER system.

APPENDIX A: POWER II PARTITION INITIATION EXAMPLE

The following job control statements should be placed in SYSIN and read by DOS:

```
    ASSGN  SYSIN,UA
//  ASSGN  SYS001,X'cuu' QFILE DISK
//  ASSGN  SYS002,X'cuu' DATAFIL DISK
//  DLBL QFILE,'QFILE',99/360,DA
//  EXTENT SYS001, vol serial no, 1,0,rel track, no. of tracks
//  DLBL DATAFIL,'DATAFIL',99/360,DA
//  EXTENT SYS002, vol serial no, 1,0, rel track, no. of tracks
//  EXEC FGPSPOOL
```

When the message PLEASE ASSIGN SYSRDR appears on the typewriter, the following action should be taken:

<u>DOS Message</u>	<u>Operator Action</u>
BG 1C10A PLEASE ASSIGN SYSRDR	
BG	STOP (EOB) Press the typewriter request key.
AR 1I60A READY FOR COMMUNICATIONS	
AR	START F1 (EOB)
F1	READ X'00c' (EOB)
F1 FORMAT Q'S,AUTOSTR? NO,YES (EOB)	
F1 BATCH PARTITION(S) MAY NOW BE STARTED	
AR 1I60A READY FOR COMMUNICATIONS	Press the typewriter request key and enter any valid DOS or POWER command. For example:
AR	START (EOB)
BG	ASSGN SYSIN,X'00c' (EOB)
BG	(EOB)

## APPENDIX B: QUICK REFERENCE OF CENTRAL INSTALLATION CONSOLE COMMANDS

Note: xx = BG or F2

yyy = Reader, printer, or punch

cuu = Unit record or tape physical device address

### Queue Management

a xxyyy,jobname[,jobno],priority	Alter job priority
d xxyyy,jobname[,jobno]	Display job status
ALL	All jobs
HOLD	Jobs held
PN	Jobs with priority/n
h xxyyy,jobname[,jobno]	Hold a job
ALL	
r xxyyy,jobname[,jobno]	Release a job
ALL	
l xxyyy,jobname[,jobno]	Delete a job

### Task Management

s xxyyy, cuu[,no-buffers][,cuu]	Start a rdr/wtr task
p xxyyy, cuu	Stop a rdr/wtr task
f xxyyy, cuu	Flush a wtr task
c xxyyy, cuu	Cancel a rdr/wtr task
t xxyyy, cuu	Restart a print wtr task
g xxyyy, cuu	Reactivate a rdr/wtr task
g xx	Reactivate a batch partition
m xxyyy, cuu[,no-copies]	Display/alter copy counter
e	End the POWER system
k	End the POWER system with dump

### System Management

d a	Display active task
d b	Display available buffers
d q	Display available disk space
d t	Display current system time

## RJE Management

B M,userid'message text'	Send a message
ALLUSERS,'message text'	
B D,userid[,NR]	Display a message
ALLUSERS[,NR]	in the message
ALL	queue
B L,userid[,NR]	Delete a message
ALLUSERS[,NR]	in the message
ALL	queue
I L,lineaddr	Inquire about RJE
U,userid	task activity
T,termid	
ALL	
G RJE,lineaddr	Reactivate an RJE
	task
P RJE,lineaddr	Stop an RJE task
S RJE,lineaddr,type	Start an RJE task

APPENDIX C: JOB ENTRY CONTROL LANGUAGE

```
* $$ JOB [jobname] ,[hold] ,[priority] ,[partition]
* $$ PRT [disposition] ,[forms number] , [number of copies
      [tape device address]
      ,[number of lines before message] ,[linetab]
* $$ PUN [disposition] ,[card number] ,[number of copies]
      ,[number of lines before message]
* $$ EOJ
```

APPENDIX D: QUICK REFERENCE OF WORK STATION COMMANDS

ID	Operation	Operand
* ..	RJSTART	termid [,BRDCST]
* ..	RJEND	(no operand)
* ..	LOGON	userid
* ..	LOGOFF	(no operand)
* ..	OUTPUT	[jobname[,jobnumber] ALL]
* ..	CONTINUE	[BEGIN NO HOLD]
* ..	DELETE	queue, {jobname[,jobnumber] ALL}
* ..	STATUS	queue, {jobname[,jobnumber] HOLD Pn ALL}
* ..	BRDCSTR	(no operand)
* ..	MSGR	M,'text'



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International Business Machines Corporation  
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112 East Post Road, White Plains, N. Y. 10601  
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