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Remote Job Entry (RJE) for VAX/VMS User Guide

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REMOTE JOB ENTRY (RJE) FOR VAX/VMS
USER GUIDE

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ABSTRACT

At Sandia National Laboratories in Albuquerque, New Mexico, a group of CDC computers handle large computational (batch) jobs. Some DEC VAX systems have been connected to the CDC systems to provide pre- and postprocessing of batch jobs. To facilitate running jobs on the CDC systems, members of Division 2644 created a Remote Job Entry (RJE) system. This document describes procedures for using that system.

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1. **What is RJE?**

The RJE subsystem runs on a VAX computer connected to the CDC batch computers through a ModComp front-end. It is similar in concept and operation to the traditional RJE stations that also connect to the CDC batch systems through a similar ModComp front-end. A user logged into the VAX system can use the RJE system to do any of the following.

- Submit a job to run on the CDC systems and receive output from that job.

- Transfer either binary or text files in either direction between the VAX and the CDC systems (by submitting a job).

- Query the status of the local RJE system.

- Query the status of the CDC systems.

- Control jobs submitted to the CDC systems (EVICT, DIVERT).

- Receive output from the CDC systems, even if the job was not submitted from that VAX. (It is possible with this mechanism to transfer files from one VAX to another, or to submit a job from a VAX and get output on a traditional RJE station.)

Because the CDC batch systems run some classified work, only those VAXs that do NOT have dialup access can be connected to the batch system by means of RJE. Submission of classified jobs, or retrieval of classified output, through RJE is not allowed at this time.

The RJE system on the VAX consists of three cooperating programs:

RJEMGR   The manager of the RJE system. It maintains the queues and manages operation of the RJE system. Normally it starts when the VAX system is loaded and should run continuously, waiting for requests to service.

RJEPUMP   Communicates with the CDC system. It is completely controlled by the RJEMGR, and should not concern users.

RJEUSER   The user interface. This program is run by any user who wishes to use the RJE package in any way. From the user's perspective, this is the RJE package.

2. How is RJE Accessed on the VAX?

    There are two ways to access the RJE system on the VAX: run the
    RJEUSER program and give it commands; or define new commands to
    DCL (the Digital Command Language) that run RJEUSER in a
    transparent way.

    2.1 Running the RJEUSER Program From Your Terminal

        When the RJE system is installed on a VAX system, the
        command "RJE" is defined to allow a simple way to run the
        RJE user interface. The user interface is a privileged
        system program that parses commands from the user, formats
        requests to the manager of the RJE system, and displays
        output from the RJE system on the user's terminal.

        When you give the command

            $ RJE

        the RJEUSER program is run and types the prompt

            RJE>

        on your terminal. Now you can give any of the commands
        described in this report. After execution of any of those
        commands (except EXIT), or after a command error, RJEUSER
        returns to the RJE> prompt.

    2.2 Command Language Interface to RJE

        It is possible to define commands to DCL that will run the
        RJE user interface to execute single RJE commands in a
        transparent way. After execution of the RJE command, or
        after a command error, RJEUSER exits and returns to DCL.
        For example, if the following commands are defined to DCL
        like this:

            $ STAT :== RJE STATUS
            $ WH :== RJE WHERE

        then you can give commands like

            $ STAT   !equivalent to RJE> STATUS

            $ STAT I   !equivalent to RJE> STATUS I

            $ WH XYZ   !equivalent to RJE> WHERE XYZ

        In the rest of this report, all commands are described as
        they are given directly to RJEUSER, NOT through this DCL
        interface.

2.3 Output From RJEMGR

As long as a user is running RJEUSER, RJEMGR can send messages to a user at his terminal notifying him of significant events such as the return of a job's output from the CDC systems. However, if the user is not running RJEUSER or has logged off the VAX and RJEMGR has a message to send to the user, then RJEMGR uses the VAX MAIL facility. The mail message may indicate that it came from "SYSTEM" or "RJE" (or some other privileged user) depending on how RJEMGR was last started. In any case, the subject of the mail message will always say that it is a message from the RJE manager.

3. RJE Commands

All commands to RJEUSER are described in this section. They are grouped as

- Inquiry commands

- Job submittal, control, and retrieval commands

- Operator privileged commands

- Miscellaneous commands

All commands can be abbreviated to the shortest unique substring. For example, WHERE can be abbreviated WHER, WHE, WH, or just W. Some commands, for the sake of compatibility, also have other abbreviations or synonyms. Synonyms are shown in brackets after the command name in the following sections.

3.1 Inquiry Commands

The commands in this group get information from RJEMGR and/or from the CDC system (BART). Messages from RJEMGR in the VAX are in mixed case and messages from the CDC BART package are in all upper case. Most commands are identical to commands used on the non-VAX RJE stations. The only exceptions to this rule are the following.

- The command L is used for STATUS,LOCAL rather than LIMITS.

- Some commands do not make sense on the VAX. An example is REWIND, which restarts the job on the local printer on non-VAX RJE stations.

3.1.1 STATUS

The STATUS command with no arguments is equivalent to the STATUS,QUEUE command.

3.1.2 STATUS,INPUT [INPUT]

The STATUS,INPUT command returns information from BOTH RJEMGR and CDC. The local status shows the contents of the local VAX input queue; the CDC status shows the contents of CDC input queues.

3.1.3 STATUS,LOCAL [LOCAL]

The STATUS,LOCAL command returns the number of entries in each of the local queues, and lists each of the entries that belongs to you. It does not query the CDC system, and returns no information about it other than an informative message if the link is down.

3.1.4 STATUS,OUTPUT [OUTPUT]

The STATUS,OUTPUT command returns information from BOTH RJEMGR and CDC. The local status shows the contents of the local output queue; the CDC status shows the contents of the CDC output queues.

3.1.5 STATUS,QUEUE [QUEUE]

The STATUS,QUEUE command returns information from CDC about the number of jobs in the CDC input and output queues.

3.1.6 STATUS,SITE [SITE]

The STATUS,SITE command returns information about the status of the local site from CDC--which data streams are up, what are the limits, whether a data transfer is active, etc.

3.2 JOB SUBMITTAL, CONTROL, and RETRIEVAL

Before discussing each command in detail, we define a few useful general terms:

EQ   Equipment (data stream). The data streams are pseudodevices that correspond to simultaneous file transfers across the communications link. Those supported by the VAX RJE package are

CR   "Card Reader" stream, input to CDC

LP   "Line Printer" stream, list output from CDC

PCH   "Punch" stream, binary output from CDC

LFN   Logical File Name. All jobs in the CDC system are identified by a seven-character LFN. Entries in some of the RJE queues are also identified by this name. The name is created by the CDC system when a job is submitted. The first four characters come from the "JOB CARD", the next two identify which RJE station submitted the job, and the last two are assigned in sequence by the CDC system to limit the possibility of duplicate job names.

The full seven characters must be used in most RJE commands requiring an LFN. Exceptions include WHERE and CANCEL. When a short form is allowed, at least three characters must be given, and any job that matches the characters specified is treated as · a match; i.e.: WHERE,XYZ finds all jobs whose LFN starts with XYZ.

Unsolicited Output sent from the CDC systems to a VAX for
Output   which no corresponding entry exists in the local output queue.

3.2.1 CANCEL

This command removes an entry from one of the local VAX queues maintained by RJEMGR. If a job is cancelled while still in the VAX input queue, i.e., it has never been sent to the CDC systems, then it is discarded. That is the end of it. If a job is in the VAX output queue when cancelled, the VAX output queue entry is discarded and any output that comes back for that job is treated as unsolicited output. The format of the command is

CANCEL,lfn

where the LFN is the temporary job ID assigned by RJEMGR if the job is still in the input queue, or the CDC job ID if the job has already been sent to the CDC system. If you specify less than seven characters, ALL jobs belonging to you whose first characters match the part you specified are cancelled. For example, if you always use XYZ as the job name, you can cancel ALL your jobs with the command:

CANCEL,XYZ

3.2.2 CLASSIFY

This command is NOT yet allowed. It will be used in the future to retrieve classified output after the VAX/VMS systems are enhanced to handle classified data.

3.2.3 DIVERT

Divert a job in one of the CDC output queues to the central site printer or card punch. The format of the command is

    DIVERT,lfn,q

where q is either OUTPUT or PUNCH

3.2.4 EVICT

Remove a file from one of the CDC queues. The format of the command is

    EVICT,lfn,q

where Q is the name of the CDC queue; i.e.:

6	Input queue for the 6600 systems
7	Input queue for the 7600 systems
OUTPUT	Output queue from either system
PUNCH	Binary output queue from either system

A job in the VAX RJE local OUTPUT queue may be in the CDC INPUT queue, and it is the CDC queue name you specify in the EVICT command. Because EVICT also implies CANCEL, the job is removed from the local VAX queues as well as from the CDC queues.

3.2.5 GET

The GET command has two similar uses. If unsolicited output has been or will be sent to the VAX RJE system, the output cannot normally be routed to the correct user. The GET command retrieves files from the unsolicited output queue. If the output has not yet come from the CDC system, it places an entry into the output queue so that the

output can be routed correctly when it arrives. The form of the GET command is

GET lfn (/qualifiers)

3.2.5.1   Qualifiers

/LIST=file-name   Specifies where the LIST output files are to be delivered. The default is your current default disk and directory, with the LFN as the file name and .LOC as the file type (extension).

/PUNCH=file-name   Specifies where the PUNCH output files (if any) are to be delivered. If the file name is omitted, the default is your current default disk and directory, with the LFN as the file name and .BIN as the file type (extension).

/CARRIAGE_CONTROL-   Specifies the type of carriage control to be used when the file is returned from the CDC system. Two possible keywords are used here:

FORTRAN   The first column of output is carriage control (this is the default).

LIST   The first column of output is part of the text.

3.2.6   KILL

Kill the currently active output file on the indicated device. The format is

KILL,eq,lfn

where EQ is one of LP, PCH, or CR.

3.2.7 NEXT

The NEXT command raises the priority of a file returned to the CDC system (perhaps because the user exceeded his disk quota on the VAX) and causes that file to be retransmitted to the VAX. If a user gets a message from RJEMGR saying a job was returned to the CDC system, he should make enough room for the file and then use the NEXT command to retrieve it. The format is

    NEXT,eq,lfn

where eq is either LP or PCH.

3.2.8 SENDJOB [SUBMIT]

Jobs submitted to the CDC batch systems consist of one or more files that may be thought of as a "card deck." It is possible to control the structure of that "card deck" in a few ways. The normal mode of operation is to separate each input file with an "end of record," and to follow the last file with an "end of information." This can be altered by

- Qualifiers specified in the SENDJOB command.

- Special characters imbedded in the input files.

The qualifiers are described in this section; the special characters in the input file are covered in the section on Text File Formats.

The SENDJOB command requires one or more file names; e.g.

    SENDJOB Jl.CCL,Jl.FOR,JlA.DAT

3.2.8.1 Passwords

With the current implementation of the CDC systems, every job must have at least one password, and may include many passwords (for file accesses). RJE provides a simple mechanism to eliminate the need for passwords in files on the VAX. See Section 4.1.1 for details.

3.2.8.2 Job Qualifiers

The following qualifiers are recognized anywhere in SENDJOB commands and apply to the job as a whole.

/LIST
/LIST=file-name   Specifies where the LIST (text) output files are to be written when the output is returned from the CDC system. /OUTPUT is a synonym for /LIST.

/NOLIST   Specifies that no list output is expected. When the job is sent to the CDC system, the local queue entry is deleted if no LIST or PUNCH output is expected. This is NOT the normal case.

/PUNCH
/PUNCH=file-name   Specifies that PUNCH (binary) output is expected, and is written to the file specified. The file name and "=" can be omitted; see DEFAULTS below.

/NOPUNCH   Specifies that no PUNCH output is expected. This is the default.

/TIME_LIMIT=n   Specify the time limit (in DAYS) that the job should stay in the output queue waiting for expected output. Entries in the output queue are deleted when all output has arrived, or when this time limit has expired. The default is 3 days.

3.2.8.3 File Qualifiers

File qualifiers follow the corresponding file name.

/ASCII (D)
/BINARY
/SEGMENTED_BINARY   Specifies the form of the input
                     or output file. All input
                     files are assumed to be ASCII
                     text files unless one of the
                     forms of binary is specified.
                     All list output MUST be ASCII.
                     Punch output files are assumed
                     BINARY unless /SEGMENTED_BINARY
                     is specified. NOTE: Normal
                     VAX binary files will NOT get
                     to the CDC system intact. See
                     the section on Binary File
                     Formats for details.

/EOF   [/EOP or /679]
/EOR (D)   [/EOS or /789]
/CONCATENATE   [/NOEOR OR /NOEOF]
                     Specifies that this file is to
                     be separated from the following
                     file (if any) by an "End of
                     File", "End of Record", or no
                     separator at all. The default
                     between files is EOR, and the
                     last file is ALWAYS followed by
                     "End of Information".

/CARRIAGE_CONTROL=FORTRAN (D)
/CARRIAGE_CONTROL=LIST

                     Specify whether Column 1 of ALL
                     text output files for this job
                     is to be treated as carriage
                     control. Because the default
                     is FORTRAN, most files from the
                     CDC will look correct if typed
                     or printed on the VAX. If the
                     first column of each line in
                     the output file contains data,
                     and not carriage control
                     information, LIST should be
                     specified.

3.2.8.4 Defaults

1. The default extension (file type) of the first
    file is ".CCL" (for Cyber Command Language).

2. The default directory and device for the first file are your current default directory.

3. For files after the first, the default device and directory are the device and directory last specified in the command, or your current defaults if none has been specified (i.e., once a device or directory is specified it "sticks" through that command unless changed again). For example, if your current default is UD:[MYDIR], the command

        SENDJOB J1,SD:P1.FOR,[XYZ]D1.DAT,UD:XX

    looks for the following files

        UD:[MYDIR]J1.CCL
        SD:[MYDIR]P1.FOR
        SD:[XYZ]D1.DAT
        UD:[XYZ]XX.

4. For all files except the first, there is no default file type (extension).

5. Each file is, by default, separated from the next by an "end of record."

6. The LIST files default to your current default directory, with the same name as the .CCL file, and the file type (extension) of .LOG.

7. The PUNCH files default to your current default directory, with the same name as the .CCL file, and the file type (extension) of .BIN. This is true ONLY if you specify /PUNCH in the SENDJOB command; otherwise, no punch output is expected.

3.3 Operator Privileged Commands

The commands contained in this section require OPER privilege not normally granted to most VAX users. They allow changes in the operation of the RJE system that can affect all users of the system.

BEWARE

Users with OPER privilege will see all jobs for ALL USERS when looking at the local queues maintained by RJEMGR, and can CANCEL a job for ANY

user EVEN ACCIDENTALLY when using the short form
of the CANCEL command.

3.3.1 AUTO

Turn the AUTO DIVERT switch on or off in the CDC
system. This command should NOT be used except in
very unusual circumstances; i.e., the AUTO DIVERT
switch should normally stay OFF, so that all output
is sent back to the VAX. The format of the command
is

```
        AUTO,ON
    or AUTO,OFF
```

3.3.2 CONTINUE

The CONTINUE command resumes I/O suspended by a
PAUSE command. The format of the command is

```
    CONTINUE,eq
```

where EQ is one of LP, PCH, or CR.

3.3.3 LIMITS

The LIMITS command sets a limit on the size of
output files that are sent to the VAX system. Any
file larger than the upper limit (or smaller than
the lower limit) is held in the output queue at the
CDC system. The format of the command is

```
    LIMITS,eq,upper,lower
```

where EQ is either LP or PCH. If either limit is
omitted, it means "leave it as it is." If the upper
limit is omitted, two consecutive commas are re-
quired (i.e.: LIMITS,LP,,0). The LOWER limit
should ALWAYS be zero. Note: On non-VAX RJE sta-
tions, the command L is an abbreviation for LIMITS.
On VAX RJE systems, L is an abbreviation for the
STATUS,LOCAL command.

3.3.4 ON

Turn on a data stream (logical device) for input to,
or output from, the CDC system. The format of the
command is

```
    ON,eq
```

where EQ is one of LP, PCH, or CR.

3.3.5 OFF

Turn off a data stream (logical device) for input to, or output from, the CDC system. The format of the command is

    OFF,eq

where EQ is one of LP, PCH, or CR. The stream is shut down AFTER any currently active file transfer is complete.

3.3.6 PAUSE

Suspend I/O on the specified data stream (logical device). The format of the command is

    PAUSE,eq

where EQ is one of LP, PCH, or CR. The CONTINUE command is the inverse of PAUSE.

3.3.7 SHUTDOWN

Request that RJEMGR shut itself down. If some data stream is currently active, it will continue; but no new file transfers will be started. If the stream is still active 5 minutes later, RJEMGR assumes it was hung and shuts itself down anyway.

3.4 Miscellaneous Commands

3.4.1 MESSAGE

The MESSAGE command sends a text string to the CDC operator. The format of the command is

    MESSAGE any string of text

Example:

    MESSAGE HELP, THIS VAX IS ON FIRE

Note: This command should NOT be used in normal circumstances. If the CDC operator responds, the VAX RJE system doesn't know where to route the reply and thus sends it to EVERY TERMINAL on the VAX. This feature is meant to handle special messages only, such as telling all VAX users that the CDC systems are on fire.

4. Text File Formats

4.1 Text Input Files

Text files are normal VAX text files. The character set on the VAX is ASCII. Files are converted to DISPLAY CODE in the ModComp front-end while going from the VAX to the CDC system, and from DISPLAY CODE to ASCII while going from the CDC system to the VAX. Because DISPLAY CODE is a 64-character set, all lower-case characters are converted to upper case going in to the CDC system. Tabs are expanded to some number of spaces between 1 and 8, to get to the next "tab stop." Tab stops are fixed at Columns 1, 9, 17, etc.

When the files are sent to the CDC system, they are scanned for imbedded separator indicators, such as "{EOR}" or "{EOF}". These indicators MUST start in Column 1. When such an indicator is found, an end-of-record or end-of-file is sent to the CDC system.

4.1.1 The "Control Statement" File

The first file in a job is treated as the control statement file. The second control statement in a CDC job should be a USER statement that contains a user identifier and password. CDC file access commands containing passwords may also appear in the control statement file. Because it is undesirable to have CDC passwords appearing in VAX files, a password replacement feature is provided in RJEUSER. When an RJE SENDJOB command is entered, RJEUSER copies the control statement file to a "hidden" file on the VAX. Each time a text string in braces is encountered, the user is prompted with the text string. Whatever text he enters is substituted in the "hidden" file for the original text string including the braces. For example, the CDC control statement

USER,JDSMITH,{NOS Password}.

would result in the prompt

Enter "NOS Password":

When the user enters his password it will be substituted in the USER statement. The password will not be echoed so that other users cannot observe it.

If a user wishes to ensure that the password is entered correctly, he may place an exclamation point at the end of the prompt string just before the closing brace. In that case RJEUSER will prompt twice for the password and will verify that it is entered the same way both times. If it is not, the SENDJOB command will be immediately aborted. This verification mechanism may be useful in cases where a mistake could result in the loss of several hours of CDC time, e.g., when an output file from a lengthy run is being saved in the permanent files.

WARNING

Password replacement is not done on strings when the opening brace is in Column 1 of a line, since {EOR} and {EOF} must start in Column 1.

Since the control statement file is copied to a "hidden" file, it is not wise to make it a very large file with a lot of data following the control statements. The time required for RJEUSER to copy a large file may be noticeable, and a considerable amount of the user's disk quota may be consumed as a result.

This string replacement mechanism is NOT restricted to passwords only, but can be used as a general parameter replacement mechanism.

4.1.2 Other Text Input Files

The other input files are NOT copied when you give the SENDJOB command. They must not be deleted before the job is actually sent to the CDC system. They will be scanned for imbedded separators such as "{EOR}" or "{EOF}", but password replacement will NOT be done.

4.2 List Output

All text output directed to the file "OUTPUT" on the CDC system is delivered to the list output file specified explicitly or implicitly in the SENDJOB command. If the OUTPUT file contains imbedded end-of-file marks, it is delivered as multiple "versions" on the VAX; i.e., files with the same name and extension, but different version numbers. For example, a compilation listing followed by program output and by the dayfile comes back as three versions.

5. Binary File Formats

5.1 Binary Output

Note: Unless you specify /PUNCH in your SENDJOB command, the VAX does not expect binary output from your CDC job and will not know how to deliver it to you. See the section on Unsolicited Output for more information on what happens to it. Each 60-bit CDC word is stored on the VAX in 8 consecutive bytes (64 bits), with the upper 4 bits of the first byte set to zero. If the file contains imbedded end-of-file marks, it is delivered as multiple "versions" on the VAX; i.e., files with the same name and extension, but different version numbers.

The qualifiers /BINARY and /SEGMENTED_BINARY refer to the method in which binary data is written on the VAX. The RJEPUMP process writes normal BINARY output in variable length records of up to 4096 bytes each. CDC records longer than 4096 bytes are broken into multiple 4096 byte records with a short record at the end.

SEGMENTED BINARY records are written as a sequence of short variable length records of 126 bytes or less, of which the first two data bytes are actually flag bytes that indicate whether that record is the beginning, middle, last, or only record in the larger "segmented record." Segmented records are a special feature of VAX-11 FORTRAN (they are the default type for unformatted reads and writes) and are not recognized by the record manager as a separate record type. Instead, RMS just treats a segmented record as a string of short variable length records. Segmented binary records are of particular use when CDC record sizes exceed 4096 bytes (512 CDC words), since the VAX segmented records will have a one-to-one correspondence with CDC records.

5.1.1 Binary Conversion Routines

Routines are available to convert the binary format used for output from the CDC system to normal VAX binary formats. Those routines are included in the library CDCBIN.OLB and are documented in the file CDCBINARY.MEM, which should be available on each VAX system with an RJE connection.

5.2 Binary Input Files

It is NOT possible to send just any VAX binary file to the CDC system. The file MUST be in a format like that used for binary output from the CDC system, in which the first

4 bits of every 64 bits must be zero. They are stripped off to fit into the 60-bit word of the CDC system. If the contents of 8 consecutive bytes look like

    0A BC DE FG HI JK LM NP

where each letter represents a 4-bit hexadecimal digit, then it gets to the CDC system looking like

    ABC DEF GHI JKL MNP

5.2.1 Binary Conversion Routines

Routines are available to convert normal VAX binary formats to the proper format to be sent to the CDC system. Those routines are included in the library CDCBIN.OLB and are documented in the file CDCBINARY.MEM, which should be available on each VAX system with an RJE connection.

6. CDC Control Statements of Special Interest to VAX Users

While we do not want to go into any unnecessary details about general CDC systems, there are a few control statements of particular interest to VAX RJE users.

6.1 DISPOSE

The DISPOSE statement disposes a file either immediately or at the end of the job. Because of the way the queues are maintained on the VAX, we STRONGLY recommend inclusion of the * in the DISPOSE statement so that the output will ALL come at the end of the job if output is to be sent back to the VAX from which the job was submitted. To dispose a file to OUTPUT:

       DISPOSE,lfn,*PR.
    or DISPOSE,lfn,PR,ST=NOSExx.

Where xx is the RJE station (example: NOSER2 or NOSEV3).

To dispose a binary file to the VAX (as punch output):

       DISPOSE,lfn,*P8=CVX.
    or DISPOSE,LFN,P8=CVX,ST=NOSExx.

6.2 ROUTE

The ROUTE command can be used on OPEN NOS to route a file to a VAX connected to the SECURE batch systems. The form of the ROUTE command is

    ROUTE,lfn,DC=SO,TID=xx.

7. Examples

In all the examples in this section, we assume the user is John Q. Sandia, and that Mister Sandia is known to NOS as JQSANDI, has password MYPASWD, and likes to use his initials for his CDC job name. All commands that he types on his terminal are underlined in all examples; all other text constitutes either system prompts or comments.

7.1 Minimal Job

First, consider the minimum useful job. List the contents of your directory on NOS. Only one file will be needed; let's call it MINI.CCL. The contents of that file would look like

    JQS.
    USER,JQSANDI,{NOS Password}.
    CNH.

Mr. Sandia would type the following commands on his VAX terminal:

    $ RJE
    RJE> SEND MINI
    Enter "Nos Password": MYPASWD
    [Sending Job JQS37]
    RJE>
    JQSOEAN PLACED INTO QUEUE
    Temporary job name was JQS37, 32 bytes transmitted
    RJE>

When the job finishes execution on the CDC system, Mr. Sandia is notified at his terminal (if he is still logged in).

    978 bytes of List output received for Job JQSOEAN
    Job Completed
    RJE> EXIT

Mr. Sandia now finds a file named MINI.LOG in his directory. It contains the dayfile and directory listing from his job.

7.2 Compile and Run

The next example includes compilation and execution of a FORTRAN program on the 7600. There are two options for this:

• The control statements are in one file and the program in another file.

• The control statements and program are in the same file, separated by one line containing only "{EOR}".

For this example they are combined in a single file; in following examples they are shown as separate files. The contents of the file "EXAMPLE2.CCL" are

```
JQSEX2,T20.
USER,JQSANDI,{NOS Password}
FTN.
LGO.
{EOR}
          Program TRINGL (Output)
C
C   SAMPLE PROGRAM TO COMPUTE PASCALS TRIANGLE
C
          INTEGER L(11)
          DATA L(11) /1/
          PRINT 100, (I, I=1,11)
100       FORMAT (44H1COMBINATIONS OF M THINGS TAKEN N AT
          A TIME.//
          1 20X,3H-N-/11I5)
          DO 2 I=1,10
             K = 11 - I
             L(K) = 1
             DO 1 J=K,10
                L(J) = L(J), L(J+1)
1               CONTINUE
             PRINT 101, (L(J), J=K,11)
2         CONTINUE
101       FORMAT (11I5)
          STOP
          END
```

To send this job to the CDC system, Mr. Sandia types the following commands on his VAX terminal:

```
$ RJE
RJE> SEND EXAMPLE2
Enter "NOS Password":   MYPASWD
[Sending Job JQS83]
```

```
RJE>
JQSEEHS PLACED INTO QUEUE
Temporary job name was JQS83, 518 bytes transmitted
RJE> Q                    !ask for status of the CDC Queues
[Waiting for reply from CCF]
 15.51.50 V2 QUEUE COUNTS
66 ACTIVE=000 OF 001 QUEUE=000 OF 000
76 ACTIVE=001 OF 026 QUEUE=001 OF 015 (007 HOURS 10 MIN)
PRT=000
DONE
RJE>
8242 bytes of List output received for Job JQSEEHS
Job completed.

RJE> EXIT
```

Mr. Sandia will now find TWO files named EXAMPLE2.LOG in his directory. The file with the highest version number is the dayfile; the lower numbered version is the output of his program.

7.3 Job with Binary Output

In this example Mr. Sandia runs a program that creates a binary output file on the CDC system and returns that file to the VAX. The file EXAMP3.CCL contains the following:

```
JQS(T10)
USER,JQSANDI,{PSWD}.
FTN5.
LGO.
DISPOSE,TAPE1,P8=CVX.
```

The file EXBIN.PGM looks like

```
    PROGRAM FLOAT (OUTPUT, TAPE1)
    REAL X(1000)
    DATA (X(I),I=1,10)/1.0,0.0,3.3333333,100.,1.89E+150,
   1 -1.0,-0.0,5.5E-40,-2.666666667E+9,-6.5891432E-4/
    DO 10 I=1,991,10
       DO 10 J=I, I+9
         X(J) = X(J-I+1)
10     CONTINUE
    PRINT 100, (X(J), J=1,100)
100 FORMAT (1X,Z16,4X,Z16)
    DO 20 I=1,10
       WRITE (1) (X(J), J=1,1000)
```

```
20    CONTINUE
      STOP
      END
```

To send this job to the CDC system, Mr. Sandia types the
following commands on his VAX terminal:

```
$ RJE
RJE> SEND EXAMP3,EXBIN.PGM/PUNCH
Enter "PSWD":  MYPASWD
[Sending Job JWS84]
RJE>
JQSOEJO PLACED INTO QUEUE
Temporary job name was JQS84, 491 bytes transmitted
RJE> Q                    !ask for status of the CDC Queues
[Waiting for reply from CCF]
 15.51.50. V2 QUEUE COUNTS
66 ACTIVE=000 OF 001  QUEUE=000 OF 000
76 ACTIVE=000 OF 033  QUEUE=002 OF (007 HOURS 55 MIN)
PRT=000
DONE

RJE> EXIT
$ LOGOUT
```

In this case, Mr. Sandia decides not to wait at his
terminal until the job is run. He sees the following the
next time he logs in to the VAX:

    You have 2 new messages

When he runs MAIL to read them, he sees the following:

```
$ mail

you have 2 new messages

MAIL> read

From:  RJE 12-AUG-1981 14:04
To:    JQSANDI
Subj:  Message from RJE system:

80000 bytes of Punch output received for Job JQSOEJO
More output expected.

MAIL> del
MAIL> read
```

```
From:  RJE 12-AUG-1981 14:05
To:    JQSANDI
Subj:  Message from RJE system:

12180 bytes of list output received for Job JQS0EJ0
Job completed.

MAIL> del
MAIL> read
%MAIL-E-NOMOREMSG, no more messages

MAIL> exit
```

Mr. Sandia now finds TWO files named EXAMP3.LOG and ONE file named EXAMP3.BIN in his directory. The .BIN file is the binary output (i.e.: TAPE1); the .LOG files are the dayfile and the output from his program, as in Example 2.

Because the floating-point numbers in the binary output file are still in the CDC internal representation, they can't be used yet. They MUST be converted to VAX internal floating-point format before they can be used to do any arithmetic on the VAX. Conversion would also be necessary for a CDC binary file containing integers or display code characters. See the chapter on Binary File Formats for more information.

7.4 Job with Binary Input

In this example Mr. Sandia wants to send a binary file to the CDC system to be plotted at an adjacent old-style RJE station. The command file is named COMQ.CCL and contains the following:

```
JQS,STNOS.                          COMQ SUBMITTED FROM VAX.
USER,JQSANDI,{Secure NOS Password}.
COPYBF,INPUT,TAPE77.
COMQ,TAPE77,HC1,CS=R2.                                    .
```

The binary file is called FOR078.DAT and contains data ALREADY FORMATTED CORRECTLY FOR THE CDC SYSTEM (see the section on Binary File Formats for details).

To send this job to the CDC system, Mr. Sandia types the following commands on his VAX terminal:

```
$ sendjob comq,for078.dat/binary
Enter "Secure NOS Password": MYPASWD
[Sending Job JQS85]
```

In this case Mr. Sandia would get two mail messages from RJEMGR as the job progresses through the systems.

The first message is sent when the files are transferred to the CDC systems. It gives the job name (LFN) assigned by the CDC system and the count of the number of bytes transferred.

The second message comes after the job has been run and the dayfile returned to the VAX, saying that the job is complete and listing how many bytes of output were received.

7.5   Routing Output to Another RJE Station

In this example Mr. Sandia runs the same program as in Example 1, but routes the program output to the printer at an adjacent old-style RJE terminal.

The command file is named PREMOTE.CCL and contains the following:

```
DEMO,T20.
USER,JQSANDI,{NOS PASSWORD}.
FTN.
LGO.
DISPOSE,OUTPUT,PR,ST=NOSER2.   Print output at R2
```

The program is in file TRINGL.FOR (see Example 1 for the contents of that program).

To send this job to the CDC system, Mr. Sandia types the following commands on his VAX terminal:

```
$ RJE
RJE>SENDJOB PREMOTE,TRINGL.FOR
Enter "NOS PASSWORD": MYPASWD
[Sending Job DEM86]
RJE>
DEMOENN PLACED INTO QUEUE
Temporary job name was DEM86, 590 bytes transmitted

RJE>Q
[Waiting for reply from CCF]
 14.10.30. V2 QUEUE COUNTS
66 ACTIVE=000 OF 000  QUEUE=000 OF 000
76 ACTIVE=000 OF 032  QUEUE=001 OF 024  (009 HOURS
10 MIN)
PRT=000
DONE
RJE>
```

    2818 bytes of List output received for Job DEMOENN
    Job Completed.

    RJE> <u>EXIT</u>

7.6 Unsolicited Output

This example does NOT include a sendjob command, because we
are showing how a job that was NOT submitted from a VAX can
get to a user on a VAX. For this example, Mr. Sandia
logged into the OPEN NOS system and sent a file from there
to VAX node V2 with the following command:

    ROUTE,lfn,DC=SO,TID=V2.

The CDC system responds with the job name (LFN) assigned to
the job:

    ROUTE COMPLETE. JOB NAME IS JQSV2FH

Some time later (after the file has been transferred from
OPEN NOS to SECURE NOS by operations) the file arrives at
VAX node V2. Mr. Sandia uses the GET command to request
the output. If the file has already arrived, it is copied
to his directory immediately. Otherwise, the GET command
creates an entry in the local OUTPUT queue to await the
arrival of the file. The LFN assigned by the CDC system
must be used in the GET command. If a file name is
specified with the /LIST= switch, that name is used;
otherwise the file name is the LFN with extension .LOG (or,
for /PUNCH=, .BIN), i.e.:

    $ <u>RJE</u>
    RJE> <u>GET JQSV2FH/LIST=MYFILE.NOS/CA=LIST</u>

The response will be one of the following:

    [Job placed in output queue]
  or
    List output will be copied to your directory

If the GET command is issued BEFORE the output is received,
qualifiers   such   as   /CARRIAGE_CONTROL=LIST   or
/SEGMENTED_BINARY will have the desired effect. If the GET
command is issued AFTER the output has already been
received, it is TOO LATE for those qualifiers to have
effect. For this reason, text files should normally be
copied on the CDC system with COPYSBF, rather than COPY, to
insert FORTRAN-like carriage control in the first character
position of each line. For SEGMENTED_BINARY files

you must be FAST. Thus, writing shorter records that don't require segmentation is recommended.

7.7 Shipping a Text File From One VAX to Another

In this example, Mr. Sandia wants to send a program to a user on another VAX. The file we will send is the program used in the previous example; i.e., TRINGL.FOR.

In transferring text files by this means, characters are converted from ASCII to DISPLAY CODE, and later back to ASCII. This results in converting all lower case characters to uppercase, converting tabs to multiple spaces, and loss of some special characters.

The command file is named GIVEFILE.CCL and contains a destination node that can be varied by using the string replacement normally used for passwords, i.e.:

```
jqs(t2,stnos)                 job to move file to another VAX
user,jqsandi,{NOS password}.
copysbf,input,output.
route,output,dc=pr,tid={Destination node}.
```

Mr. Sandia gives the following commands to send this job to node V3:

```
$ rje
RJE>SEND GIVEFILE,TRINGL.FOR
Enter "NOS password": MYPASWD
Enter "Destination node": V3
[Sending Job JQS87]
RJE>
JQS0E08 PLACED INTO QUEUE
Temporary job name was JQS87, 615 bytes transmitted

RJE>EX
```

Mr. Sandia gets one more message when the job is completed, telling him that the dayfile has been received and including the byte count. The file is sent to the node he specified, where it is treated as UNSOLICITED OUTPUT (unless the user expecting the file issues a GET command BEFORE the file arrives).

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