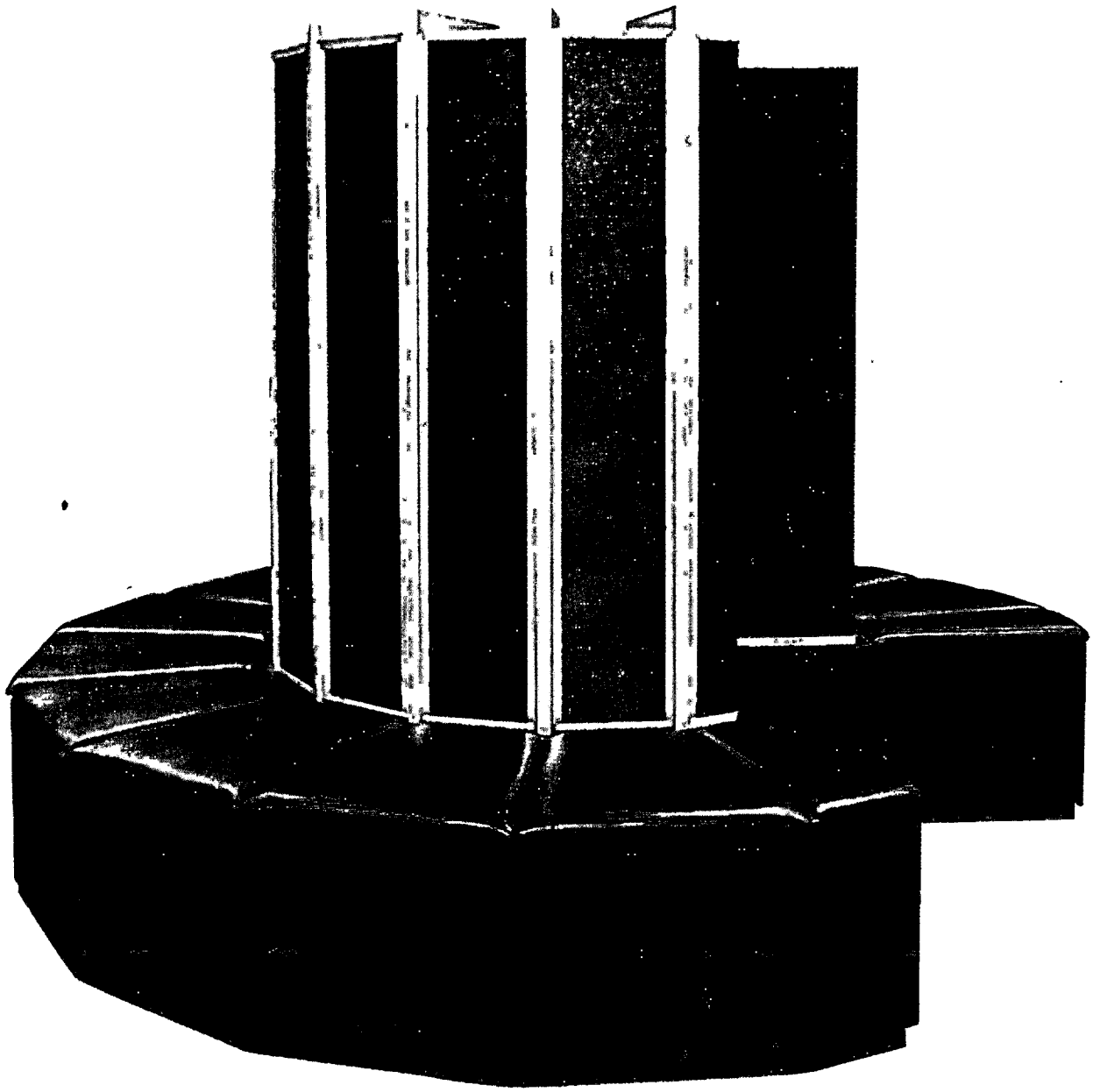
CRAY RESEARCH, INC.

CRAY-1®

COMPUTER SYSTEM

DATA GENERAL STATION (DGS) OPERATOR'S GUIDE

2240006



CRAY-1®

COMPUTER SYSTEM

DATA GENERAL STATION (DGS)
OPERATOR'S GUIDE

2240006

RECORD OF REVISION

CRAY RESEARCH, INC.

PUBLICATION NUMBER

Each time this manual is revised and reprinted, all changes issued against the previous version in the form of change packets are incorporated into the new version and the new version is assigned an alphabetic level. Between reprints, changes may be issued against the current version in the form of change packets. Each change packet is assigned a numeric designator, starting with 01 for the first change packet of each revision level.

Every page changed by a reprint or by a change packet has the revision level and change packet number in the lower righthand corner. Changes to part of a page are noted by a change bar along the margin of the page. A change bar in the margin opposite the page number indicates that the entire page is new; a dot in the same place indicates that information has been moved from one page to another, but has not otherwise changed.

Requests for copies of Cray Research, Inc. publications and comments about these publications should be directed to.

CRAY RESEARCH, INC.,
1440 Northland Drive,
Mendota Heights, Minnesota 55120

Revision	Description
	Feb. 1976 - Original distribution
A	July 1976 - Reprint incorporating change packets 01 through 04.
B	July 1977 - Reprint with revision. This publication has been completely rewritten and obsoletes all previous editions. Changes are not noted by change bars.
C	Sept. 1977 - Reprint with revision. This edition obsoletes all previous editions. Significant changes and additions have been made to the command language.
D	Jan. 1978 - This revision adds the DELAY, REFRESH, STATION, and STATUS commands and deletes the JOBQ command. Disk initialization has been rewritten and is now located in Appendix C. Other, miscellaneous changes are also included. This revision reflects the January, 1978 release of the station.
D-01	April 1978 - Changes in this revision include the addition of the POLL and STORAGE commands, additions and changes to messages, and other minor technical changes.
D-02	July 1978 - This change packet adds descriptions of the INTERRUPT station command and the ED and RDF CLI commands, and notes technical changes reflecting Version 1.02 of the Station.
E	Oct. 1978 - This revision adds the DELETE, DISCONNECT, MESSAGE, PARITY, SAVE, SET, SUBMIT and SWITCH commands and replaces the INPUT command with the BLOCK command. The operator stations have been redefined as system or local stations. A new section, Station Error Termination, has been included. Other miscellaneous changes are also included.

PREFACE

This publication describes how to operate a Data General Eclipse being used as either an on-site or remote batch entry station for the CRAY-1 Computer System. Section 1 presents an overview of the hardware and software system configurations. Section 2 summarizes often-used procedures. Section 3 describes station commands in general and then presents them in detail in alphabetical order.

Section 4 tells how to operate the off-line features provided by Cray Research, Inc. which are available under the Data General RDOS Operating System.

Section 5 is intended primarily for the batch user and tells how a job deck or dataset is prepared for transmission to the CRAY-1.

CONTENTS

APPENDIX SECTION

TABLES

FIGURES

INTRODUCTION 1

This manual describes the operational requirements of a Data General ECLIPSE S-200* Computer and associated peripheral devices when used as either an on-site or remote job entry station for the Cray Research, Inc. CRAY-1® Computer System. A job entry station is a computer system that collects and presents data to the CRAY-1 for processing and receives output from the CRAY-1 for distribution to slower devices. An on-site station is connected directly to a CRAY-1 channel; in addition to acting as a job entry station it may gather data from or distribute data to one or more second-level processors referred to as remote job entry stations. An on-site station can act as a data concentrator for one to four remote stations connected via telephone lines.

An Eclipse connected to the CRAY-1 through the MCU cable provides operator functions reserved to the Maintenance Control Unit (MCU). These functions are available on-site or remotely.

HARDWARE CONFIGURATION

The following types of devices may be associated with the Eclipse computer when used as a station:

TEC Model 1440 Data Screen**
TEC Model 455 Data Screen**
Calcomp Model 144D Disk Drive
Documation Model M-1000 Card Reader
Data General 9-track, 800 bpi Magnetic Tape Unit
Gould 5000 Printer/Plotter

Not all of these devices are used for all applications and the number of devices of each type is site dependent.

---

* ECLIPSE is a registered trademark of the Data General Corporation, Southboro, Mass.

** Data Screen is a trademark of TEC, Inc. Tucson, Arizona.

Figures 1-1 and 1-2 illustrate the configurations for an on-site station and a remote station, respectively.

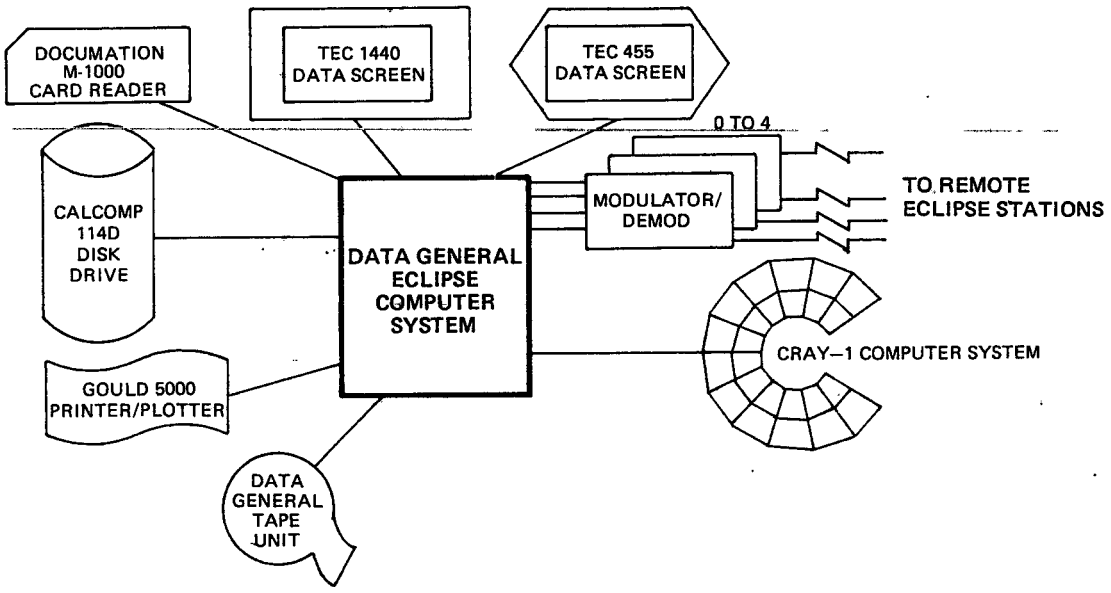


Figure 1-1. On-site station configuration

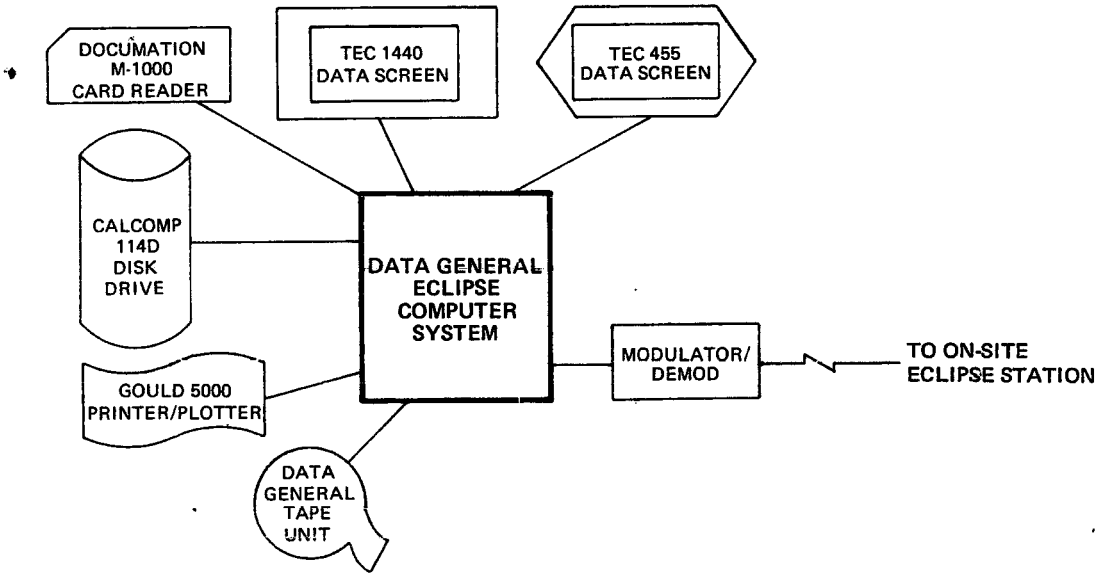


Figure 1-2. Remote station configuration

SOFTWARE CONFIGURATION

Three versions of station software are supplied by Cray Research: on-site station, concentrator, and remote station. The versions are operationally the same (with the exception of MCU and communications operations), so for the most part, any differences are transparent to the operator.

The Eclipse computer operates under control of the Data General RDOS unmapped operating system. This system is described in detail in the following Data General publications:

RDOS Reference Manual	Data General publication 093-000129
RDOS User's Manual	Data General publication 093-000075
RDOS CLI Reference Manual	Data General publication 093-000109

RDOS has two user program areas: foreground and background. The Eclipse station software supplied by Cray Research can execute in either of the areas.

The operator initializes RDOS and submits commands to RDOS via the TEC 1440 data screen to bring the station to an operational state. The RDOS routine that translates the commands is known as the Command Line Interpreter (CLI). CLI commands allow the operator to select programs to run in the foreground and background areas of the computer and to control files and devices local to the computer. CLI permits the operator to perform a variety of off-line utility functions as described in general in section 4 of this publication and described in detail in the Data General CLI Reference Manual. When the background area is in use, CLI is deactivated.

Section 2 of this publication describes the operator procedures for initializing RDOS and loading and executing the station software. Operator communication with the station and with the CRAY-1 Operating System is through the TEC Model 455 Data Screen. Station commands entered at this device are processed locally by station software or are passed to the CRAY-1. The CRAY-1 Operating System performs the requested function and returns messages and data to the station.

OPERATOR STATIONS

One station in the CRAY-1 system is designated as the System Operator Station and is privileged to perform functions not allowed at any other station.

The mainframe identifier of the system operator station is specified as an assembly parameter of the CRAY-OS Operating System. A station that is currently the system operator station can manipulate any jobs in the system. As one of its privileged functions, it may designate that some other station assume the duties of the system operator station in its place.

Commands restricted to the system operator station are noted as such in the descriptions of commands in section 3.

At other operator stations, known as Local Operator Stations, the operator can manipulate jobs for that station only. The mainframe identifier must match the terminal identifier to manipulate jobs or datasets.

SYSTEM OPERATION 2

This section presents the procedures necessary for bringing the Data General Eclipse computer and associated peripheral equipment to an operational state. Restart and power-off procedures are also included.

POWER ON PROCEDURE

Perform the following procedure to apply power to the Data General Eclipse and associated devices. This procedure does not tell how to apply power to the CRAY-1. Power-on procedures for the CRAY-1 are given in the CRAY-1 Maintenance Manual.

1. Turn on the Eclipse by turning the key on the computer cabinet to ON.
2. Turn on the disk controller by turning the key in the lower cabinet clockwise to the ON or LOCKED ON position. Allow a 30 second warm-up period or wait until you hear a loud click indicating that the unit is ready.
3. Turn on the Calcomp 114 Disk Drive by pressing the POWER ON button.
4. Turn on the TEC 455 Data Screen by actuating the switch on the back panel (at upper right as viewed from the back). Select REMOTE at the keyboard.
5. Turn on the TEC 1440 Data Screen by actuating the switch at the lower center of the back panel. Select LINE at the keyboard.
6. Turn on peripheral devices as required for the computer application.
7. Perform site-related duties such as turning on the air conditioning.

PROGRAM INITIALIZATION PROCEDURE

Initialization of the RDOS system and the station software can be performed when the disk ready light comes on after performing the power-on procedure. This procedure assumes that the disk pack has been initialized with the latest system as described in appendix C.

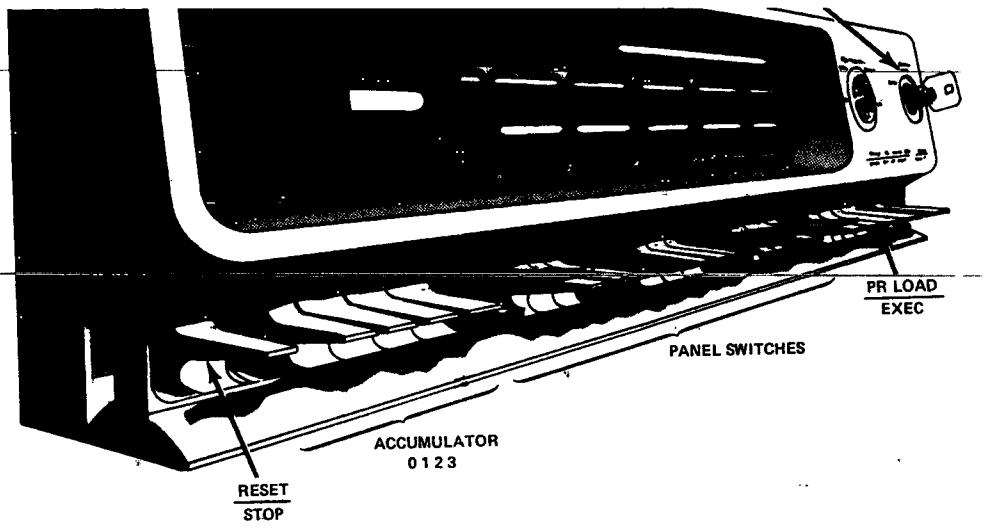


Figure 2-1. Eclipse console

1. If necessary, mount the pack containing the desired system. Procedures for mounting the disk pack are given in Appendix B.
2. At the computer console (figure 2-1):
   a. Set the panel switches to 100033_8.
   b. Flip up the PR LOAD switch.
   c. The system is loaded into the computer memory from the disk. When loading is complete, the message FILENAME? appears on the 1440 data screen.
3. At the 1440 keyboard:
   a. Press RETURN, or if a non-standard RDOS system is being used reply with *sysname* and press RETURN.
   b. If the system is being restarted after a system failure, the message PARTITION IN USE - TYPE C TO CONTINUE appears. Type C.

c. Enter the date and time when prompted by RDOS. If the system is being restarted, enter CLEAR/A and press RETURN. Enter DIR *dir* and press RETURN (where *dir* is the name of the directory in use when the failure occurred). Then, enter CLEAR/A and press RETURN.

d. Enter the STATION command and press RETURN to execute the command file that causes the on-site or remote version of the station to be loaded and begin execution. The station is then ready to accept commands entered at the 455 display (section 3).

RESTART PROCEDURE

If the system fails (for example, the displays are unresponsive), reinitialize the system using the following procedure:

1. To stop and reset the computer, flip the RESET/STOP switch at the computer console down and then up.
2. Set the panel switches to 175400_8.
3. Flip up the Deposit Accumulator 0 switch.
4. Set the panel switches to 061333_8.
5. Flip down the PR LOAD/EXEC switch.
6. Set the panel switches to 100033_8.
7. Flip up the PR LOAD switch.
8. Initialize RDOS and execute the command file that loads the station as described under step 3 of PROGRAM INITIALIZATION PROCEDURE

STATION SHUTDOWN PROCEDURE

Type END and press RETURN at the 455 display to terminate execution of the station program and return the Eclipse to off-line RDOS operation.

POWER OFF PROCEDURE

Use the following procedure to shut down the Eclipse computer system.

1. At the 1440 display screen, type CTRL and F concurrently to terminate the foreground program and type CTRL and A concurrently to terminate the background program and return control to CLI.
2. Type RELEASE DPO and press RETURN. Then wait for the message MASTER DEVICE RELEASED before continuing. This step releases all subdirectories.
3. Turn off the disk drive by pressing the POWER ON button.
4. Turn off displays and peripheral devices.

CAUTION

Do not turn off the disk controller before turning off the disk drive. Doing so could wipe out the pack.

5. When the disk has stopped rotating, turn off the disk controller by turning the key in the lower cabinet to the OFF position.
6. Turn off the Eclipse by turning the key on the computer console to OFF.
7. Turn off any other equipment special for the site (e.g., the air conditioning).

CONSOLE COMMANDS 3

When the station software is running on the Eclipse, the computer is on-line to the CRAY-1 as either a remote or on-site station. The TEC Model 455 Data Screen serves as the operator console for the station and provides for communication between the operator and the CRAY-1 CPU. The console (figure 3-1) consists of an alphanumeric keyboard and a cathode ray tube (CRT) display. The CRAY-1 operating system (COS) uses the display screen to bring information to the attention of the operator. The operator initiates communication with the CRAY-1 or responds to requests from the CRAY-1 by entering commands at the 455 keyboard.

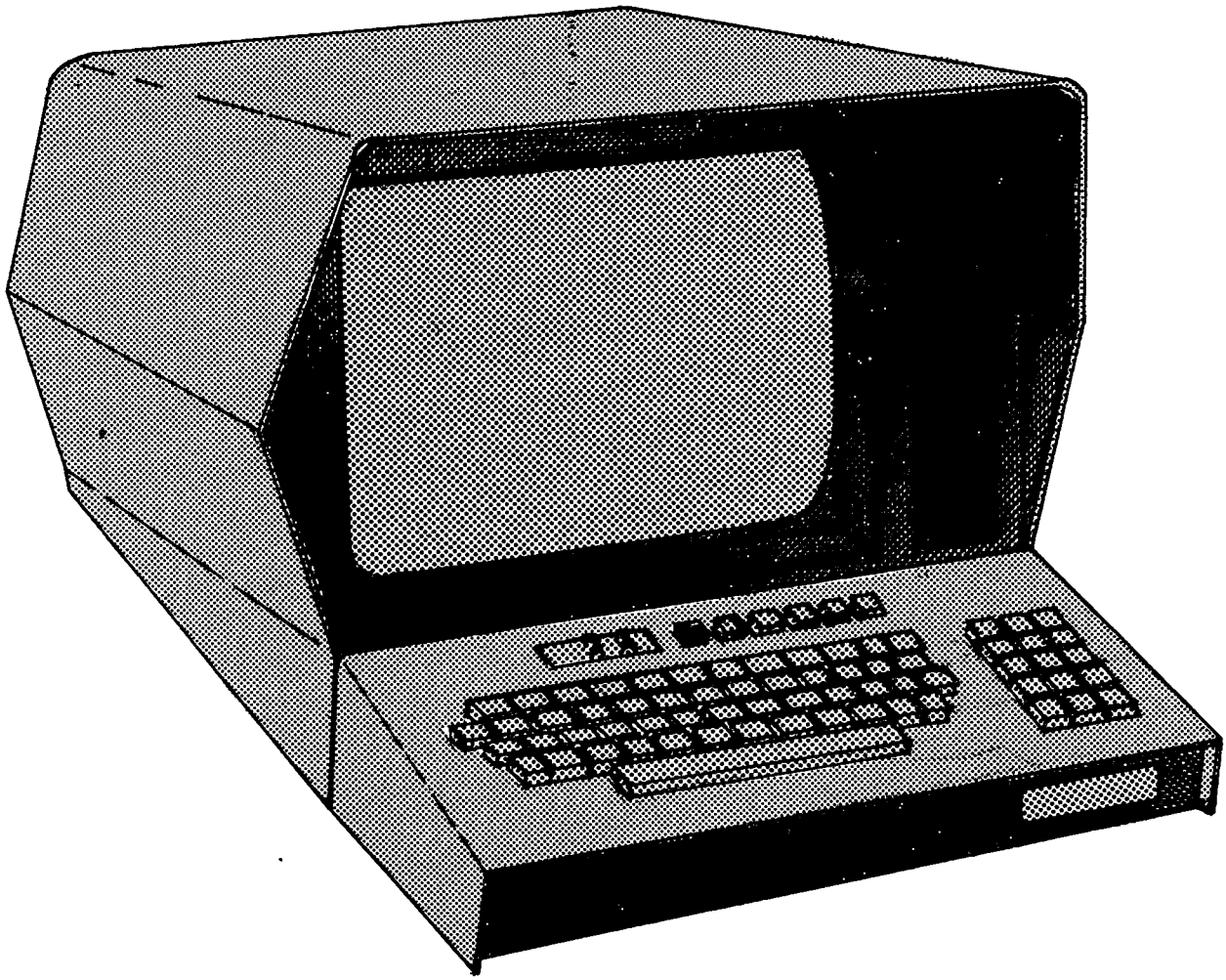


Figure 3-1. TEC Model 455 Station Console

STATION DISPLAY FORMAT

The station generates a 24-line display image (80 characters per line) on the screen (figure 3-2). The first line identifies the version of the station, the current date, and the time. The second line is used for hardware status messages described in appendix E.

The next 18 lines are used for displaying status information requested by the operator. Contents of this area are affected by a number of status commands described later in this section. A set of system debug displays available only to the system analyst is described in the CRAY-OS System Programmer's Handbook.

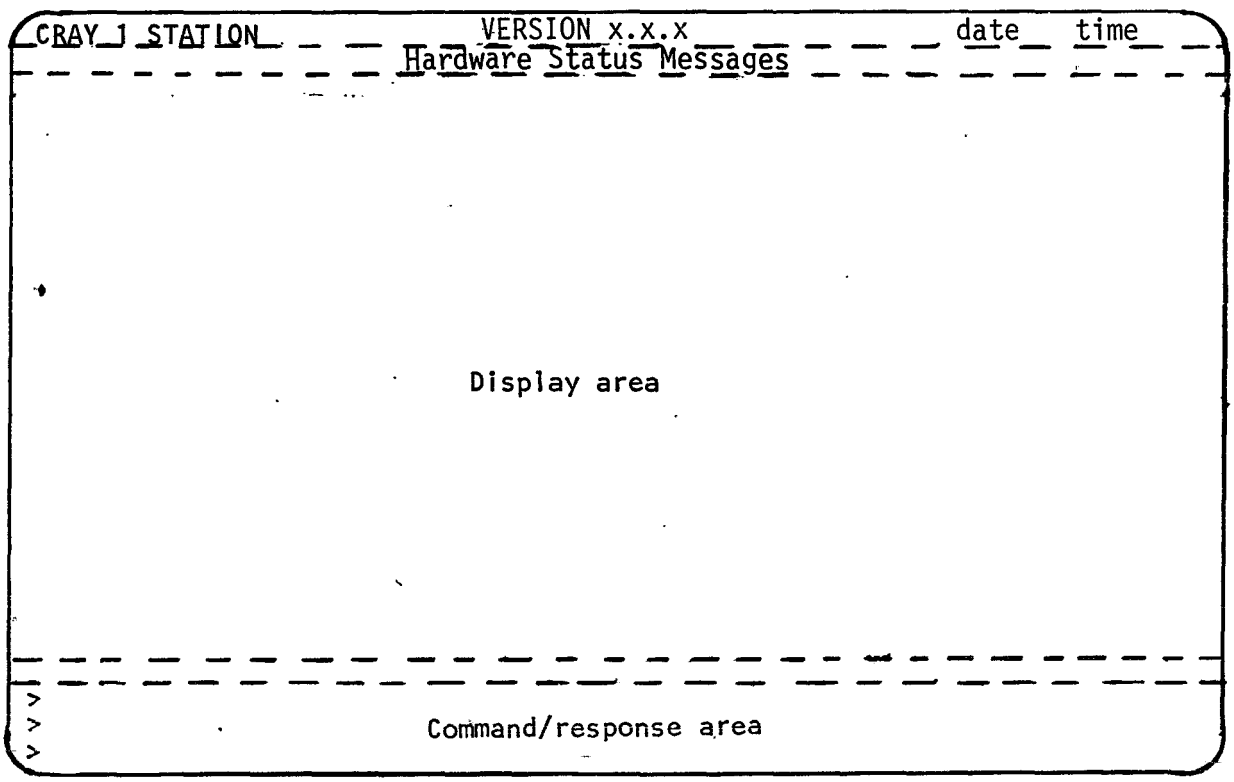


Figure 3-2. Station screen format

The fourth line from the bottom of the display is normally unused. The three bottom lines of the display are for command entry and response. Through the SCROLL command, this area can be expanded to encompass all but the top two lines. As each command is interpreted, it appears on the bottom line of the display. Entries are rolled up to the other lines and eventually disappear off the screen as responses and additional commands appear. The symbol > appears on the bottom line when the system is ready to process the next entry from the keyboard. A colon precedes each command processed from an indirect command file.

INDICATORS

Sixteen indicators form a vertical column to the right of the display screen. The station turns on these indicators under the conditions shown in figure 3-3.

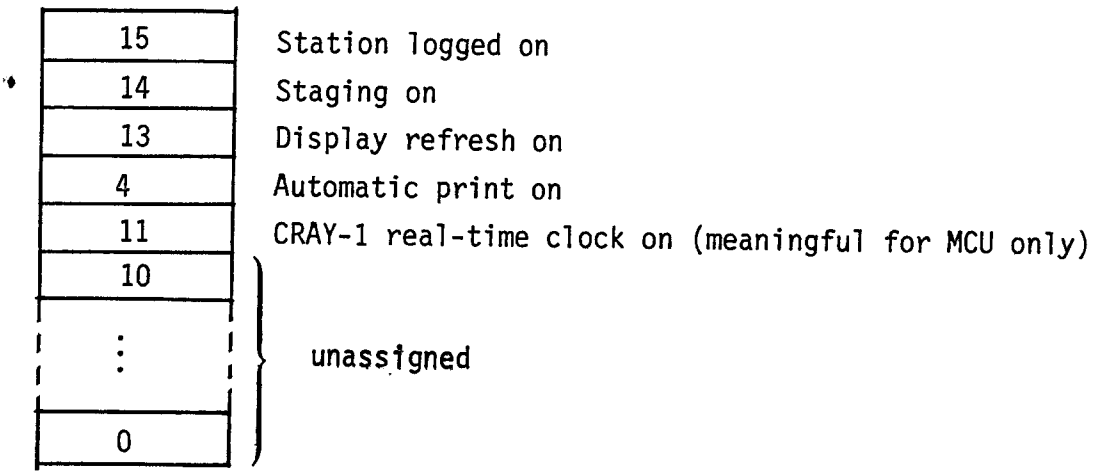


Figure 3-3. Display indicators

STATION KEYBOARD

The console keyboard (figure 3-4) provides coded signals to the station for transmittal to the CRAY-1 for processing. The operator controls station operation by entering station commands. The use of special keys is summarized in Table 3-1.

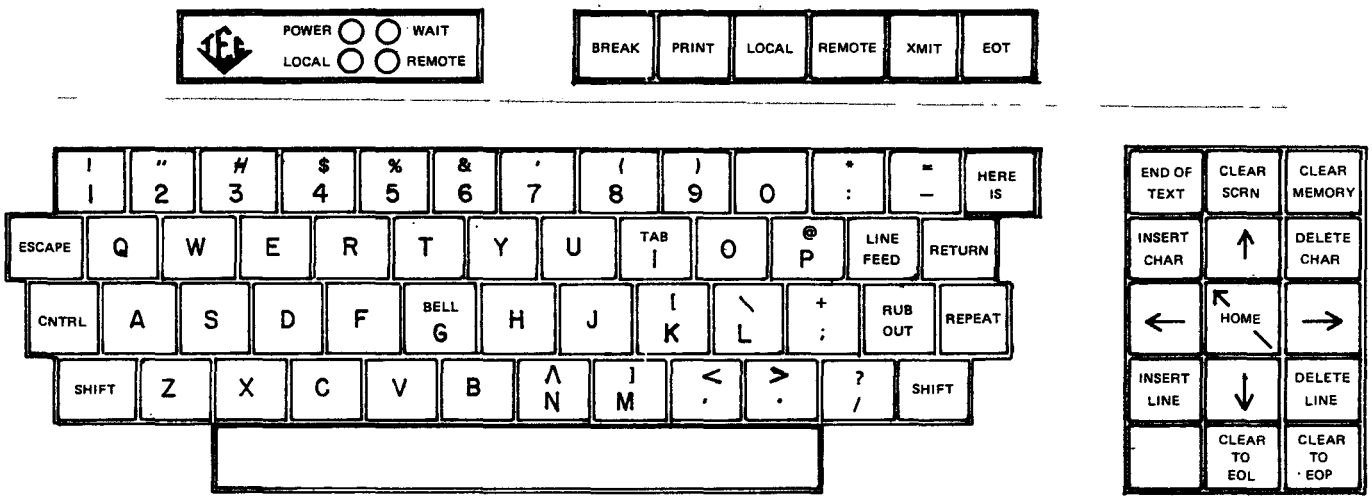


Figure 3-4. Console keyboard

Table 3-1. Use of special Keys

Key	Function
RETURN (↵)	Transmits the command.
RUBOUT	Backspaces and erases one character on the entry line.
\	(Shift and L keys) Deletes an entire line.
+ or >	Rolls STATUS or LINK display forward one frame.
- or <	Rolls STATUS or LINK display backward one frame.
CNTRL-A	Discards unprocessed keyboard input.

COMMAND ENTRY

Use the following procedure to enter a command at the 455 keyboard.

1. Type the command. As each character is typed, it is placed in a type-ahead buffer. This buffer stores up to 79 characters. A bell rings if the type-ahead buffer is full. In this case, wait until another command is processed and try again.
   The bell also rings if one of the special keyboard keys (other than RETURN, RUBOUT, and CNTRL-A) is pressed.
   To correct a typographical error, press RUBOUT once for each character to be deleted and re-entered.
   To delete an entire line, press \, that is, press SHIFT and L concurrently.
2. To terminate a command line (place it in the type-ahead buffer), press RETURN (indicated by ↵ in command descriptions).

When the station is ready to process the next command in the type-ahead buffer, it rolls the response/entry lines up and displays the current command on the bottom line.

To purge the type-ahead buffer of all unprocessed keyboard input, press CNTRL-A, that is, press CNTRL and A simultaneously. After the command in process is completed, an ! and the message CNTRL-A PAUSE are displayed. Control then returns to the console keyboard.

COMMAND SYNTAX

Commands described in this section have the following general form:

$$verb, p_1, p_2, \ldots, p_n \downarrow$$

verb This is a set of characters that uniquely identifies the command to the station. The entire command verb need not be typed. A minimum of three or enough characters to render the verb unique must be entered. These characters are shown underscored in the command descriptions.

p_i Requirements for parameters vary with each command. Details are given with the description of each command later in this section. The delimiter between parameters can be either one or more blanks, or a coma. A parameter having a default value can be omitted. The position of an omitted parameter must be indicated by the commas that would ordinarily delimit it.

For some parameters, a short form is allowed. In these cases, only the characters shown underscored need be entered to identify it to the station.

INDIRECT COMMAND FILES

This section describes how the operator can summon an RDOS file containing station commands to be processed.

To set up an indirect command file, the operator (under RDOS control, section 4) creates a file containing station commands. These may be in the form of punched cards copied to a mass storage file, for example.

To summon these commands for processing, the operator enters the command:

@*filename*@ ↵

where *filename* is the name of the RDOS file containing the commands.

The closing @ is optional.

The station begins processing commands at the beginning of the file. As each command is processed, it appears on the display preceded by a colon. When the end of the indirect file is reached, control returns to the console keyboard. This is signalled by > on the entry line.

If an error occurs, processing from the indirect command file halts. To resume processing with the next command, ignoring the error, the operator types ↵ (i.e., RETURN). Any other entry causes the system to terminate processing of commands from the indirect file and resume processing of commands from the keyboard.

A command file may itself contain a call to another indirect command file. Control passes to the new file and does not return to the file that issued the command.

NOTE

When the station is activated, the file $STAT.CM is executed as an indirect file if it exists.

A PAUSE command embedded in an indirect command file or a CNTRL-A at the keyboard causes processing of commands in the file to halt. The operator may then transfer command processing to the console by entering a command or may resume processing of commands in the indirect file by sending a null line (RETURN only).

Example of indirect command file contents:

File A1, summoned by the command @A1@ contains the following commands:

```
START
LOGON DG
SUBMIT JSYSDIR
DELAY 20
LIMIT 1
```

TYPES OF STATION COMMANDS

Station commands described in this publication are of five types:

MCU commands,
Batch entry commands,
Operator commands,
Display and status response commands, and
Communication commands.

These general classes of commands are briefly summarized in the following paragraphs, after which each command is described in detail.

MCU COMMANDS

When the Data General Eclipse is linked to the MCU channel of the CRAY-1 (either on-site or remotely through an on-site Eclipse), the operator can issue the commands summarized in table 3-2.

Table 3-2. MCU command summary

Command	Function
STARTUP	Begins CRAY-OS operation based on COS source file and parameter file.
DUMP	Dumps a selected portion of CRAY-1 memory to an Eclipse file. A STARTUP must follow this command.
INTERRUPT	Enables or disables CRAY-1 real time clock interrupts.
PARITY	Enables or disables CRAY-1 parity error scan.

If STARTUP is issued from a remote Eclipse, the files required for starting up the CRAY-1 must be on the on-site Eclipse disk.

Similarly, if the DUMP command is issued at a remote Eclipse, the information returned will reside on the on-site Eclipse disk.

The PARITY command enables or disables parity error scan at the on-site station or concentrator only.

BATCH ENTRY COMMANDS

Entry of batch jobs at the Eclipse station is provided through the commands summarized in table 3-3. General functions include station activation, staging control, and input/output control. In addition, there are a number of specialized commands.

Station activation commands

The station activation commands (LOGON and LOGOFF) turn on or turn off the communication link between the Eclipse and the CRAY-1. When the station is logged on, the operator can issue commands to be processed at the CRAY-1 rather than just at the Eclipse.

Staging control

Staging is the process of transferring jobs and data in the form of CRAY-1 datasets from the Eclipse disk to CRAY-1 mass storage or of transferring datasets from CRAY-1 mass storage to the Eclipse disk. When the Eclipse station is logged on and entries are present in either the station input staging queue or the CRAY-1 output staging queue, staging of datasets

Table 3-3. Batch entry command summary

Command	Function
Station activation	
LOGON	Establishes communications between the station and the CRAY-1.
LOGOFF	Terminates communications between the station and the CRAY-1
Staging control	
STAGE	Suspends or resumes staging of datasets between the CRAY-1 and the Eclipse.
QUEUE	Enters an Eclipse-resident file into the staging input queue for the CRAY-1.
SUBMIT	Queues a job dataset for staging to the CRAY-1.
SAVE	Queues a permanent dataset for staging to the CRAY-1.
Input/output control	
BLOCK†	Formats a dataset into CRAY-1 blocked format and queues the dataset for staging to the CRAY-1.
PRINT†	Enables or disables automatic printing of queued output datasets.
Miscellaneous control	
SNAP	Copies screen contents to a file or the printer.
PAUSE	Suspends indirect command file processing and allows operator to abort it or resume it.
END	Terminates station and returns control to RDOS.
DELAY	Suspends processing of a command for a specified time interval.
POLL	Sets the rate at which control messages are exchanged with the CRAY-1.
SET	Modifies the default value associated with a parameter.

† Deferred implementation

automatically begins. The operator can suspend staging through the STAGE OFF command and can subsequently resume staging through the STAGE ON command.

Names of files to be staged to the CRAY-1 are contained in the input queue file DPØ:$STAT.IQ. Each file created via the BLOCK command is assigned a filename with the format $STAT*nnn*.IF, where *nnn*=000 through 240. When a file has been staged to the CRAY-1, it is deleted unless it was queued by the QUEUE, SUBMIT, or SAVE command

The output queue file, DPØ:$STAT.OQ, contains names of files to be printed. Each file is assigned a filename with the format $STAT*nnn*.OF, where *nnn*= 000 through 240. After being printed, the file is deleted.

To delete $STAT.IQ or $STAT.OQ, the operator can use the RDOS DELETE command. This will clear the files from the input or output queue.

The operator may explicitly enter an existing file into the staging queue through the SAVE, QUEUE, or SUBMIT commands. Such a file must be already in CRAY-1 blocked format, possibly having been processed by the BLOCK program as an RDOS off-line function.

The normal method for entries to be made in the input staging queue, however, is through the BLOCK command, as described under Input/output control.

The CRAY-1 maintains the queue of datasets to be staged out to the Eclipse. The operating system makes an entry in this queue for the list output dataset for each job and for any permanent dataset routed to the Eclipse to be saved on the Eclipse disk. Datasets with the disposition code PR (print) are entered into the print queue. If the disposition code is not PR, the dataset is entered into an Eclipse file.

Input/output control

Through the BLOCK command, the operator can make entries in the input staging queue. The jobs entered are blocked into the CRAY-1 dataset format as determined by the station input directives (section 5) accompanying data in the deck. Directives also describe whether the dataset is a job input dataset or a staged permanent dataset. The resulting dataset is entered into the input staging queue at the Eclipse.

Table 3-3. Batch entry command summary

Command	Function
Station activation	
LOGON	Establishes communications between the station and the CRAY-1.
LOGOFF	Terminates communications between the station and the CRAY-1
Staging control	
STAGE	Suspends or resumes staging of datasets between the CRAY-1 and the Eclipse.
QUEUE	Enters an Eclipse-resident file into the staging input queue for the CRAY-1.
SUBMIT	Queues a job dataset for staging to the CRAY-1.
SAVE	Queues a permanent dataset for staging to the CRAY-1.
Input/output control	
BLOCK†	Formats a dataset into CRAY-1 blocked format and queues the dataset for staging to the CRAY-1.
PRINT†	Enables or disables automatic printing of queued output datasets.
Miscellaneous control	
SNAP	Copies screen contents to a file or the printer.
PAUSE	Suspends indirect command file processing and allows operator to abort it or resume it.
END	Terminates station and returns control to RDOS.
DELAY	Suspends processing of a command for a specified time interval.
POLL	Sets the rate at which control messages are exchanged with the CRAY-1.
SET	Modifies the default value associated with a parameter.

† Deferred implementation

automatically begins. The operator can suspend staging through the STAGE OFF command and can subsequently resume staging through the STAGE ON command.

Names of files to be staged to the CRAY-1 are contained in the input queue file DPØ:$STAT.IQ. Each file created via the BLOCK command is assigned a filename with the format $STAT*nnn*.IF, where *nnn*=000 through 240. When a file has been staged to the CRAY-1, it is deleted unless it was queued by the QUEUE, SUBMIT, or SAVE command

The output queue file, DPØ:$STAT.OQ, contains names of files to be printed. Each file is assigned a filename with the format $STAT*nnn*.OF, where *nnn*= 000 through 240. After being printed, the file is deleted.

To delete $STAT.IQ or $STAT.OQ, the operator can use the RDOS DELETE command. This will clear the files from the input or output queue.

The operator may explicitly enter an existing file into the staging queue through the SAVE, QUEUE, or SUBMIT commands. Such a file must be already in CRAY-1 blocked format, possibly having been processed by the BLOCK program as an RDOS off-line function.

The normal method for entries to be made in the input staging queue, however, is through the BLOCK command, as described under Input/output control.

The CRAY-1 maintains the queue of datasets to be staged out to the Eclipse. The operating system makes an entry in this queue for the list output dataset for each job and for any permanent dataset routed to the Eclipse to be saved on the Eclipse disk. Datasets with the disposition code PR (print) are entered into the print queue. If the disposition code is not PR, the dataset is entered into an Eclipse file.

Input/output control

Through the BLOCK command, the operator can make entries in the input staging queue. The jobs entered are blocked into the CRAY-1 dataset format as determined by the station input directives (section 5) accompanying data in the deck. Directives also describe whether the dataset is a job input dataset or a staged permanent dataset. The resulting dataset is entered into the input staging queue at the Eclipse.

As an alternative to using the BLOCK command, the operator may take a job deck or a data deck that has been arranged according to the requirements of the BLOCK program (section 4) and as an off-line RDOS operation, execute the BLOCK program. This program blocks the input into CRAY-1 dataset format but does not make an entry in the input staging queue. The operator must issue a SAVE, QUEUE, or SUBMIT command to cause the dataset to be staged.

The operator can initiate automatic operation of the printer/plotter through the PRINT command. This means that all datasets staged to the Eclipse that have a disposition code of PR (print) are automatically printed. Automatic operation of the printer/plotter can be suspended through the PRINT,OFF command and resumed through the PRINT,ON command. The station need not be logged on for this automatic printer/plotter operation to occur. When execution of the Eclipse station begins, automatic operation of the printer/plotter is not in effect.

As an alternative to automatic operation of the printer, the operator may, as an off-line RDOS operation, print files on the Eclipse disk using the OUT program (section 4). The OUT program deblocks and prints one file at a time.

Miscellaneous control

The operator is able to record screen contents through the SNAP command. This is useful for providing hard documentation of a problem. For example, the operator may elect to SNAP a status display.

The PAUSE command may be embedded in an indirect command file. When it is encountered, control switches to the keyboard where the operator may either terminate indirect processing or cause it to resume.

Processing of the next command entered by the operator or from the command file in which it may be embedded can be delayed through the DELAY command. For example, a DELAY command issued between STATUS and STORAGE commands would allow the STATUS display to be viewed for a period of time before the STORAGE display is initiated. Similarly, issuing

a DELAY 60 command between STARTUP and LOGON would cause the CRAY-1 to run one minute before the LOGON takes effect.

The END command terminates execution of the station and returns control to RDOS for off-line operation of the Eclipse. Step 3d of Program Initialization (section 2) must be followed to re-initialize the station.

If no staging is in progress, the POLL command determines the rate at which messages are exchanged with the CRAY-1.

The SET command is used to modify the default value associated with a parameter.

OPERATOR STATION COMMANDS

The operator station commands, summarized in table 3-4, provide for controlling jobs, mass storage, the link, and channels.

Job control

A job is the unit of work described for the CRAY-OS Operating System. A job enters the system via a station (perhaps as a card deck) and is staged to the CRAY-1 as a job input dataset and is scheduled for processing. A job input dataset begins with a set of control statements defining the characteristics of the job and specific steps the operating system is to take while processing the job. Section 5 describes station requirements for a job input dataset. Job control statements are described in detail in the CRAY-OS Version 1.0 Reference Manual, CRI pub. no. 2240011. However, it is important for the operator to know that the first control statement is a JOB statement that provides the name of the job and possibly the CRAY-1 processing time limit and memory field size. Accompanying the control statements for the job may be one or more files of data such as source language decks and data to be processed. These or other types of data needed by a job may alternatively reside permanently on CRAY-1 mass storage rather than accompanying the job or may be staged from the Eclipse to the CRAY-1 independent of the job.

Table 3-4. Operator station command summary

Command	Function
Job control	
LIMIT	Sets maximum number of jobs that CRAY-1 can process at one time.
DROP	Ends processing of job at CRAY-1 immediately but does not delete output datasets.
KILL	Ends processing of job at CRAY-1 immediately and/or deletes output datasets.
RERUN	Ends processing of job at CRAY-1 immediately and attempts to rerun the job.
SUSPEND	Suspends processing of a job.
RESUME	Resumes processing of a suspended job.
ENTER	Assigns a new time limit or priority to a job (or its output dataset) or changes the ID for the station at which the job originated or to which its output dataset is to be sent.
MESSAGE	Enters message into a job logfile, the system logfile or both.
SWITCH†	Sets or alters a job sense switch.
Link control	
ROUTE	Changes the station ID for all jobs and output datasets having a specific ID to a new ID.
OPERATOR	Changes the ID of the operator station.
STREAM	Changes the input, output, and active stream counts for the specified station.
DISCONNECT†	Logs off the specified front-end if it is logged on.
Channel control	
CHANNEL	Turns CRAY-1 channel on or off.
Mass storage control	
DEVICE†	Sets or clears read-only mode for CRAY-1 mass storage device.

† Deferred implementation

Control of jobs includes:

- Setting the maximum number of jobs that can be multiprogrammed (LIMIT),
- Terminating (KILL or DROP), suspending (SUSPEND), rerunning (RERUN), or resuming (RESUME) processing of specific jobs,
- Altering the characteristics of a job (ENTER) such as its time limit, priority, and job identifier,
- Setting or clearing job sense switches (SWITCH), and
- Entering messages into the job logfile, the system logfile, or both (MESSAGE).

When using job control commands, the operator identifies a job by its Job Sequence Number (JSQ). Job sequence numbers are shown in the job queue status display available through use of the STATUS display command.

Link control

Link control commands, ROUTE, OPERATOR, and DISCONNECT, allow system operator control of links for other front-end systems as well as of its own link.

Through the ROUTE command, the operator can reroute datasets intended for disposition at one station to another station.

The operator can control the identity of the operator station, itself, through the OPERATOR command.

Any front-end that has been logged-on can be logged-off by the operator through the DISCONNECT command.

The STREAM command is available to the system and local operator stations. The operator can change the activity on the link by changing the total number of input streams and output streams defined for a link and by changing the number of streams that can be active at one time. Here, the term "stream" refers to the flow of the pieces of information comprising a dataset being staged. When a station is installed (Refer to the CRAY-OS System Programmer's Handbook), the number of input streams and output streams is defined for the station. The link control commands allow the operator to change this number but not go above it at any time.

The input stream count defines the maximum number of datasets that can be staged in at any one time. The output stream count defines the maximum number of datasets that can be staged out at any one time. The active stream count defines the maximum number of datasets that can be handled at one time on the link and includes both directions of data flow. Thus, for example, if two input streams, one output stream, and three active streams are defined, staging in occurs with two datasets interleaved and staging out occurs one dataset at a time. However, if three input streams, two output streams, and three active streams are defined, the station can stage a maximum of three datasets at a time. This may be three input streams with no output stream, two input streams and one output stream, or one or no input stream and two output streams. Link control status information is available through the LINK command.

Channel control

CRAY-1 channels connected to mass storage devices and to front-end systems can be enabled and disabled through the CHANNEL command. Channels are defined as pairs (one input channel and one output channel) numbered from 1 to 12 (decimal). The operator should consult a system analyst for specific channel assignments.

Mass storage control

Mass storage devices at the CRAY-1 come under system operator station control and can be enabled or disabled through the DEVICE command. Consult a system analyst for specific information concerning device identifiers.

DISPLAY AND STATUS RESPONSE COMMANDS

The commands summarized in table 3-5 return to the operator status information about jobs, datasets, and the link. Information to be displayed on the screen is updated at a rate determined by the REFRESH command.

Table 3-5. Display and status response command summary

Command	Function
CLEAR	Clears display area of screen.
COMMENT	Inserts comment in command stream.
SCROLL	Causes entire display area to be used as command/response area.
~~REFRESH~~	~~Sets display refresh rate.~~
JOB	Displays status of a specific job.
STATUS	Displays status of all jobs in job input queue and all datasets in output staging queue.
DATASET	Responds with status of specific dataset.
LINK	Displays status of station link.
STATION	Displays status of station.
STORAGE	Displays status of mass storage devices.

A SCROLL command is provided so that the operator can monitor the command entries and responses on all but the top two lines and the bottom three lines of the display screen. This display mode is the default when the station is initialized. The CLEAR command allows the entire display area to be cleared.

COMMENT does nothing but copy the command to the display area. It allows the operator to insert documentation in the command stream. This is useful for documenting an indirect file or the SNAP of a display.

COMMUNICATION COMMANDS

Communication commands are applicable only when an Eclipse is serving as a concentrator or a remote station. Table 3-6 summarizes the commands available.

The LINE command enables or disables a communications link. To enable communication between the concentrator and a remote station, the link must be activated via a LINE ON command at the concentrator. The link

at the remote station may be activated explicitly by the LINE ON command or implicitly by the DELETE, DUMP, INTERRUPT, LOGON, RECEIVE, STARTUP, and TRANSMIT commands.

Table 3-6. Communication command summary

Command	Function
LINE	Turn remote link for specific station on or off.
TRANSMIT†	Send file to concentrator.
RECEIVE†	Receive file from concentrator.
DELETE	Delete a file from the concentrator disk.

TRANSMIT and RECEIVE are entered at a remote station. TRANSMIT sends a file from the remote station to the concentrator. Conversely, RECEIVE transfers a file from the concentrator to the remote station.

NOTE

Except for file length, the characteristics of the source file (the file type and file attributes) are not conveyed to the destination file. The destination file is created as a random file and no attributes are assigned to the file

To retain the file type (e.g. contiguous) or file attributes (e.g. save file):

1. Use the DUMP utility to create an intermediate file from the source file,
2. Transfer the intermediate file to the concentrator or remote station, and
3. Use the LOAD utility to create the destination file.

The intermediate file created by the DUMP can contain more than one source file.

For example, to send FILE1 and FILE2 to the concentrator retaining their file characteristics, the following sequence of commands could be used.

† Deferred implimentation

1. Under RDOS at the remote station, create the intermediate file IFILE:

   DUMP/V IFILE FILE1 FILE2

2. Use the remote station to send the file to the concentrator:

   TRANSMIT IFILE

3. Under RDOS at the concentrator, create the destination files:

   LOAD/V/R IFILE

This creates files FILE1 and FILE2 whose characteristics are the same as those of the source files at the remote station.

DELETE is entered at a remote station only. The DELETE command deletes a file from the concentrator disk.

COMMAND DESCRIPTIONS

The remainder of this section contains a detailed description of each command. Command descriptions are in alphabetical order according to verb.

COMMAND FORMATS

UPPER CASE	Identifies the command verb or literal parameter.
UNDERLINED UPPER CASE	Specifies the minimum number of characters required for the verb or parameter to be recognized.
Italics	Define generic terms which represent the words or symbols to be supplied by the user.
[ ] Brackets	Enclose optional portions of a command format.
{ } Braces	Enclose two or more literal parameters when only one of the parameters must be used.
↓ Arrow	Indicates the RETURN key.

BLOCK - FORMAT AND QUEUE DATASET†

FUNCTION: Formats a job or permanent dataset and queues it for staging to the CRAY-1.

See section 5 for a description of blocking directives and the source file layout. The dataset created has the name $STATnnn.IF (nnn=000-240) and is deleted after the dataset has been staged to the CRAY-1.

FORMAT: BLOCK,*file*

file - Name of file containing directives and data

TYPE: Input/output control

PREREQUISITES: None

†Deferred implementation

CHANNEL - TURN CHANNEL ON OR OFF

FUNCTION: Turns the specified channel pair on or off.

FORMAT: CHANNEL,*channel*, {ON / OFF} ↵

channel Number of channel pair; odd decimal number in the range 1 through 12. Consult a system analyst for specific channel assignments.

ON Turns on channel pair

OFF Turns off channel pair

TYPE: Operator station; channel control subtype.

PREREQUISITES: Eclipse is a system operator station and is logged on.

CLEAR - CLEAR SCREEN

FUNCTION: Clears status display area of screen.

FORMAT: CLEAR ↵

TYPE: Display and status response

PREREQUISITES: None

COMMENT - COMMAND STREAM COMMENT

FUNCTION: Provides documentation of the command stream; usually used prior to a SNAP command or to document an indirect file.

FORMAT: COMMENT [,*text*]

text Arbitrary character string

TYPE: Display and status response

PREREQUISITES: None

DATASET - DISPLAY DATASET STATUS

FUNCTION: Returns one of the following dataset status messages in the command/response area:

COS DATASET *dsn* WITH ID = *id* AND ED = *ed* DOES EXIST

COS DATASET *dsn* WITH ID = *id* AND ED = *ed* DOES NOT EXIST

FORMAT: DATASET,*pdn* [,*userid*] [,*ed*] ↵

pdn Permanent dataset name of dataset for which status is requested; 1-15 characters (A-Z, 0-9, or $ % or @). Of these, only the numeric characters cannot be used for the first character.

userid User ID of permanent dataset for which status is requested; 1-8 alphanumeric characters. If not specified, null is used.

ed Edition number of requested dataset; 1-4095. If *ed* is not specified, the status of the latest edition is returned. If *ed* is nonzero, the status of the requested edition is returned.

TYPE: Display and status response

PREREQUISITES: Eclipse station logged on

DELAY - SUSPEND COMMAND PROCESSING

FUNCTION: Suspends command processing for the time interval specified.

FORMAT: DELAY,*sec*)

sec Number of seconds (1-60) by which processing of the next command is delayed.

TYPE: Batch entry; miscellaneous subtype

PREREQUISITES: None

DELETE - DELETE CONCENTRATOR FILE

FUNCTION: Deletes a file from the concentrator disk. The line initialization is implicit in the command.

FORMAT: DELETE,*file*

file Name of the file to be deleted.

TYPE: Communications

PREREQUISITES: Remote station only

DEVICE - RENDER MASS STORAGE DEVICE AVAILABLE OR UNAVAILABLE†

FUNCTION: Sets or clears read-only status for a mass storage device.

FORMAT: DEVICE,*device*,{ON / OFF} ↓

device Name of device; 1 to 8 characters. Consult a system analyst for specific device names.

ON Makes mass storage device allocatable

OFF Makes mass storage device unallocatable

TYPE: Operator station; mass storage control subtype

PREREQUISITES: Eclipse is a system operator station and is logged on.

† Deferred implementation

DISCONNECT - LOG OFF FRONT END[†]

FUNCTION: Logs off the specified front end if it is logged on.

FORMAT: DISCONNECT, *id*

id Two-character alphanumeric identifier of front-end to be logged off

TYPE: Operator station; link control subtype

PREREQUISITES: Eclipse is a system operator station and is logged on.

[†]Deferred implementation

DROP - DROP JOB

FUNCTION: Ends processing of job at CRAY-1 but saves output dataset associated with the job. DROP causes processing of EXIT statements that may be in the job deck.

FORMAT: DROP,*jsq*

jsq Job sequence number by which job or dataset is identified. The *jsq* ordinal for the job can be obtained through the STATUS command.

TYPE: Operator station; job control subtype

PREREQUISITES: Eclipse is operator station and is logged on

DUMP - CRAY-1 DEAD DUMP

FUNCTION: Dumps CRAY-1 memory to the Eclipse file specified. After the dump, the CRAY-1 must be restarted with STARTUP.

FORMAT: DUMP,*file*,*fwa*,*lwa* ↵

file	File on on-site Eclipse to receive the memory area.
fwa	Absolute octal address of first word to be dumped; 0-3777777
lwa	Absolute octal address of last word to be dumped; 0-3777777≥*fwa*. Since memory is written in 64-word blocks, the last word address will be raised to the next multiple of 64 and up to 63 extra words may be dumped.

TYPE: MCU

PREREQUISITES: Eclipse is connected to CRAY-1 MCU channel directly or through an on-site Eclipse

EXAMPLE:

```
DUMP,DDUMP,0,1000 ↵
DUMP,DUMPY,50000,60000 ↵
STARTUP ↵
```

The above sequence dumps the contents of CRAY-1 memory from 0 to 1000 and 50,000 to 60,000 (absolute octal addresses) and restarts the CRAY-1.

END - END STATION OPERATION

FUNCTION: Terminates operation of the station and returns to RDOS. The station is logged off if it was logged on.

Files being staged to the CRAY-1 are placed back on the input queue. File transfers from the CRAY-1 are postponed.

FORMAT: END ↵

~~TYPE:~~ ~~Batch entry, miscellaneous subtype~~

PREREQUISITES: None

ENTER - ENTER JOB PARAMETERS

FUNCTION: Changes a job parameter.

FORMAT: ENTER,*jsq*,{TIME,*tl* / PRIORITY,*pri* / ID,*id*[,*tid*]} ↵

jsq Job sequence number by which job is identifier in CRAY-OS system. The JSQ of a job can be obtained through the STATUS command.

TIME New time limit to be assigned to the job; 0-16777215. The time limit is a decimal count of the maximum number of seconds the job will be allowed to execute on the CPU.

PRIORITY Assigns a new priority

pri New priority; decimal in the range 0-15

ID Changes station and, optionally the terminal ID, for the job or output dataset.

id New station ID; 2 alphanumeric characters.

tid New terminal ID; 1-8 alphanumeric characters. If *tid* is not specified, null is entered as the new terminal ID.

TYPE: Operator station; job control subtype

PREREQUISITES: Eclipse is a system operator station is logged on.

EXAMPLES: ENTER,10,TIME,10 ↵

The job having the JSQ of 10 will be allowed to execute a maximum of 10 seconds.

ENTER,12,PRI,5 ↵

The priority for the job having the JSQ of 12 is changed to 5.

INTERRUPT - ENABLE/DISABLE REAL-TIME CLOCK INTERRUPT

FUNCTION: Enables or disables CRAY-1 real-time clock interrupts.

FORMAT: INTERRUPT [,ON / ,OFF] [,*interval*]

ON — Enables CRAY-1 real-time clock interrupts; default.

OFF — Disables CRAY-1 real-time clock interrupts.

interval — Interval between interrupts in hundreths of a second (1 - 6000). If *interval* is not specified, the previously defined rate is used. *Interval* is initially set to 100.

TYPE: MCU

PREREQUISITES: None

JOB -- DISPLAY JOB STATUS

FUNCTION: Returns job status message in command response area.

FORMAT: JOB, *jobname* [,*jsq*] ↓

jobname Name of job for which status is requested; 1 to 7 alphanumeric characters, the first of which must be alphabetic (A-Z).

jsq Job sequence number by which job is identified in CRAY-OS system. The JSQ of a job can be obtained through the STATUS command.

TYPE: Display and status response

PREREQUISITES: Eclipse is logged on.

The job status message returned by this command has the following general form:

COS JOB *jobname* *(job status)*
(last logfile message)

where job status reports one of the following conditions:

AWAITING CPU
AWAITING MEMORY
DOES NOT EXIST
DORMANT
EXECUTING
QUEUED FOR EXEC
ROLLED OUT
ROLLING IN
ROLLING OUT
SUSPENDED
WAITING FOR I/O

The last logfile message is displayed unless the job status is DOES NOT EXIST or QUEUED FOR EXEC.

KILL - KILL JOB

FUNCTION: Depending on the status of the job, either deletes its input dataset from the input queue if processing has not yet begun, terminates processing if processing has begun, or deletes the job's output dataset from the output queue if processing has completed. KILL (unlike DROP) does not cause processing of EXIT control statements that may be in the job deck.

FORMAT: KILL, *jsq*)

jsq Job sequence number by which job or its output dataset is identified. The JSQ for the job can be obtained through the STATUS command.

TYPE: Operator station; job control subtype

PREREQUISITES: Eclipse is operator station and is logged on

LIMIT - LIMIT NUMBER OF JOBS ACTIVE

FUNCTION: Sets maximum number of jobs that CRAY-1 may process at one time. If the number of jobs is being reduced, jobs currently in process are allowed to finish.

FORMAT: LIMIT,*n* ↵

n Number of jobs that can be active (multiprogrammed) at CRAY-1. If *n* is one, jobs are monoprogrammed. The maximum allowed for *n* is 63.

TYPE: Operator station, job control subtype.

PREREQUISITES: Eclipse is a system operator station and is logged on.

ERRORS: None

EXAMPLE: LIMIT,5 ↵

No more than 5 jobs can be processed concurrently.

LINE - ACTIVATE OR DEACTIVATE REMOTE STATION LINK

FUNCTION: Activates or deactivates link to remote station. Note that the LINE ON function at the remote station is implicit in the communications commands as well as the DUMP, INTERRUPT, LOGON, and STARTUP commands.

FORMAT: LINE, {ON / OFF} [,*number*]

ON	Turns on link
OFF	Turns off link
number	Number of line to activate or deactivate. Consult system analyst for the communication configuration. If *number* is not specified, 1 is used.

TYPE: Communications

PREREQUISITES: None

LINK - LINK STATUS DISPLAY

FUNCTION: Provides operator with the following information:

- Station ID.
- Queue count, that is, the number of datasets at CRAY-1 to be staged to the Eclipse.
- Number of active input streams.
- Number of active output streams.
- Maximum number of input streams at LOGON.
- Maximum number of output streams at LOGON.
- Maximum number of active streams at LOGON.
- The number of subsegments associated with the message.
- The subsegment size measured in 64-bit words.
- Channel number.

A frame count in the upper right of the display tells the operator which frame of status information is being displayed. Frames are numbered from 0 to 99, modulo 100.

If the command is issued at the system operator station, information is provided for all station links. If the station at which the command is entered is not the system operator station, only information for the link for that station is provided.

FORMAT: LINK ↵

No parameters.

TYPE: Display and status response

PREREQUISITES: Eclipse is logged on

EXAMPLE: LINK ↵

```
LINK STATUS DISPLAY                              FRAME 0

    QUEUE  ACTIVE  MAXIMUMS    SUBSEGMENT
ID  COUNT   I  O   I  O  AC     #    SIZE  CH
--  -----  -  -   -  -  --     --   ----  --
DG     11  0  1   1  1   1     1     64   2
              END OF DATA
```

LOGOFF - LOG OFF STATION

FUNCTION: Terminates communications between the station and the CRAY-1.

FORMAT: LOGOFF)

TYPE: Batch entry; station activation subtype.

PREREQUTSITES: Eclipse is logged on.

LOGON - LOG ON STATION

FUNCTION: Establishes communications between the station and the CRAY-1. LOGON sets the number of streams allowed and the number of active streams as determined by an assembly option.

If the ID and TID of the station logging on is that for the System Operator Station, commands privileged to the System Operator Station are enabled for the logged on station.

FORMAT: LOGON[,*id*][,*tid*]

id Two alphanumeric character identifier used by the CRAY-1 to associate messages and data with this station. If not specified, DG or the value last specified in the SET command is used. Logging on a second station with the same ID on the same channel causes the previously logged on station to be logged off with no notification to the logged off station.

tid Optional terminal ID, 1-8 alphanumeric characters. If not specified, OPERATOR or the value last specified in the SET command is used.

TYPE: Batch entry; station activation subtype

PREREQUISITES: None

MESSAGE - ENTER MESSAGE INTO LOGFILE

FUNCTION: Enter a message into a job logfile, the system logfile, or both

FORMAT:

MESSAGE, { JOB,*jobname*,*jsq* / BOTH,*jobname*,*jsq* / SYSTEM } ,*message*

JOB	Enter message into the job logfile
BOTH	Enter message into the job logfile and the system logfile
SYSTEM	Enter message into the system logfile
jobname	Name of job; 1-7 alphanumeric characters, the first of which must be alphabetic (A-Z).
jsq	Job sequence number by which the job is identified. The JSQ for the job can be obtained through the STATUS display
message	Character string to be entered into the logfile. The message will be truncated to 79 characters if necessary.

TYPE: Operator station; job control subtype

PREREQUISITES: Eclipse is operator station and is logged on.

OPERATOR - CHANGE OPERATOR STATION

FUNCTION: Changes operator station from currently designated station (at which this command is entered) to some other front-end system. The newly designated operator station is identified by front-end ID and terminal ID.

The system is assembled with the front-end system identified as the operator station having an ID of "DG" and a TID of "OPERATOR".

FORMAT: OPERATOR,*nid*,*tid* ↵

nid 2-alphanumeric character ID of front-end system to become operator station.

tid ID of terminal at front-end system (1-8 alphanumeric characters)

Consult a system analyst for front-end IDs.

TYPE: Operator station; link control subtype

PREREQUISITES: Eclipse is a system operator station and is logged on.

EXAMPLE: OPERATOR,CD,T3 ↵

The new operator station is terminal T3 of front-end CD.

PARITY - MONITOR CRAY-1 PARITY ERRORS

FUNCTION: Enables or disables CRAY-1 parity error scan. Parity error information is displayed on the second line of the display screen. See appendix E for the display format and field descriptions. When parity error scanning is enabled, the station tests for errors at one or two second intervals. If CRAY-1 parity errors are occurring more frequently, the station will detect only a sampling of the errors.

FORMAT: PARITY, { FIRST / SCAN / OFF }

FIRST	Enables parity error monitoring. Monitoring terminates after the first CRAY-1 parity error is detected.
SCAN	Enables parity error monitoring. Parity error monitoring does not terminate when a parity error is detected. The parity error display is updated to contain information on the most recent error.
OFF	Disables parity error monitoring.

TYPE: MCU

PREREQUISITES: On-site station or concentrator only

PAUSE - INDIRECT COMMAND FILE PAUSE

FUNCTION: Suspends interpretation of commands from indirect file and allows operator to terminate processing from the indirect file (by entering a command) or to resume processing from the indirect file by entering a null command (RETURN only).

FORMAT: PAUSE

TYPE: Batch entry; miscellaneous subtype

PREREQUISITES: None

POLL - SET CONTROL MESSAGE EXCHANGE RATE

FUNCTION: Sets rate at which CONTROL messages are exchanged with the CRAY-1.

FORMAT: POLL,*sec*)

sec Interval between CONTROL messages (1-60 seconds)

TYPE: Batch entry; miscellaneous subtype

PREREQUISITES: None

PRINT - ENABLE/DISABLE PRINTING †

FUNCTION: Enables or disables automatic printing of queued output datasets. The station need not be logged on.

FORMAT: PRINT[,ON/OFF]↓

ON Enables automatic printing (default)

OFF Disables automatic printing

TYPE: Batch entry; input/output control subtype

PREREQUISITES: Printer must not be in use by the program sharing the Eclipse and executing in the other program area (i.e., the background or foreground). If the printer is in use, results of this command are unpredictable.

† Deferred implementation

QUEUE - QUEUE INPUT DATASETS

FUNCTION: Enters named Eclipse file into staging queue to be sent to CRAY-1 as job dataset or permanent dataset.

FORMAT: QUEUE, *filename*, *crayname*, {IN / ST}

filename Name of file to be staged. This file must be resident on the Eclipse disk at which the command is issued. The file must be a random or contiguous file. See BLOCK program description to create file.

crayname If type is IN, this is the originating job name and is 1 to 7 alphanumeric characters, the first of which must be alphabetic (A-Z).

If type is ST, this is the permanent dataset name and can be 1 to 15 characters (A-Z, 0-9, or $ % or @). Of these, only the numeric characters cannot be used for the first character.

ST File is to reside on CRAY-1 mass storage as staged permanent dataset.

IN File is to reside on CRAY-1 mass storage as job input dataset.

TYPE: Batch entry; staging control subtype

PREREQUISITES: None.

RECEIVE - RECEIVE FILE FROM CONCENTRATOR†

FUNCTION: Transfers specified file from the concentrator to the remote station. See Section 3 for restrictions.

FORMAT: RECEIVE,*cfile* [,*rfile*]

cfile Name of the concentrator file which is to be transferred to the remote station.

rfile Name to be assigned to the file at the remote station. If not specified, *cfile* is assumed.

TYPE: Communications

PREREQUISITES: Remote station only

† Deferred implimentation

REFRESH – SET DISPLAY REFRESH RATE

FUNCTION: Sets the interval between display refreshes.

FORMAT:

ON Enables display refresh; default is on.

OFF Disables display refresh.

rate Specifies refresh interval in seconds (1-60). If *rate* is not specified, the rate previously in effect is assumed.

TYPE: Display and status response

PREREQUISITES: None

RERUN - RERUN JOB

FUNCTION: Immediately ends processing of job identified by its SDT entry, without processing of EXIT statements that may be in the job deck. The job input dataset at the CRAY-1 is saved and all output datasets associated with the job are deleted. The job input dataset is then rescheduled so that the job can be rerun. No action is taken if the job has already completed execution.

FORMAT: RERUN,*jsq* ↵

jsq Job sequence number by which job or its output datasets are identified. The JSQ for a job can be obtained through the STATUS command.

TYPE: Operator station; job control subtype

PREREQUISITES: Eclipse is operator station and is logged on

RESUME - RESUME JOB PROCESSING

FUNCTION: Reschedules a suspended job for processing. The job may have been suspended by a SUSPEND command.

FORMAT: RESUME,*jsq* ↵

jsq Job sequence number by which the job is identified. The JSQ ordinal for a job can be ascertained through the STATUS command.

TYPE: Operator station; job control subtype

PREREQUISITES: Eclipse is a system operator station and is logged on.

ROUTE - CHANGE FRONT-END ID

FUNCTION: Changes the source ID of jobs or the destination ID of output datasets that match the old ID. In other words, this command reroutes job output. Consult a system analyst for front-end system IDs.

FORMAT: ROUTE,*oid*,*nid* ↵

oid — ID (two alphanumeric characters) of front-end system from which job originated and to which output datasets were to be sent.

nid — ID (two alphanumeric characters) of front-end system to which output datasets are to be sent and with which jobs will be identified.

TYPE: Operator station; link control subtype

PREREQUISITES: Eclipse is a system operator station and is logged on. Front-end systems for which routing is changing need not be logged on.

EXAMPLE: ROUTE,DG,GD ↵

All jobs that originated at the front-end system identified as DG and all of their output datasets are rerouted to the front-end system having the ID of CD.

SAVE - QUEUE PERMANENT DATASET

FUNCTION: Queues on the Eclipse file for staging to the CRAY-1. At the CRAY-1, the file will be made a permanent dataset.

FORMAT: SAVE,*filename* [,*dataset*] [,*pars*] ↓

filename Name of the file to be staged. The file must be a random or contiguous file. See the BLOCK program description to create the file.

dataset Name to be assigned to the permanent dataset at the CRAY-1; 1-15 alphanumeric characters (A-Z, 0-9, $, %, or @). Of these, only the numeric characters cannot be used for the first character. If not specified, *filename* is used as the dataset name.

pars Any combination of the following keyword-value pairs (if a keyword is repeated, the last value entered is used):

EDITION,*number*

number Edition number; 0-4095. If zero, a default edition number is assigned by the CRAY-1. If non-zero and a dataset with the specified edition number already exists, the dataset transfer will be canceled.

ID,*userid*

userid User identification; 1-8 alphanumeric characters

MAINTENANCE,*pcw*

pcw Maintenance permission control word; 1-8 alphanumeric characters

PERIOD,*days*

days Retention period in days; 0-4095

READ,*pcw*

pcw Read permission control word; 1-8 alphanumeric characters

USER,*userno*

userno User number; 1-8 alphanumeric characters

WRITE,*pcw*

pcw Write permission control word; 1-8 alphanumeric characters

TYPE: Batch entry; staging control subtype

PREREQUISITES: None

SCROLL - USE DISPLAY FOR COMMAND/RESPONSE SCROLL AREA

FUNCTION: Changes the entire display area (except for the two-line header) to a command/response area. Commands and responses are rolled up to the second line of the display in a scroll-like fashion before disappearing from the screen. This mode is in effect when the station begins execution and is cleared by issuing any other display command.

FORMAT: SCROLL ↓

TYPE: Display and status response

PREREQUISITES: None

SET - MODIFY PARAMETERS

FUNCTION: Modifies the default value associated with a parameter.

FORMAT: SET [,*parameter*]

parameter One of the following keyword value pairs:

ID,*id*

id Mainframe identifier to be used if none is specified on the LOGON command. (2 alphanumeric characters) The *id* is initially DG. The default *id* is displayed in the STATION display if the station is not logged on.

TID,*tid*

tid Terminal identifier to be used if none is specified on the LOGON command (1-8 alphanumeric characters). The *tid* is initially OPERATOR. The default *tid* is displayed in the STATION display if the station is not logged on.

TYPE: Batch entry; miscellaneous subtype

PREREQUISITES: None

SNAP - TAKE SNAPSHOT OF DISPLAY CONTENTS

FUNCTION: Copies display-screen image to line printer or a file.

FORMAT: SNAP[,*filename*] [,*comment*] ↵

filename File to which data is to be appended. If this parameter is omitted, data is printed.

comment An arbitrary character string.

TYPE: Batch entry, miscellaneous subtype

PREREQUISITE: Printer must not be in use by the program sharing the Eclipse and executing in the other program area (i.e., the background or foreground). If the printer is in use and print is indicated, the results of this command are unpredictable.

Keyboard input cannot be processed when a SNAP of the display is being taken. Hence, the results of characters entered while the SNAP is in progress are unpredictable.

STAGE - HALT OR RESUME STAGING

FUNCTION: Halts or resumes dataset staging between the Eclipse station and the CRAY-1. Staging is normally on when the station begins operation. When staging is on, the Eclipse is transmitting files listed in the input staging queue to the CRAY-1 and the CRAY-1 is transmitting files listed in the output staging queue to the Eclipse.

FORMAT: STAGE[,ON/OFF]

OFF Halt staging; staging in process is completed, no new staging is initiated.

ON Resume staging; default.

TYPE: Batch entry; staging control subtype

PREREQUISITES: None.

STARTUP - COS SYSTEM STARTUP

FUNCTIONS: Initiates CRAY-1 execution and causes it to follow one of three Startup procedures: Install, Deadstart, or Restart. The type of startup is determined by a parameter file sent to the CRAY-1 by the command. The command also identifies the file containing the binary of the CRAY-OS operating system and causes it to be sent to the CRAY-1.

FORMAT: STARTUP [,*sysfile*][,*parfile*] ↵

sysfile Name of file containing the CRAY-OS binary. The file name COS is used if this parameter is omitted from the command. Refer to the CRAY-OS System Programmer's Handbook for details of COS file generation.

parfile Name of file containing system parameters to be used by the operating system. If this parameter is omitted, a file named COSPAR is used. Refer to the CRAY-OS System Programmer's Handbook for details of COSPAR file generation.

Regardless of whether the STARTUP command is issued at a remote or an on-site Eclipse station, the files used by STARTUP must reside at the on-site Eclipse. Both *sysfile* and *parfile*

Note that the first 8 64-bit words of *sysfile* are not included in the data written to the CRAY-1.

TYPE: MCU

PREREQUISITES: On-site Eclipse must be connected to CRAY-1 MCU channel.

STATION - DISPLAY STATION STATUS

FUNCTION: Returns information about the Data General station at which the command is entered.

If the input staging queue is full, no more print files will be queued for staging to the CRAY-1.

If the output staging queue is full, no more print files will be staged out.

FORMAT: STATION ↵

TYPE: Display and status response

PREREQUISITES None.

The following information is returned via this display:

- Station logged on or off; if off, no stream status is returned.
- Staging on or off
- Print on or off
- Refresh rate in seconds
- Station ID and TID (default if not logged on)
- Poll interval (rate of exchange of control messages) in seconds
- Maximum stream count
- Segment size expressed as a number of Eclipse sectors where each sector is 256 16-bit words.
- Number of input files (240 maximum); when count reaches 240, FULL is displayed
- Number of output files (240 maximum); when count reaches 240, FULL is displayed
- Stream status; indicates stream number, status, filename, size, and block.

EXAMPLE: STATION)

STATION STATUS

LOGGED ON
STAGE ON
PRINT OFF
REFRESH ON 10

STATION ID : DG_OPERATOR
POLL INTERVAL : 2
MAX STREAMS : 1
SEGMENT SIZE : 4

INPUT FILES : 1

OUTPUT FILES : 23

INPUT STREAMS					OUTPUT STREAMS			
#	STATUS	FILENAME	SIZE	BLOCK	#	STATUS	FILENAME	SIZE BLOCK
1	ACTIVE	FILE3	8	5	4	IDLE		

STATUS - DISPLAY SYSTEM STATUS

FUNCTION: Returns status of jobs and output datasets known to the operating system. Several jobs are reported at a time according to their job sequence numbers. Status can be requested for any or all of the CRAY-1 job queues.

If the command is issued at the operator station, all sequence entries are displayed. If the station is not the operator station, only entries matching the station ID are displayed.

FORMAT: STATUS[,*queues*]

queues One or more of the following designators, each of which specifies a queue for which status is requested. If the *queues* parameter is omitted, the status of all of the queues is displayed.

EXECUTION	Execution queue
INPUT	Input queue
OUTPUT	Output queue
RECEIVING	CRAY-1 receiving queue
SENDING	CRAY-1 sending queue

TYPE: Display and status response

PREREQUISITES: Eclipse must be logged on

The status display returned by this command provides the following information

- Job sequence number
- Disposition code, as follows:
  - IN Job dataset
  - MT Dataset is to be disposed to magnetic tape at the receiving front-end system.
  - PR Dataset is to be disposed to a printer at the receiving front-end system.
  - PT Dataset is to be disposed to a plotter at the receiving front-end system.
  - PU Dataset is to be disposed to punched cards at the receiving front-end system.
- Job name when submitted at originating front-end system.

- Job or dataset status:

  AWAITING EVENT
  AWAITING MEMORY
  DOES NOT EXIST
  DORMANT
  EXECUTING
  OPERATOR SUSPEND
  QUEUED FOR EXEC
  ROLLED IN
  ROLLED OUT
  ROLLING OUT
  SUSPENDED
  TRANSFERRING
  WAITING FOR CPU
  WAITING FOR I/O

- Priority displayed as two fields: the integer field gives the assigned priority, the fractional field gives the calculated priority.
- Time used in seconds and time limit in seconds. If the job's time used or time limit exceeds the display area, the corresponding entry contains *****. If time used or time limit is not applicable for the dataset, the corresponding entry contains -----.
- Field length of job specified as an octal count of 1000_8-word blocks. If field length is not applicable, the entry contains ------.
- Front-end identifier associated with job or dataset.
- Terminal identifier associated with job or dataset.

The header line for the display lists the queues being displayed. The frame count at the right of the line tells the operator which frame of status information is being displayed. Frames are numbered 0 to 99, modulo 100.

EXAMPLE: STATUS ↵

```
STATUS E I O R S                                            FRAME  0
                                               TIME       FIELD
  JSQ  DC  DATASET       STATUS          PRI   USED LIMIT  LENGTH  ID    TID

    3  IN  VRN       EXECUTING           1.0  1605 *****      50  CF
    4  IN  SFR       WAITING FOR CPU     1.0  1534 *****      50  CF
   65  IN  FNOC10    WAITING FOR CPU     7.4    95  1000     227  CF  OPERATOR
                              END OF DATA
```

STORAGE - DISPLAY MASS STORAGE STATUS

FUNCTION: Initiates mass storage status display.

FORMAT: STORAGE ↵

TYPE: Display and status response.

PREREQUISITES: Eclipse is a system operator station and is logged on.

The mass storage status display provides the operator with the following information:

- Flags give special information about each device.
  - M - Master device
  - R - Read only
  - D - Device down
- Device label, as it is known to the operating system.
- Percentage of space free (available) and permanent (in use) on each device. Space not accounted for by these two categories is allocated to local datasets.
- Number of recovered and unrecovered errors on each device.
- Location of last error (in octal). Gives cylinder (CYL), head (HD), and sector (SC) location.

EXAMPLE: STORAGE ↵

MASS STORAGE STATUS FRAME 0

FLAGS	DEVICE	SPACE FREE	SPACE PERM	ERRORS RECOV	ERRORS UNREC	LAST ERROR CYL	LAST ERROR HD	LAST ERROR SC
RD	DD-19-20	0%	0%	0	0	0	0	0
RD	DD-19-30	0%	0%	0	0	0	0	0
RD	DD-19-40	0%	0%	0	0	0	0	0
RD	DD-19-50	0%	0%	0	0	0	0	0
M	DD-19-21	95%	0%	0	0	0	0	0
RD	DD-19-31	0%	0%	0	0	0	0	0
RD	DD-19-41	0%	0%	0	0	0	0	0
RD	DD-19-51	0%	0%	0	0	0	0	0
	DD-19-22	100%	0%	0	0	0	0	0
RD	DD-19-32	0%	0%	0	0	0	0	0
RD	DD-19-42	0%	0%	0	0	0	0	0
RD	DD-19-52	0%	0%	0	0	0	0	0

STREAM - CHANGE STREAM COUNTS

FUNCTION: Changes input, output, and active stream parameters for the station with the specified id. These parameters are initially defined for a station as assembly options and take effect when a station logs on. STREAM commands cannot increase stream counts beyond the logon limits.

FORMAT: STREAM,*id*,*ni*,*no*,*na* ↵

id	Station id for which other parameters apply
ni	Number of input streams allowed, 0-8
no	Number of output streams allowed, 0-8
na	Number of streams on which data can be sent concurrently, that is, active streams; 0-16

TYPE: Operator station; link control subtype

PREREQUISITES: Eclipse is operator station and is logged on

EXAMPLE: STREAM,DG,1,1,1 ↵

Designates that station DG can have only one input stream and one output stream and that both cannot be active at the same time.

SUBMIT - QUEUE JOB DATASET

FUNCTION: Queues an Eclipse file for staging to the CRAY-1. At the CRAY-1, the dataset will be entered into the job input queue.

FORMAT: SUBMIT,*filename*

filename Name of file to be staged. The file must be a random or contiguous file. See BLOCK program description to create the file.

TYPE: Batch entry; staging control subtype

PREREQUISITES: None

SUSPEND - SUSPEND JOB PROCESSING

FUNCTION: Suspends processing of job identified by its SDT entry.

FORMAT: SUSPEND,*jsq* ↓

jsq Job sequence number by which job to be suspended is identified. The JSQ can be ascertained from the STATUS display.

TYPE: Operator station; job control subtype.

PREREQUISITES: Eclipse is a system operator station and is logged on

SWITCH - MANIPULATE JOB SENSE SWITCHES†

FUNCTION: Sets or clears a job sense switch.

FORMAT: SWITCH,*jsq*,*ssw*,{ON / OFF}

jsq	Job sequence number by which the job is identified. The JSQ for the job can be obtained through the STATUS display.
ssw	Sense switch number (1-6)
ON	Sets the switch designed by *ssw*
OFF	Clears the switch designated by *ssw*

TYPE: Operator station, job control subtype

PREREQUISITES: Eclipse is operator station and is logged on

†Deferred implementation

TRANSMIT - TRANSMIT FILE TO CONCENTRATOR†

FUNCTION: Sends specified file from a remote station to the concentrator. See section 3 for restrictions.

FORMAT: TRANSMIT,*rfile* [,*cfile*]

rfile Name of file at the remote station to be sent to the concentrator.

cfile Name to be assigned to the file at the concentrator. If not specified, *rfile*

TYPE: Communications

PREREQUISITES: Remote station only

† Deferred implimentation

CLI OPERATION 4

INTRODUCTION

This section briefly describes the features of the RDOS Command Line Interpreter. For a complete description, refer to the Data General publication 093-000109, RDOS Command Line Interpreter Reference Manual.

The Command Line Interpreter (CLI) is the interface between the console operator and the RDOS operating system. The operator enters CLI commands via the 1440 keyboard (figure 4-1). CLI passes the commands to RDOS for processing and displays messages and requests for entry on the 1440 display.

COMMAND SYNTAX

Each command consists of a verb and parameters.

$$verb\ p_1,p_2,\ldots,p_m$$

verb The verb is a group of characters representing a unique CLI command or the name of a file to be executed by RDOS. The verb may be accompanied by one or more switches.

$$verb/s_1/s_2/\ldots/s_n$$

p_i Indicates a string of arguments. Each argument may be accompanied by one or more switches.

$$p_i/s_1/s_2/\ldots/s_n$$

Arguments and switches vary with each command and are described in this manual only for those commands added to the repertoire by Cray Research. For details of Data General CLI commands, refer to the CLI Reference Manual.

DISPLAY FORMAT

The most recent message or command is displayed on the bottom line of the CRT. As new information is added at the bottom, older information is pushed up in a scroll-like fashion and eventually disappears from the top of the screen. The Data Screen is illustrated in figure 4-2.

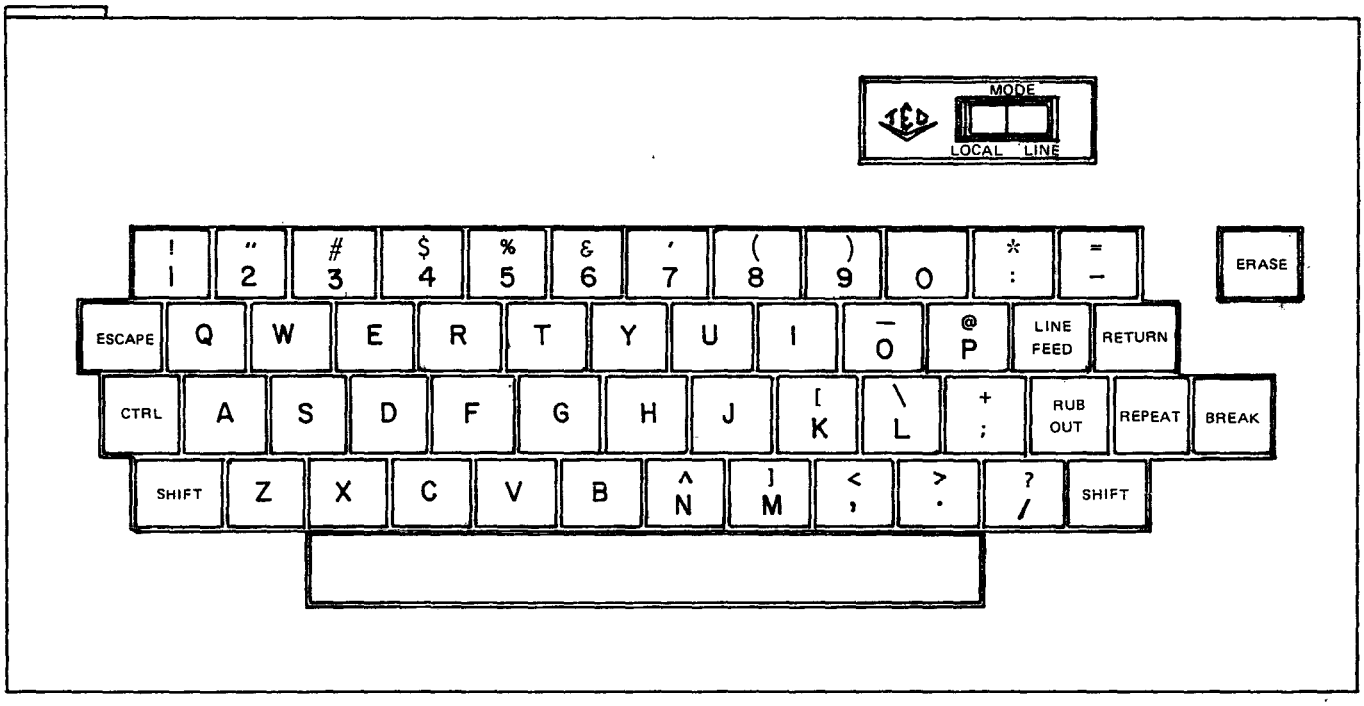


Figure 4-1. TEC 1440 Keyboard

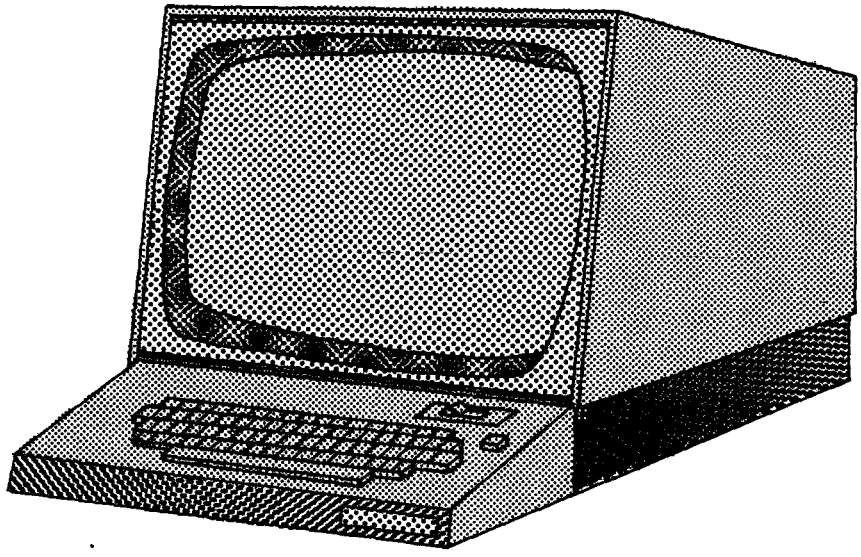


Figure 4-2. TEC 1440 Data Screen

HOW TO ENTER A COMMAND

Use the following procedure to enter a CLI command at the 1440 keyboard.

1. Type the command beginning with the first character position of the entry line. As each character is typed, it appears on the bottom line of the display. The cursor advances so that it always marks the position of the next character to be typed.
2. Press RETURN (indicated by ↵ in command descriptions) to transmit the command to CLI. All information up to the cursor is sent. When the command has been processed by RDOS and CLI is ready for the next command, a simple or time-augmented prompting reply appears on the line following the command entry. If the command cannot be processed, an error message appears before the reply.

Correct any typographical error before transmitting a command by pressing RUBOUT once for each character to be ignored. The cursor advances one character each time RUBOUT is pressed. The display is not updated to reflect the deleted characters.

Type \ (SHIFT and L keys) to delete an entire line.

Multiple commands can be entered on a single line when a command is terminated a semicolon rather than pressing RETURN. To send the entire line, press RETURN.

A command or command series can be continued on additional lines by entering ^ (SHIFT and N keys) immediately before pressing RETURN. This causes the RETURN to be ignored as the command terminator and causes the information on the next line to be considered as a continuation of the previous line.

Typing a period and pressing RETURN causes the current type of ready message to be changed from simple to time-augmented or vice versa.

ERROR MESSAGES

Transmitting a command containing an error causes an appropriate error message to be displayed. In general, error messages are quite explicit, giving the user sufficient information to correct the error easily. For details, refer to the RDOS Command Line Interpreter Reference Manual.

SPECIAL KEY ASSIGNMENTS

Table 4-1 summarizes special uses of keys by the CLI in the command syntax.

ALTERNATE COMMAND INPUT

To temporarily discontinue command entry at the display/keyboard and to cause CLI to read commands from an alternate (indirect) source, enter @*filename*@ where *filename* is the file or device containing the command images.

Table 4-1. Special key assignments for CLI

Key	Function
RETURN	Terminates a command activates CLI.
\	(SHIFT and L keys). Deletes an entire line.
RUBOUT	Causes the last character in the string to be ignored and advances the cursor one space.
, or space	Separates arguments in a command. Extra spaces are ignored.
;	Delimits multiple commands on a command line.
^	(SHIFT and N keys). Causes the next RETURN to be ignored so that information on the next line continues the entry.
. RETURN	Changes the reply format from simple to time-augmented or vice versa.
@---@	Causes CLI to interpret commands or command fragments from the file or device named within the pair of @'s.

SYSTEM CONSOLE BREAKS

The console break mechanism provides a means of terminating the program executing in the foreground or in the background.

CTRL and A Terminates background program; CLI is reactivated.

CTRL and F Terminates foreground program.

FILE NAMES

All RDOS devices and disk files are accessible by file name; magnetic tape files are accessible by file number. A file name is a byte string of up to ten ASCII characters. Characters in a file name can be upper case alphabetic, lower case alphabetic, numeric, and $. A carriage return, null, space, or line feed terminates the file name.

An extension consisting of a string of alphanumeric characters and $ characters may be appended to a file name. If more than two characters are provided, only the first two are used.

END OF FILE

When using the card reader as an input device, RDOS detects end of file when all rows are punched in column 1 of the card. An end-of-file card can be punched on a 029 keypunch by multipunching the following characters: &, -, * and 0 through 9.

When using the 1440 console ($TTI) as an input device, CTRL and Z acts as an end of file.

RESERVED DEVICE NAMES

The following list indicates the names of devices reserved by RDOS for use in CLI commands when addressing a device. Using any of these names in a command that creates a file would result in a duplicate file name.

Device name	Device
$CDR	Punched card reader
$CDR1	Second punched card reader
CT*n*	Cassette unit *n*, first controller
CT1*n*	Cassette unit *n*, second controller
DK0	Fixed head Novadisc, first controller
DK1	Fixed head Novadisc, second controller
$DPI	Input dual processor link
$DPO	Output dual processor link
$LPT	80 or 132-column line printer
$LPT1	Second line printer
MCAR	Multiprocessor communications adapter receiver
MCAR1	Second multiprocessor communications adapter receiver
MCAT	Multiprocessor communications adapter transmitter
MCAT1	Second multiprocessor communications adapter transmitter
MT*n*	7- or 9-track magnetic tape transport *n*, first controller ($n \geq 0$)
MT1*n*	7- or 9-track magnetic tape transport *n*, second controller ($n \geq 0$)
$PLT	Incremental plotter
$PLT1	Second incremental plotter
$PTP	Paper tape punch
$PTP1	Second paper tape punch
$PTR	Paper tape reader
$PTR1	Second paper tape reader
$QTY	Asynchronous data communications multiplexer
$TTI	1440 display keyboard
$TTI1	455 display keyboard
$TTO	1440 display screen
$TTO1	455 display screen
$TTP	Teletype punch
$TTP1	Second teletype punch
$TTR	Teletype reader
$TTR1	Second teletype reader

CLI COMMAND DESCRIPTIONS

This section contains descriptions of commands added to the CLI repertoire by Cray Research. All other CLI commands are described in the Data General Command Line Interpreter Reference Manual.

The station operator may wish to refer to that publication for descriptions of the following commands which are likely to be used when operating the Data General Eclipse.

CLEAR	Clear file use counts
DELETE	Delete files
DUMP	Dump one or more files
ENDLOG	Close the log file
EXFG	Execute in foreground
FILCOM	Compare two files
GTOD	Get date and time
INIT	Initialize directory or device
LIST	List directory
LOAD	Reload dumped files
LOG	Open the log file
PRINT	Print a file
RELEASE	Release a device
RENAME	Change the file name
SDAY	Set today's date
STOD	Set time of day
TYPE	Display file contents
XFER	Perform file-to-file copy

NAME: BLOCK (Block CRAY-1 datasets)

FORMAT: BLOCK [*dirfile*] [*list*/L]

dirfile The Eclipse file from which BLOCK reads directives. If the parameter is omitted, the default is the card reader ($CDR). Other sources of directives could be the 1440 console ($TTI), magnetic tape (MTØ), or a disk file.

PURPOSE: To create one or more Eclipse files in CRAY-1 blocked dataset format. Files in blocked format may be queued for staging to the CRAY-1 using the SAVE, QUEUE, or SUBMIT station commands.

SWITCHES:

Global: /P - Listing goes to line printer.

Local: /L - List output is directed to given file (overrides global /P).

DIRECTIVES: Directives control the functions performed by the BLOCK program. A directive must begin in column 1. Parameters are separated by one to three blanks. Comments may follow the directive on a card. Directives are displayed as processed.

/OUT *filename*

The /OUT directive specifies that the Eclipse file produced by BLOCK is to be named *filename*. Subsequent directives up to the next /OUT directive or to the end of the directives file determine the contents of *filename*. The current /OUT directive pads the prior file (if there is one) to a 512-word boundary writes an end of data on the file, and closes it.

sourcefilename [B]

This directive causes the RDOS file *sourcefilename* to be added to the blocked dataset with a terminating CRAY-1 end-of-file RCW. If no parameter other than the file name appears on the directive, the file is processed as a coded file. That is, the file is read one line at a time and each line becomes a record with all blanks compressed. If a second parameter (i.e., B) appears on the directive, the file is processed as a binary file. That is, the file becomes a single record and there is no blank compression.

If input is from the card reader, *sourcefilename* is $CDR.

/EOF

This directive causes the BLOCK program to generate a CRAY-1 end-of-file RCW. An unblocked file containing /EOF directives can be edited, perhaps changing the positions of the file marks. The result can then be reblocked with BLOCK.

If the last record in a file is a /EOF record, BLOCK writes just one end-of-file record control word rather than two.

EXAMPLES:

1. In this example, directives are read from the card reader ($CDR). Directives dictate that the coded file CFILE on the Eclipse disk is to be written in CRAY-1 blocked format to an Eclipse file named BLKFILE.

   The command that invokes the BLOCK program is:

   ```
   BLOCK
   ```

   The directives are:

   ```
   /OUT BLKFILE
   CFILE
   (RDOS end-of-file card)
   ```

2. The following command causes directives to be read from an Eclipse disk file named DFILE and causes directives to be displayed as they are processed:

   ```
   BLOCK DFILE
   ```

3. The following command causes directives to be read from an Eclipse file named DFILE and causes the list output to be written on a file named LFILE:

   ```
   BLOCK DFILE LFILE/L
   ```

4. The following command causes directives to be read from the console ($TTI) with list output printed:

   ```
   BLOCK/P  $TTI
   ```

   If the operator types the following directives, the BLOCK program reads two coded files of punched cards from the card reader and creates a CRAY-1 blocked file named CFILE.

   ```
   /OUT  CFILE
   $CDR
   $CDR
   (CTRL and Z)
   ```

5. The following command causes directives to be read from the card reader and the list output to be written on a file named LFILE.

```
BLOCK LFILE/L
```

The following directives could cause four files to be combined in CRAY-1 blocked format. The first file might be a control statement file, the second might be a FORTRAN source language file, the third might be a data file, and the fourth (in this example) is a binary file. All of the files reside on the Eclipse disk.

```
/OUT  BIGJOB
CS
SOURCE
DATA
PROGRAM  B
(RDOS end-of-file)
```

6. In this example, all of the files to comprise a CRAY-1 input dataset are read from the card reader.

The following command invokes the BLOCK program:

```
BLOCK
```

The card reader holds the following cards and decks:

```
/OUT   JOBNAME
$CDR
(RDOS end-of-file)
(control statements)
/EOF
(source language program)
/EOF
(data)
(RDOS end-of-file)
```

NAME: CAL (CRAY Assembly Language)

FORMAT: CAL *filename* [*binary*/B] [*list*/L]

PURPOSE: To assemble a CAL assembly language source file. Output may be an absolute binary file, a listing file, or both.

Detailed information about the CAL assembler is contained in the CAL Reference Manual, CRI publication 2240000.

SWITCHES: By default, the output of an assembly is an absolute binary file (no listing file). Switches not specified are ignored.

Global:

/E List only lines with errors on listing file. /L or /P must also be selected.

/L Listing file is produced. If *list* file is not specified, *filename*.LS is used.

/N No absolute binary file is produced.

/O Override LIST pseudo instructions; ineffective if L or P switches not selected.

/P Listing goes to printer; overriden by L switch.

/X Cross referencing of symbol table; ineffective if L or P switches not selected.

Local:

/B Binary on *binary*. Overridden by global /N switch.

/L Listing is produced on *list*; global L switch is required.

EXTENSIONS: On input, search for *filename*.

On output, produce *filename*.SV for absolute binary and *filename*.LS for listing (If the global L switch is selected).

The source file name specified on the call cannot have an extension and is limited to ten characters.

EXAMPLES: CAL Z ↵

This command causes assembly of CAL source file Z, producing absolute binary file Z.SV.

CAL/N/L A↵

This command causes assembly of file A, producing as output a listing file .LS. No binary file is produced.

CAL/P/X EXAMP ↵

This command causes assembly of file EXAMP, producing an assembly listing with cross-referenced symbol table, output to printer, and an absolute binary file named EXAMP.SV.

NAME DMP (Dump formatted binary file)

FORMAT: DMP *filename* [*directives*/D] [*list*/L]

PURPOSE: Formats all or selected parts of a binary file for listing on the printer. The list data may be directed to an alternate file as an option. Directives specify areas to be listed and whether data is to be formatted by words or parcels.

SWITCHES:

Global: None.

Local: /D Directives on named file.

/L Listing is to go to named file.

DIRECTIVES: Directives specify areas of *filename* to be listed and specify whether data is to be formatt-d by words or parcels. A directive assumes the following form:

address$_1$,*address*$_2$P▽ *comment* (▽ signifies a blank)

address$_1$ First word address, octal.

address$_2$ Last word address, octal.

P Parcel format; i.e., if P is specified, the dump presents information as 16-bit parcels rather than as 64-bit words.

comment Arbitrary character string to identify dump.

NAME: ED (Modify text)

FORMAT: ED

PURPOSE: ED allows the user to modify text from a source file and write the output to a destination file. (The source and destination file names may be the same, in which case the original source file can be saved with a .BU extension.)

ED displays a page of instructions on the 455 console and waits until the user enters names for the source and destination files. At this point, a carriage return (a null source file name) will terminate the program; this is the only instance in which ED terminates itself. If the destination file name is null, it is assumed to be the same as the source file. If the source file name cannot be found, ED blanks the screen and redisplays the instruction page.

Once ED has valid input and output file names, it displays the first 24 lines (one page) of the input file. The user positions the cursor to the location at which text modification is desired. The cursor is moved about on the screen using the space bar, the carriage return, and the five arrow keys in the group of 15 keys on the right side of the keyboard.

Table 4-2 lists the keys that provide special functions with a single keystroke.

Table 4-2. Special function keys

Key	Function
ESCAPE	Moves forward to fixed tab positions at columns 1, 10, 20, 35, and 73.
Blank function key	Destructive space; erases the current character.
RUBOUT	Destructive backspace key; overwrites the previous character with a blank.
LINE FEED	Scrolls lines forward on the screen one at a time; does not change the cursor position. (The only way that the user can bring back lines that have been scrolled up and off the screen is to finish editing and then restart from the beginning of the resulting output file.)
	Hold down the LINE FEED and REPEAT keys for continuous scrolling.
END OF TEXT	Finishes output for the file being edited and closes all files.

Additional editing features can be obtained by using the SHIFT key in combination with some of the function keys. Table 4-3 summarizes the keys which can be prefixed by the SHIFT key to perform special functions in ED.

Table 4-3. Special function keys prefixed by the SHIFT key

Key	Function
DELETE LINE	Deletes a line of text
INSERT LINE	Inserts a line of text
DELETE CHAR	Deletes a character
INSERT CHAR	Inserts a character
CLEAR TO EOL	Erases to end of line
Blank function key	Erases to end of tab field

The HERE IS key functions (in ED only) as a true escape character (the ESCAPE key having been pre-empted for the tab function). A number of editing features can be obtained by pressing the HERE IS key followed by another key. Table 4-4 summarizes the keys that can be prefixed by the HERE IS key.

Table 4-4. Special function keys prefixed by the HERE IS key

Key	Function
C	Close up line one character (same as DELETE CHAR key)
D	Delete one line (same as DELETE LINE key)
G	Get one line into a one-line buffer (without deleting it)
I	Insert one blank line (same as INSERT LINE key)
N	Find next occurrence of a previously-specified search string. Searching continues beginning at the line after the one containing the cursor. HERE IS N does not blank the screen while searching unless it must scan more than 24 lines.
O	Open up line one character (same as INSERT CHAR key)

Table 4-4. Special function keys prefixed by the HERE IS key (continued)

Key	Function
P	Put (insert) a line that was previously captured by a HERE IS G (get) or a HERE IS Y (yank).
S	Initiate search for a given character string. User can specify up to 80 characters (with the assistance of the ESCAPE and RUBOUT keys). A carriage return terminates the reply. If the carriage return is entered while the cursor is in column one, no search is done and the original data is put back on the screen with the cursor position unchanged. Searching starts at the beginning of the line containing the cursor. HERE IS S always blanks the screen while scanning. HERE IS S followed by a carriage return is useful to refresh the screen from ED's memory if the 455 has to be turned off and on again.
Y	Yank one line into a one-line buffer (also deletes the line). It is possible to move one line at a time by using HERE IS Y to yank the line from the display, followed by HERE IS P to put it back. A "yanked" line can be "put" any number of times. HERE IS Y deletes the yanked line; to get the line without deleting it, use HERE IS G.
)	Disables output to the destination file. (This also turns off the top four indicator lights in the 455's Data-Panel. These lights are usually on to indicate normal output.)
(	Enables output to the destination file. (This turns on the top four indicator lights in the 455's Data-Panel.)
SPACE	Destructive space (same as blank function key).
RUBOUT	Move cursor up one line.
RETURN	Move cursor down one line.
LINE FEED	Move forward in file one page (24 lines).
ESCAPE	Redisplay initial instruction page. A carriage return restores the text to the display screen. This series of three keystrokes can be used to refresh the screen from ED's memory if the 455 has to be turned off and on again.
. (period)	Signals end-of-text and saves the input in a backup file.
# (not sign)	Signals end-of-text and cuts off output.

Of the two search commands, HERE IS N gives better feedback to the user than HERE IS S because the latter always blanks the screen. When HERE IS N completes its search, the feedback given to the user depends on the amount of text that was scanned.

- If the matching text was already on the screen, the cursor moves to the first character of the matching text.
- If the match is made in the 24 lines following the screen text, HERE IS N scrolls the screen until the match is made at the bottom of the screen, and the cursor is moved to the matching text.
- If the match is farther away, HERE IS N blanks the screen (just as HERE IS S always does). Then, when a match is found, it is displayed at the bottom of the screen, along with the preceding 23 lines.

If no match is found in the file, the cursor stops at the end-of-file indicator, [].

After making all desired changes to the file being edited, use one of the commands listed below to copy the rest of the input file to the output file. If the input and output files have the same name, the three commands have the following effect:

END OF TEXT (no HERE IS prefix is needed) Discards the original text by deleting the input file and changing the name of the temporary output file.

HERE IS . (remember as "dot") Saves the input file with a .BU extension before renaming the temporary output file.

HERE IS # (remember as "not") Leaves the input file unchanged and discards the output.

If the input and output files have different names, both END OF TEXT and HERE IS . merely copy the rest of the input to the output file. However, HERE IS # cuts off output immediately, so that the result is as if HERE IS) had been entered, followed by END OF TEXT.

NAME: OUT (Deblock and print dataset)

FORMAT: OUT [*inds*] [*outds*]

PURPOSE: Converts a CRAY-1 blocked dataset (*inds*) to RDOS format on file *outds*. The default for *inds* is OUTPUT. The *inds* file must reside on the station disk. Files named $STAT*nnn*.OF can be referred to by the 2- or 3-digit number, *nnn*. For example, OUT 21 prints $STAT021. (Deblocking a file whose name is really only 2 or 3 digits, therefore, requires that the file be renamed first.)

If the output file, *outds*, is named $LPT, it is printed. The default for *outds* is $LPT.

The OUT program handles a maximum line length of 133 characters from the CRAY-1 blocked input file (*inds*).

The *inds* file is not deleted from the Eclipse disk after it is printed unless the /D global switch is present. If it is deleted, it will be removed from the print queue when the station is re-initialized.

SWITCHES:

Global:

/C Change unprintable bytes to blank characters. (Normally, they are translated to the ▪ character.)

/D Delete the input file when done.

/E Force an end-of-file indication after each END statement. If /E is used alone, there is no effect. Using /E in conjunction with /F causes /EOF records to be written. Using /E with /P causes pages to be skipped.

/F Output an /EOF record for each end-of-file in the blocked dataset.

/P Skip to a new page after each end-of-file in the blocked dataset.

/S Suppress printer format control. The first character of data in each record is not interpreted as a printer control character but is treated as ordinary data.

/T Interpret tab characters (with tab positions 8, 16, 24,...)

Local: None

MESSAGES:

Termination: DELETED *filename* (if the /D global switch is present)

nn UNPRINTABLE BYTES IN *filename*

nn is a decimal number. If *nn*=0, this message is suppressed.

m FILES

m is a decimal number. The count includes end-of-file indications generated by the /E and /F global switches. If *m*=1, or if the /F global switch is absent, the message is suppressed.

NAME: RDF (Read foreign tapes)

FORMAT: RDF [*input*] [*output*] [*pars/s...*]

PURPOSE: RDF is a utility program for retrieving files from tapes that were written by computers other than the Data General Eclipse. RDF allows the user to process multiple tape files in many input formats. RDOS restricts the size of a record that can be read from tape to 4096 characters.

The input file name, *input*, must be of the form MT*n*:*m*, where *n* is the tape transport number and *m* is a tape file number from 0 to 99. The default for *input* is MTØ:Ø.

The default for *output*, the output file name, is FILEX.

Optionally, if the second parameter (normally the output file name) begins with the same four characters (i.e., MT*n*:) as the input file name, then the first and second parameters specify the first and last tape files and a third parameter specifies the names of the output files. This option allows tape files beyond MT*n*:99 to be read even though RDOS does not recognize the existence of more than 100 files per tape. The format of the RDF command in this case is:

RDF *first last* [*output*]

Both *first* and *last* are of the form MT*n*:*m*; but the *m* that specifies the *last* tape file may be any number less than 9999 and greater than the *m* specified for the *first* file (which must still be between 0 and 99). The third parameter, *output*, supplies a prefix to which numeric suffixes are added to form the names of the multiple output files. (See the /N local switch.) If *output* is omitted, the prefix FILE is used.

Messages are written to the operator's console and, simultaneously, to the file RDF.CM. Each time RDF is initiated, the old RDF.CM is deleted; if the messages are to be reviewed later, the user must capture RDF.CM with RENAME, DUMP, or PRINT.

RDF rewinds the *input* tape after every run.

SWITCHES:

Global:

/D Causes the end of each tape record to act as a record delimiter.

/E Translates characters from EBCDIC to ASCII.

NOTE

The delimiter and terminator tests (/D and /T local switches) are performed before the input characters are translated.

Local: Local switches are used to specify decimal values only; any parameter having a local switch must be a string of decimal digits.

/L Record length in characters; allowable range is from 2 to 513. The default is 80.

/D Decimal value of logical record delimiter; allowable range is from 0 to 127. The default is no delimiter. If there is no delimiter, the logical records have a fixed length defined by the /L parameter. If a delimiter is defined by /D, the logical records may be of variable length with a maximum defined by /L.

/T Decimal value of logical file terminator; allowable range is from 0 to 127. The default is no terminator. If a terminator is defined by /T, the first character of each record is compared to the terminator and, if there is a match, the current record and all records remaining in the file are discarded.

/B Beginning logical record number (divided by 1000) to be copied from the tape file; allowable range is from 0 to 32767. The default is 0, which means that copying starts with logical record 0.

/E Ending logical record number (incremented by 1, then divided by 1000); allowable range is from 0 to 32767. The default is 0, which means that copying will not stop until 65,536,000 logical records are output, unless the end of the tape file (or mass storage overflow) occurs first.

/S Segment size for multiple segmentation of a single tape file. The /S parameter specifies the number of logical records to be written to each file segment. All segments are created in one pass through the tape file, and all but the last segment created must contain the same number of records. Allowable values are from 0 to 32767. The default is 0 (no multiple segmentation).

Note that /S is mutually exclusive with /B and /E, which are used to create only one (usually very large) segment at a time. Also, /S cannot be used if there is more than one tape file to be processed; that is, where parameters 1 and 2 are used to specify a range of file numbers.

/N Number to be added to file-name suffixes. (See examples.) Allowable range is 0 to any number that will not overflow 9999 when added to the standard file-name suffixes. The default is to use standard numeric suffixes defined as follows:

When reading multiple tape files, the multiple output file names are given suffixes that correspond to the RDOS-assigned tape file numbers.

When creating multiple segments from a single tape file (see /S), the output file names are given ascending numeric suffixes beginning with 0.

The file name suffix becomes an extension if the output file name ends with a period. Whether or not there is a period in the file name, the user must be careful to avoid truncation of the suffix. RDOS allows ten characters before the period and two after it. (The portion of the name after the period is called the file name extension.) In the following example, the first and last tape files will be written to LONGNAME1Ø because the eleventh character in the name is discarded.

```
RDF MTØ:1Ø,1ØØ LONGNAME
```

In the next example, B.1Ø will be written twice if there are more than 4000 lines in MTØ:2.

```
RDF MTØ:2 B. 4Ø/S
```

EXAMPLES:

```
RDF
```

This command copies information from MTØ:Ø to FILEX in the current directory, assuming that each logical record on the tape is exactly 80 characters (that is, the tape records contain no carriage returns or other special characters used as delimiters). The length of each physical tape record is immaterial so long as it is less than or equal to 4096 characters.

```
RDF MTØ:1 MTØ:2ØØ 132/L 13/D
```

This command copies 200 files from the tape in one run, creating 200 new files named FILE1 through FILE200 in the current directory. Each record is assumed to be terminated by a carriage return (decimal value 13), but the maximum record length is set to 132 so that no line can be created that is too long to be printed. The carriage return terminators are discarded.

```
RDF/E MTØ:99 XYZ 27/L
```

This command copies all of MTØ:99 (the last file on the tape that can be specified in the first parameter) to a file named XYZ. Each record is assumed to be exactly 27 characters long. The global switch /E causes the input to be translated from EBCDIC to ASCII-

```
RDF MTØ:4 SPQR 1ØØØ/S 1/N
```

This command breaks up a large file (MTØ:4) into smaller files to make them more manageable. The files created on disk by the above command will be named SPQR1, SPQR2, and so on.

Suppose MTØ:4 consists of 25192 80-character logical records. Then, the last file created will be SPQR26, containing 192 records, with the first 25 files (SPQR1 through SPQR25) each containing 1000 records. Any segment size from 1 to 32767 may be specified, but it must apply to all segments in the file.

```
RDF MTØ:Ø PART1 Ø/B 4Ø/E
```

Reads the first 40,000 records from MTØ:Ø.

```
RDF MTØ:Ø PART2 4Ø/B 8Ø/E
```

Reads the next 40,000 records from MTØ:Ø, and so on. RDF rewinds the tape after each call. If the tape file has, for example, 110,000 records, then the last 30,000 records can be read by specifying '8Ø/B' and 'xxx/E' where xxx is 110 or greater; or the /E parameter could be omitted.

```
RDF MTØ:Ø SOLO1 1Ø/D 25/T
```

This command reads the first file from the Concurrent Pascal distribution tape. The records are variable length with line feeds as delimiters. The last actual record of the file is immediately followed by a CONTROL-Y (decimal 25). The line feed terminators are discarded.

```
RDF MTØ:<1,115> SOLO1 1ØD 25/T 1/N
```

This command reads the 115 files that make up the Concurrent Pascal distribution tape (except MTØ:Ø, which describes the other 115). The 1/N parameter is used to force the file names to begin with 'SOLO2' instead of 'SOLO1' so that the files may be referenced by the number assigned them by their accompanying documentation.

```
RDF/D MTØ:Ø UNBLOCKED
```

This command assumes that the tape file contains one (perhaps variable-length) logical record in each physical tape record and that the maximum record length is 80 characters. (If any tape record were longer than that, it would be divided after every 80th character.)

NAME: READ (Card to disk transfer)

FORMAT: READ *file*$_1$ [,*file*$_2$ ...]

PURPOSE: Read cards at the card reader and store the images on the specified file. More than one file may be read with a single command. Existing files are deleted; the new files are created as random files. A card with rows 6, 7, 8, and 9 punched in column 1 is interpreted as an end of file; rows 12, 11, and 0 through 5 are not examined.

This utility should be used instead of the RDOS XFER command.

SWITCHES: None.

NAME: UPDATE (Source maintenance program)

FORMAT: UPDATE *file* [*afile*/s...]

PURPOSE: Maintain source language decks on disk files in updatable format. Details of UPDATE are given in the Data General UPDATE Reference Manual, CRI publication 2240007. Note that a "program library" always contains exactly one deck, even though the term "library" suggests multiple decks.

SWITCHES:
Global:

/G UPDATE generation mode. The G global switch is selected when a program library is to be generated from a source file. This switch overrides all other global switches.

/S Source file generation mode. The S global switch is selected when a source file is to be written from a program library. No input file (.IN extension) is read. The S switch overrides all other global switches except G.

/C Write compressed compile file. Ignored if G or S global switches are selected. Selecting no global switches is the same as selecting only C.

/A Write uncompressed compile file (alternate form). Ignored if G or S global switches are selected. /A does not override /C. UPDATE prefixes the sequence information with a semicolon when the A global switch is selected. The /A switch is used when the compile file is to be used as input to a Data General assembler; the semicolon places the sequence information in the comments field.

/N Write new program library. Ignored if G or S global switches are selected. No new program library is written if the N global switch is not selected.

/E List only errors in the listing file.

At least one file name is required as a parameter on the UPDATE call. If no local switches appear with the file name (lfn), UPDATE assigns the following default names:

lfn.	Compile file
lfn.SR	Source file
lfn.PL	Program library file
lfn.IN	Input file
lfn.NL	New program library file

SWITCHES: (continued)

Local: Alternate file names may be specified by using local switches:

/A Compile file

/C Compile file

/I Input file

/N New program library

/P Program library

/S Source file

/L Listing file

STATION INPUT DIRECTIVES† 5

INTRODUCTION

An input file or deck consists of station directives and CRAY-1 data. When processing input via the BLOCK command the station interprets the directives and formats the data into blocked datasets which are then queued for transfer to the CRAY-1.

The station directives in the input file (1) identify the dataset type, (2) specify station files containing additional directives and data, and (3) control blocking of the datasets.

A station directive is characterized by a slash in column one of an input record followed by a valid directive verb. The first three characters of the verb (shown underscored in the descriptions of directives) are sufficient for identification of the directive.

Directives include the following:

/SAVE	Identifies permanent dataset.
/SUBMIT	Identifies job input dataset.
/CONTINUE	Switches source of directives and data to alternate file.
/RETURN	Returns to primary source of directives.
/EOF	Inserts CRAY-1 end-of-file RCW into dataset.
/EOD	Inserts CRAY-1 end-of-data RCW into dataset.

INPUT FILE STRUCTURE

A station input file contains directives and data that describe one or more CRAY-1 datasets.

The set of directives describing a job input dataset begins with a /SUBMIT directive; the set of directives describing a staged permanent dataset begins with a /SAVE directive. In either case, the directive set is terminated by a /EOD or, if reading from the main input file, by an RDOS end-of-file.

† Deferred implementation.

Input file data consisting of directives and data may originate from:

1. The main input file, that is, the file specified on the BLOCK command (section 3).
2. An alternate input file, that is, a file referenced by a /CONTINUE directive.

A /CONTINUE directive in an alternate input file causes that file to be closed and a new alternate input file to be opened. Control returns to the main file if a /RETURN or an RDOS end-of-file is encountered.

The /EOF and /EOD directives, the /RETURN directive, and the RDOS end-of-file control blocking. An /EOF directive or an RDOS end-of-file on an alternate file generates an end-of-file RCW and terminates the current block. An /EOD directive or an RDOS end-of-file on the primary input file generates an end-of-file RCW and terminates the block. The /RETURN directive allows a user to return from an alternate source to the primary source without writing an EOF or EOD RCW on the dataset and without beginning a new block.

DIRECTIVES

/SAVE Identify permanent dataset

FUNCTION: Identifies the dataset as a staged permanent dataset to be staged to the CRAY-1 with disposition code (DC) of stage (ST) and permanent dataset name (PDN) as specified on the directive.

FORMAT: /SAVE,*pdn*

pdn 1-15 character name of permanent dataset. First character must be alphabetic.

/SUBMIT - Identify job input dataset

FUNCTION: Identifies the dataset as a job input dataset to be staged to the CRAY-1 with a dispostion code (DC) of input (IN).

FORMAT: /SUBMIT

/CONTINUE - Continue source from alternate file

FUNCTION: Switches to alternate file for source of directives and data. This file is read until another /CONTINUE, a /RETURN, or an RDOS end-of-file is encountered.

FORMAT: /CONTINUE,*filename* {,BINARY}

filename Name of RDOS file containing dataset directives and data.

BINARY If this parameter is present, the file contents are assumed to be binary and the station does not look for directives. All binary data is blocked in the dataset.

If BINARY is omitted, the file contents are assumed to contain ASCII data and may include directives.

/RETURN - Return to previous source of station input

FUNCTION: Returns from current alternate file to main input file. No CRAY-1 end-of-file RCW is generated with a RETURN.

FORMAT: /RETURN

/EOF - End-of-file RCW

FUNCTION: Inserts a CRAY-1 end-of-file record control word into the dataset.

FORMAT: /EOF

/EOD - End-of-data RCW

FUNCTION: Inserts a CRAY-1 end-of-data record control word into the dataset and queues the dataset for staging to the CRAY-1.

FORMAT: /EOD

EXAMPLES

These examples illustrate different methods of building a dataset consisting of two files.

1. The primary source file is EX1. The station command BLOCK,EX1 ↵ causes the station to begin reading from this file.

   Contents of EX1:

/SAVE,EXAMPLE	Input is staged permanent dataset named EXAMPLE.
/CONTINUE,FILE1	Input switches to alternate file, FILE1.
/CONTINUE,FILE2	Input switches to alternate file, FILE2.
(RDOS end of file)	Insert EOD RCW and queue dataset.

   Contents of FILE1:

RECORD 1.	Record is blocked onto dataset.
(RDOS end of file)	Insert EOF RCW and return to EX1.

   Contents of FILE2:

RECORD 2.	Record is blocked into second file of dataset.
(RDOS end of file)	Insert EOF RCW and return to EX1.

2. The primary source file is EX2. The station command BLOCK,EX2 ↵ causes the station to begin reading from this file.

   Contents of EX2:

/SAVE,EXAMPLE	Input is staged permanent dataset named EXAMPLE.
RECORD 1.	Record is blocked onto dataset.
/EOF	Insert EOF RCW.
RECORD 2.	Record is blocked into second file of dataset.
/EOF	Insert EOF RCW.
(RDOS end of file)	Insert EOD RCW and queue dataset.

3. The primary source file is EX3. The station command BLOCK,EX3 ↵ causes the station to begin reading from this file.

Contents of EX3:

/SAVE,EXAMPLE	Input is staged permanent dataset named EXAMPLE.
/CONTINUE,FILE3	Input switches to alternate file, FILE3.
(RDOS end of file)	Insert EOD RCW and queue dataset.

Contents of FILE3:

RECORD 1.	Record is written on dataset.
/EOF	EOF is written on dataset.
/CONTINUE,FILE4	Input switches to alternate file, FILE4.
(RDOS end of file)	

Contents of FILE4:

RECORD 2.	Record is written on second file of dataset.
/EOF	EOF is written on dataset.
/RETURN	Input switches to primary file.
(RDOS end of file)	

STATION ERROR TERMINATION 6

The Data General Station aborts execution upon encountering either of two classes of errors:

Class 1

Errors involving a critical resource. In this instance the station provides information via an error code which may enable the operator to diagnose and remedy the cause of the problem and reinitiate station execution.

Class 2

Inconsistencies in the internal state of the station. This class of errors cannot normally be remedied by operator action. An image of station memory at the time of the error is saved for analysis of the problem.

The method of termination depends upon the class of the error encountered and whether the station was executing in background or foreground mode.

BACKGROUND STATION TERMINATION

Class 1

The station terminates with the following error message appearing on the 1440 display screen.

UNKNOWN ERROR CODE *code: stat*.SV

stat.SV is the station file which was executing at the time. *code* is a five digit octal error code. Refer to table 6-1 for an explanation of the error and suggested remedial action.

Class 2

The station terminates with the message BREAK appearing on the 1440 display screen. An image of station memory is contained in the file BREAK.SV. A copy of this file should be written to tape and submitted to Cray Research through Software Problem Report procedures.

FOREGROUND STATION TERMINATION

For both class 1 and class 2 errors, the station terminates with the message FG TERM appearing on the 1440 display screen. An image of station memory has been captured in the file FBREAK.SV. It is necessary to print a portion of this file to determine the error type. Enter:

FPRINT/L FBREAK.SV 342/F 357/T)

Class 1

The ascii text ERROR: appears in locations 342-344. Word 345 contains the error code to be used in conjunction with table 6-1 to diagnose the problem.

EXAMPLE:

```
340  ----   ----  042522 051117 051072 014057 000000 000000 ....ERROR: ./....
350 000000 000000 000000 032020 032212 032270 032320 032336 ......4.4.484P4^
```

14057 is the error code.

Class 2

The ascii text BREAK appears in words 342-344. The file FBREAK.SV should be saved and a copy submitted to Cray Research for analysis through a Software Problem Report (SPR).

EXAMPLE:

```
340  ----   ----  041122 042501 045440 000000 017641 177777 ....BREAK ...!..
350 027771 020363 000000 032020 032212 032270 032320 032336 /y s..4.4.484P4^
```

Table 6-1. Error code descriptions

Code†	Meaning	Causes, solutions
03*nnn* 04*nnn* 05*nnn*	Error opening, reading, or closing the command file COM.CM (FCOM.CM for foreground station)	1. CLEAR/A and reboot system 2. Disk errors
06*nnn*	Error opening the station overlay file, *stat*.OL	1. Not linked to stat.OL file 2. File *stat*.OL linked to itself 3. File *stat*.OL not contiguous 4. CLEAR/A and reboot system
07*nnn*	Error initiating a task	1. Station generated improperly (RLDR) See a systems analyst
10*nnn*	Error defining the 455 Data Screen interface	1. CLEAR/A and reboot system
12000	Invalid real time clock rate	1. Boot proper RDOS system
14*nnn*	Error opening DPO:$STAT.IQ or DPO:$STAT.OQ file	1. File linked to itself 2. Disk nearly full so that files cannot be created 3. Files in use by another program 4. CLEAR/A and reboot system
15*nnn*	Error reading or writing DPO:$STA.IQ or DPO:$STAT.OQ during initialization	1. File not contiguous 2. File less than 81 blocks (41472 characters) in length 3. File read or write protected 4. Disk errors
16000	Invalid identifier in file DPO:$STAT.IQ or DPO:$STAT.OQ (First word of file must be IQ or OQ respectively)	1. Delete DPO:$STAT.IQ or DPO:$STAT.OQ
00403	Insufficient buffer space	1. Boot proper RDOS system 2. Station generated improperly (RLDR) 3. Foreground program running with the background station

†*nnn* - RDOS error code. Refer to RDOS User's Handbook (093-000145) for error code descriptions.

Table 6-1. Error code descriptions (cont.)

Code†	Meaning	Causes, solutions
40*nnn*	Error reading a station overlay	1. *stat*.OL not a contiguous file 2. Disk errors
37*nnn*	Error reading or writing DPO:$STAT.IQ or DPO:$STAT.OQ	1. File not contiguous 2. File less than 81 blocks (41472 characters) 3. File read or write protected 4. Disk errors

† *nnn* - RDOS error code. Refer to RDOS User's Handbook (093-000145) for error code descriptions.

APPENDIX SECTION

CHARACTER SETS

Character	Card Punch	ASCII Code
NUL	12-0-9-8-1	000
SOH	12-9-1	001
STX	12-9-2	002
ETX	12-9-3	003
EOT	9-7	004
ENQ	0-9-8-5	005
ACK	0-9-8-6	006
BEL	0-9-8-7	007
BS	11-9-6	010
HT	12-9-5	011
LF	0-9-5	012
VT	12-9-8-3	013
FF	12-9-8-4	014
CR	12-9-8-5	015
SO	12-9-8-6	016
SI	12-9-8-7	017
DLE	12-11-9-8-1	020
DC1	11-9-1	021
DC2	11-9-2	022
DC3	11-9-3	023
DC4	4-8-9	024
NAK	9-8-5	025
SYN	9-2	026
ETB	0-9-6	027
CAN	11-9-8	030
EM	11-9-8-1	031
SUB	9-8-7	032
ESC	0-9-7	033
FS	11-9-8-4	034
GS	11-9-8-5	035
RS	11-9-8-6	036
US	11-9-8-7	037

Character	Card Punch	ASCII Code
SPACE	NO PUNCHES	040
!	12-8-7	041
"	8-7	042
#	8-3	043
$	11-8-3	044
%	0-8-4	045
&	12	046
'	8-5	047
(	12-8-5	050
)	11-8-5	051
*	11-8-4	052
+	12-8-6	053
,	0-8-3	054
-	11	055
.	12-8-3	056
/	0-1	057
0	0	060
1	1	061
2	2	062
3	3	063
4	4	064
5	5	065
6	6	066
7	7	067
8	8	070
9	9	071
:	8-2	072
;	11-8-6	073
<	12-8-4	074
=	8-6	075
>	0-8-6	076
?	0-8-7	077

Character	Card Punch	ASCII Code
@	8-4	100
A	12-1	101
B	12-2	102
C	12-3	103
D	12-4	104
E	12-5	105
F	12-6	106
G	12-7	107
H	12-8	110
I	12-9	111
J	11-1	112
K	11-2	113
L	11-3	114
M	11-4	115
N	11-5	116
O	11-6	117
P	11-7	120
Q	11-8	121
R	11-9	122
S	0-2	123
T	0-3	124
U	0-4	125
V	0-5	126
W	0-6	127
X	0-7	130
Y	0-8	131
Z	0-9	132
[	12-8-2	133
\	0-8-2	134
]	11-8-2	135
¬ or ↑	11-8-7	136
← or —	0-8-5	137

Character	Card Punch	ASCII Code
`	8-1	140
a	12-0-1	141
b	12-0-2	142
c	12-0-3	143
d	12-0-4	144
e	12-0-5	145
f	12-0-6	146
g	12-0-7	147
h	12-0-8	150
i	12-0-9	151
j	12-11-1	152
k	12-11-2	153
l	12-11-3	154
m	12-11-4	155
n	12-11-5	156
o	12-11-6	157
p	12-11-7	160
q	12-11-8	161
r	12-11-9	162
s	11-0-2	163
t	11-0-3	164
u	11-0-4	165
v	11-0-5	166
w	11-0-6	167
x	11-0-7	170
y	11-0-8	171
z	11-0-9	172
{	12-0	173
!	12-11	174
}	11-0	175
~	11-0-1	176
DEL	12-9-7	177

EQUIPMENT OPERATION B

This section gives a brief summary of the procedures that an operator will be expected to perform on a day-to-day basis for the disk drive, the printer/plotter, and the card reader. Consult the manufacturer's publications for additional procedures or when in doubt about one of these procedures.

Device	Publication
Calcomp Model 114D Disk Drive	Calcomp Model 114D Disk Drive Technical Manual, Part No. 76199-100
Documation M-1000 Card Reader	Documation M-1000 C Card Reader Technical Manual, Document No. M1026.
Gould 5000 Printer/Plotter	Gould 5000 Printer/Plotter Operation, Service and Maintenance Manual, Pub. No. 94-2-50006-1

CALCOMP MODEL 114D DISK DRIVE

DISK PACK EXCHANGING

1. Make certain that the POWER ON indicator is not lighted and that the disk pack is not spinning. If the POWER ON indicator is lighted, press it to turn off the light and stop the drive.
2. When the disk pack has stopped, press the cover latch (figure B-1) and lift the cover.
3. Place the disk pack cover over the loaded disk pack so that it engages the spindle. Turn counter-clockwise until the spindle clicks and lift the cover and disk pack from the drive.

CAUTION

Place one hand under the disk pack to prevent the disk pack from falling free of the cover.

4. Using its cover as a handle, place the new disk pack slowly over the spindle until it engages the spindle drive unit. Turn the disk pack cover clockwise until it reaches a stop. Lift the disk pack cover from the pack.

5. Close the main cover making sure that it latches.
6. Press the POWER ON switch.

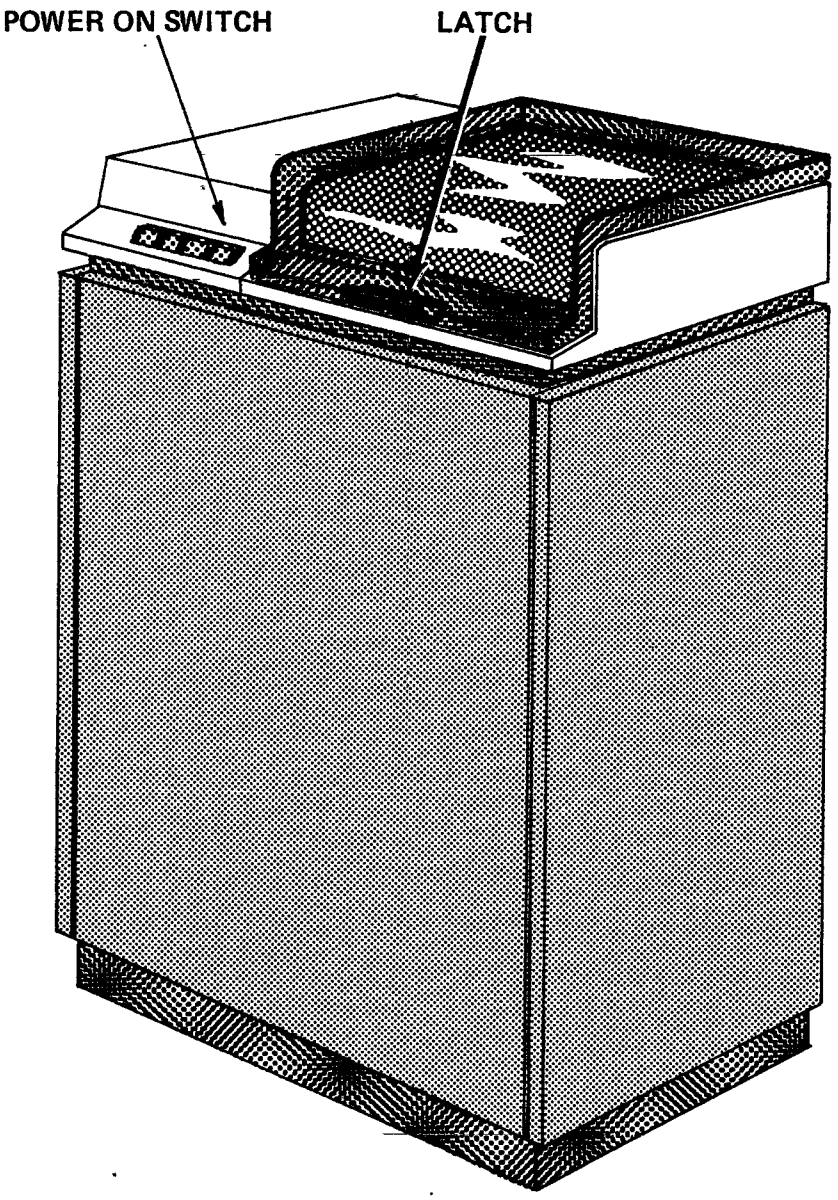


Figure B-1. CALCOMP Model 114D Disk Drive

GOULD 5000 PRINTER/PLOTTER

POWER ON

In order for the system to operate, the printer/plotter must be powered on with all interlocks satisfied. In addition, the printer must be placed in REMOTE mode to be accessible to the computer interface. Refer to figure B-2.

1. Press POWER; the indicator should light.
2. Press REMOTE; the indicator should light.

POWER OFF, PAPER LOW, ETC.

To power down the printer/plotter, thus making it inaccessible to the computer, perform the Power On sequence in reverse.

To terminate any operation in progress, press REMOTE to place the place the printer in local mode.

To extract any output remaining out of view, press the REMOTE switch and the the PAPER LOW switch.

After performing local operations, remember to return the printer to remote mode by pressing REMOTE.

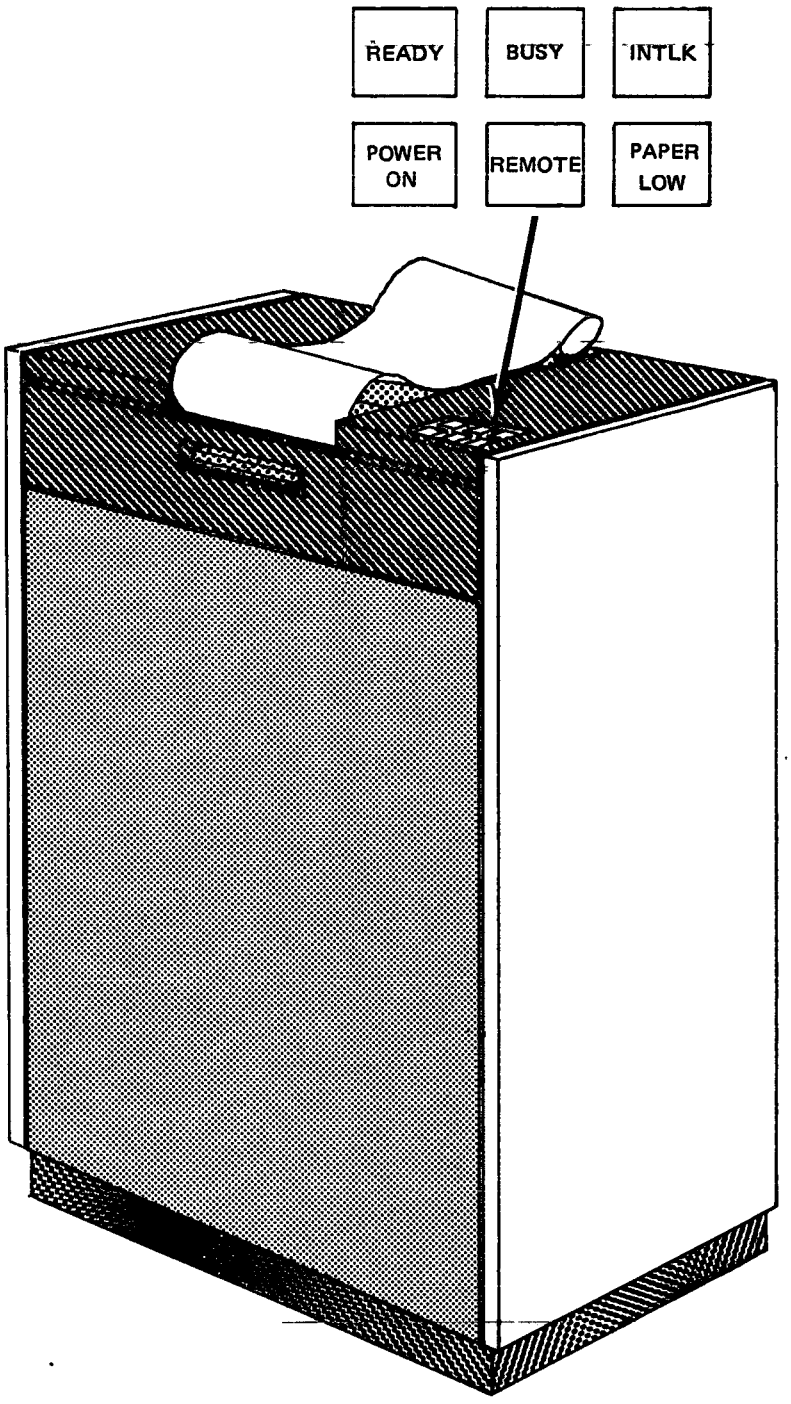


Figure B-2. Gould 5000 Printer/Plotter

LOADING THE INPUT HOPPER

Load the input hopper with punched cards to be read as follows:

a. Pull the hopper follower back with one hand and load the card deck into the hopper area; the first card to be read must be placed at the front with the "9" edge down, column "1" to the left. Continue placing cards into the hopper until it is loosely filled (approximately 1000 cards).

CAUTION

Do not pack the input hopper so full that the riffle action is inhibited.

b. The hopper may be loaded while cards are being read if the operator is careful to keep tension on the front portion of the deck while loading additional cards at the rear. This is accomplished with the input hopper approximately one-half to one-third full. Use just enough pressure to maintain the riffle action.

c. Unloading the input hopper is the reverse of the loading procedure. Normally all cards are processed through the reader; however, if it is necessary to unload the hopper, pull the follower back and remove the card deck.

UNLOADING STACKER

To unload the stacker, perform the following steps.

a. Pull stacker follower forward with one hand and remove the front or rear portion of the card deck from the stacker area, being careful that the deck order is maintained.

b. To unload stacker during operation, pull stacker forward and remove portion of deck taking care to allow stacker plate to return to its normal position gently.

CONTROLS AND INDICATORS

Reader controls and indicators are located on the front control panel, (figure B-3) the rear of the card cage, and the rear subframe.

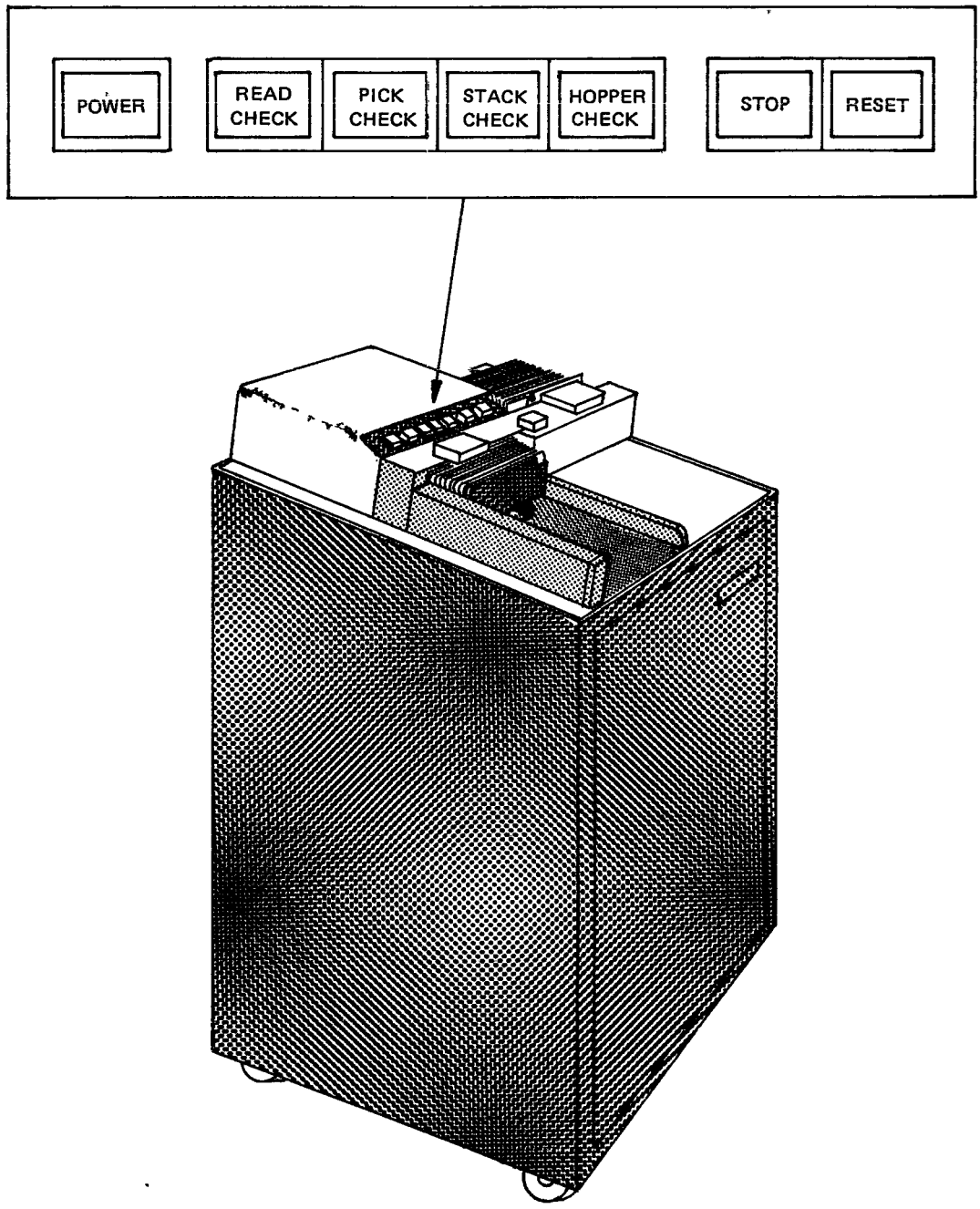


Figure B-3. Documation M-1000 Card Reader

CARD READER OPERATIONAL PROCEDURES

The following procedures explain both the operational sequence and some of the theory associated with the controls and indicators for the card reader.

a. Place the AC power circuit breaker in the ON position to allow power ON/OFF control from the front panel.

b. Select the mode of operation, MANUAL or AUTO. When the MANUAL mode is selected, the drive motor and vacuum/blower will run continuously when AC power is applied. When the AUTO mode of operation is selected, all motors will turn off after the last card is read.

c. The second mode switch is used to select either REMOTE or LOCAL operation. When LOCAL operation is selected, card reader operations are controlled from the operator's control panel. In normal operation the card reader is connected to the appropriate interface logic and the switches should be in AUTO and REMOTE positions.

d. With the LOCAL mode of operation established, press the POWER switch on the front panel to apply primary power to the reader. The drive motor and vacuum/blower will not come on at this time due to the input hopper being empty and AUTO shutdown selection.

e. Press the LAMP TEST switch and check that all front panel indicators are lighted.

f. Load the input hopper and press the RESET switch. The RESET switch is a momentary action pushbutton indicator used to clear any error conditions and establish the card reader "ready" condition. When the "ready" condition is established, the RESET indicator will light green. All motors will start and riffling action begins on the first half inch of cards.

g. As the cards are being read, the PICK CHECK indicator will light if a card has failed to reach the read head after a pick command has been given. Inspect the cards in the input hopper for excessive leading edge damage, interlocked webs or cards stapled together. If no apparent card damage is present, check for excessive card warpage.

h. The READ CHECK indicator will light and the "stop" condition will be established when any of the following conditions are detected.

1. Failure of leading or trailing edge dark check.
2. Failure of trailing edge light check.
3. Card slippage.
4. Control logic failure.

i. The STACK CHECK will light if the previous card read has not reached the output stacker. Check the card track to make sure it is clear and check the output stacker for incorrectly stacked cards.

j. The HOPPER CHECK indicator will light when the input hopper is empty or when the output stacker is full. This is normal operation.

k. The STOP switch is a momentary action pushbutton switch indicator used to terminate card reader operation at the end of a ready cycle. The STOP indicator will light red when the "stop" condition is established.

DISK PACK PROCEDURES C

INITIALIZATION

The following procedure tells how to load the Eclipse station software from the deadstart tape onto the Eclipse disk pack. Procedures for generating this tape are provided in the CRAY-OS System Programmer's Handbook, Cray Research publication 2240012.

Perform the initialization procedure whenever the RDOS disk pack becomes unusable (for any of a myriad of reasons, usually indeterminable). There are two levels of initialization: partial and full.

PARTIAL INITIALIZATION

A partial initialization is less severe than a full initialization and involves replacing the disk copy of RDOS with a new copy from tape. No files are lost in this process. The recommended procedure is to first attempt a partial initialization although it seldom seems to correct any disk pack problem.

This procedure assumes that the operator has performed the Power On procedure given in section 2.

1. Mount the current RDOS deadstart tape on tape unit 0 and press LOAD and ONLINE.
2. Flip up the RESET/STOP switch.
3. Set the Eclipse panel switches to 100022_8.
4. Flip up the PR LOAD switch.
   The tape moves slightly as the first file is loaded into Eclipse memory.
5. The following dialog then occurs at the 1440 display terminal.

	Message	Operator response
a.	FROM MTO:	2 ↵
b.	FULL(F) OR PARTIAL (P OR <CR>)?	↵
c.	INITIALIZING WHAT DISK?	DPO ↵
d.	DATE (M/D/Y)?	mm/dd/yy ↵
e.	TIME (H:M:S)?	hh:mm:ss ↵

   The partial initialization is complete when R appears.

FULL INITIALIZATION

If a partial initialization fails to correct the problem, a full initialization is indicated. A full initialization takes about 5 minutes and destroys all disk files.

> NOTE
>
> For a particularly severe problem or for a new pack, first reformat the pack as described in the next section of this appendix.

1. Perform steps 1 through 5a as for a partial initialization.
2. Respond F ↵ to the message FULL(F) OR PARTIAL (P OR <CR>)? and complete steps 5c through 5e.
3. Enter the following commands:

   a. INIT MTO ↵

   b. LOAD/A MTO:(3,6,9) ↵

      After the files have been loaded, the tape rewinds and R appears.

   c. RELEASE DPO ↵

      The message MASTER DEVICE RELEASED appears.

4. Set the Eclipse panel switches to 100022_8.
5. At the Eclipse, flip up the PR LOAD switch.
6. The following dialog then occurs at the 1440 display terminal.

	Message	Operator response
a.	FROM MTO:	5 ↵
b.	BOOTSTRAP DEVICE SPECIFIER?	DPO ↵
c.	INSTALL BOOTSTRAP (Y OR N)?	Y

The console bell sounds. There is no other response. The disk bootstrap program is now on disk enabling subsequent disk recoveries without tape.

The pack has been initialized and released. It can be powered off and removed or the RDOS system can be activated in the normal program initialization procedure.

FORMATTING AN ECLIPSE DISK PACK

Data General programs provide for formatting and flaw testing of a disk pack. The current formatting program is the RDOS Rev. 6 program, DKINIT. If this program fails, the RDOS Rev. 4 program, DPDF may need to be run.

REV 6 FORMATTING PROCEDURE

This procedure assumes that the Power On procedure has been performed.

1. Mount the current RDOS tape onto magnetic tape unit 0 and press LOAD and ONLINE.
2. Mount the pack to be formatted and power on the disk drive.
3. At the Eclipse:
   a. Flip up the RESET/STOP switch.
   b. Set the Eclipse panel switches to 100022_8.
   c. Flip up the PR LOAD switch.

   The tape moves slightly when the first file is loaded into Eclipse memory.
4. The following dialog then occurs at the 1440 display terminal.

	Message	Operator response	
a.	FROM MTO:	4 ↵	
b.	DISK INITIALIZER - REV. 06.20 DISK DRIVE MODEL NUMBER?	4057 ↵	
c.	4057 DRIVE TYPE DISK UNIT?	DPO ↵	
d.	COMMAND?	FULL ↵	
e.	COMMAND DESTROYS ANY PREVIOUS DISK STRUCTURE RDOS INIT/F MUST BE DONE ON DISK AFTER COMMAND TYPE CONTROL-A NOW TO ABORT WITHOUT LOSS.		
	NUMBER OF PATTERNS TO RUN (1-5)?	1 ↵	Enter 5 if formatting new pack.
	*** PATTERN # 1 (155555) ***		
	Formatting begins and takes about 10 minutes per pattern. If any bad blocks are discovered, a message appears on the screen and the bad block address is recorded by the program in the bad block table.		

NOTE

If a large number of flaw messages appears or if the message DRIVE UNSAFE OR ADDRESS ERROR appears, refer to Rev 4 formatting procedure.

	Message	Operator response
f.	DO YOU WISH TO DECLARE ANY BLOCKS BAD THAT ARE NOT ALREADY IN THE BAD BLOCK TABLE?	NO)
g.	DEFAULT REMAP AREA SIZE IS 12 BLOCK(S) LONG IT NEEDS TO BE AT LEAST 0 BLOCK(S) LONG REMAP AREA SIZE (TYPE RETURN FOR DEFAULT)?	)
h.	REMAP AREA START BLOCK NUMBER (TYPE RETURN FOR DEFAULT)?	)
i.	DEFAULT FRAME SIZE IS 83, MIN IS 1, AND MAX IS 4060 DISK FRAME SIZE (TYPE RETURN FOR DEFAULT)?	)
j.	FULL DISK INIT COMPLETE COMMAND?	STOP)

REV 4 FORMATTING PROCEDURE

An apparent deficiency in the Rev 6 Disk Initializer may cause it to abort with the message DRIVE UNSAFE OR ADDRESS ERROR. This necessitates running the Rev 4 Formatter, DPDF, followed by repeating the Rev 6 procedure.

1. At the Eclipse panel:
   a. Set the panel switches to 100022_8.
   b. Flip up the RESET/STOP switch.
   c. Flip up the PR LOAD switch.

2. At the 1440 display terminal, respond 10 to the message FROM MTQ.

3. At the magnetic tape unit:
   a. Press RESET and REWIND.

      The tape rewinds.

   b. Press RESET and ONLINE.
4. At the Eclipse panel:
   a. Set the panel switches to 000000.
   b. Flip down the START/CONT switch.
   c. The message TYPE UNIT NUMBER appears, respond with 0.

      Formatting begins and takes about 8 minutes after which the message FORMATTING DONE appears.
5. Repeat the Rev 6 formatting procedure.

COMMAND RESPONSES D

ALREADY LOGGED ON
CHANNEL ERROR
CHANNEL PARITY ERROR
CONCENTRATOR FUNCTION REJECT
CRAY-1 FUNCTION REJECT
CRAY-1 MESSAGE RETRY COUNT EXCEEDED
CRAY-1 NOT RESPONDING
CREATE ERROR: *RDOS message*[†]: *filename*
CTRL-A PAUSE
DELETE ERROR: *RDOS message*[†]: *filename*
FILE IS EMPTY: *filename*
FILE NOT RANDOM OR CONTIGUOUS: *filename*
FILE STATUS ERROR: *RDOS message*[†]: *filename*
FUNCTION RESTRICTED TO OPERATOR
ILLEGAL FORMAT FOR INFORMATION
ILLEGAL INFORMATION FOR MODE
ILLEGAL MODE FOR DEBUG FUNCTION
  Refer to CRAY-OS System Programmer's Handbook for debug functions.
ILLEGAL REQUEST FOR MODE
INCOMPATIBLE SEGMENT SIZE
INVALID COMMAND KEYWORD: *keyword*
INVALID CONCENTRATOR REPLY MESSAGE
INVALID FILE NAME: *filename*
INVALID PARAMETER: *parameter*
LINE ALREADY ACTIVE
LINE NOT ACTIVE
LINE NOT INITIALIZED
NO BUFFER SPACE AVAILABLE
NO RDOS CHANNEL AVAILABLE

[†]Refer to Data General documentation of RDOS error messages.

NOT LOGGED ON
OPEN ERROR: *RDOS message*[†]*: filename*
PRINTER IS IN USE
QUEUE IS FULL
READ ERROR: *RDOS message*[†]*: filename*
REQUIRED PARAMETER MISSING
SPECIFIED JOB NOT FOUND
TASK INITIATION ERROR: *RDOS message*[†]
UNABLE TO INITIALIZE LINE
UNDEFINED ERROR CODE
WRITE ERROR: *RDOS message*[†]*: filename*

[†]Refer to Data General documentation of RDOS error messages.

HARDWARE STATUS MESSAGES

MODEM NOT READY

FORMAT: MODEM NOT READY

Communications line is active but the modem is not ready (concentrator or remote station only).

PARITY ERROR

FORMAT: *n mode* E=*t* R=*m* S=*synbits* A=*addr*

n	Number of errors
mode	OFF, FIRST, or SCAN
t	Error type: C - correctable U - uncorrectable
m	Read mode: S - scaler I - I/O V - vector F - fetch
synbits	Syndrome bits (0 - 377_8)
addr	Parity error address (0 - 3777777_8)

READERS COMMENT FORM

CRAY-1 DATA GENERAL STATION (DGS) OPERATORS GUIDE 2240006 E

Your comments help us to improve the quality and usefulness of our publications. Please use the space provided below to share with us your comments. When possible, please give specific page and paragraph references.

NAME _____

JOB TITLE _____

FIRM _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CRAY RESEARCH, INC.

CUT ALONG THIS LINE

FOLD

STAMP

Attention:
PUBLICATIONS

CRAY RESEARCH, INC.
1440 Northland Drive
Mendota Heights, MN 55120

FOLD

STAPLE

Cray Research, Inc.
Corporate Addresses

General Offices

Corporate Headquarters
1440 Northland Drive
Mendota Heights, Minnesota 55120

≈

Manufacturing
Industrial Park
Chippewa Falls, Wisconsin 54279

Sales Offices

Domestic
Eastern Regional Sales
10750 Columbia Pike, Suite 602
Silver Spring, Maryland 20901

≈

Central Regional Sales
1440 Northland Drive
Mendota Heights, Minnesota 55120

≈

Mountain Regional Sales
75 Manhattan Drive, Suite 3
Boulder, Colorado 80303

Houston District (Petroleum)
3121 Buffalo Speedway, Suite 400
Houston, Texas 77098

≈

Western Regional Sales
1010 Continental Boulevard, Suite 456
El Segundo, California 90245

Seattle District
536A Medical and Dental Building
Everett, Washington 98201

≈

International
Cray Research (U.K.) Limited
James Glaisher House
Grenville Place
Bracknell, England

CRAY RESEARCH, INC.