

3600

3800

COMPUTER SYSTEMS
DRUM SCOPE / MSIO
OPERATING GUIDE

CONTROL DATA
CORPORATION

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The Drum SCOPE operating system for the CONTROL DATA® 3600/3800 Computer uses drum storage as the principal input/output device. All disk processing is done through MSIO (Mass Storage Input/Output) under the Drum SCOPE operating system.

The drum contains the system library (COMPASS, FORTRAN, etc.), some of the background programs, parts of the operating system (system overlays), and production programs (preloaded versions of frequently used library programs which can be brought into core several times faster than standard library programs). The drum is also used for scratch units, standard output, punch, etc., except when they are specifically equipped to some other device by a programmer.

Drum SCOPE assigns logical unit numbers to physical units, selects an available channel, stacks a request if no channel is available, responds to external interrupts, initiates input/output operations, and locates or initiates a continuation tape to complete an operation.

Drum SCOPE requires the following hardware:

- 3600/3800 Storage Module (called bank 0)
- 3600/3804 Computation Module
- 3600/3802 Communication Module
- 3600/3806 Data Channel
- 3600/3800 Console Typewriter
- Drum Storage System
- Card Punch System
- Card Reader System
- Line Printer System
- Magnetic Tape System (2 tapes minimum)

MSIO requires the following additional hardware:

- 3600/3800 Storage Module (called bank 1)
- 828 Disk System
- or
- 813/814 Disk System

2.1 OPERATOR'S BRIEFING

Interaction between the operator and the Drum SCOPE system takes place via the interrupt key and the typewriter. The maintenance console should not (normally) be touched except for the stop keys.

Do not change any dial settings, or change the state of any equipment during its operation. Never unload tape units manually; instead, use the appropriate typewriter input statement. If a new tape is introduced into the system, it must be blanked with the BLANK operator statement before it may be used.

Operators familiar with Tape SCOPE should note that autoloader recovery differs in Drum SCOPE.

Operating Environment

I/O on the drum channel will be almost continuous. The printer will be in use virtually the entire job run; should it stop, the operator should immediately determine why and take corrective action.

The printer will stop when it is out of paper or NOT READY.

Typewriter

The operator and the Drum SCOPE system communicate through the console typewriter which is called the Input Comment Medium (ICM) when the operator uses it and the Output Comment Medium (OCM) when the system uses it.

To type in a statement to the system:

1. Press INTERRUPT to alert the system.
2. When the TYPE-IN light comes on, type the statement.
3. To cancel a partial statement, type an apostrophe and press carriage return before another attempt.
4. Conclude the statement with a carriage return.

Blanks are ignored by the system. A carriage return as the first non-blank entry is ignored. If the input statement is not acceptable to the system, it will respond by typing a series of question marks.

2.2 HARDWARE DESIGNATIONS

The hardware designate is a 3- or 4-character code indicated by hhmn. The hh refers to a hardware type mnemonic as listed below:

CP	card punch
CR	card reader
CT	console typewriter
DR	drum
LP	line printer
MT	magnetic tape unit

The mn is a 1- or 2-digit octal hardware unit number.

Examples:

MT0
LP2
MT4
MT16

2.3 READYING SYSTEM

The Drum SCOPE system is initialized by autoloading an external library (Drum SCOPE Master). It contains the routine PREDRUM which processes the rest of the library, loads the resident part of the system into core, and places the system overlays and production programs on the drum.

For ease in reloading the system, an internal library tape may be prepared. This tape is a copy of the system in absolute form as contained in core and on the drum. Since it is created at the conclusion of external library tape processing, an autoloading internal library tape will not perform drum or unit checking. The status of all units (up or down), when the internal library tape is prepared, will prevail for all subsequent autoloadings of that tape. Similarly, drum problems that arise during normal processing will not be detected on a subsequent autoloading of an internal library tape. To facilitate recovery, the system is set up so it may be autoloading from the drum, whether or not an internal library tape has been made.

Hardware Setup

1. The typewriter margins are usually set at columns 1 and 81. Set a single tab stop at about column 41 so that messages from background programs will be indented for easy recognition.
2. Mount the library tape; select the correct density and ready it at loadpoint. For an external library, dial the unit indicator to 0; for an internal library, dial the unit indicator to 1. (The units may vary with the installation.)
3. If an internal library is to be prepared, mount a scratch tape and ready it at loadpoint. Dial the unit indicator to 1.
4. Set console switches:

CARD INPUT	}	NORMAL
TEST MODE		
DISCONNECT P		
SWEEP		
STEP MODE		
BREAKPOINT		OFF
STOP-1		ON if category-1 messages are desired. (Chapter 3)
STOP-2		ON if category-2 messages are desired. (Chapter 3)
STOP-3		ON if category-3 messages are desired. (Chapter 3)
SENSE SW 6		ON <u>only</u> if an external library is to be autoloaded <u>and</u> an internal library tape is to be prepared.

5. Set Autoload dials:

Channel	Channel of unit from which the library will be loaded.
Connect	E0uu (E is the equipment number of the library-loading unit, uu is the unit number).
Function	0013 for a labeled tape library. 0010 for an unlabeled tape library (an internal library tape is always unlabeled). 0041 for autoload from the drum

Autoload of System

The sequence of events at this point depends upon the type of library to be autoloaded. Diagnostics for this phase are shown on page 3-2. †

External Library

1. Press AUTO LOAD.
2. A portion of the library is transferred to core.
3. The system performs drum write checks to assure that the drums are OK. During this phase, there is no discernible activity on the console for approximately 50 seconds for each drum known to the system.
4. The remainder of the library is transferred to core and/or the drum(s).
5. If SENSE Sw 6 is On, an internal library is written on MT01. The tape is then rewound.
6. Recovery information is written on the drum.
7. The first standard message on OCM from the system is DATE? followed by ? on the next line. The TYPE-IN light will come on.
8. Type in the 6-digit current date (mmddy) on ICM. Indicate statement completed with a carriage return.
9. The second message from the system, TIME? will appear. Type in a time of day (hhmmss) on the ICM; conclude with carriage return.
10. The system will then type READY?

Blank label all new tapes. (New tapes do not have EOF marks and require blank labeling.) For each tape, press INTERRUPT and type in:

BLANK,MTxx (xx is the tape unit number)

followed by carriage return.

† MISSING EOF generally indicates that the autoload tape is being loaded in the wrong density.

Also, if any units are to be declared inoperable, press INTERRUPT and type in:

DOWN, hhhh

followed by carriage return.

11. Press INTERRUPT, type in GO, followed by carriage return.
12. The system will type a list of down units, followed by LOADED <name> for each resident background program.
13. Except when autoloading from the drum, maps of the system and production programs will begin printing provided the printer is up and ready. Should the printer be down or not ready, printing will begin when the condition is corrected.
14. An idling pattern will appear on the D-register display whenever the system is waiting for input. Diagonal lines of lights move upward toward alternate corners of the register.

Internal Library

1. Press AUTO LOAD.
2. The core and drum portions of the library are restored from the tape. Once this action is initiated, SENSE Sw 6 (if On) should be turned Off.
3. The remainder of the procedure is as specified in items 6 through 14 above.

Drum Library

1. Press AUTO LOAD.
2. The remainder of the procedure is as specified in items 7, 8, 9, 10, 11, 12 and 14 of the external library procedure.

The operating system supplies information via OCM to the operator. These messages are of three basic types: (1) those produced by the system, (2) those output from the background programs, and (3) MSIO messages. The MSIO communication concerning disk operations is fully described in Chapter 5. All background program messages are indented to the first selected tab stop.

3.1 MESSAGE CATEGORIES

Since the occurrence of some of the messages, as well as their contents, are subject to the status of the maintenance console STOP switches, they are classified as belonging to one of four categories (0 through 3). Only messages of categories 1, 2, and 3 are affected by the STOP switches.

All category 0 messages appear unconditionally, regardless of STOP switch settings. This category includes all messages not explicitly defined to be in categories 1, 2, or 3.

Category 1 messages provide minimal job identification; they will appear if STOP switch 1 is On:

```
JOB,seq  
CRP mnnnn seq, pri, c  
END, seq  
BK. PU PUNCHING, seq
```

Category 2 messages provide additional accounting information (such as time, optional comments, etc.) and appear if STOP switch 2 is On.

```
JOB, seq, t, c  
END, seq, t
```

Category 3 messages provide job running information, diagnostics, etc.; they appear only if STOP switch 3 is On:

```
NOEX  
SKIP, diagnostic  
TERM, diagnostic  
LIBRARY ERRORS
```

3.2 AUTOLOAD DIAGNOSTICS

The following messages may be generated during the autoloading phase of the system. The system analyst and/or customer engineer should be notified if any are encountered.

<u>Message</u>	<u>Generating Routine</u>
AET DATA MISSING	PREDRUM
BAD DRUM <unit number, head group number>	PREDRUM
BINARY CARD WITH ILLEGAL WORD COUNT	PREDRUM
BIN RECORD TOO LARGE TO PROCESS	PREDRUM
BLSIZE NOT DEFINED	PREDRUM
BOUND VIOLATION IN LOADING	PREDRUM
CHECKSUM ERROR	PREDRUM
.CWORDS NOT DEFINED	PREDRUM
DCODES DATA MISSING	PREDRUM
DUPLICATE HARDWARE MNEMONIC IN HTL DATA	PREDRUM
DUPLICATED AET ENTRY	PREDRUM
DUPLICATED DISPOSITION CODE ENTRY	PREDRUM
DUPLICATED ENTRY IN PNL DATA	PREDRUM
DUPLICATED ENTRY IN RDL DATA	PREDRUM
DUPLICATED SYSUNIT DATA	PREDRUM
EOF IN PRODUCTION CODE	PREDRUM
FILE CARD MISSING	BOOT
FUDGE NOT DEFINED	PREDRUM
HARDWARE TYPE DR NOT DEFINED IN HTL	PREDRUM
HTL DATA MISSING	PREDRUM
ILLEGAL ACC	PREDRUM
ILLEGAL BCD CD	AUTOLOAD
ILLEGAL BCD RECORD ON INP	PREDRUM
ILLEGAL BINARY RECORD	PREDRUM
ILLEGAL CHANNEL FORMAT IN AET DATA	PREDRUM
ILLEGAL CHANNEL NO. IN AET DATA	PREDRUM
ILLEGAL DATA FORMAT IN AET DATA	PREDRUM

<u>Message</u>	<u>Generating Routine</u>
ILLEGAL DATA SET IN SYSUNIT FILE	PREDRUM
ILLEGAL DELINEATOR (=)	PREDRUM
ILLEGAL DISPOSITION CODE	PREDRUM
ILLEGAL EOF	AUTOLOAD
ILLEGAL EOF ON INP	PREDRUM
ILLEGAL EOP CODE IN HTL DATA	PREDRUM
ILLEGAL EQUIPMENT NO. IN AET DATA	PREDRUM
ILLEGAL FILE CD	PREDRUM and AUTOLOAD
ILLEGAL HARDWARE MNEMONIC IN AET DATA	PREDRUM
ILLEGAL HARDWARE MNEMONIC IN HTL DATA SET	PREDRUM
ILLEGAL HARDWARE MNEMONIC IN RDL DATA	PREDRUM
ILLEGAL ICM DESIGNATE IN SYSUNIT DATA	PREDRUM
ILLEGAL LAT STRING	PREDRUM
ILLEGAL OCM DESIGNATE IN SYSUNIT DATA	PREDRUM
ILLEGAL PUNCH ON CARD	PREDRUM
ILLEGAL RESIDENT IOC CARD	PREDRUM
ILLEGAL RETURN	PREDRUM
ILLEGAL UNIT DESIGNATE IN AET DATA	PREDRUM
ILLEGAL USE OF B SUFFIX IN PARAMS DATA	PREDRUM
IMPROPER DECK FORMAT	PREDRUM
IMPROPER DECK FORMAT IN LIB FILE	PREDRUM
IMPROPER SYMBOL IN HTL DATA SET	PREDRUM
IMPROPERLY FORMATTED BINARY CARD	PREDRUM
IMPROPERLY FORMATTED HTL DATA RECORD	PREDRUM
IMPROPERLY FORMATTED PARAMS DATA	PREDRUM
IMPROPERLY FORMATTED SYSUNIT DATA	PREDRUM
INCOMPLETE PRODUCTION PROGRAM	BOOT
. LEQPERM NOT DEFINED	PREDRUM
LIB DIRECTORY TOO LARGE	PREDRUM
LINP NOT DEFINED	PREDRUM

<u>Message</u>	<u>Generating Routine</u>
LOADER ERROR (0)	AUTOLOAD
LOADER ERRORS IN PRODUCTION PROGRAM	BOOT
LPOOL NOT DEFINED	PREDRUM
LSCR NOT DEFINED	PREDRUM
MISPLACED BINARY CARD	PREDRUM
MISSING EOF	PREDRUM and AUTOLOAD
MISSING LAT DATA	PREDRUM
MISSING NAMED EPT CARD	BOOT
NBUFS NOT DEFINED	PREDRUM
NCPFAMS NOT DEFINED	PREDRUM
NCPLUN NOT DEFINED	PREDRUM
NCPLUNS NOT DEFINED	PREDRUM
NO DRUM UNITS IN AET	PREDRUM
NO *PROGRAM CARD	BOOT
PARAMS DATA MISSING	PREDRUM
POOL AREA ON DRUM EXHAUSTED	PREDRUM
PRESS START TO CONTINUE	AUTOLOAD
PSL NOT DEFINED	PREDRUM
RBD DATA OUT OF RANGE	PREDRUM
READY DRUM UNIT <unit no. > AND PUSH START	PREDRUM
RELOCATION BYTE ERROR	PREDRUM
REPEATED DATA SET IN SYSTEM FILE	PREDRUM
RUNRELOC NOT DEFINED	PREDRUM
SYMBOL MISSING IN SEPT	PREDRUM
SYSUNIT DATA MISSING	PREDRUM
UNDEFINED ENTRY POINT	BOOT
UNDEFINED EXT IN NONRESIDENT CODE	PREDRUM
UNDEFINED EXT SYMBOL IN <program name> <ext symbol>	PREDRUM
UNREADABLE CARD	PREDRUM
UNREADABLE RECORD ON INP	PREDRUM
UNRECOGNIZABLE FORMAT-SYSUNIT DATA	PREDRUM
VECTOR NOT DEFINED	PREDRUM

**3.3
MESSAGES FROM
THE SYSTEM**

<u>Message</u>	<u>Category</u>
<p>?????</p> <p>The last input statement entered was unintelligible. Reintroduce the statement after verifying its legality.</p>	0
<p>@ comment</p> <p>The operator is requested to perform the action specified by the user.</p>	0
<p>@ ?</p> <p>Respond with the action designated in the previous @ comment message.</p>	0
<p>dc, state, p, seq</p> <p>dc data string disposition code</p> <p>state active/inactive indicator</p> <p style="padding-left: 40px;">A currently active string</p> <p style="padding-left: 40px;">I currently inactive string</p> <p>p priority of the string</p> <p>seq sequence number associated with the string</p> <p>Message received in response to a MAP input statement. The message is repeated for each string known to the system.</p>	
<p>hhnn ASSIGNED</p> <p>hhnn hardware designate</p> <p>Message received in reply to an input STATUS statement, where the designated unit is currently assigned to a program.</p>	0
<p>hhnn AVAILABLE</p> <p>hhnn hardware designate</p> <p>Message received in reply to an input STATUS statement, where the designated unit is un-assigned, ready, up, has a blank label or an expired retention code, and a write ring.</p>	0

<u>Message</u>	<u>Category</u>
<p>hhnn DOWN</p> <p style="padding-left: 40px;">hhnn hardware designate</p> <p style="padding-left: 40px;">Message received in reply to an input STATUS statement, where the designated unit is inoperable.</p>	0
<p>hhnn(label id.), LU = nn, ED = nn, RL = nn, RT = nnn, DATE = nnnnnn</p> <p style="padding-left: 40px;">hhnn hardware designate</p> <p style="padding-left: 40px;">label id. label identifier (14 characters)</p> <p style="padding-left: 40px;">LU logical unit number (2 digits)</p> <p style="padding-left: 40px;">ED edition number (01-99)</p> <p style="padding-left: 40px;">RL reel number (01-99)</p> <p style="padding-left: 40px;">RT retention code (000-999)</p> <p style="padding-left: 40px;">DATE creation date (format mmddyy)</p> <p style="padding-left: 40px;">Message received in reply to an input STATUS statement, where the designated unit contains the specified labeled file.</p>	0
<p>hhnn NO RING</p> <p style="padding-left: 40px;">hhnn hardware designate</p> <p style="padding-left: 40px;">Message received in reply to an input STATUS statement, where the designated unit is unlabeled and has no write ring.</p>	0
<p>hhnn NOT READY</p> <p style="padding-left: 40px;">hhnn hardware designate</p> <p style="padding-left: 40px;">Message received in reply to an input STATUS statement, where the designated unit is in a not ready condition.</p>	0

<u>Message</u>	<u>Category</u>
hhmn PARITY ON LABEL	0
<p>hhmn hardware designate</p> <p>An irrecoverable parity error occurred on the designated unit while trying to write a label. Mount another scratch tape on the unit. The faulty tape should be stripped.</p>	
CAN-T LOAD background program name	0
<p>Message received in reply to an input LOAD statement. The named program either does not exist or could not be loaded due to core requirements. If the named program does exist, try the LOAD request statement at a later time.</p>	
DEMANDS, seq, hhmn	0
<p>seq job sequence number</p> <p>hhmn hardware designate</p> <p>The system writes this message when hardware requirements on the DEMAND card are not met. The user is attempting to reserve equipment for his job. The operator may:</p> <p>(a) Respond with the statement HOLD.</p> <p>The system will place the job in a held (suspended) state and attempt to select the job in its normal sequence.</p> <p>To remove a job from a held state, the operator may use the input statement, RETRY, seq. This statement causes the system to resume normal selection procedures for the job specified by seq. DEMANDS which are not met are written on OCM when the job is to be processed.</p> <p>(b) The reply statement NONE is used if the equipment will not become available; the requested job is terminated.</p> <p>(c) If the equipment is located, type in GO; the DEMAND card will be processed again. The operator may wait for currently assigned equipment to be released to make the necessary equipment available, or he may use the input statement UP.</p>	

<u>Message</u>	<u>Category</u>
DISASTER FROM loc	0
<p style="margin-left: 40px;">loc octal memory address</p> <p style="margin-left: 40px;">This message occurs when the system detects an error from which it has no means of recovery. The condition was detected at the specified location. See Chapter 5 for methods of recovery.</p>	
DISPLAY	
<p style="margin-left: 40px;">See Appendix A.</p>	
DRUM IS ERROR FREE	0
<p style="margin-left: 40px;">The system has performed sufficient error-free drum writes to assure that the drum is OK. Subsequent drum writes will be performed without write checks; the drum will operate in HI gear.</p>	
DRUM PARITY ERROR	0
<p style="margin-left: 40px;">A parity error was encountered on the drum. If this message appears frequently, the system should be placed in low gear with the GEAR, LO input statement. After the drum has operated for some time in low gear with no further parity error messages, the GEAR, HI input statement may be used to increase running speed.</p>	
END, seq, t	1, 2
<p style="margin-left: 40px;">seq job sequence number</p> <p style="margin-left: 40px;">t elapsed time in seconds; appears only if STOP switch 2 is On.</p> <p style="margin-left: 40px;">The specified job has terminated. This message will appear only if STOP switches 1 and/or 2 are On.</p>	

<u>Message</u>	<u>Category</u>
JOB, seq, t, c	1, 2
<p>seq job sequence number</p> <p>t time limit (in seconds) from JOB card</p> <p>c contents of the JOB card comment or ID field of JOB card depending on a system assembly option.</p> <p>Execution of the specified job has been initiated. This message appears only if STOP switches 1 and/or 2 are On. The parameters t and c will appear only if STOP switch 2 is On.</p>	
LOADED background program name	0
<p>Message received in reply to an input LOAD statement. The named background program has been loaded and activated.</p>	
NEED lun = hh = (label id.), ED = , RL = , DATE =	0
<p>lun logical unit number (2 digits)</p> <p>hh hardware type (usually MT)</p> <p>label id. label identifier (14 characters) or UNLABELED</p> <p>ED edition number (01-99)</p> <p>RL reel number (01-99)</p> <p>DATE creation date (mmddy)</p> <p>The system could not locate the specified input file on a unit of the designated type.</p> <p>If no label information appears in the message, the system could not find an available output unit.</p> <p>If UNLABELED appears in place of a label identifier, the programmer requested a deferred assignment tape for output.</p>	

Message

Category

The operator should attempt to locate the unit containing the specified file and verify that the unit is ready and contains the proper label (if any). The operator may use the input statements STATUS, UP, BLANK, UNLOAD and also MTxx or ASSIGN, MTxx to assist in this procedure. When the operator types GO, the system attempts to locate and automatically assign the unit. If the file does not exist, or no unit is available, the operator informs the system that the request cannot be honored by typing NONE. The requesting program will be terminated. Note: The actual assignment must be made by the system; the operator cannot force an assignment.

NOEX

3

This message appears when the execution phase of a job was deleted because errors were returned from a library routine. The subsequent SKIP message contains a diagnostic indicating the cause.

NOT CODED

0

The action specified by the last input statement has not been implemented. The statement is ignored.

NOT PRESENT

0

This message appears in response to the last input statement referring to a background program. The background program is not currently in core.

OVERFLOW

0

An overflow condition exists on the drum. Central program execution is suspended until the operator types GO; the program request that produced the overflow will be repeated.

Message

Category

SCOPE attempts to alleviate the drum overflow condition by transferring information to tape. If this is impossible, the system awaits the normal release of drum area by background programs. For instance, a background program may complete printing a data string. The operator is notified that the overflow condition exists, and he may load BK. DU to remove data from the drum. If no tape is available for the overflow and there is at least one unassigned tape unit, the operator will be instructed to mount a blank tape.

PAUSE

0

A PAUSE control card has been encountered while processing the central program. After performing the action specified by the previous comment message, the operator may resume processing by typing GO.

PRESENT background program name

0

Message received in reply to an input LOAD statement. The named background program is already in core and activated.

**3.4
MESSAGES FROM
BACKGROUND
PROGRAMS**

Background program messages appear on the OCM indented to the first selected tab stop; the name of the generating program prefixes the message.

From BK. BT (Background Trouble)

Category

BK. BT ASSIGN 1, BT REJECTED

0

The request to assign a BT string was rejected. This can happen only if the disposition codes list does not contain BT. Inform the system analyst of the condition.

BK. BT BACKGROUND PROGRAM ABORTED

0

A background program has been terminated. A subsequent message will indicate the name of the program.

<u>From BK. BT (Background Trouble)</u>		<u>Category</u>
BK. BT	name	0
	The named background program was terminated. This message follows the BACKGROUND PROGRAM ABORTED message.	
BK. BT	DISPOSE 2, PR REJECTED	0
	The request to dispose of the post-mortem dump information as a PR string was rejected. This can happen only if the disposition codes list does not contain PR. Inform the system analyst of the condition.	
BK. BT	MODE 2, X, BCD REJECTED	0
	The request to set the mode on logical unit 2 to BCD was rejected. Inform the system analyst of the condition.	
BK. BT	RELEASE LUN REJECTED	0
	The request to release a logical unit was rejected.	
	RELEASED lun = hhnn = label	0
	lun	logical unit number
	hhnn	hardware designate of an unloaded unit
	label	optional label information if the hardware is a labeled device
	RELEASED appears when a central program unit assignment has been released by the system and the unit has an unexpired retention code, is unlabeled, or is a magnetic tape with no ring. This message gives the label information to the operator and informs him that the tape is to be saved.	

<u>Message</u>	<u>Category</u>
SKIP, diagnostic	3
This message appears when the execution phase of a job has been deleted due to errors encountered by a library routine.	
TERM, diagnostic	3
When a job terminates abnormally, the diagnostic given indicates the reason for the termination.	
WHICH hh IS LU _{nn}	0
hh hardware type nn unit designate	
A read assignment was attempted on a MT unit declared unlabeled by the user, or a read was attempted for an unlabeled device, such as paper tape.	
The operator should try to locate the specified tape and mount it on an available unit. He should then respond on ICM with the ASSIGN statement using the hardware designate of the available unit (same hardware type as specified in WHICH message). If the file does not exist, or if a unit is not available for mounting, NONE may be typed, and the requesting program will be terminated.	
<u>From BK. PR (Drum-to-Print)</u>	<u>Category</u>
BK. PR HELP ON LP _{nn}	0
nn unit designate	
The specified printer is not ready. Operation will be resumed when the operator readies the printer.	
BK. PR ??????	0
The last operator statement to this program was unintelligible. Reintroduce the statement after verifying its format and content.	

From BK. PU (Drum-to-Punch) Category

BK. PU HELP CP 0

Punch error, feed failure or compare error. Remove jammed cards, run the punch out, remove the last two punched cards, and ready the punch. Two blank cards will precede the corrected cards. After correcting the fault, punching will be resumed after entering the input statement:†

*BK. PU, CPnn OK

nn is the unit designate of the punch.

BK. PU PUNCHING seq 1

seq job sequence number

Punching has been initiated. This message appears only if Stop switch 1 is ON.

BK. PU ? ? ? ? 0

The last input statement entered by the operator was unintelligible. Reintroduce the statement after verifying its format and content.

From BK. TP (Drum-to-Tape) Category

BK. TP ASSIGNED MTnn, i 0

nn unit designate

i the ident field of the 7/9 TAPE control card.

Identifies the tape on which the program is performing a drum-to-tape operation.

† Any message in response to a BK. PU, HELP serves as a *BK. PU, OK.

From BK. TP (Drum-to-Tape)

Category

BK. TP FAILED, TASK ABANDONED

0

Card-to-tape operation abandoned because of tape failure. The remainder of the card file will be bypassed. To retry the task, reintroduce the card deck.

BK. TP NEEDS MT

0

No available tape unit. The operator must make a tape available and type:

*BK. TP, OK

BK. TP will resume its attempt to locate the required equipment.

BK. TP ? ? ? ?

0

The operator input statement last entered for this program was unintelligible. Reintroduce the statement after verifying its format and content.

From CRP (Card-to-Drum)

Category

CRP CRnn BAD DECK

0

nn unit designate

Control card error. The first card was not a control card; or, the card following the PRIORITY card was not JOB, TAPE, PRINT, or DISPOSE, or the disposition mnemonic was not recognized. The remainder of the deck will be bypassed until a valid end-of-file or JOB control card is detected, or the card reader input hopper becomes empty.

<u>Message</u>	<u>Category</u>
CRP CRnn CARDS PLEASE	0
<p>The card reader hopper was emptied but the END-OF-FILE switch was not On. To continue reading, load the remaining cards and ready the unit. To terminate the batch, insert two end-of-file cards, turn on the END-OF-FILE switch, and ready the unit. This suppresses the CARDS PLEASE message until the card hopper is emptied subsequent to the initial introduction of the next batch.</p>	
CRP CRnn HELP	0
nn unit designate	
<p>Hardware malfunction on the card reader: a compare or feed error. Correct the situation and ready the unit. Card reading resumes when the system detects the ready status.</p>	
CRP MTnn PARITY	0
nn unit designate	
<p>Irrecoverable parity error encountered on the input tape. The unit will be unloaded and normal processing resumed.</p>	
CRP ON CR??	0
<p>The input statement CRP, MTINMTnn is not acceptable because CRP is currently reading input from the card reader. The statement will be acceptable only after the card reader hopper has become empty while the END-OF-FILE switch is On.</p>	
CRP seq, p, c	1, 2
seq job sequence number	
p job priority	
c contents of JOB card comment or ID field, depending on a system assembly option	
<p>Input of the specified job to the drum has been initiated. This message appears only if STOP switch 1 is On.</p>	

<u>Message</u>	<u>Category</u>
CRP ????	0
The operator input statement last entered for this program was unintelligible. Reintroduce the statement after verifying its format and content.	

<u>From BK.DU (Dump Drum)</u>	<u>Category</u>
BK.DU TAPE #, DISPOSITION?	0
Reply contains the number of a tape unit, followed by a comma and the disposition code for the type of string to be dumped.	

Example: 4,PR

will dump all strings with disposition PR onto MT4.

BK.DU UNIT NOT READY	0
This will be typed if the specified tape unit is not ready.	

<u>From ENTER (Enter a Dumped Tape)</u>	<u>Category</u>
ENTER TAPE #?	0
The reply is the number of the tape to be entered.	

ENTER BAD MT FORMAT	0
This message will be typed if the format of the tape is incorrect.	

Operator statements are normally entered exactly as shown; however, the system accepts a shorthand notation, consisting of the first two characters of the statement followed by its parameters. For example, ST, MT4 and STATUS, MT4 will both request the status of MT04. This shorthand notation is not acceptable for commands and responses to background programs.

If the operator types a statement that is not acceptable, the system will not act upon it, except to notify the operator that he has keyed in an invalid entry. This is indicated by a series of question marks on the OCM.

4.1 STATEMENTS TO SYSTEM

ABORT

This statement terminates the central program currently in process.

ASSIGN, hhnn

hhnn hardware designate
 hh hardware type
 nn physical unit number

This statement is used to assign an unlabeled device in response to a WHICH message. The system assigns the specified unit to the logical unit designated in the most recent WHICH message. The unit must be available and of the hardware type designated.

AUDIT

The operator uses this statement when the accounting records are to be processed. If the accounting is a drum string, the accounting will be disposed of as an AC string to be processed by a background program. Another accounting string will be started for subsequent accounting. If the accounting is on a hardware device other than drum, the unit will be unloaded but will remain assigned.

BLANK, hhnn

hhnn hardware designate

With this statement, the operator can override an unexpired retention code or blank label a new magnetic tape (new tapes do not contain an EOF). The specified unit must be unassigned, have a write enable ring, and be ready.

No response is given unless the unit cannot be blanked, in which case the system will respond as in the STATUS statement.

BLANK, hh

hh hardware device type (MT)

Same as BLANK, hhnn, except that all unassigned and ready write units of the named hardware type that may be labeled, will be made available. No response is given.

BLANK, ALL

Same as BLANK, hh only for all hh.

CANCEL, seq_i-seq_j

CANCEL may be used by the operator to eliminate processing of specified jobs. All unassigned data strings with sequence numbers seq_i through seq_j are cancelled. If seq_j is omitted, only seq_i is cancelled.

CHANGE, seq, p

seq 5 octal digit sequence number assigned to the job by the system (leading zeros may be omitted)

p new priority (0 through 7)

The operator may change the priority of the specified job. All inactive files on the drum which have the specified sequence number will be assigned the designated priority.

DOWN, hhnn

hhnn hardware designate

The operator may make a peripheral unit inaccessible to the system. This condition will exist until an UP statement is entered which references the unit. The system will respond with DOWN or ASSIGNED.

GEAR, speed

speed LO, perform all drum writes with write check
HI, return to normal writes, without checking

The GEAR, LO statement should be used if the message DRUM PARITY ERROR appears frequently. After the drum has operated for some time in LO gear with no further error messages, the GEAR, HI statement may be used to increase running speed.

GO

With GO, the operator signals the system to resume processing the central program. This message may be used subsequent to the following situations:

DEMANDS message	system will process DEMAND again
NEED message	system will again attempt to locate and assign the specified unit
OVERFLOW message	system will resume processing
PAUSE message	system will resume processing
Manual interrupt	system will resume processing

HHNN

Also accepted as a reply to WHICH or NEED

HOLD

This statement is valid only in response to an unmet DEMANDS message. HOLD places the job in a suspended state until the hardware requirement specified by the DEMANDS message is met. At the completion of each central program, the system will attempt to reselect the held job.

To remove a job from the held state, the operator may enter the REPLY statement. The input statement MAP may be used to determine the status of held jobs.

LOAD, name

name background program name

This statement loads and activates the named background program. If the routine is already in core and activated, the reply PRESENT will appear. Otherwise, the LOADED or CAN-T LOAD message will appear later.

MAP

The number and type of data strings currently known to the system will be determined. MAP should be used before terminating operations to insure that no information is lost. DUMP and REPLY may be used in conjunction with MAP. The system response to MAP is in the form:

dc, state, p, seq

dc disposition code of the data string

state active/inactive indicator

 A currently active string

 I currently inactive string

p priority of the string

seq sequence number associated with the string

NONE

This statement is used in response to DEMANDS, NEED, and WHICH messages, when a request for equipment assignment cannot be honored. NONE will terminate the requesting program.

OK

This statement, acceptable only from ICM, causes resumption of central program operations.

PAUSE

This statement is acceptable only from ICM and will suspend all central program operations at the completion of the current job. To initiate action on the next job, the operator types OK.

RETRY, seq

seq job sequence number

This statement resumes normal selection procedures for the job; DEMANDS which are not met will be written on OCM when the job is to be processed.

STATUS, hhnn

hhnn hardware designate

The operator can determine the current status of equipment attached to the system. One of the following declarations will be displayed on the OCM:

hhnn ASSIGNED	unit is currently assigned to central program or a background program
hhnn AVAILABLE	unit is unassigned, ready, up, has a blank label or an expired retention code, and a write ring
hhnn DOWN	unit is inoperable
hhnn (label) . . .	unit has a label with the listed information
hhnn NO RING	unit is unlabeled and has no write enable ring
hhnn NOT READY	unit is in a not ready condition

STATUS, hh

hh hardware type

Same as STATUS, hhnn except that all units of the specified type will be interrogated.

STATUS, ALL

Same as STATUS, hhmn except that all units known to the system will be interrogated.

UNLOAD, hhmn

hhmn hardware designate

This statement may be used by the operator to unload a tape unit; the unit must be connectable, ready, and unassigned.

UNLOAD, hh

hh hardware type

Same as UNLOAD, hhmn except that the system will search for an available unit of the designated type to unload.

UP, hhmn

hhmn hardware designate

UP informs the system that the designated down unit is to be made available.

If the unit is not connectable, the operator will be notified as in the STATUS statement. The unit must be down at the time this statement is given.

4.2 STATEMENTS TO BACKGROUND PROGRAMS

The operator may communicate with background programs in the system provided they are in core and prepared to receive such statements.

To write a statement on the ICM for a background program, the operator enters

*program name, statement

For example: *BK. TP, OK

will communicate OK to the background program BK. TP.

To BK. PR

*BK. PR, STOPLPnn

The string currently being printed on LPnn will be released and printing stopped. The remainder of the print information is lost.

To BK. PU

*BK. PU, CPnnOK

Punching will resume. This message should be typed only after operator has remedied punch error.

*BK. PU, STOPCPnn

The string currently being punched on CPnn will be released and punching stopped. Several blank cards will be punched.

To BK. TP

*BK. TP, STOPMTnn

This may be used in response to a tape unit malfunction message or at any time the operator wishes to abandon the operation involving MTnn.

*BK. TP, OK

BK. TP will resume attempts to locate equipment.

To CRP

*CRP, MTIN, MTnn

MTnn is the hardware designate of the magnetic tape unit to be used as the source of jobs, rather than the card reader.

The jobs should be in the proper structure with an ENDREEL card terminating the batch of jobs. The jobs are written on the drum as if they had come from the card reader.

CRP does not accept MTIN message if the MT drivers are not present; a response of ???? will be typed out.

*CRP, STOPhhnn

This statement may be used to abandon the operation on hhnn; the remainder of the task will be bypassed.

To BK.DU

*BK.DU, < tape number, disposition >

This causes BK.DU to dump all strings with the specified disposition code onto the specified tape.

*BK.DU, STOP

This causes BK.DU to stop dumping strings when the current one is completed.

To ENTER

*ENTER, < tape number >

This causes ENTER to write the strings from the specified tape onto the drum.

*ENTER, STOP

This causes ENTER to stop processing the tape after completing the current string.

MSIO (Mass Storage Input/Output) controls the disk processing on a 3600/3800 Computer System. Under MSIO, there is a certain amount of conversation between the operator and the system. Messages and reply options are outlined below:

A message to the operator is followed by a carriage return and the typed characters @ ?. This is a system request for an operator reply statement. In the examples given below, the operator's replies are underlined.

5.1 MESSAGES AND REPLY OPTIONS

NO LABEL FOR FILE

This message is given when the system is unable to locate the file requested.

Example:

```
xxxxxxxxxxxxxxxx (file id-14 characters or less)
NO LABEL FOR FILE
ENTER ABANDON OR DISPLAY ALL DEV (NAME) OR
DISPLAY (FILEID-14 CH), (DEV NAME- 8 CH) OR
REPLACE (FILEID-14 CH), (ED-2CH), (DATE-6 CH)
@?
```

The operator responds by typing in one of the four options: ABANDON, DISPLAY ALL DEV, DISPLAY FILEID, or REPLACE.

The option is entered immediately following the @ ? which is a system request for immediate reply.

Response: DISPLAY (fileid-14 ch), (dev name-8 ch)

This statement causes the system to display all files with the indicated name on the specified device. Fileid must be typed as a 14 character field counting blanks.

Example:

```
LANDFILE 32747
NO LABEL FOR FILE
ENTER ABANDON OR DISPLAY ALL DEV (NAME) OR
DISPLAY (FILEID-14 CH), (DEV NAME- 8 CH) OR
REPLACE (FILEID-14 CH), (ED-2 CH), (DATE-6 CH)
@? DISPLAY LANDFILE 32747, ARNOLDDV
```

In reply to the NO LABEL FOR FILE message, the operator requested that all file labels with the name LANDFILE 32747 be displayed from device ARNOLDDV.

Response: REPLACE (fileid-14 ch), (ed-2 ch), (date-6 ch)

This statement specifies file parameters to replace the existing ones. With this command, used in response to the NO LABEL FOR FILE message, the operator asks for another file, when a file cannot be found. The REPLACE reply option allows the operator to change the edition or the date in his original request.

Example:

```
ROSEMARY CHUNG
NO LABEL FOR FILE
ENTER ABANDON OR DISPLAY ALL DEV (NAME) OR
DISPLAY (FILEID-14 CH), (DEV NAME-8 CH) OR
REPLACE (FILEID-14 CH), (ED-2 CH), (DATE-6 CH)
@? REPLACE ROSEMARY CHUNG, 09, 040167.
```

Response: ABANDON

This statement terminates the current job.

Example:

```
CHUNG
NO LABEL FOR FILE
ENTER ABANDON OR DISPLAY ALL DEV (NAME) OR
DISPLAY (FILEID-14 CH), (DEV NAME- 8 CH) OR
REPLACE (FILEID-14 CH), (ED-2 CH), (DATE-6 CH)
@ ? ABANDON
```

In the above example, the system could not find a file with ID CHUNG. The operator chose to abandon the job.

Response: DISPLAY ALL DEV xxxxxxxx (8 characters or less)

This operator reply statement causes the system to display all file labels assigned to the specified device.

Example:

```
CHUNG
NO LABEL FOR FILE
ENTER ABANDON OR DISPLAY ALL DEV (NAME) OR
DISPLAY (FILEID-14 CH), (DEV NAME- 8 CH) OR
REPLACE (FILEID-14 CH), (ED-2 CH), (DATE-6 CH)
@ ? DISPLAY ALL DEV ARTHUR
```

In the above example, there was no label for the file CHUNG. The operator requested a display of all the file labels assigned to the device ARTHUR.

Normally, the following response is given by the system when a display is requested:

```
FILES FROM DEVICE (name)
FILE ID  ED NO.  DATE WRITTEN
```

All files, CHUNG and FILE 32747 on the indicated device will be typed out and file id, edition number and date written will be listed for each.

Should the device requested be down or device name misspelled, the following system statement to the operator will be typed:

DEVICE (name) CANNOT BE FOUND

This message indicates the specified device cannot be found. It could also indicate the possibility of format error or misspelling.

DEVICE (name) IS DOWN

This message indicates the specified device is not operating.

TERM, ILL REQ

Example:

```
DAVEFILE 007
TERM, ILL REQ
```

This message is given upon abnormal job termination. The first line of the message indicates the file ID from which the error originated. There is no operator response.

TOO MANY SEGMENTS

This message results when there are not enough segments requested for the size of the file.

Example:

```
BECKER 599
TOO MANY SEGMENTS
ENTER ABANDON OR CHANGE
@?
```


The operator can abandon the job or allow segmentation of the file.

ABANDON

This statement terminates the current job.

CHANGE

This statement causes the system to segment a large file; normal processing is then resumed.

PARITY ERROR

Example:

BECKER 599

PARITY

ENTER ABANDON, RETRY, OR CONTINUE

The operator has the option to abandon, retry, or continue despite the parity error.

ABANDON

This statement terminates the current job.

RETRY

The system will repeat the error recovery sequence. If error persists, the PARITY ERROR message will again be printed out.

CONTINUE

This operator reply effectively ignores any error and processing continues.

SECONDARY DEVICE DOWN

Example:

BECKER 599

SECONDARY DEVICE DOWN

ENTER ABANDON OR CONTINUE

The operator can abandon or continue the job. If the CONTINUE command is used, the job will continue up to the point in which the file is inaccessible and then a message will be typed out indicating what part of the file is not available.

BLOCKS xxxxxxxxB TO xxxxxxxB DOWN

or

BLOCKS xxxxxxxxB TO FILE END DOWN

This message is informative only and indicates the parts of the file unavailable when the secondary device is down and the CONTINUE command is chosen.

Example:

LANDFILE 32747

SECONDARY DEVICE DOWN

ENTER ABANDON OR CONTINUE

@? CONTINUE

CONTINUE

This statement is one of the optional responses to the SECONDARY DEVICE DOWN and PARITY ERROR message. If in response to Device Down, this command will cause job processing to continue up to the point in which the file is inaccessible.

ABANDON

This set terminates the current job.

Upon the occurrence of a system detectable disaster condition, the system will attempt, if at all possible, to reinstate itself and continue normal processing. However, due to conditions beyond the scope of the operating system, elements of jobs which were in an active state at the time the disaster occurred are not recoverable. As a result, these activities are aborted; and the sequence numbers of the affected jobs are typed out to the operator, indicating that the designated jobs must be resubmitted.

6.1 RECOVERY ASSUMPTIONS

Prior to recovery, the following conditions are assumed to be valid:

1. The contents of the drums are unaltered.
2. The disaster routine, BAT, DFLO, and the following resident cells have not been modified:

DATEBOX

MIDNITE

JULDATE

SEQCT

MONTHS + 1

RHTACC

6.2 RECOVERY PROCEDURES

When a system disaster has occurred, the following events take place:

1. The message DISASTER FROM nnnnn is typed.
2. The computer stops and awaits operator action. A number of options are available to the operator at this time depending upon whether or not the system has been assembled with the debugging aids.

- a. If the debugging aids have been incorporated in the system, a dump of core memory may be taken at this time. The connect code of the "standard dump unit" (an assembly parameter) will be displayed in the A register. †
 - (1) If a dump is desired on the "standard dump unit", depress GO; otherwise,
 - (2) If a dump is desired on a unit other than the "standard dump unit", modify the A register to reflect the connect code of the desired unit and depress GO; otherwise,
 - (3) If no dump is desired, set the sign bit (bit 47) of the A register and depress GO.
 - b. If the debugging aids have not been incorporated in the system, the operator must depress GO to continue the recovery action.
3. The system simulates a manual drum autoload except that the DATE? and TIME? messages will not be output. Instead, the message

RESUBMIT FOLLOWING JOBS

may be typed; in which case, the sequence numbers of those jobs which should be resubmitted (if their processing is desired) will follow.

- 4. The next message to appear on the OCM is the READY? message. The conditions which prevail at this time are the same as those when autoloading from an internal library with the following exceptions:
 - a. The system and production file map strings are released and will not be printed.
 - b. TIME & DATE are carried over from the system which dis-astered; thus, these inputs are bypassed.
 - c. The system will normally have jobs contained on the drum which it can start processing immediately.
 - d. The operator should delete incomplete files from the punch and printers to avoid later confusion by the existence of partial output.

† The dump will constitute an unlabeled file. If placed on a magnetic tape, the unit will be rewound and unloaded at the completion of the dump. If the equipment of the dump unit is ≥ 1 the system assumes the dump output is going to the printer.

6.3
RESTRICTIONS

If the job source at the time of the system disaster was magnetic tape, those jobs which have not yet been processed will either have to be rerun on card-to-tape or submitted to the system via the card reader.

Drum SCOPE includes assembly options which aid the system programmer in the development and checkout of programs and routines added to the system.

Sense switches 1 and 2 are used to control time interrupts and displays. Setting of SW 1 will cause the system to ignore all time interrupts.

Setting SW 2 activates a display program which reads out and/or modifies core storage or causes the entire contents of memory to be dumped and printed. The procedure for initiating the Display program is as follows:

Press the INTERRUPT key.

System replies with the message DISPLAY to indicate the routine is ready to accept commands.

At this time, all system activities will cease until the display routine has exited. With the Display routine in control, the following options may be chosen:

To Display the Contents of a Memory Location

Enter the location address as a six-digit octal number. Immediately, the routine will type the contents of the specified location in octal form. Pressing carriage return will force a typeout of the address and contents of the next successive location.

To Modify the Contents of a Memory Location

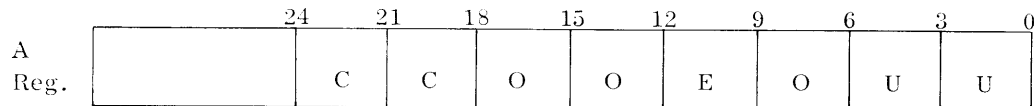
First display the memory cell to be modified. Enter the new contents as a 16-digit octal number and follow with a carriage return. The cell will be modified and the address and contents of the next successive location will be typed out.

If a period is entered at any point, the routine will terminate and exit back to interrupt control. Any illegal location, or a character (other than an octal digit or a period) will restart the routine at the DISPLAY typeout. A backspace will force a typeout of the contents of the lower 15 bits (bank zero only) of the previous typeout.

To Dump and Print the Entire Contents of Memory

Enter the word DUMP in the location field in place of a six-digit address.[†] As a result, a system disaster (see System Dump Format) will occur and the system will halt. To dump on other than the pre-selected unit, enter the numbers of the channel, equipment, and unit on which the dump information is to be written into the A register. This information is entered in the following format:

[†] If control cannot be obtained by the interrupt key, press the STOP button and enter 754 00002 in the instruction register and execute it. This is equivalent to typing DUMP.



C = channel number (bits 18-22)

E = equipment number (bits 9-11)

U = unit number, if applicable (bits 0-6)

After setting the A register, press the GO key. The dump will be output directly to the specified device, and the recovery procedure (section 5) will begin.

If a dump is produced on tape, the dump unit (tape) will be unloaded. To avoid a dump, set bit 47 in the A register.

System Disaster Dump Format

The first page of the System Disaster dump contains information about the status of the system. The succeeding pages give the status of the individual programs in the system. These, in turn, are followed by an octal memory dump.

The first two lines of the system information page contain the registers A, Q, D, index registers 1-6, and the limit register. The third line contains the interrupt mask register, interrupt register, normalization count register, miscellaneous modes register, and the clock register. The fourth line contains PGNO, SPGNO, RUNRELOC, NLUN, and XQNAME.

PGNO	program being processed
SPGNO	program that gave the original request
RUNRELOC	indicates what banks are present in the system and the location at which system modules may be loaded
NLUN	number of logical units assigned to the central program
XQNAME	name of the overlay currently in resident

The next three lines contain information about the managed tables. The location and length of each table is specified by an indicator word. The lower address of this word contains the location of the table and the upper address contains the number of words in the table. The managed tables are:

INL	interrupt list
DFLO	data file list
STACK	
PNL	program name list
IVL	INVOKE list

ASS	assign stack
ITIMES	time stack
REQSTK	request stack
DRS	drum stack

The next two lines give information on the status of EXEC. Flow time indicates the current EXEC cycle.

<u>Flow Time Value</u>	<u>Description</u>
0	no central program
3	central program exists but is not loaded into core
2	central program is in core and is running
1	central program is in core and is now performing abnormal termination

CARDIN is the location of the last card read by EXEC. HBUF is the information on the last control card read by EXEC. CPCORE is the lower bound of the central program in memory.

CHANNEL STATUS INFORMATION consists of channel number, control word, address of control word, status and channel table. The last part is the LEQ table which is the translator table from the logical unit numbers used by the programmer to the logical unit ordinals used by the system. The table reads across from left to right. The entries in each ordinal position contain the logical unit number used by the central program. The first 12 entries are permanent; others are added as they are mentioned by the central program.

The pages for each program contain the program number, its program status list entry, and its program control table entry. These are followed by the 11 words of the PCT table, the logical unit block, and the family table block.

The PCT table contains the PCT entries, PCTA, PCTQ, PCTD, PCTZ, PCTB123, PCTB456, PCTNCIM, PCTET, PCTBR, and PCTK.

In the logical unit block, for each logical unit are entries for USTA, USTQ, UPT, and UIA.

In the family table block, each family contains entries for FAT, FUT, CWD1, CWD2, BCWP, and BCWS.

CONTROL DATA

C O R P O R A T I O N

COMMENT AND EVALUATION SHEET

3600/3800 Drum SCOPE/MSIO

Operating Guide

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