CONTROL DATA CORPORATION

KRONOS® 2.1 SYSTEMS PROGRAMMER'S INSTANT

CONTROL DATA®
CYBER 70 SERIES
MODELS 72, 73, 74
6000 SERIES
COMPUTER SYSTEMS

RECORD of REVISIONS

REVISION	NOTES
B	Manual released at revision B to coincide with revision
(10-75)	B of the KRONOS 2.1 Applications Programmer's Instant
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PREFACE

The KRONOS® 2.1.2 Time-Sharing System provides network capabilities for time-sharing and transaction processing, in addition to local and remote batch processing on CONTROL DATA® CYBER 70 Series, Model 72, 73, and 74 Computer Systems and 6000 Series Computer Systems.

This manual provides condensed descriptions of console commands, systems oriented control cards, central memory tables, function requests, machine instructions, and external function codes for analysts, programmers, and operators.

The following manuals provide more detailed descriptions of these subjects.

Control Data Publication	Publication No.
KRONOS 2.1 Applications Programmer's Instant	60407200
KRONOS 2.1 Reference Manual Volume 1	60407000
KRONOS 2.1 Reference Manual Volume 2	60448200
KRONOS 2.1 Operator's Guide	60407700
KRONOS 2.1 Installation Handbook	60407500
COMPASS 3.0 Reference Manual	60360900
COMPASS Instant	60361000
6400/6500/6600 Computer Systems Reference Manual	60100000
CYBER 70/Model 72 Computer System Reference Manual	60347000
CYBER 70/Model 73 Computer System Reference Manual	60347200
CYBER 70/Model 74 Computer System Reference Manual	60347400
ECS Description/Programming Manual	60347100

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CONSOLE COMMANDS

SYSTEM DISPLAY (DSD) COMMANDS

DSD DESCRIPTION

DSD is an interpretive display driver. When a console operator is typing a command, DSD completes the command as soon as it recognizes enough characters to establish the uniqueness of the command. Moreover, DSD does not accept or display illegal characters.

DISPLAY SELECTION

The system displays can be selected by the console command:

xy. (CR)

where x and y represent the letter designations of the displays; x appears on the left screen and y on the right. If x and y are identical, both screens display the same information.

Letter Designation	Display	Description
A	Dayfile †	Chronological history of operation; includes the system (A,.) display, the account (A,ACCOUNT FILE.) display, and the error log (A,ERROR LOG.) display.
B	Job status	Current status of all jobs assigned to control points.
C,D	Central memory	Portions of the contents of central memory in five groups of four octal digits and their display code equivalents.

†This display is control-point oriented. Paging forward and backward through the display for each control point is achieved with the + and - keys, respectively.

Letter Designator	Display	Description
E	Equipment status	Status of peripheral devices; includes the equipment status table (E,. or E,A.) display, the mass storage table (E,M.) display, the resource mounting preview (E,P.) display, and the tape status (E,T.) display.
F,G	Central memory	Portions of the contents of central memory in four groups of five octal digits and the display code equivalents.
H	File name table (FNT)	Lists, by type, † all files in the system: CM Common file IN Input file FA Fast-attach file LI Library file (read-only common file) LO Local file PM Direct access permanent file PR Print file PT Primary terminal file PH Punch file RO Rollout file SY System file TE Timed/event rollout file
I	BATCHIO status	Status of central site unit record devices.
J	Control point status † †	Displays the status of a specified control point
K,L	CPU programmable † †	Dynamic operator/CPU communication.

† If an asterisk follows the file type mnemonic, the file is locked.

† † This display is control-point oriented. Paging forward and backward through the display for each control point is achieved with the + and - keys, respectively.

Letter Designator	Display	Description
N	File display	Contents of any file assigned to a control point.
O	Transaction status	Status of Transaction Subsystem.
P	PP communications area	Current contents of PPU registers.
Q	Queue status	Status of input/output/rollout queues.
R	Export/Import status	Status of remote batch operations.
S	System control information	Parameters used to control job flow.
T	Time-sharing status	Status of time-sharing job processing.
Y	Monitor functions	Lists all monitor mnemonics and codes.
Z	Directory	List of the letter designators and description of all DSD displays.

SPECIAL FIRST CHARACTER ENTRIES

* Alternates display control between DSD and DIS each time * key is pressed

= Alternates left screen display between its absolute and relative setting (applicable only to memory displays C, D, F, or G)

\+ Advances left screen display as follows:

Memory (C, D, F, or G)	Advances display address by 40_8.
H	Advances to next page of FNT display.
N	Advances file displayed by one sector.
P	Advances to next page of P display.
R, T	Advances to next page of R or T display.

A, J, K, L	Advances control point number of control-point oriented display.

Decrements left screen display as follows:

Memory (C, D, F, or G)	Decrements display address by 40_8.
H	Decrements FNT display one page.
N	Backspaces file displayed by one sector.
P	Decrements one page of P display.
R, T	Decrements one page of R or T display.
A, J, K, L	Decrements control point number of control-point oriented display.

right blank (display)	Advances left screen display sequence established by SET command.
/	Advances left screen memory display by the value in the lower 18 bits of the first word displayed.
(	Advances right screen as described for + key.
)	Decrements right screen as described for - key.
CR (carriage return)	Sets repeat entry flag. The subsequent entry is processed but not erased after completion. Flag is cleared by pressing the left blank (erase) key.

CONTROL CHARACTERS

left blank (erase)	Clears current keyboard entry and any resultant error messages.
BKSP (clear)	Deletes last character typed and clears error messages.
CR (carriage return)	Initiates processing of entered command.

SYSTEM DISPLAY COMMANDS

H, x. Specifies the type of files to appear on the H display:

x		
	A	All files
	C	Common files
	I	Input files
	L	Local files
	O	Output files
	P	Punch files
	R	Rollout files
	T	Timed/event rollout files
	n	Control point number

m, n. Sets control-point oriented display m (A, J, K, or L) to display only control point n information.

n Control point number

xz, aaaaaa.

x Letter designation of a storage display (C, D, F, or G).

z Type of display modification:

- z=0-3 Changes the specified group to display the eight words beginning at location aaaaaa
- z=4 Changes the entire display to display the memory contents beginning at location aaaaaa
- z=5 Increments the display by aaaaaa locations
- z=6 Decrements the display by aaaaaa locations

aaaaaa Location parameter (as explained previously)

SET, ssss.	Preselects left screen display sequence ssss Letter designating any four DSD displays. Pressing the right blank key after SET is entered causes each display to appear on the left console screen in the sequence specified by ssss.

DAYFILE COMMANDS

A.	Resets the A display to the beginning of the system dayfile buffer.
A,.	Resets the A display to the system dayfile when the error log dayfile, account dayfile, or one of the control point dayfiles is currently being displayed.
A, n.	Displays the dayfile buffer for control point n.
A, ACCOUNT FILE.	Displays the account dayfile buffer on the left console screen.
A, ERROR LOG.	Displays the error log dayfile buffer on the left console screen.
ACCOUNT, xx.	Requests that account dayfile be dumped to equipment xx. If xx is omitted, the dayfile is dumped to the print queue.
DAYFILE, xx.	Requests that the system dayfile be dumped to equipment xx. If xx is omitted, the dayfile is dumped to the print queue.
ERRLOG, xx.	Requests that error log dayfile be dumped to equipment xx. If xx is omitted, the dayfile is dumped to the print queue.

JOB PROCESSING CONTROL COMMANDS

n.CKP.	Requests checkpoint of job at control point n.
CPxx, yy.	Assigns a numeric identifier yy to card punch xx.
CRxx, yy.	Assigns a numeric identifier yy to card reader xx.

DELAY, t_1 xxxx, . . . , $t_n$xxxx.

Changes system delay parameters:

t_i	Delay
JSxxxx	Job scheduler delay interval in seconds
CRxxxx	CPU recall period in milliseconds
ARxxxx	PPU auto recall interval in milliseconds
JAxxxx	Job advance interval in milliseconds
CSxxxx	CPU job switch interval in milliseconds

n. DROP. Drops the job currently assigned to control point n.

ENID, yy, zzz. Enters identifier; assigns a numeric identifier yy ($0-67_8$) to the queue type file specified by FNT ordinal zzz.

n. ENPR, xx. Enters CPU priority xx ($1-70_8$) for job currently assigned to control point n.

n. ENQP, xxxx. Enters queue priority of xxxx (MNPS to MXPS) for the job currently assigned to control point n.

ENPR, xxxx, yyy. Enters a priority of xxxx for a file specified by FNT ordinal yyy.

ENQP, xxxx, yyy. Enters queue priority of xxxx for a queue type file specified by FNT ordinal yyy.

n. ENTL,xxxxx. Enters time limit of xxxxx for job currently assigned to control point n.

LOAD, xx, yy. Requests that a job be loaded from equipment xx. Job is assigned identifier yy ($0-67_8$).

LPxx, yy.
or
LQxx, yy
or
LRxx, yy.

Assigns identifier yy ($0-67_8$) to the line printer identified by equipment number xx. LP directs output to either 512 or 580 line printers. The LQ command directs output only to a 512 line printer and LR to a 580 line printer.

MSAL, C, $f_1$xx, . . . , $f_n$xx.

Assigns job files of type f_i to mass storage device xx. Mass storage device specified must be nonremovable, and its current status must be ON.

If C is entered, the value specified by the MSAL entry in the IPRDECK (if any) is cleared. If C is omitted and an MSAL entry was specified in IPRDECK, the new values are added to those already specified.

f_i	File Type
LO	Local
IN	Input
OT	Output
RO	Rollout
LG	LGO

PURGE,xxx. Purges queue type file identified by FNT ordinal xxx from the system.

PURGEALL,t. Purges all files of queue type t from the system:

t	File Type
I	Input
O	Output
P	Punch
R	Rollout
T	Timed/event rollout

QUEUE,ot, qt, qp_1xxxx, ..., qp_nxxxx. Alters the queue priorities associated with the input, rollout, and output queues.

ot	Job Origin Type
SY	System
BC	Local batch
TX	Time-sharing
EI	Export/Import
MT	Multiterminal

qt	Job Queue Type
IN	Input
RO	Rollout
OT	Output

qp	Queue Priority
LPxxxx	Lowest priority at which a job can enter the queue and still be aged (MNPS≤xxxx≤MXPS).
OPxxxx	Original (entry) priority; the entry associated with the job when it initially enters the specified queue.
UPxxxx	Highest priority a job can reach in the specified queue; aging stops when this priority is reached.
INxxxx	Number of scheduler cycles before incrementing the job priority by one.

n.RERUN, xxxx. Terminates the job currently assigned to control point n, then reruns the job from the beginning with a queue priority of xxxx (MNPS<xxxx<MXPS). Job is not rerun if NORERUN control is set.

ROLLIN, xxx. Allows job identified by FNT ordinal xxx to be scheduled to an available control point by assigning it maximum queue priority (MXPS).

n.ROLLOUT. Removes job currently assigned to control point n and places it in the rollout queue; job is not scheduled back to a control point automatically.

n.ROLLOUT, xxxx. Removes job currently assigned to control point n and places it in the rollout queue for xxxx job scheduler delay intervals; job is automatically scheduled back to a control point at this time.

SERVICE, ot, $p_1$xxxx, . . . , $p_n$xxxx. Alters the service limits associated with each job origin type.

ot	Job Origin Type
SY	System
BC	Local batch
TX	Time-sharing
EI	Export/Import
MT	Multiterminal

p_i	Service Limits
PRxx	CPU priority ($1-70_8$)
CPxx	CPU time slice (milliseconds * 64)
CMxxxx	Central memory time slice in seconds
NJxxxx	Maximum number time-sharing jobs
FLxxxx	Maximum field length/100 for any job of the specified job origin type
AMxxxx	Maximum field length/100 for all jobs of the specified job origin type
FCxxxxx	Number of permanent files allowed ($1-77777_8$)
CSxxxxxx	Cumulative size in PRUs allowed for all indirect access permanent files; maximum of 777777_8
FSxxxxx	Size in PRUs allowed for individual indirect access permanent files; maximum of 77777_8

The following job control commands are used to respond to a job currently assigned to a control point.

n.CFO.ccc...ccc.	Allows the operator to send message ccc...ccc (36 characters maximum) to the program currently assigned to control point n.
n.COMMENT.ccc...ccc. or n.*ccc...ccc.	Enters comment ccc...ccc (120 characters maximum) in the dayfile for control point n.
n.GO.	Clears the pause bit at control point n.
n.OFFSWx.	Turns off sense switch ($1 \leq x \leq 6$) at control point n.
n.ONSWx.	Turns on sense switch ($1 \leq x \leq 6$) at control point n.

The following job control commands apply only to time-sharing origin jobs.

DIAL, nnnn, ccc...ccc.	Sends message ccc...ccc (48 characters maximum) to terminal currently using line number nnnn.
MESSAGE, ccc...ccc.	Changes current header message that is output to terminal when user logs in to ccc...ccc (48 characters maximum).
WARN.	Clears message entered by the WARN, ccc...ccc. command.
WARN, ccc...ccc.	Sends message ccc...ccc (48 characters maximum) to all terminals currently logged into the system.

PERIPHERAL EQUIPMENT CONTROL COMMANDS

n. ASSIGN, xx.	Assigns equipment xx to job at control point n.
FORMAT, xx.	Toggles format pending status for device xx. If this status bit is set, the command sets the full initialize status bit. If the format pending status bit is being cleared, the full initialize status bit is not changed. The console must be unlocked before entry of this command is permitted.
DOWN, CHxx.	Discontinues use of channel xx for tape units. Channel remains available for use by other devices.
INITIALIZE, xx, op.	Toggles initialize option op for mass storage device xx. Enter the INITIALIZE command for each device to be initialized and then assign the K display. If the user decides not to initialize the device specified, initialize status can be cleared by entering K. CLEAR.

Device characteristics are: †

Device Definition Option	Description
FM=	1- to 7-character family name; if TY=X, 1- to 7-character pack name
PN=	1- to 7-character pack name
UN=	1- to 7-character user number (to clear user number, use UN=NULL)
TY=F	Initialized device is a family device
TY=X	Initialized device is an auxiliary device
OP=	AL All preserved files PF Permanent files QF Inactive queued files DF Inactive dayfile AF Inactive account file EF Inactive error log FP Format pack (initialization does not occur until format pending is cleared)

† Device characteristics may be changed only if OP=AL.

Device Definition Option	Description
DM=	3-digit device mask (0 to 377_8).
SM=	3-digit secondary mask (0 to 377_8).
NC=	Octal number of catalog tracks (power of 2).
EQ=	EST ordinal of device to be initialized.
NP=	Number of physical units to be included in a multispindle device; default is 1.
DN=	2-octal-digit device number (1 to 77) that uniquely identifies the device in its permanent file family.

Track Flawing Option	Description
RTK	Converts input physical address to a logical address and sets TRT to indicate that track is a reserved, flawed track.
TTK	Input is the same as for RTK, but track reservation is toggled.
STK	Performs the same function as RTK except that input address is a logical address.

After all necessary parameters have been entered for a specific device, the K.GO. command is entered to begin initialization.

OFFxx. Logically turns off device xx.

ONxx. Logically turns on device xx.

SCRATCH,xx. Indicates that magnetic tape unit xx should be used to satisfy a request for a scratch VSN tape. The VSN is displayed as SCRATCH although the original VSN is used when the tape is assigned. If the tape is written, the original VSN is retained and not made scratch.

TEMP,xx. Reverses current set or clear condition of temporary file status for mass storage device xx.

TRAINxx,y. Assigns or changes print train identification of line printer defined by EST ordinal xx. y field represents print train number.

y	Print Train
1	595-1 (for 512) or 596-1 (for 580)
2,3,4	Reserved for future use
5	595-5 (for 512) or 596-5 (for 580)
6	Reserved for future use

UNLOAD,xx. Logically removes a magnetic tape unit xx or removable mass storage device xx from the operating environment while the operator dismounts a tape or disk pack.

UP,CHxx. Reverses effect of DOWN command for channel xx and resumes normal use of the channel by tape units.

VSN,xx. Clears current VSN for tape unit xx and checks if a VSN is specified on that tape; valid only if the unit is not currently assigned.

VSN,xx, aaaaaa. Assigns 1- to 6-character VSN aaaaaa to magnetic tape unit xx.

VSN,xx,. Assigns a scratch VSN to magnetic tape unit xx. The VSN is displayed as SCRATCH, and if the tape is written, the VSN in the VOL1 label is written as a scratch VSN destroying any previous VSN.

BATCHIO BUFFER POINT CONTROL COMMANDS

BKSPxx.	Backspace print file at BATCHIO buffer point xx, one logical record.
BKSPxx,yy.	Backspace print file at BATCHIO buffer point xx, yy logical records.
BKSPFxx.	Backspace print file at BATCHIO buffer point xx, one file.
BKSPFxx,yy.	Backspace print file at BATCHIO buffer point xx, yy files.
BKSPRUxx,yy.	Backspace print file at BATCHIO buffer point xx, yy sectors.
CONTINUExx.	Resume printing at BATCHIO buffer point xx.
ENDxx.	Terminates current operation at BATCHIO buffer point xx. BATCHIO then assigns the next available file to that buffer point or accepts a new job from that buffer point.
ENDxx,yy.	Terminates current operation at BATCHIO buffer point xx; yy is subtracted from the repeat count specified for that buffer point. If yy is greater than the current repeat count, the repeat count is cleared.
REPEATxx.	Repeats the current operation at BATCHIO buffer point xx one time.
REPEATxx,yy.	Repeats the current operation at BATCHIO buffer point xx the number of times specified by yy (maximum is 77_8).
RERUNxx.	Terminates current operation at BATCHIO buffer point xx and reenters the job in the correct queue at a default queue priority.
RERUNxx, yyyy.	Terminates current operation at BATCHIO buffer point xx and reenters the job in the correct queue with queue priority yyyy (MNPS $\leq$ yyyy $\leq$ MXPS).
SKIPxx.	Skip forward one logical record on print file at BATCHIO buffer point xx.
SKIPxx,yy.	Skip forward yy logical records on print file at BATCHIO buffer point xx.
SKIPFxx.	Skip forward to next file mark on print file at BATCHIO buffer point xx.

SKIPRUxx,yy. Skip forward yy sectors on print file at BATCHIO buffer point xx. yy is limited to 10B sectors (current buffer size) plus number of sectors remaining in buffer (that is, if buffer is empty, yy $\leq$ 20B).

STOPxx. Stop printing at BATCHIO buffer point xx.

SUPPRESSxx. Suppresses automatic printer carriage control at BATCHIO buffer point xx (must be line printer buffer point).

SUBSYSTEM CONTROL COMMANDS

n.EXPORTL. Calls Export/Import to control point n (next to last); punch files disposed as follows:

Entry	Response
n.ONSW1.	Sends all punch files to local batch card punch
n.ONSW2.	Purges all punch files

n.IO. Calls BATCHIO to control point n (second from last); control option is:

Entry	Response
n.ONSW1.	Lines producing printer Print Error are not flagged or retried.

n.MAGNET. Calls the magnetic tape subsystem to control point n (third from last).

n.STOP. Drops (terminates) subsystem currently assigned to control point n. This command must also be entered in order to drop any job with a queue priority greater than MXPS.

TELEX. Calls the time-sharing subsystem to control point 1; control options are:

Entry	Response
1.ONSW1.	When TELEX is terminated (with a 1.STOP command), enters users into recover state and inhibits restarting operations.

1.ONSW2.	Enables TELEX to use the delay queue feature.
1.ONSW3.	Aborts TELEX on all abnormal conditions.
1.ONSW4.	Verifies all user's working files upon recovery.
1.ONSW5.	Calls DMP, which dumps information to OUTPUT and releases OUTPUT after TELEX is dropped or aborted (default).

TRANEX. Calls the transaction subsystem to control point 2.

SYSTEM CONTROL COMMANDS

AUTO. Calls specific subsystems to control points and initiates automatic job processing.

BLITZ. Drops all but the last control point (system is permanently assigned to the last control point).

CHECK POINT SYSTEM. Rolls out all jobs and transfers contents of central memory tables to mass storage.

DATE. yy/mm/dd. Changes current system date (console keyboard must be unlocked):

yy	Year (0-99)
mm	Month (1-12)
dd	Day (1 through number of days in month)

DEBUG. Toggles the current set or clear condition of debug mode; debug mode provides system origin privilege to validated users and allows modifications to be made to the running system (console keyboard must be unlocked).

n.DIS. Calls DIS to control point n.

ENABLE,x.
or
DISABLE,x.

Enables or disables one of the following options:

x	Result
ACCOUNT	Enables or disables processing of VAL= entry point programs (USER, CHARGE, FAMILY). If ACCOUNT is disabled, the control statement is sent to the dayfile and processing continues at the next control statement.
AUTOROLL	Enables or disables automatic rollout of jobs.
BATCHIO	Enables or disables BATCHIO subsystem.
FI200	Enables or disables Export/Import.
MAGNET	Enables or disables magnetic tape subsystem.
PRIORITY AGING	Enables or disables priority aging.
REMOVABLE PACKS	Enables or disables automatic label checking for mass storage devices defined as removable.
TELEX	Enables or disables time-sharing subsystem.
TRANEX	Enables or disables transaction subsystem.

x	Result
VALIDATION	Enables or disables the running of jobs without USER control statement. If validation is disabled, USER statement, if present, will be processed as defined in the x=ACCOUNT feature. Jobs will run if no USER statement exists. (Access to magnetic tapes, permanent files, and removable packs is not allowed.)

ENGR.	Toggles the current set or clear condition of ENGINEERING mode. ENGINEERING mode allows PPU/ hardware diagnostics and FORMAT/ FDP to run (the console keyboard must be unlocked).
IDLE.	Idles all but the system control point.
K.ccc...ccc. or L.ccc...ccc.	Allows entry of data ccc...ccc in CPU buffer for control when K or L is active.
LOCK.	Locks the console keyboard.
MAINTE-NANCE.	Performs the same function as the AUTO command but also assigns several maintenance routines at available control points and runs them with minimum queue and CPU priorities.
STEP.	Sets monitor in step mode; stops all central memory I/O operations and prevents the system from processing PPU requests when the next monitor function is encountered.

STEP, xx.

Sets step mode for monitor function xx; stops all central memory I/O operations and prevents the system from processing PPU requests when function xx is encountered.

n.STEP.
or
n.STEP, xx.

Sets monitor in step mode for control point n. If xx is present, step mode is set for that monitor function.

TIME. hh.
mm. ss.

Changes current system time (console must be unlocked):

hh	Hour (0-23)
mm	Minute (0-59)
ss	Second (0-59)

UNLOCK.

Unlocks the console keyboard; keyboard must be unlocked for following commands.

- DEBUG.
- DATE. yy/mm/dd.
- TIME. hh. mm. ss.
- DISABLE, VALIDATION.
- ENABLE, VALIDATION.
- ENGR.
- FORMAT, xx.
- All memory entry commands
- All channel control commands
- STEP.
- STEP, xx.
- n. STEP.
- n. STEP, xx.
- UNSTEP.

UNSTEP.

Clears step mode (console must be unlocked).

X. name.
or
X. name
(ccc...ccc)
or
X. name, xxxxx.

Calls a system program or utility specified by name to an available control point. If parameters are to be passed, second form is used. Third form is used if a field length, xxxxx, different from the default is required.

99.

Disables or enables syntax overlay processing.

MEMORY ENTRY COMMANDS

aaaaaa, **yyy...yyy.** or aaaaaa± yyy...yyy.	Changes contents of absolute memory location aaaaaa to yyy... yyy (20 digits). †
n.aaaaaa, yyy...yyy. or n.aaaaaa± yyy...yyy.	Changes contents of memory location aaaaaa to yyy...yyy (20 digits). Location aaaaaa is relative to reference address (RA) for the control point n. †
aaaaaa,b, yyyy. or aaaaaa±b, yyyy.	Changes the contents of byte b at absolute memory location aaaaaa to yyyy. † ††
n.aaaaaa, b,yyyy. or n.aaaaaa±b, yyyy.	Changes the contents of byte b at memory location aaaaaa to yyyy. Location aaaaaa is relative to the reference address (RA) for control point n. † ††
aaaaaa, Dyyy...yyy. or aaaaaa±D yyy...yyy.	Changes the contents of absolute memory location aaaaaa to display code characters yyy...yyy (left-justified, zero-filled). †
n.aaaaaa,D yyy...yyy. or n.aaaaaa±D yyy...yyy.	Changes the contents of memory location aaaaaa to display code characters yyy...yyy (left-justified, zero-filled). Location aaaaaa is relative to reference address (RA) for control point n. †

†The second form of the command is used when it is necessary to change successive memory locations. + increments aaaaaa by 1 while - decrements aaaaaa by 1.

††Each memory location consists of five 12-bit bytes, numbered 0 through 4 from left.

CHANNEL CONTROL COMMANDS

ACNcc.	Activates channel cc.
DCHcc.	Drops channel cc.
DCNcc.	Deactivates channel cc.
FCNcc.	Outputs a zero function code (no activity) to channel cc.
FNCcc,xxxx.	Outputs function code xxxx to channel cc.
IANcc.	Inputs to pseudo A register from channel cc.
LDC,nnnn.	Loads pseudo A register with nnnn (normally a peripheral equipment function code).
MCHcc.	Master clears and removes all 3000-series peripheral equipment selections on channel cc (6681 function code 1700_8 is issued).
OANcc.	Outputs contents of pseudo A register to channel cc.

KEYBOARD MESSAGES

ILLEGAL ENTRY.	Command not recognized by DSD. Operator must either correct or re-enter the command.
DISK BUSY.	DSD is waiting for an overlay to be loaded from a mass storage device.
PPU BUSY. †	DSD is waiting for a PPU to be assigned so that it can process a command.
MTR BUSY. †	DSD is waiting for a response from the system.

JOB DISPLAY (DIS) COMMANDS

DIS DESCRIPTION

Unlike DSD, DIS is not interpretive. The operator must complete every entry manually and signal DIS to act upon the message by pressing the carriage return key.

DIS is brought to a control point by any of the following methods.

- Control statement in the form DIS.
- Operator call to DIS by typing n.DIS. for the job active at control point n.
- Operator call to DIS by typing X.DIS,fl. (fl is field length desired) or X.DIS.

DISPLAY SELECTION

xy. (CR) Brings the x and y displays to the left and right screens, respectively.

The right screen display must be B, C, D, N, T, or U.

Letter Designation	Display	Description
A	Dayfile	Dayfile messages and files attached to control point.
B	Control point status	Job status, control cards, and exchange package.

† If preceded by LOG - , the command has been executed but not logged in the system dayfile and/or error log.

Letter Designation	Display	Description
C, D	Data storage	Five groups of four octal digits per group with display code translation.
E	Data storage	Four groups of five octal digits with display code translation.
F, G	Program storage	Four groups of five octal digits per group with COMPASS mnemonic translation.
H	Job files	File name table entries for this control point.
J	Job display	Current status of jobs being processed.
K	Equipment status table	Displays the status entry for each device in the system.
L	System file name table	Lists, by type, all active files in the system.
M	Tape status	Displays magnetic tape status.
N	Blank screen	Blank screen.
P	PP registers	Displays current contents of PP registers.
Q	Job queues display	Gives status of input, output, and rollout queues.
T, U	Text display	Displays text from central memory in coded lines (240 words for T; 300 words for U).
V	Central memory buffer	Displays 512 words directly from central memory.
Y	Monitor functions	Displays mnemonics and values of all monitor functions.
Z	Directory	Lists DIS directory.

OTHER SYSTEM DISPLAY COMMANDS

m, xxxx.	If m is one of the letters C through G, xxxx is the bias address for the managed table display.
SET, ssss...s.	Sets the left screen display sequence; ssss...s consists of one to eight display identifiers. The sequence is toggled by the right blank key.

SPECIAL FIRST CHARACTER ENTRIES

*	If DSD has relinquished the main display console to DIS, * acts as a quick hold, and DIS drops the display channel so that DSD can use it.
=	Toggles memory references between absolute and relative.
+	Advances left screen memory display address by 40_8.
-	Decrements left screen memory display address by 40_8.
right blank	Advances left screen display sequence established by SET command.
/	Advances left screen memory display address by the values in the lower 18 bits of the first word displayed.
(	Breakpoint program to (P+1).
)	Breakpoint program to (P-1).
8	Advances left screen managed table pointer.
9	Decrements left screen managed table pointer.
CR (carriage return)	Sets repeat entry flag. The subsequent entry is processed but not erased after completion.
.	Reads control card buffer automatically and executes until completion or an error is detected (same as RCS command).

CONTROL CHARACTERS

left blank (erase)	Clears entry line and error message (if one exists).
BKSP (backspace key)	Deletes last character entered and clears error message (if one exists).
CR (carriage return)	Initiates processing of command.

KEYBOARD ENTRIES

BKP, xxxxxx.	Breakpoints to address xxxxxx. Central processor execution begins at current value of P and stops when P=xxxxxx; DIS is the only PPU active at user's control point.
BKPA, xxxxxx.	Breakpoints to address xxxxxx. Central processor execution begins at current value of P and stops when P=xxxxxx.
DCP.	Drops the central processor and displays the exchange jump area on the B display.
DIS.	Reloads main DIS overlay.
DROP.	Drops DIS; does not drop the job if there are control cards remaining in the buffer (unless the error flag is set).
ELS. ccc...ccc.	Enters control statement ccc...ccc in the control card buffer after the last control statement, if there is space.
ENAi, xxxxxx.	Sets register Ai=xxxxxx in the exchange package area.
ENBi, xxxxxx.	Sets register Bi=xxxxxx in the exchange package area.
ENEM, n00m.	Sets CPU hardware exit mode to n ($0 \leq n \leq 7$). Sets CPU program exit mode to m ($0 \leq m \leq 7$).†
ENFL, xxxxxx.	Sets FL=xxxxxx in the exchange package area.
ENP, xxxxxx.	Sets P=xxxxxx.
ENPR, xx.	Sets job priority to xx ($1 \leq xx \leq 70_8$).

†n has no meaning for CDC CYBER 70/6000.

ENS. **ccc...ccc.**	Allows entry of control statement ccc...ccc as the next unprocessed statement in the control card buffer; ENS clears control card buffer of previous statements.
ENTL,xxxxx.	Sets the job time limit to xxxxx. 77777_8 is infinite.
ENXi, xxxxx xxxxx xxxxx xxxxx.	Sets register Xi=xxxxx xxxxx xxxxx xxxxx in the exchange package area.
ENXi, Lzzz ...zzz.	Sets register Xi to zzz...zzz, left-justified.
ENXi, Dccc ...ccc.	Sets register Xi to ccc...ccc display code characters.
ENXi, b, zzzz.	Sets byte b of register Xi to zzzz.
ERR.	Sets error flag, terminates execution, and clears AUTO mode if set.
GO.	Restarts a program which has paused.
HOLD.	DIS relinquishes the display console, but the job is held at the present status.
M. ccc...ccc.	Enters ccc...ccc as a program command. Data is stored at RA+CCDR.
N. ccc...ccc.	Sets DIRECT CPU INPUT mode. Characters entered from the keyboard are passed one character at a time, right-justified, directly into central memory at RA+CCDR.
OFFSWx.	Turns off sense switch x for the job ($1 \leq x \leq 6$).
ONSWx.	Turns on sense switch x for the job ($1 \leq x \leq 6$).
O26.	Calls O26 to the control point.
RCP.	Requests central processor. Depending on job priority, execution begins at the next program address for a job suspended by a DCP request.
RCS.	Sets AUTO MODE and initiates automatic control statement processing.

RE, xx.	Releases reservation of equipment xx (xx may not be the display assigned to DIS).
RNS.	Reads and processes the next control statement in the DIS control statement buffer.
ROLLOUT.	Allows the job to roll out.
ROLLOUT, xxxx.	Places job in rollout queue for xxxx job scheduler delay intervals; job is automatically rolled back in after this period of time.
RSS.	Reads the next control statement and stops prior to CPU execution.
RSS, ccc... ccc.	Reads statement ccc...ccc and stops before execution.
SCS.	Clears AUTO mode and stops automatic control statement processing.
T, xxxxxx.	Changes the T display to start at address xxxxxx.
U, xxxxxx.	Changes the U display to start at address xxxxxx.
UCC=c.	Sets the uppercase character to c.
V, xxxxxx.	Changes the V display to start at address xxxxxx.
X. ccc...ccc.	Processes ccc...ccc as the next control statement.
* xxx.	If an asterisk is followed by a blank and xxx is encountered during automatic control statement processing, xxx is interpreted as a direct DIS command rather than a control statement.
xxxx.	xxxx is processed as a control statement if it is not a recognizable DIS command.
xz, aaaaaa.	Refer to description under DSD System Display Commands.

MEMORY ENTRY COMMANDS

aaaaaa, yyy...yyy. or aaaaaa+ yyy...yyy.	Changes the contents of the word at aaaaaa (relative to its RA) to yyy...yyy. Leading zeros may be dropped. If an absolute mode, the entry is at central memory absolute location aaaaaa.†
aaaaaa,b,yyyy. or aaaaaa+b,yyyy.	Changes the contents of byte b at location aaaaaa to yyyy. Each location consists of five 12-bit bytes, numbered 0 through 4 from the left. †
aaaaaa, Dyyy...yyy. or aaaaaa+ Dyyy...yyy.	Changes the contents of location aaaaaa to display code characters yyy...yyy (left-justified, zero-filled). †
aaaaaa, Lyyy...yyy. or aaaaaa+ Lyyy...yyy.	Changes the contents of memory location aaaaaa, left-justified, to yyy...yyy.†
aaaaaa, In,yyyyy. or aaaaaa+ In,yyyyy.	Changes the contents of instruction n (0-3 from left) at location aaaaaa to yyyyy; yyyyy may be a 15- or 30-bit instruction. †

PP CALL COMMANDS

Keyboard Entry	Description	Format of PPU Call Initiated
nam.	Calls PPU program nam to control point n.	18/3Lnam,6/n,36/0
nam,xxx.	xxx is a parameter required by the PPU program nam. n is control point.	18/3Lnam, 6/n, 18/0,18/xxx
nam,xxx,yyy.	xxx and yyy are parameters required by the PPU program nam. n is control point.	18/3Lnam, 6/n, 18/xxx,18/yyy

† The second form of the command performs the same function but leaves the address at aaaaaa+1, allowing immediate entry for the next memory location.

KEYBOARD MESSAGES

ILLEGAL ENTRY.	Command cannot be processed.
REPEAT ENTRY.	Command in control card buffer is repeated each time carriage return is pressed; cleared by left blank key.
OUT OF RANGE.	Memory entry address is greater than the field length.
SYSTEM BUSY - DISK.	DIS is waiting for an overlay to be loaded from a mass storage device.
SYSTEM BUSY - PPU.	DIS is waiting for a PPU to be assigned in order to process the keyboard entry.
JOB ACTIVE.	Previous request not completed.
AUTO MODE.	Control card buffer is read automatically. Automatic control card processing can be selected by the RCS command or by pressing the . key.
DIRECT CPU INPUT.	N. command has been entered, and all data entered from the keyboard is being passed directly to central memory.

FILE EDITOR (O26) COMMANDS

O26 DESCRIPTION

O26 enables the user to create or edit a file from the console. A central memory buffer is used to store and edit the BCD lines before writing the file. Like DSD, O26 is interpretive.

SPECIAL FIRST CHARACTER ENTRIES

0	Sets insert at first line.
1	Sets insert at 4th line on screen.
2	Sets insert at 8th line on screen
3	Sets insert at 12th line on screen.
4	Sets insert at 16th line on screen.
5	Sets insert at 20th line on screen.
6	Sets insert at 24th line on screen.
7	Sets insert at 32nd line on screen.
8	Sets insert 8 at insert line.
9	Sets insert 9 at insert line.

+	Displays next page.
-	Backs up 18 lines or to start of buffer.
*	Holds display and returns control to DSD. When * is entered under DSD, control returns to O26.
/	Starts or stops roll.
(	Advances insert by one line.
)	Decrements insert by one line.
=	Clears insert flag.
,	Finds insert line and starts display at insert marker.
.	Deletes the line following the insert line.
CR (carriage return)	Sets REPEAT ENTRY flag.
space	Sets the characters P. into buffer.

MESSAGES

FORMAT ERROR.	A format error has been detected during translation of the entry.
PPU BUSY.	Request was ignored by the system.
DISK BUSY.	Waiting for O26 overlay.
NOT IN LINE.	Character was not found by the replace character commands.
REPEAT ENTRY.	Entry is not cleared after execution.
RECORD TOO LONG.	Record read does not fit into buffer.

SYSTEM COMMANDS

DIS.	Writes the buffer, rewinds the file, and transfers control back to DIS.
DROP.	Writes the buffer, rewinds the file, and drops the display unit.
ERR.	Sets error flag at control point.
GO.	Clears pause flag.
HOLD.	Releases display to DSD.

XDIS.	Transfers control back to DIS. Buffer is not written and file is not rewound.
XDROP.	Drops display unit; does not write file.

FILE COMMANDS †

BKSP.lfn.	Backspaces file lfn one logical record. If lfn is missing, previously specified file is used.
BKSPRU,x.	Backspaces current file x physical records.
BKSPRU.lfn.	Backspaces file lfn one PRU. If lfn is missing, previously specified file is used.
FILE.lfn.	Changes name of current file to lfn.
RC.lfn.	Reads compile file. Rewinds, reads, and rewinds file lfn. If lfn is missing, set file name to COMPILE. Set scan tab to 6.
READ.lfn.	Clears buffer and rewinds, reads, and rewinds lfn. If lfn is missing, previously specified file is used.
READI.lfn.	Skips to end-of-information, backspaces twice, and reads last logical record of information on lfn. If lfn is missing, previously specified file is used.
READN.lfn.	Reads file lfn with no rewind. If lfn is missing, previously specified file is used; stops read on buffer full or end-of-record encountered.
READNS.lfn.	Reads file lfn nonstop with no rewind. If lfn is missing, previously specified file is used; stops read on buffer full or end-of-file encountered.
RETURN.lfn.	Returns file lfn. If lfn is missing, previously specified file is returned to system.
REWIND.lfn.	Rewinds file lfn. If lfn is missing, previously specified file is used.
RFR.lfn.	Clears buffer and rewinds and reads file lfn. If lfn is missing, previously specified file is used.
RI.lfn.	Rewinds, reads, and rewinds file lfn. If lfn is missing, file INPUT is read.

†For these commands, if no file was previously specified, INPUT is used.

RLR.lfn.	Clears buffer and reads last record on file lfn. If lfn is missing, previously specified file is used.
RNR.lfn.	Clears buffer and reads next record on file lfn. If lfn is missing, previously specified file is used.
RO.lfn.	Clears buffer and rewinds, reads, and rewinds file lfn. If lfn is missing, file OUTPUT is used. Sets word scan to words 4, 8, 12.
RPR.lfn.	Reads previous record from file lfn (that is, backspaces twice and reads).
SKIPEI.lfn.	Skips to end-of-information on lfn. If lfn is missing, previously specified file is used.
UNLOAD. lfn.	Unloads tape specified by lfn. If lfn is missing, previously specified tape is unloaded.
WRITE.lfn.	Writes buffer on file lfn. If lfn is missing, previously specified file is used.
WRITEF. lfn.	Writes buffer on file lfn and places an EOF mark after the data written. If lfn is missing, previously specified file is used.
WRITEW. lfn.	Writes data from start of buffer up to insert line on file lfn. If lfn is missing, previously specified file is used.

LINE ENTRY AND DATA MOVE

On all commands that read the following line for character merging (A., L., M., and N.), the following line is saved in the DUP buffer. This line can be referenced at a later time with the D. command.

A.ccc...ccc	Merges specified characters with the line following insert marker except for tabbed or spaced-over area up to carriage return.
C.ccc...ccc	Enters specified characters into buffer; ccc...ccc may consist of up to 90 characters.
COPY.	Copies data block starting at insert 8 and ending at insert 9 into block at insert marker.
DEL.	Deletes all lines after insert marker. If insert is not set, deletes all lines.

D,*.	Deletes block from insert 8 through insert 9.
D.ccc...ccc	Merges line from DUP buffer with characters ccc...ccc of keyboard buffer. Tab rules for A. command apply.
E.ccc...ccc	Merges characters ccc...ccc with remainder of characters in DUP buffer except for tabbed or spaced-over area.
L.ccc...ccc	Merges characters ccc...ccc with remainder of following line except for tabbed or spaced-over area.
M.ccc...ccc	Merges characters ccc...ccc with remainder of following line.
MOVE.	Moves data starting at insert 8 and ending at insert 9 into block starting at insert marker.
N.ccc...ccc	Merges characters ccc...ccc with following line except for tabbed area.
P.ccc...ccc	Enters characters ccc...ccc into buffer (up to 90 characters). User can set data entry mode by typing P. or typing a space.

DISPLAY, TAB, SCAN CONTROL COMMANDS

DFL.	Displays first line.
DLL.	Displays last part of file.
DS,.	Displays first line.
TAB,x,y, ...,z	Sets tabs x,y,z. If x equals 0, the command clears all tabs. Default is TAB,11,18,30,73.
SCAN,x,y, ...,z	Sets word scan to x,y,z. If x equals 0, the command clears scan.

LINE, RECORD SEARCH COMMANDS

F.ccc...ccc	Searches for matching field in line. Search is end-around.
GET,lfn. rname.	Searches file lfn for record rname. If lfn is missing, previously specified file is used.
GET.rname.	Clears buffer and searches current file for record rname.

GETR,lfn. rname.	Reads random file lfn for TEXT record rname. If lfn is missing, previously specified file is used.
GETR. rname.	Searches current random file for record rname.
GTR,lfn. rname.	Reads random file lfn for record rname. If lfn is missing, previously specified file is used.
GTR.rname.	Gets random record rname from current file. If a record of that name and type TEXT exists, reads that record; otherwise, reads record rname of any type.
LIST.	Lists directory of current file.
LIST,lfn.	Lists directory of file lfn. If lfn is missing, previously specified file is used.
S.ccc...ccc	Starting with the first line displayed, searches for a line beginning with the characters ccc...ccc. Search is end-around.

REPLACE COMMANDS

RC,x,c.	Replaces character position x of line following insert marker with character c (extend line if necessary).
RM/ aaa...aaa/ bbb...bbb/	Replace multiple; works the same way as RS command, but if a replacement took place and REPEAT ENTRY is set, this command does not advance to next line.
RS/ aaa...aaa/ bbb...bbb/	Replaces character string aaa...aaa from the following line with character string bbb...bbb. The / can be any delimiting character.
R,x./ aaa...aaa/ bbb...bbb/	Replaces character string aaa...aaa from the following line starting with character position x with character string bbb...bbb. The / can be any delimiting character.

MISCELLANEOUS COMMANDS

ENFL. Sets field length to buffer size plus 1000_8.

ENFL,xxxxx. Sets field length to $xxxxx_8$.

LC. Toggles lowercase mode flag.

OUT. Transfers output files to output queue. KRONOS processes the output files without waiting for O26 to terminate.

UCC=c. Sets uppercase control character to c. If c is missing, clears the uppercase control character. To enter a character which has been previously specified as the uppercase control character, enter that character twice.

To enter:	Enter uppercase control character and:
$	S
≡	0
[	1
]	2
%	3
≠	4
→	5
∨	6
∧	7
↑	Q
↓	W
<	E
>	R
≤	T
≥	Y
¬	U
;	I
≠	=
∧	A
<	(
>	)
≤	+
≥	-
;	,
:	z

CONTROL CARD FORMATS

COMPASS

COMPASS($p_1, p_2, \ldots, p_n$) Calls the COMPASS compiler.

p_i	Description
A	Abort to EXIT statement if assembly errors are detected.
B=lfn_1	Object code written on file lfn_1.
D	Assembly errors do not inhibit B parameter.
F=name	COMPASS was called by name (COMPASS or FTN) control statement.
G=lfn_2	System text is first overlay on file lfn_2.
I=lfn_3	Source code read from file lfn_3.
L=lfn_4	Output written on file lfn_4.
LO=chars	List options.

chars	Description
A	List statements actually assembled
B	List binary control statements
C	List control statements
D	Include details
E	Include echoed lines
F	List IF-skipped lines
G	List generated code
L	Master list control
M	List macros and opdefs
N	List nonreferenced symbols
R	Accumulate and list references
S	List system macros and opdefs
T	List nonreferenced system symbols
X	List XTEXT lines

ML=chars	MODLEVEL equal to 9-character string, chars.
N	Suppress ejects caused by normal listing.
O=lfn_5	Short list written on file lfn_5.
P	Selects consecutive page numbering.

PC=chars	PCOMMENT micro is 30-character string, chars.
S=ovl	System text is named overlay, ovl.
X=lfn_6	External text obtained from file lfn_6.

DSDI

DSDI($p_1, p_2, \ldots, p_n$) Calls the deadstart dump interpreter.

p_i	Description
I=lfn_1	Read directives from file lfn_1 (INPUT).
F=lfn_2	Read express dump from file lfn_2 (DUMP).
L=lfn_3	List output is written on file lfn_3 (OUTPUT).
PD=n	Print density is n lines per inch where n may be 3, 4, 6, or 8. If omitted, n=8. If n is omitted, n=6 is assumed.
Z	The DSDI control statement contains input directives.
P	Use low core pointers from running system. If omitted, use low core pointers from express deadstart dump (EDD) file.
NR	EDD file is not rewound before processing.

File Control Directives	Description
DISPOSE, un.	Dispose alternate output.
OUTPUT, lfn.	Begin alternate output.
READ, lfn, rec.	Read alternate input.
REWIND, lfn.	Rewind file lfn.

File Control Directives	Description
EJ, nn.	Eject if not nn lines.
EJOFF.	Turn off auto eject.
EJON.	Turn on auto eject.
PD, n.	Preset print density.
*.	Enter subtitle comment.

Hardware Register Dump Directives	Description
SC.	CDC CYBER 170 status/control register.
XP.	Executing exchange package.

Memory Dump Directives	Description
CM.	Set to dump central memory.
EC.	Set to dump extended core storage.
C, fwa, lwa+1.	Dump memory in instruction parcel format (four groups of five octal digits formatted for terminals).
D, fwa, lwa+1.	Dump memory in byte format (five groups of four octal digits formatted for terminals).
E, fwa, lwa+1.	Dump memory in word format (four words per line).
AP, n_1, n_2, . . . , n_n.	Analyze PPU number n_i.
P, n_1, n_2, . . . , n_n.	Dump PPU n_i in block format.
Q, n_1, n_2, . . . , n_n.	Dump PPU n_i in line format.
Q, n, fwa, lwa+1.	Dump PPU n in line format for terminals.
RA, addr.	Specifies that subsequent C, D, and E directives will dump memory locations relative to reference address addr.
RAC, n.	Specifies that subsequent C, D, and E directives will dump memory locations relative to reference address of control point n.

CMR Dump Directives	Description
LC.	Dumps contents of low core.
CP, n_1/ops, n_2/ops, . . . , n_n/ops.	Causes control point area n_i to be dumped (formatted for terminals).

CMR Dump Directives	Description

ops	Description
X	Exchange package and parameter summary (default)
T	Detailed dump (default)
A	Job dayfile buffer (default)
F	Attached files (default)
C	Field length in C format
D	Field length in D format
E	Field length in E format
G	Control point area in C format
H	Control point area in D format
I	Control point area in E format
P	Attached PPUs

CPO, ops.	Selects new default list options for CP directive as specified by ops.
PP.	Dumps PP communication areas (formatted for terminals).
DP.	Dumps dayfile buffer pointers.
EST.	Dumps equipment status table.
FNT.	Dumps file name table.
MST.	Dumps mass storage tables.
JC.	Dumps job control parameters.
ACCOUNT.	Dumps ACCOUNT dayfile buffer.
ERRLOG.	Dumps ERRLOG dayfile buffer.
EPB.	Dumps ECS/PP buffer.
MTR.	Dumps CPUMTR.
RPL.	Dumps resident peripheral library.
RCL.	Dumps resident central library.
PLD.	Dumps peripheral library directory.
CLD.	Dumps central library directory.

Subsystem Dump Directives	Description
MAGNET, ops.	Dumps areas of memory most frequently analyzed when a malfunction within MAGNET occurs specified by ops (default is all options).

ops	Description
P	1MT
Q	Queue table
U	Unit descriptor tables (UDT)

EI200, ops. Dumps areas of memory most frequently analyzed when a malfunction within EI200 occurs specified by ops (default is all options).

ops	Description
L	Low core pointer words
T	Terminal tables
P	1ED, 1LS, and 1SP
O	PPU overlays

BATCHIO, ops. Dumps areas of memory most frequently analyzed when a malfunction within BATCHIO occurs specified by ops (default is all options).

ops	Description
B	Buffer points
P	1CD, 1IO, and 1BA

TELEX, ops. Dumps areas of memory most frequently analyzed when a malfunction within TELEX occurs specified by ops (default is all options).

ops	Description
C	Command table
E	Reentry table
P	TELEX-related PPUs
T	Terminal tables

MODVAL

MODVAL($p_1, p_2, \ldots, p_n$) Creates, modifies, or inquires about VALIDUS.

p_i	Description
I=lfn_1	File containing input data (default INPUT)
P=lfn_2	Specifies old validation file that is to be updated (default VALIDUS)
N=lfn_3	Specifies interim file that becomes newly created validation file (default NEWVAL)
S=lfn_4	Source data for each user number is written to file lfn_4 (default is SOURCE)
U=lfn_5	File containing the available user indices for the current VALIDUS file (default VALINDS)
L=lfn_6	File to receive list output (default OUTPUT)
CV	Convert VALIDUS option
D	No abort on directive errors
FA	Forces attach of VALIDUS and VALINDS (SYOT only)
FN=name	Indicates family name user wishes MODVAL to access (SYOT only)
OP=C	Create option
OP=U	Update option
OP=Z	Statement update option
OP=I	Inquire option
OP=R	Reformats the validation file by purging all files of each deleted user
OP=S	Specifies a source run that returns the validation file specified by the P identifier on the file specified by the S keyword
OP=K	K display option
OP=L	Reads the validation file, sorts the copy by user number, and writes it to the output file
LO=E	List errors; used with OP=C, OP=U, or OP=Z

Pi	Description
LO=A	Sort by user number; used with OP=L
LO=N	Sort by user index; used with OP=L
LO=L	Catalog file lfn_2 instead of VALIDUS; used with OP=L
LO	E and N options
LO=AL	A and L options
LO=NL	N and L options
LO=EN	E and N options

/usernum,$ident_1$=$data_1$, $ident_2$=$data_2$, . . . , $ident_n$=$data_n$ — Specifies MODVAL input directives.

Identifier	Description
PW=passwrd	1- to 7-character password
UI=nnnnnn	User index
AB=ansback	1- to 10-character answerback code
MT=nn	Number of magnetic tapes allowed
RP=nn	Number of removable packs allowed
TL=nn	Index to maximum CPU time
DF=nn	Index to maximum number of MESSAGE requests
CC=nn	Index to maximum number of batch control statements
OF=n	Index to maximum number of print and punch files
CP=nn	Index to number of punched cards allowed
LP=nn	Index to number of printed lines allowed
EC=nn	Index to maximum ECS memory (not implemented)
SL=nn	SRU limit (not implemented)
CM=nn	Index to maximum CM
NF=n	Index to maximum number concurrent files

Identifier	Description
MS=nn	Index to maximum number mass storage PRUs
DB=n	Index to maximum number deferred batch jobs
AW=xxxx	60-bit access word (each bit can have special meaning)
CAB=oldab, newab	Changes answerback code
PN=prnum	1- to 10-alphanumeric project number

The following identifiers can be used only in update and K display options.

DAC=usernum	Deletes user number from VALIDUS file
FUI=nnnnnnr	Changes or inserts user index

The following identifiers control permanent file access for the individual user.

FC=n	Maximum number of indirect access permanent files
CS=n	Cumulative size of all indirect access permanent files
FS=n	Maximum size allowed for a single indirect access permanent file
DS=n	Size allowed for single direct access file

The following identifiers manipulate fields describing the user's terminal.

PX=tran	Transmission mode
RO=nn	Rubout count
PA=prty	Terminal parity
TT=term	Terminal type
TC=chset	Terminal character set
IS=subsy	Initial subsystem

SYSEDIT

SYSEDIT($p_1, p_2, \ldots, p_n$) Performs modifications to the system library.

p_i	Description
I=lfn_1	Directive input is on file lfn_1.
B=lfn_2	Binary change statements are on file lfn_2.
L=lfn_3	List output on file lfn_3.
R	Restore to initial deadstart system.
R=n	Restore to copy n of the system.
R=0	No system file restoration.
C	Checkpoint the system following SYSEDIT.

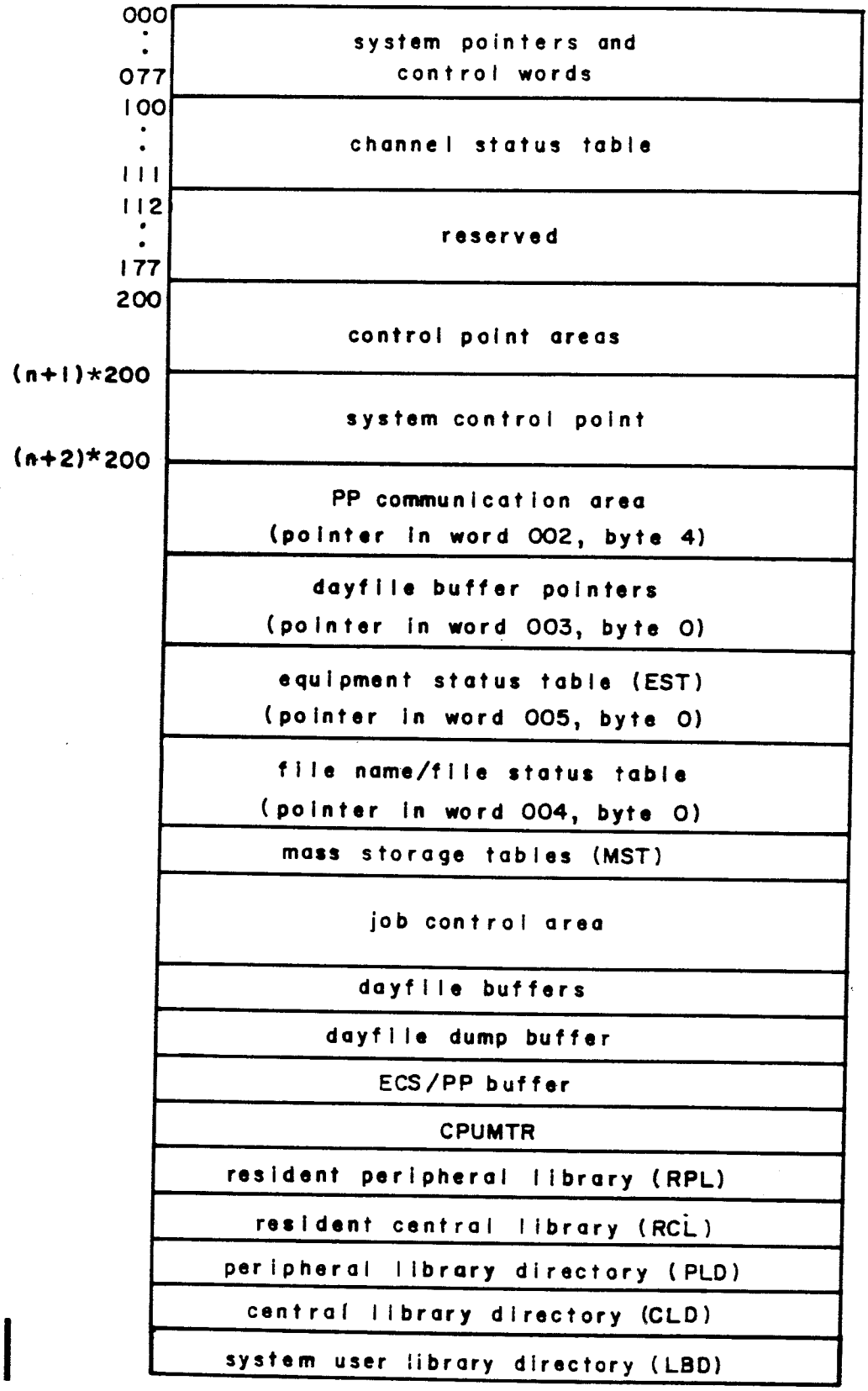
Directive	Description
*AD, nn, $ty_1/rec_1, ty_2/rec_2, \ldots, ty_n/rec_n$	Specifies the alternate device to be used instead of the system device(s) for storing ABS, OVL, and PP type routines; nn is either the EST ordinal or the device type.
*CM, $ty_1/rec_1, ty_2/rec_2, \ldots, ty_n/rec_n$	Define record rec_i of type ty_i as being central memory resident
*MS, $ty_1/rec_1, ty_2/rec_2, \ldots, ty_n/rec_n$	Define record rec_i of type ty_i as being mass storage resident.
*DELETE, $ty_1/rec_1, ty_2/rec_2, \ldots, ty_n/rec_n$	Delete record rec_i of type ty_i from the system library. Type ty_i=ULIB is ignored; user libraries cannot be deleted. *DELETE can be shortened to *D.
*FILE, lfn, NR	Define file lfn as a file containing system changes. If NR is not present, lfn is rewound before processing.
*IGNORE, $ty_1/rec_1, ty_2/rec_2, \ldots, ty_n/rec_n$	Do not process record rec_i of type ty_i when it appears on the system change file.
*PROC, $rec_1, rec_2, \ldots, rec_n$	Define record rec_i of type TEXT as procedure file.

Directive	Description
*RENAME, oe_1-ne_1, oe_2-ne_2, ..., oe_n-ne_n	Rename CPU entry names oe_i to ne_i.
*PPSYN, nam/ nam_1, nam_2, ..., nam_n	Add entries to system library to provide synonym nam_i for the PPU program nam.
*SC, ty_1/rec_1, ty_2/rec_2, ..., ty_n/rec_n	Define record rec_i of type ty_i as product set format control statements.

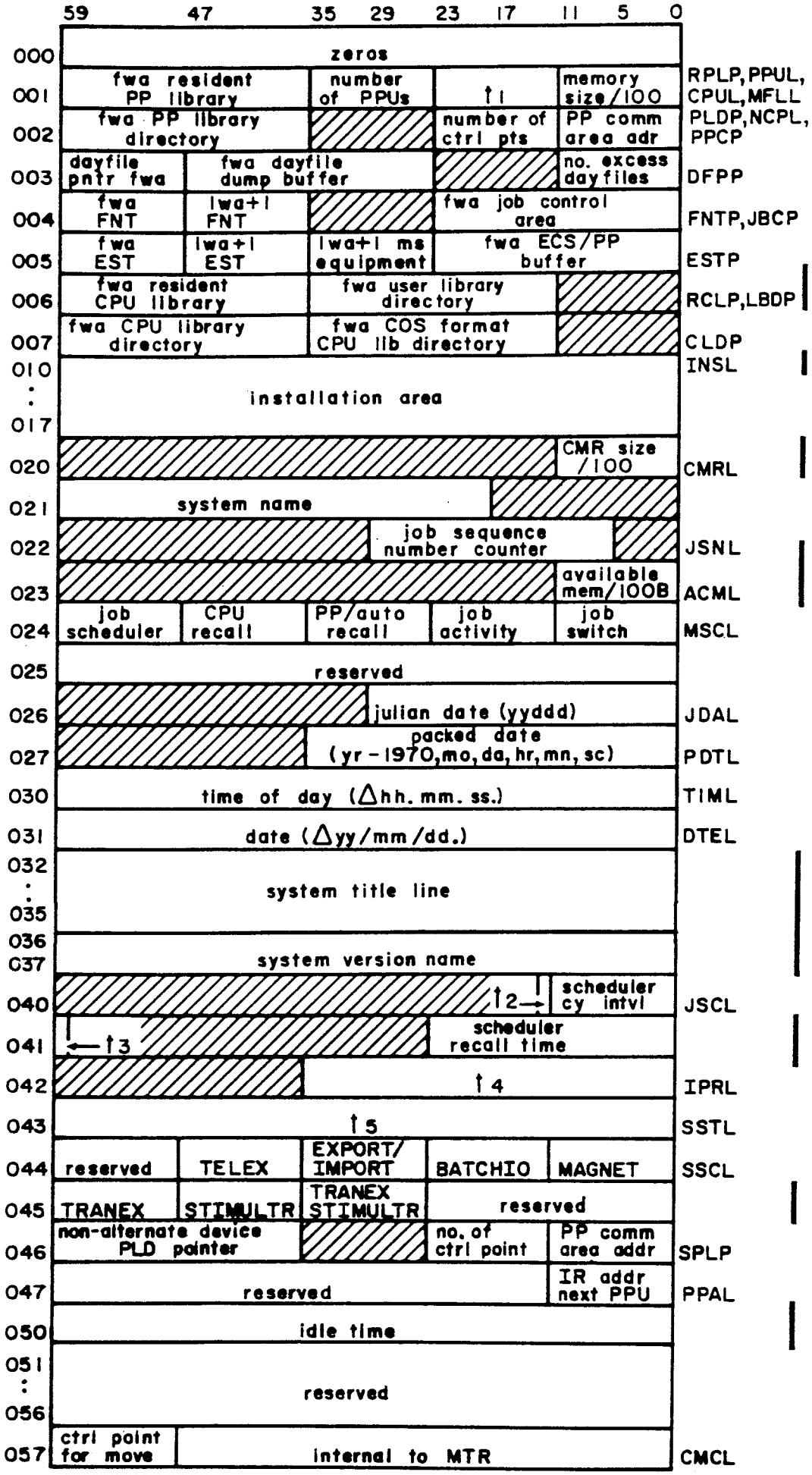
CENTRAL MEMORY

CENTRAL MEMORY RESIDENT

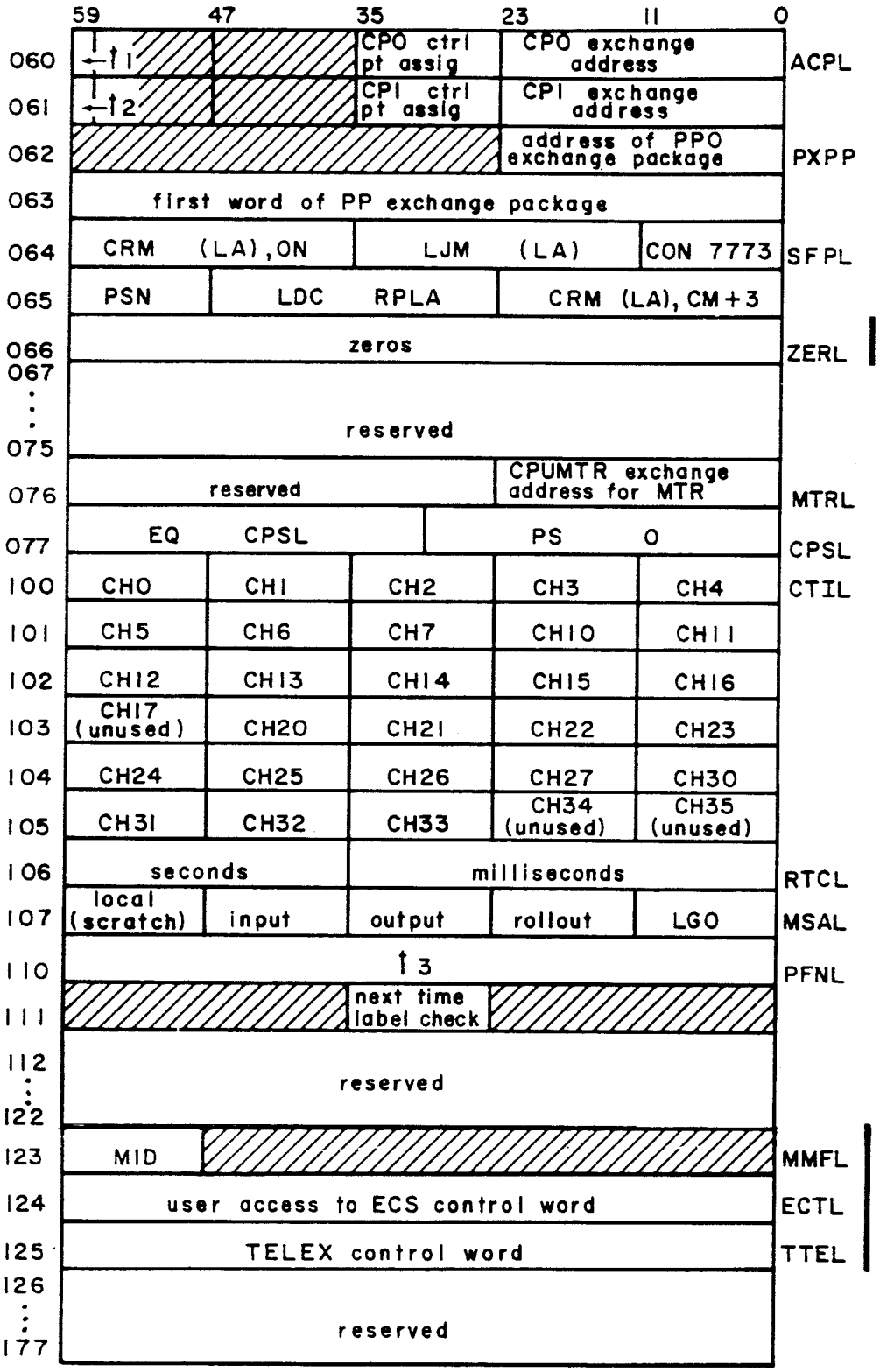
CENTRAL MEMORY LAYOUT



POINTERS AND CONSTANTS

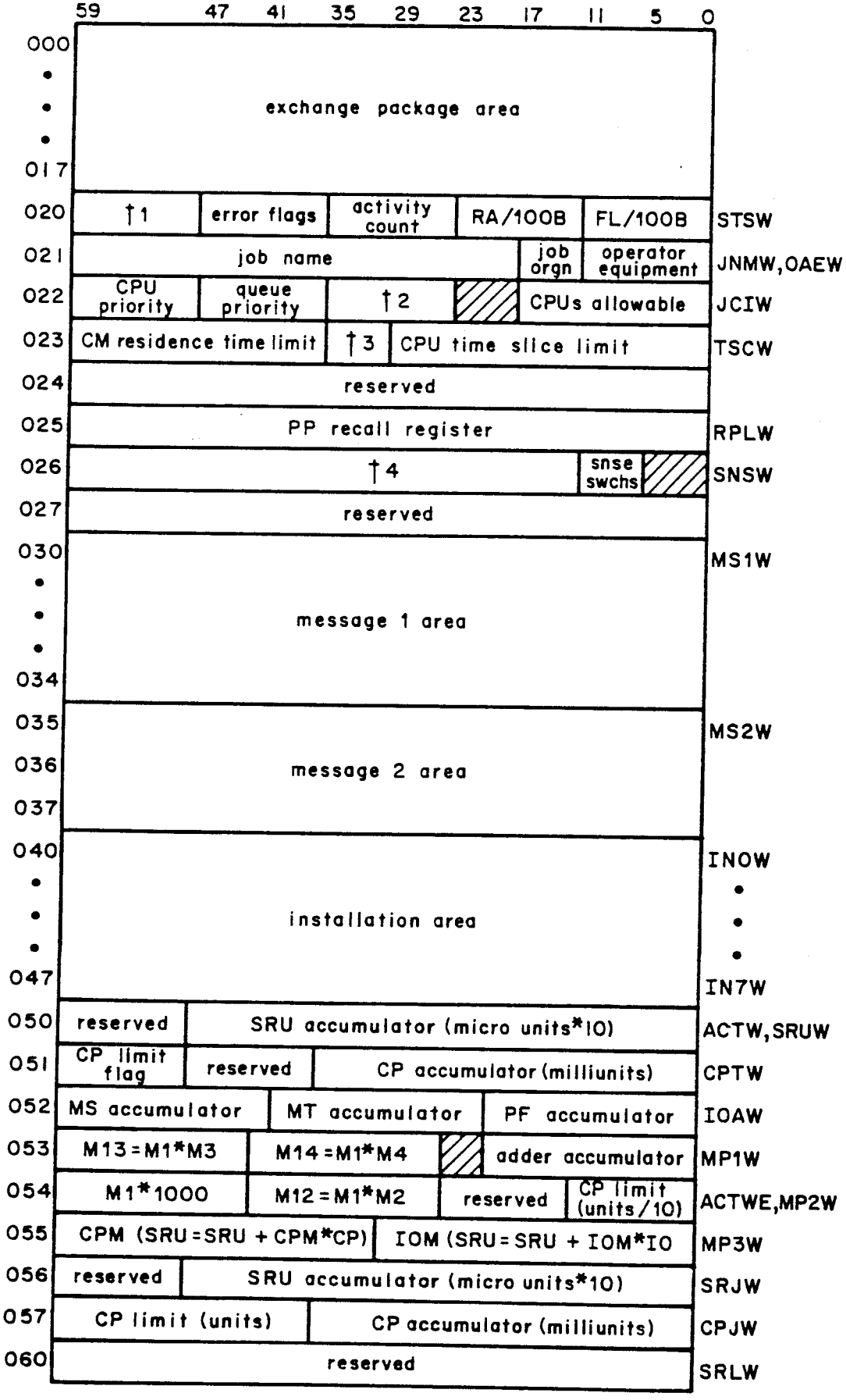


Ref.	Bit No.	Description
†1	23-17	Unused
	16	Reserved
	15	Set if CMU is present
	14	Set if CEJ/MEJ option is available
	13	Set if CPU0 has an instruction stack
	12	Set if CPU1 is present
†2	12	Scheduler requested flag
†3	59	Scheduler active flag
†4	35	O26/O29 flag (0=O26, 1=O29)
	24	System character set mode (0=63, 1=64 character set)
	23-12	Assumed conversion mode (1= ASCII/USASI, 2=EBCDIC)
	11-0	Assumed tape density (1=200, 2-556, 3=800, 4=1600)
†5	59-50	Unused
	49	Ignore USER statement
	48	Disable account verification
	47	Disable BATCHIO
	46	Disable TELEX
	45	Disable EI200
	44	Disable MAGNET
	43	Disable TRANEX
	42	Disable removable device checking
	41	Disable queue protect
	40-15	Unused
	14	ENGINEERING switch
	13	Console initial lock status
	12	DEBUG switch
	11-3	Unused
	2	Disable priority evaluation
	1	Disable job scheduler
	0	Disable AUTOROLL

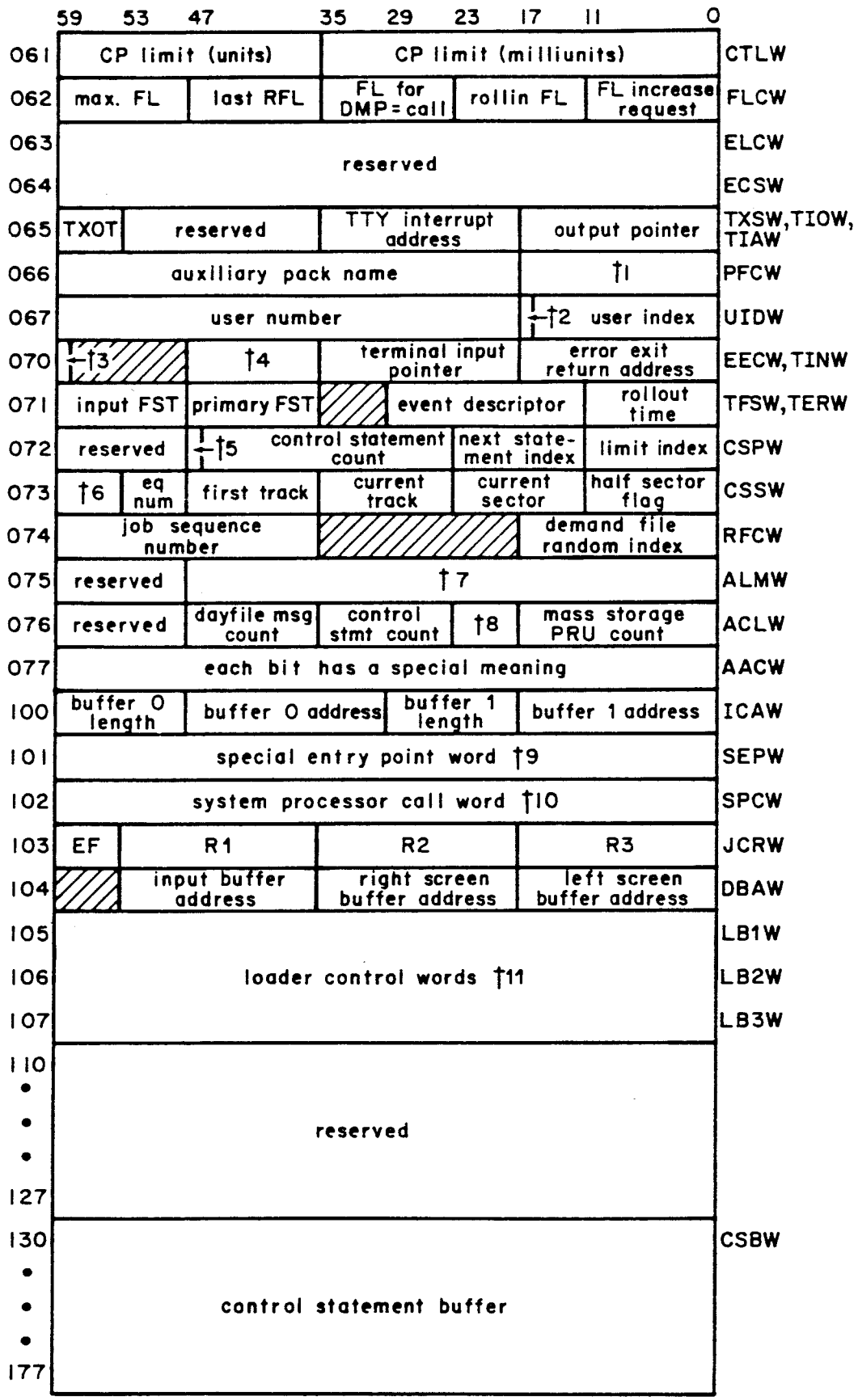

59
47
35
23
11
0
060
061
062
063
064
065
066
067
075
076
077
100
101
102
103
104
105
106
107
110
111
112
122
123
124
125
126
177
↑1
CP0 ctrl pt assig
CP0 exchange address
ACPL
↑2
CP1 ctrl pt assig
CP1 exchange address
address of PP0 exchange package
PXPP
first word of PP exchange package
CRM (LA),ON
LJM (LA)
CON 7773
SFPL
PSN
LDC RPLA
CRM (LA), CM+3
zeros
ZERL
reserved
reserved
CPUMTR exchange address for MTR
MTRL
EQ CPSL
PS 0
CPSL
CH0
CH1
CH2
CH3
CH4
CTIL
CH5
CH6
CH7
CH10
CH11
CH12
CH13
CH14
CH15
CH16
CH17 (unused)
CH20
CH21
CH22
CH23
CH24
CH25
CH26
CH27
CH30
CH31
CH32
CH33
CH34 (unused)
CH35 (unused)
seconds
milliseconds
RTCL
local (scratch)
input
output
rollout
LGO
MSAL
↑3
PFNL
next time label check
reserved
MID
MMFL
user access to ECS control word
ECTL
TELEX control word
TTEL
reserved

Ref.	Bit No.	Description
†1	59	Set if CPU0 is off
†2	59	Set if CPU1 is off
†3	59	Total PF system interlock
	58	Request total PF system interlock
	57-54	Reserved
	53-48	PF activity count
	47-18	Reserved
	17-12	Default family equipment number
	11-6	Alternate family count
	5-1	Reserved
	0	Word interlock

CONTROL POINT AREA



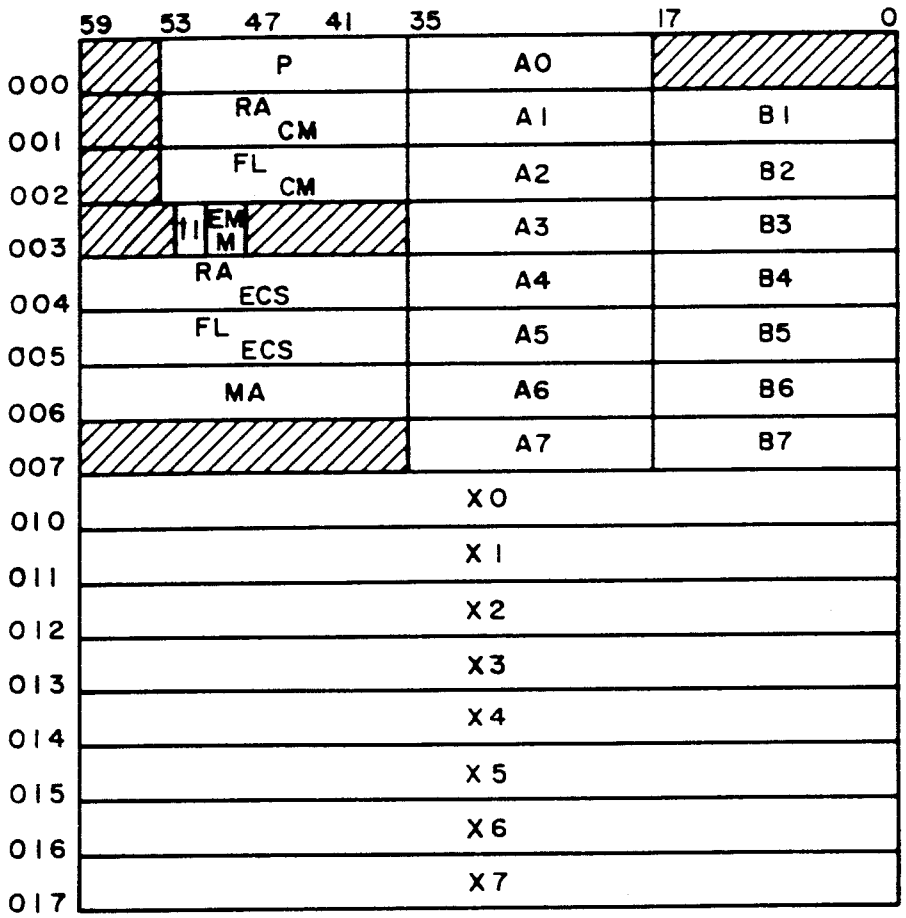
Ref.	Bit	Description
†1	59	CPU W status
	58	CPU X status
	57	CPU auto recall
	56	CPU subcontrol point active status
	55-54	Unused
	53	Job advancement flag
	52-48	Number of PPs assigned to job
†2	35-33	CPU status for rollout
	32-28	Unused
	27	Set if rollout in process
	26-25	Unused
	24	Set if rollout is requested
†3	35	Set if CPU time slice is active
	34-30	Queue control (0=input, 1=rollout)
†4	59	Reserved
	58	O26/O29 punch mode
	57-36	Unused
	35-23	Reserved for installation use
	22-13	Reserved for pause flags
	12	PPU pause flag


59 53 47 35 29 23 17 11 0
061 CP limit (units) CP limit (milliunits) CTLW
062 max. FL last RFL FL for DMP=call rollin FL FL increase request FLCW
063 reserved ELCW
064 ECSW
065 TXOT reserved TTY interrupt address output pointer TXSW,TIOW, TIAW
066 auxiliary pack name †1 PFCW
067 user number ←†2 user index UIDW
070 ←†3 †4 terminal input pointer error exit return address EECW,TINW
071 input FST primary FST event descriptor rollout time TFSW,TERW
072 reserved ←†5 control statement count next state-ment index limit index CSPW
073 †6 eq num first track current track current sector half sector flag CSSW
074 job sequence number demand file random index RFCW
075 reserved †7 ALMW
076 reserved dayfile msg count control stmt count †8 mass storage PRU count ACLW
077 each bit has a special meaning AACW
100 buffer 0 length buffer 0 address buffer 1 length buffer 1 address ICAW
101 special entry point word †9 SEPW
102 system processor call word †10 SPCW
103 EF R1 R2 R3 JCRW
104 input buffer address right screen buffer address left screen buffer address DBAW
105 loader control words †11 LB1W
106 LB2W
107 LB3W
110 reserved
127
130 CSBW
control statement buffer
177

Ref.	Bit	Description
†1	17-12	Family EST ordinal
	11-0	Indexes into tables of limits
	11-9	Limit for size of direct access files
	8-6	Limit for number of permanent files
	5-3	Limit for cumulative size of indirect access files
	2-0	Limit for size of indirect access files
†2	17	Set if charge statement required
†3	59	Noexit flag
†4	47	Set if bits 46-36 are error flag instead of reprieve error option
†5	47	Set if EOR is on control statement file
†6	59	Set if information is for INPUT file
	58	Skip to EXIT flag
	57-53	Unused
†7	47-45	Magnetic tapes
	44-42	Removable packs
	41-39	Deferred batch jobs
	38-36	Local files
	35-30	Time limit
	29-24	SRU limit
	23-18	Field length
	17-12	ECS field length
	11-6	Lines printed
	5-0	Cards punched
†8	23-18	Disposed output count
†9	59	Set indicates presence of entry points.
	58-54	Reserved
	53	Set if ARG= entry point present
	52	Set if DMP= entry point present
	51	Set if SDM= entry point present
	50	Set if SSJ= entry point present
	49	Set if VAL= entry point present
	48-36	Reserved
	35	Restart flag
	34	Reserved
	33	Suppress DMP= if control statement call
	32	Create DM* file only flag
	31	Dump FNTs with control point area
	30	Leave DM* file unlocked
	29-18	DMP= FL/100B (if field is 0, dump entire FL)
	17-0	SSJ= parameter block address

Ref.	Bit	Description
†10	For input:	
	59-42	Entry point if RA+1 request, 770000B if control statement call
	41	Special program request active (1AJ only)
	40	Clear RA+1 upon completion
	39	If set, parameter list is in bits 35-0; if clear, address of parameter list is in bits 17-0
	38	Does not start CPU at completion of control statement call (1AJ only)
	37-36	Unused
	35-0	Refer to description of bit 39
	For output:	
	59-36	Unused
	35-24	Status return
	23-0	Unused
†11	LB1W:	
	59	Use default map options if not set
	58	Reserved
	57	Local map option X
	56	Local map option E
	55	Local map option B
	54	Local map option S
	53	Reduce flag
	52-24	Reserved
	23-0	Global library set indicators (6-bit fields):
		00 End of library set
		01-76 LBD ordinal of system library
		77 User library; logical file name of first user library in LB3W; logical file name of second user library in LB2W
	LB2W, LB3W:	
	59-0	Either logical file name of second (LB2W) or first (LB3W) user library, or a collection of 6-bit global library set indicators

EXCHANGE PACKAGE AREA



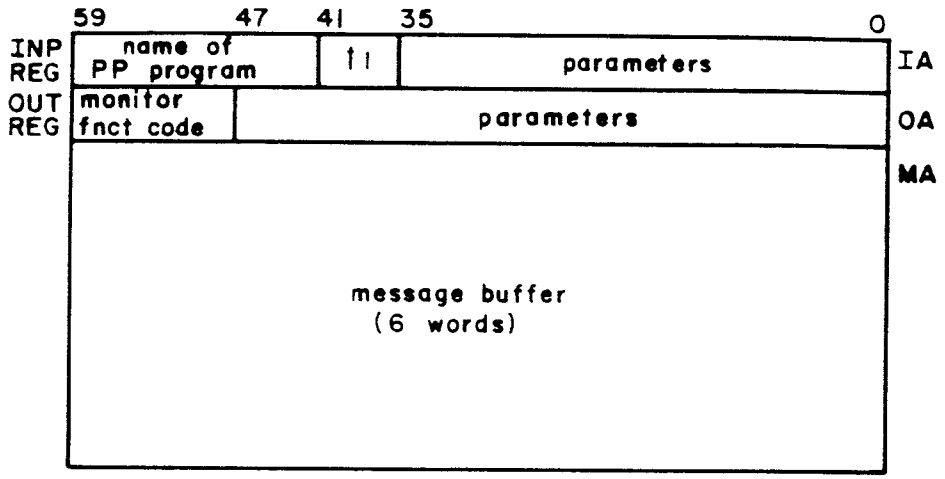
P	Program address
RA	Reference address
FL	Field length
MA	Monitor address
Ai	Address registers
Bi	Increment registers
Xi	Operand registers

EM-M CPU program exit mode:

0	Disable program exit mode
1	Address out of range
2	Operand out of range
3	Address or operand out of range
4	Indefinite operand
5	Indefinite operand or address out of range
6	Indefinite operand or operand out of range
7	Indefinite operand or address out of range or operand out of range

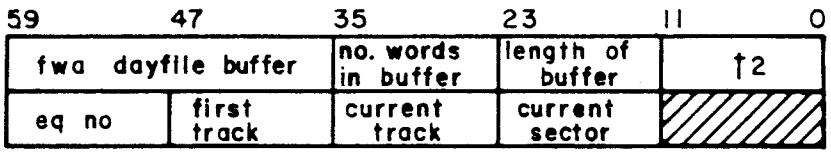
Ref.	Bit No.	Description
†1	52-51	Hardware error exit status bits on CDC CYBER 70 Model 74

PP COMMUNICATION AREA



†1 Bit 41 set if called with auto recall, bits 40-36 control point assignment

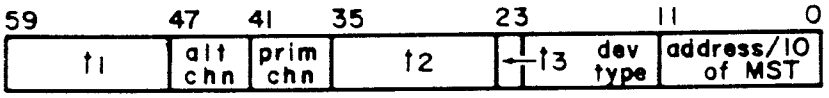
DAYFILE BUFFER POINTERS



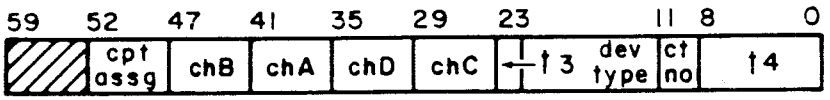
†2 Interlock byte (0 = no dump in progress, 1 = dump in progress)

EQUIPMENT STATUS TABLE (EST) FORMATS

MASS STORAGE DEVICES



NONMASS STORAGE DEVICE (3000 TYPE EQUIPMENT)

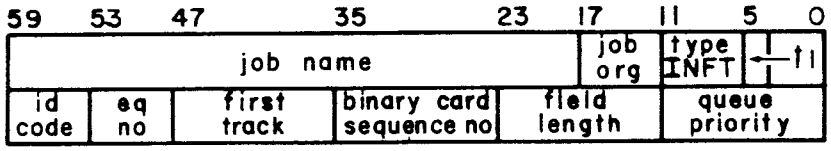


Ref.	Bit No.	Description
†1	59	Set to indicate mass storage device
	58	Set if device has copy of system
	57	Reserved
	56	Set if removable device
	55	Set if checkpoint request pending
	54	Set if device is not currently available for access
	53-48	Reserved
†2	For DI type equipment:	
	35	Set indicates vertically contiguous units
	34-33	Zeros
	32-30	Number of physical units for device minus 1
	29-24	First physical unit for device
	For other equipment types:	
	35-33	Physical equipment number
	32-30	Number of physical units for device minus 1
	29-27	Device selection for connect code
	26-24	First physical unit for device
†3	23	ON/OFF flag (set if access not allowed)

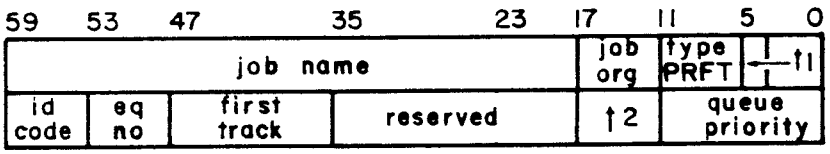
Ref.	Bit No.	Description
†4		For magnetic tape equipment:
	8-4	Flags: 01 No status 2 feature 02 No code conversion memory 04 Disable controlled backspace 10 Unused 20 66x subsystem (other bits unused when this bit set)
	3-0	Unit number
		For other equipment types:
	8-6	Unused
	5-0	Unit number

FILE NAME/FILE STATUS TABLE (FNT/FST) ENTRY

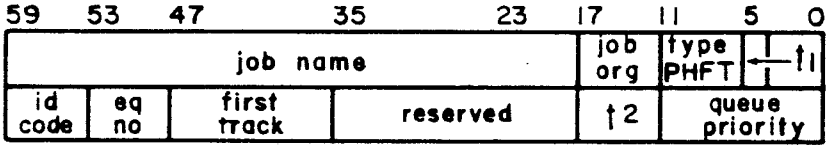
FILE IN INPUT QUEUE



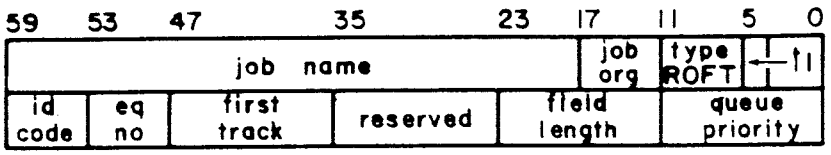
FILE IN PRINT QUEUE



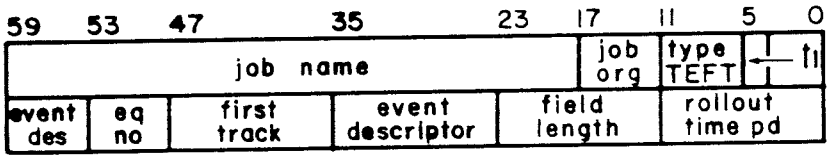
FILE IN PUNCH QUEUE



FILE IN ROLLOUT QUEUE



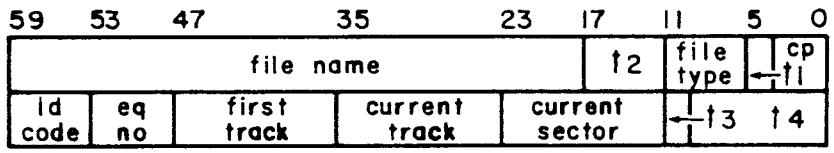
FILE IN TIMED/EVENT ROLLOUT QUEUE



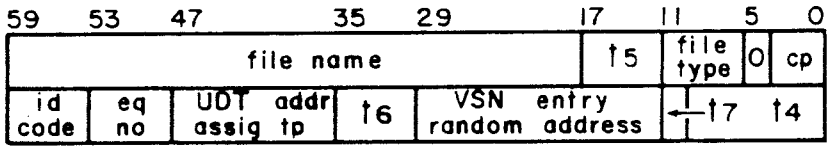
†1 Bit 5 set if system sector contains control information.

†2 The EST ordinal of the family the job was created under.

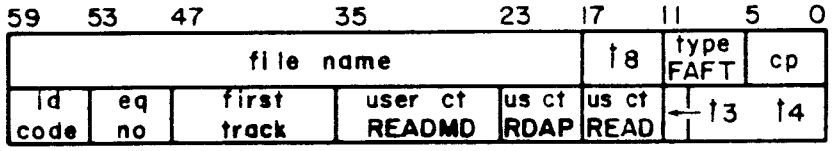
MASS STORAGE FILES NOT TYPE INPUT, PRINT, PUNCH, OR ROLLOUT



MAGNETIC TAPE FILES



FAST ATTACH PERMANENT FILES



Ref.	Bit No.	Description
†1	5	Set if system sector contains control information
†2	17	Unused
	16	Set if extend-only file
	15	Set if alter-only file

Ref.	Bit No.	Description
	14	Set if execute-only file
	13	Unused
	12	Write lockout
†3	11	Unused
†4	10	Unused
	9	Indicates the track interlock status of LIFT files (mass storage only)
	8	Set if file opened
	7	Set if file written since last open
	6	Set if file written on
	5-4	Unused
	3-2	Read status (0 = incomplete read, 1 = EOR, 2 = EOF, 3 = EOI)
	1	Set if last operation write
	0	Clear if busy status
†5	17-14	Unused
	13	Set if opened
	12	Write lockout
†6	35-32	Data format
	31-30	Type (0 = VSN entry, 1 = 7-track, 2 = 9-track)
†7	11	Set if labeled tape
†8	17	Unused
	16	Set if modify
	15	Set if append
	14	Set if execute
	13	Set if write
	12	Set if read

FILE TYPES

Files in Queues

Type	Value	Description
INFT	0	Input
ROFT	1	Rollout
PRFT	2	Print
PHFT	3	Punch
TEFT	4	Timed/event rollout

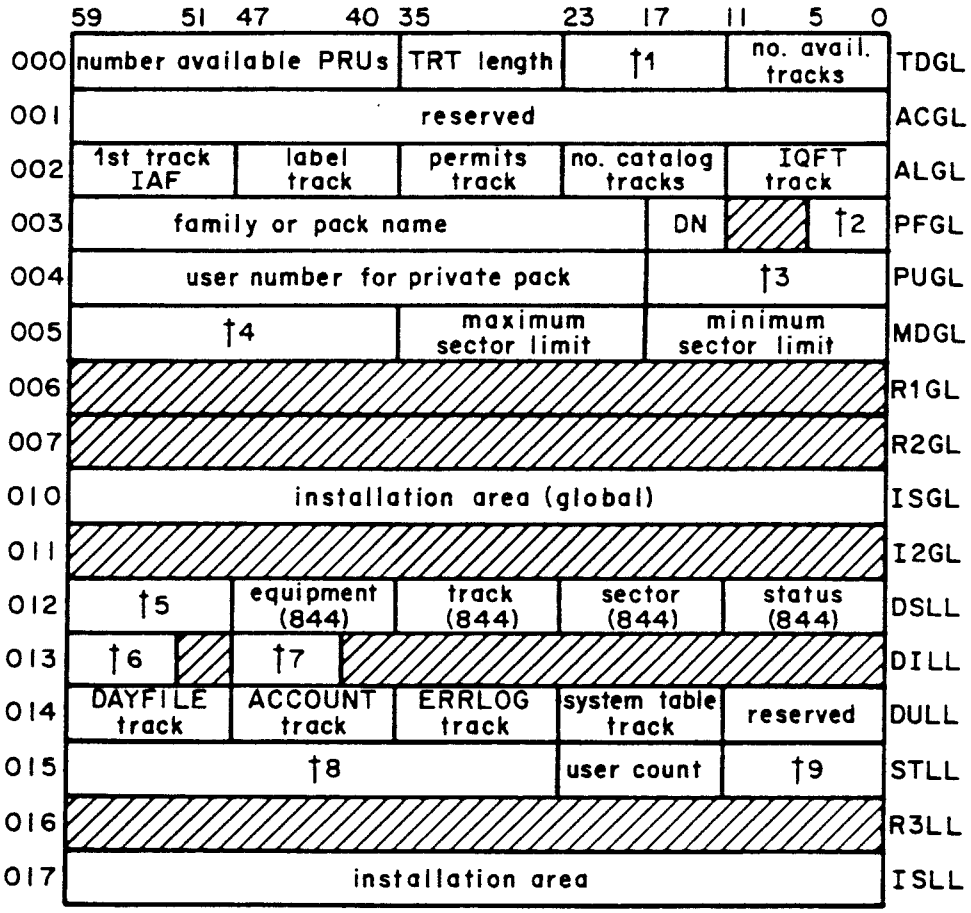
Other Files

Type	Value	Description
SYFT	5	System
LOFT	6	Local
LIFT	10	Library
PTFT	11	Primary terminal
PMFT	12	Direct access permanent file
FAFT	13	Fast attach file

JOB ORIGIN CODES

Type	Value	Description
SYOT	0	System
BCOT	1	Local batch
EIOT	2	Remote batch (Export/ Import)
TXOT	3	Time-sharing
MTOT	4	Multiterminal

MASS STORAGE TABLE (MST)



Ref.	Bit No.	Description
†1	23-12	First available track word pointer
†2	5-3	Relative unit in multiunit device
	2-0	Number of units in multiunit device
†3	17	Catalog track contiguous with label track
	16	Catalog track overflow (O)
	15-8	Secondary device mask
	7-0	Device mask
†4	59	Removable (R)
	58	Auxiliary permanent file device (X)
	57-47	Reserved
	46	Release reservation on channel release
	45	Reserved
	44-36	Single unit sector limit
†5	59-48	844 channel if 844 error
†6	59-52	Logical unit reserves for first channel (844)
†7	48-41	Logical unit reserves for second channel (844)
†8	59	Format pack (844)
	58	System on device(S)
	57	Initialize permanent files (I)
	56	Initialize IQFT (I)
	55	Initialize DAYFILE (I)
	54	Initialize ACCOUNT (I)
	53	Initialize ERRLOG (I)
	52	Initialization (full) (I)
	51	Unloaded
	50	Checkpoint requested (C)
	49	TEMP (T)
	48	Alternate system device (A)
	47-42	Unused
	41-36	Error status
	35-24	Two-character machine identification
†9	11-6	Multiple equipment link
	5-3	Original number of units
	2	Device in use
	1	Local utility interlock
	0	Local area interlock

WORD FORMAT

Ref.	Bit No.	Description
†1	11-8	Each bit set indicates corresponding byte (0 through 3) is first track of a preserved file
	7-4	Track interlock bits
	3-0	Track reservation bits

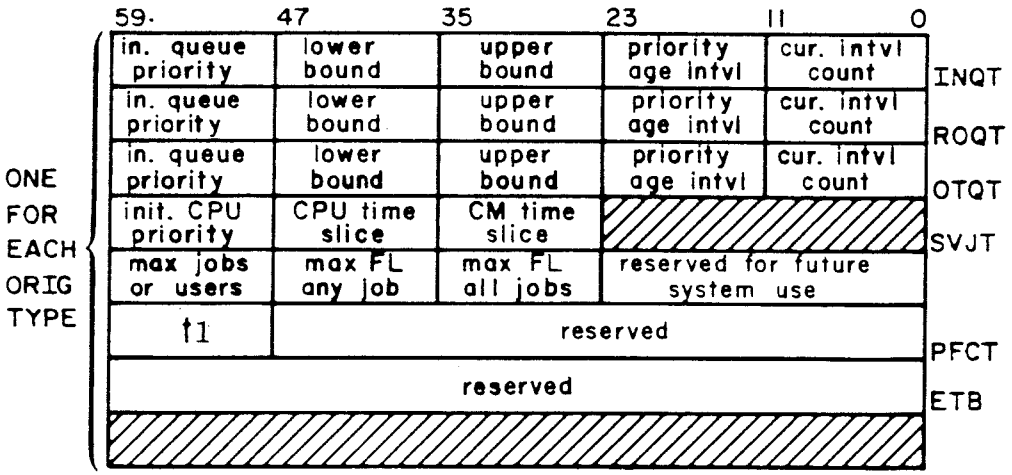
TRACK LINK BYTE (FORMAT 1)

Bit	Contents
11	Set
10-0	Next track in track chain

TRACK LINK BYTE (FORMAT 2)

Bit	Contents
11	Clear
10-0	End of chain (EOI sector in file)

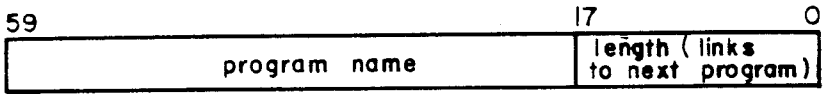
JOB CONTROL AREA (JCB)



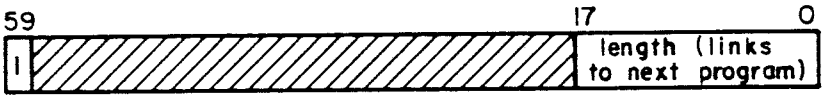
Ref.	Bit No.	Description
†1	59-48	Index into tables of limits
	59-57	Index a table of limits for size of each direct access file
	56-54	Index a table of limits for number of permanent files
	53-51	Index a table of limits for cumulative size of indirect access files
	50-48	Index a table of limits for size of each indirect access file

RESIDENT CPU LIBRARY (RCL)

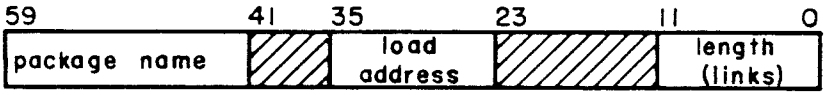
TYPE OVL



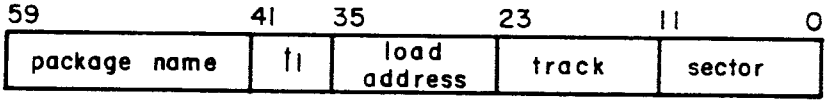
TYPE ABS



RESIDENT PPU LIBRARY (RPL)

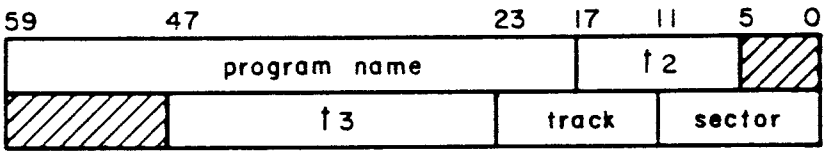


PPU LIBRARY DIRECTORY (PLD)

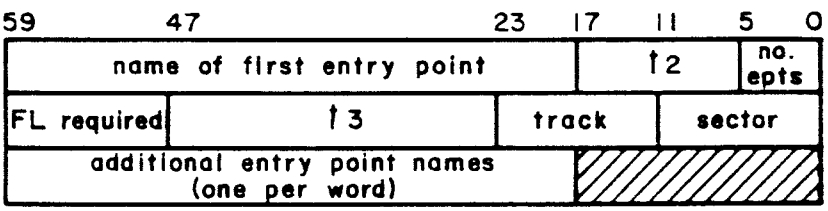


CPU LIBRARY DIRECTORY (CLD)

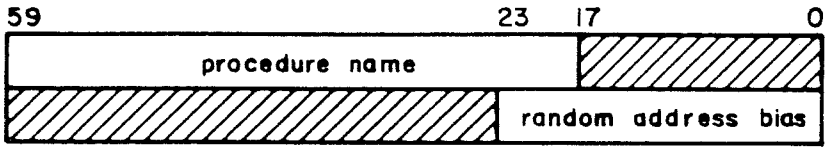
TYPE OVL



TYPE ABS

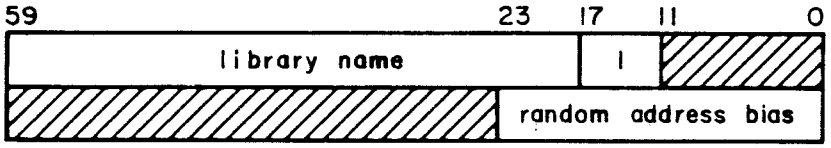


TYPE PROC



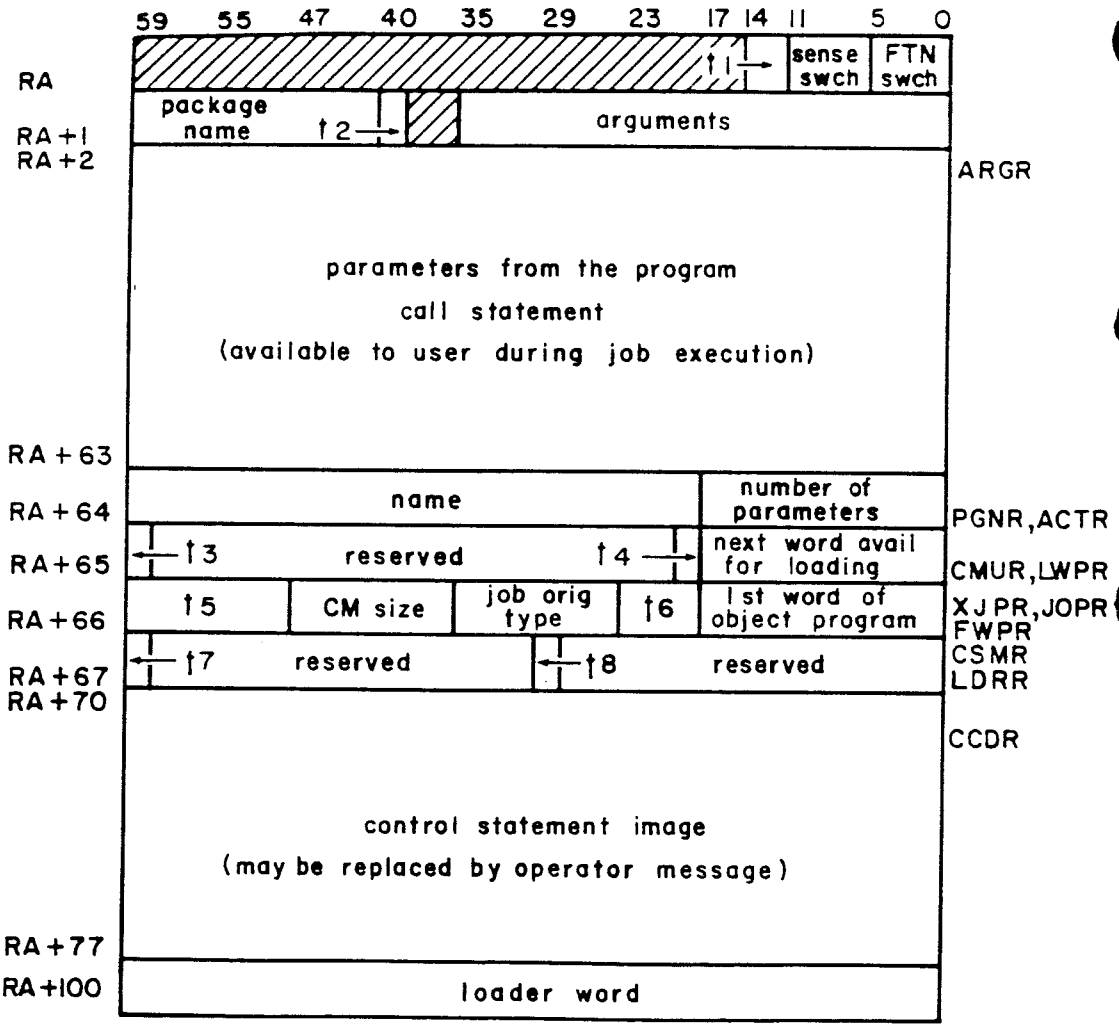
USER LIBRARY DIRECTORY (LBD)

TYPE ULIB



Ref.	Bit No.	Description
†1	41-34	Alternate device equipment number (if applicable)
†2	17-14	Unused
	13	SCOPE record flag
	12	Unused
	11-6	Alternate device equipment number
†3	47-24	If program is CM resident, field contains index to its location (that is, FWA RPL + index = RCL address). If program is assigned to alternate system device, field has mass storage address of copy on system device

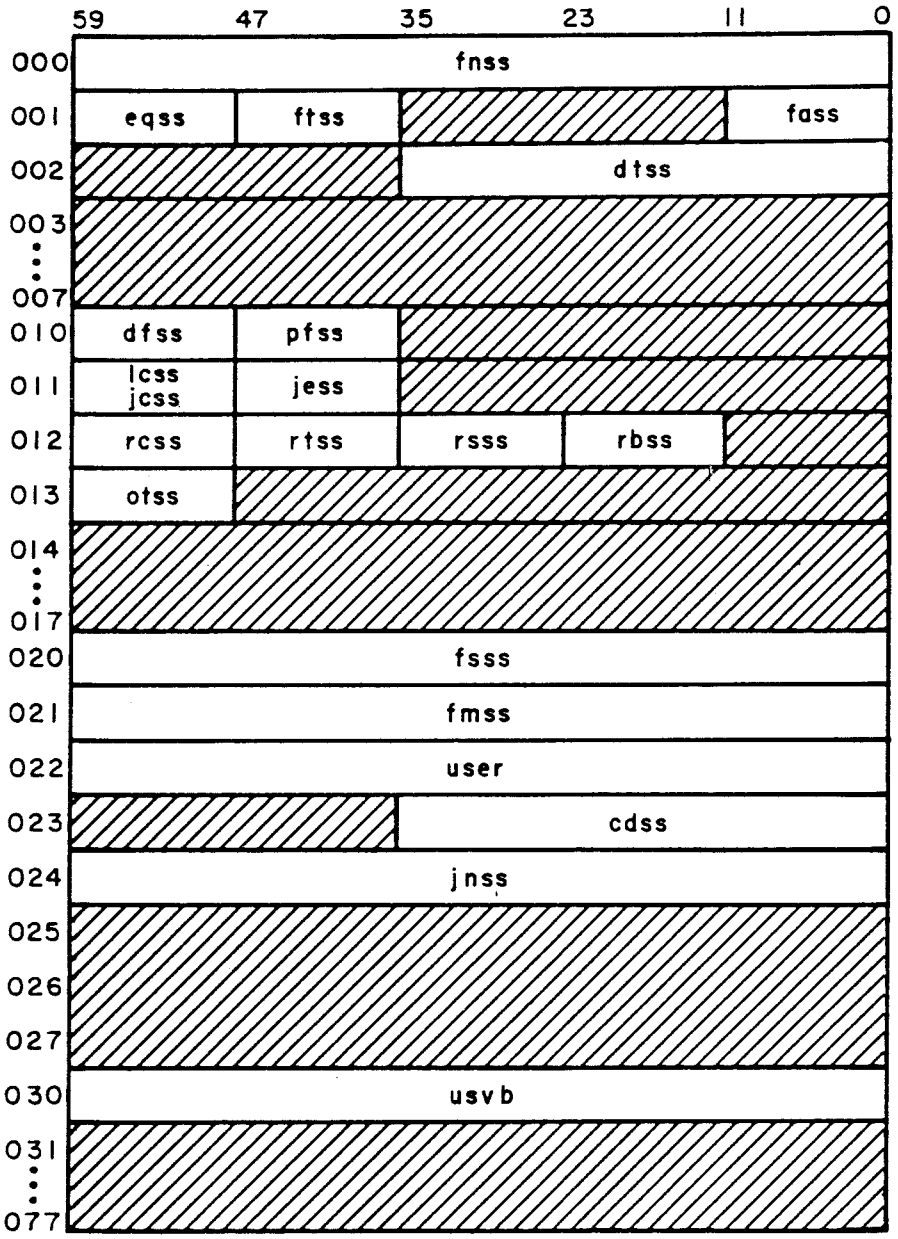
JOB COMMUNICATION AREA



Ref.	Bit No.	Description
†1	14	CFO bit
	13	Unused
	12	Pause flag
†2	40	Auto recall
†3	59	Set if compare/move unit (CMU) is present
†4	18	Set if load from system library
†5	59	Set if CEJ/MEJ option is available
	58	Set if CPU0 has an instruction stack
	57	Set if CPU1 is present
	56-53	Reserved
	52-48	Number of PPs in system
†6	23-20	Reserved
	19	Set if program called from DIS
	18	RSS bit
†7	59	Set indicates system is in 64 character set mode
†8	29	Set if load has completed

SYSTEM SECTOR FORMAT

STANDARD FORMAT

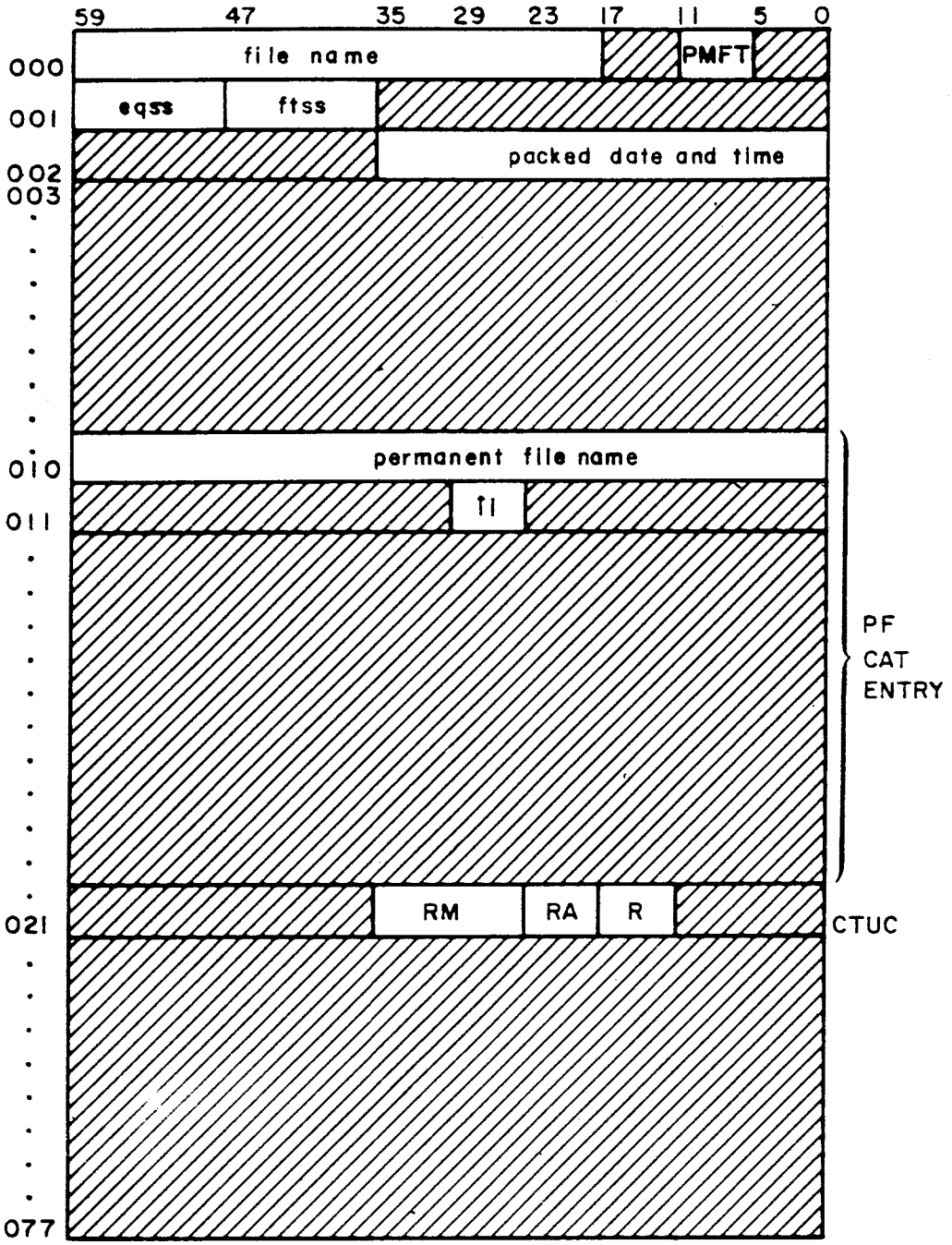


fnss	FNT entry
eqss	Equipment number
ftss	First track
fass	Address of FST entry
dtss	Last modification date and time (packed format)
†dfss	Dayfile track
†pfss	Dayfile sector or punch format
†lcss	Print line or punch card limit
††jcss	Job card CM FL

††jess	Job card ECS FL
†rcss	Repeat count
†rtss	Requeue track
†rsss	Requeue sector
†rbss	Requeue buffer
otss	Origin type
fsss	FST entry
†††fmss	Family name
†user	User number of creator
†††cdss	Queued date and time (packed format)
†††jnss	Job statement name
††usvb	User validation block

†Print/punch output files only
††Input files only
†††I/O queued files only

DIRECT ACCESS FILE FORMAT

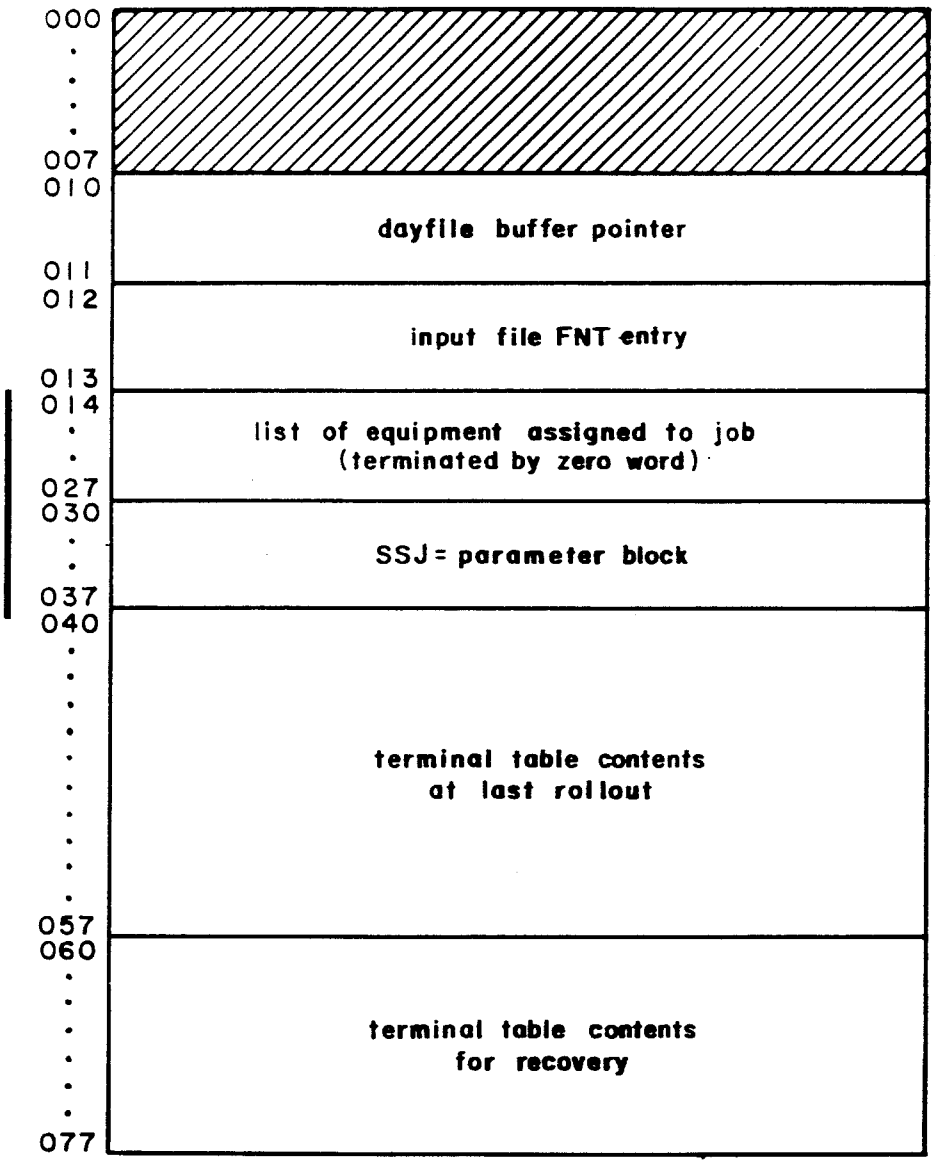


eqss	Equipment number
ftss	First track
CTUC	Current user counts:
	RM READMD users
	RA READAP users
	R Read/Write users

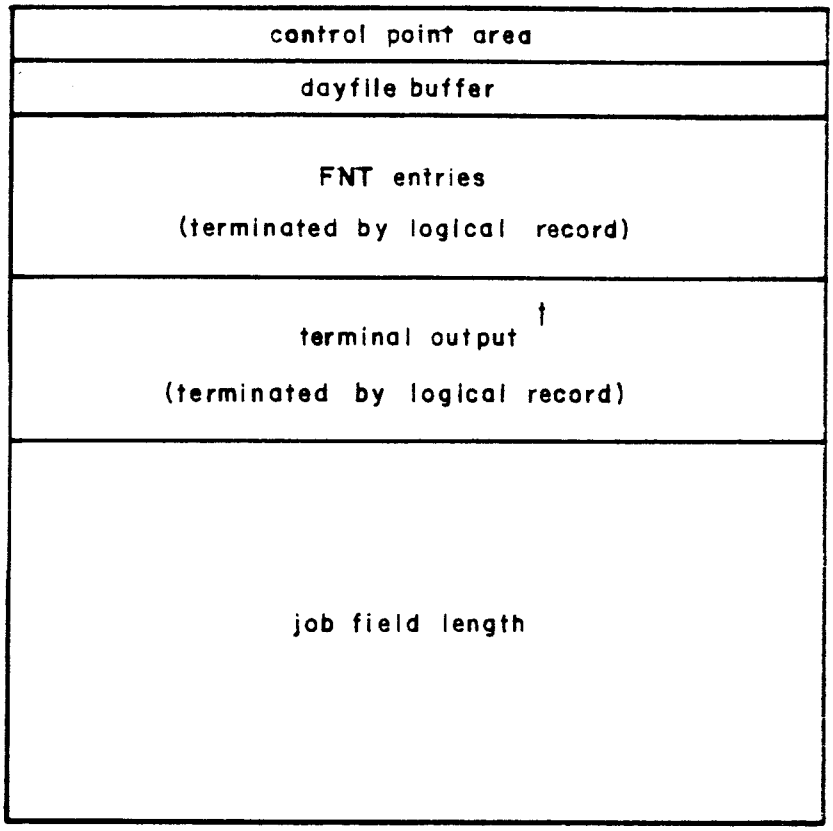
†1 Bit 29 purge; bit 28 extend; bit 27 modify; bit 26 zero; bit 25 write; bit 24 read

ROLLOUT FILE

SYSTEM SECTOR



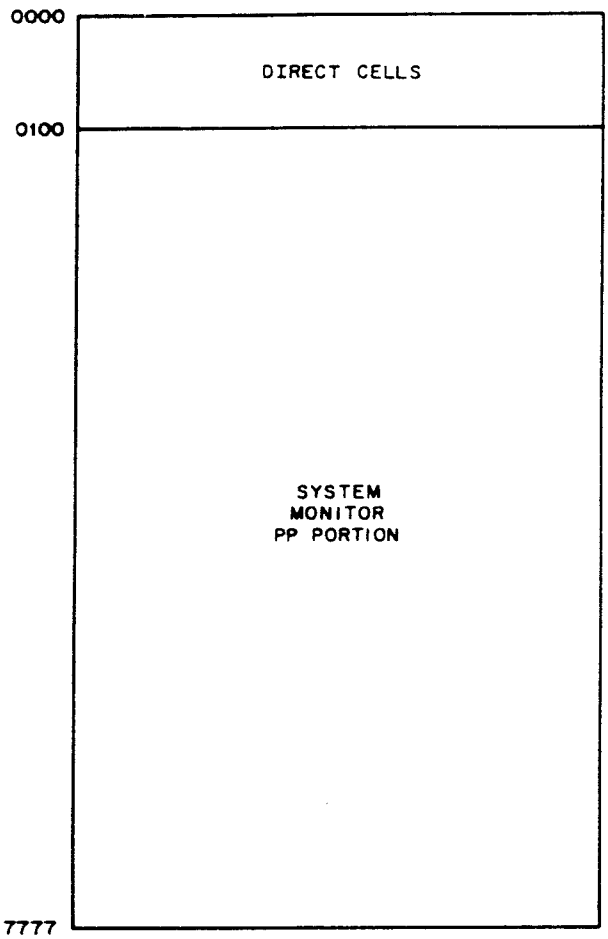
FILE FORMAT



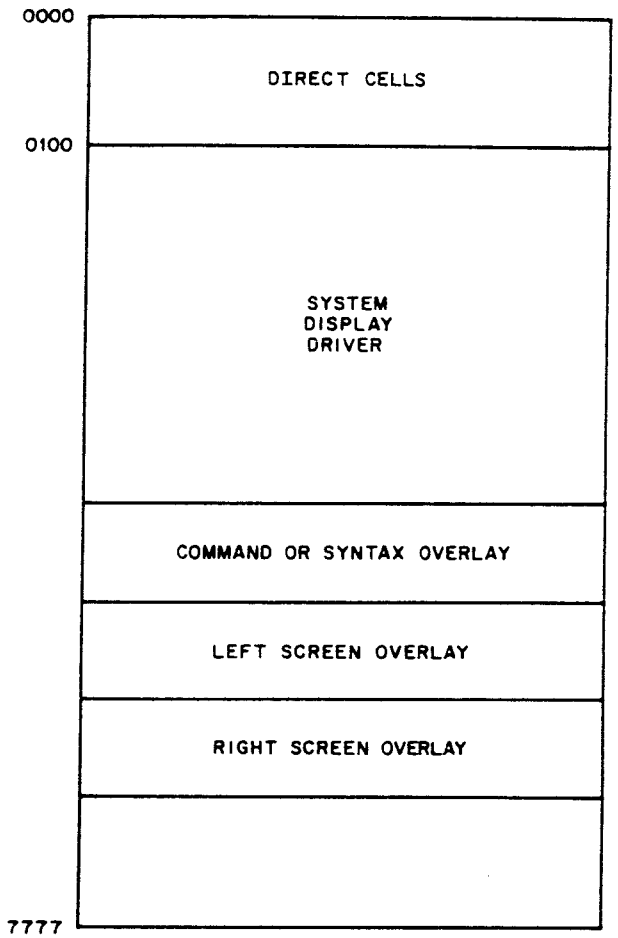
†This is the only part of the rollout file used for TXOT jobs.

PPU MEMORY LAYOUT

PP0 - SYSTEM MONITOR (PPU PORTION)

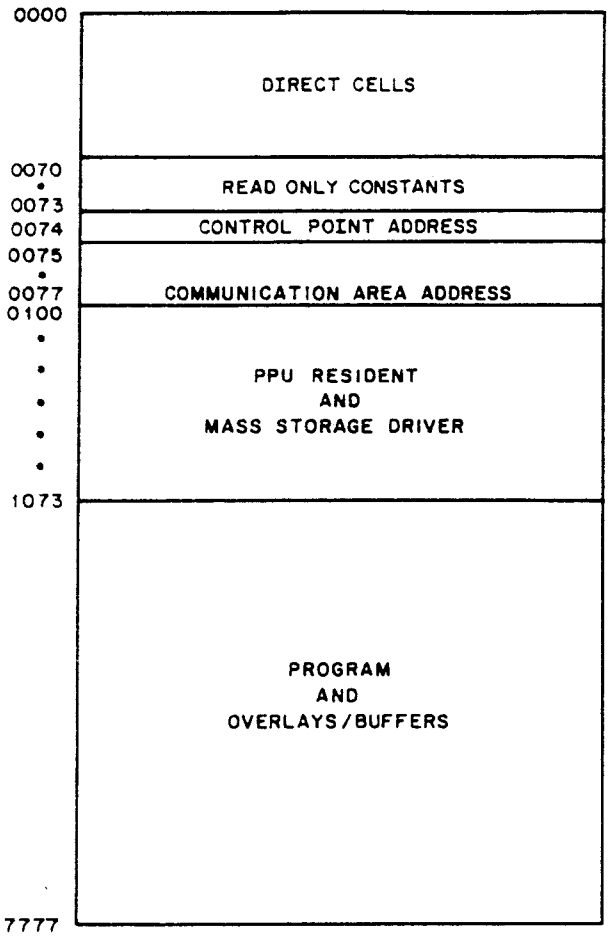


PP1 - SYSTEM DISPLAY DRIVER (DSD)



POOL PROCESSORS

(PP2 through PP11 on 10 PP machines; PP2 through PP11 and PP20 through PP31 on 20 PP machines.)†



EQUIPMENT CODES

CP	Card punch (3446/3644-415)
CR	Card reader (3477/3649-405)
DA	Disk file (6603/6603 MOD1)
DB	Disk file (6638/6639)
DC	Drum (3436/3437-863)
DD-n	Disk drive (3234-853/854)
DE	Extended core storage
DF	Disk file (3234-813/814)
DH	Disk file (3553-821)
DI-n	Disk storage subsystem (7054-844)

†PP numbers are in octal notation.

DP	Distributive data path to ECS
DS	Display console
LP	Line printer (512 or 580)
LQ	Line printer (3555-512)
LR	Line printer (580)
MD-n	Disk drive [(3553-1)-841]
MS	Mass storage device
MT	Magnetic tape drive (7-track)
NT	Magnetic tape drive (9-track)
NE	Null equipment
ST	Remote batch multiplexer (6671)
TT	Time-sharing multiplexer (6676 or 6671)

DEADSTART PANEL SETTINGS AND OPTIONS

DEADSTART PANEL SETTINGS FOR 604, 607, 657, OR 659 TAPE UNITS

Word on Panel	Setting				Octal
0001	111	101	ttt	ttt	75TT
0002	111	111	ttt	ttt	77TT
0003	fff	000	00v	vvv	F0VV
0004	111	111	ttt	ttt	77TT
0005	000	000	001	000	0010
0006	111	111	ttt	ttt	77TT
0007	001	100	000	000	1400
0010	111	100	ttt	ttt	74TT
0011	111	001	ttt	ttt	71TT
0012	110	100	000	000	6400
0013	www	xxx	xxx	yyy	WXXY
0014	rrr	ppp	sss	sss	RPSS
0015 †	000	000	000	000	0000

DEADSTART PANEL SETTINGS (COLDSTART) FOR 667 OR 669 TAPE UNITS

Word on Panel	Setting				Octal
0001	111	101	ccc	ccc	75CC
0002	111	111	ccc	ccc	77CC
0003	eee	000	000	000	E000
0004	010	100	000	000	2400
0005	010	100	ttt	ttt	24TT
0006	111	111	ccc	ccc	77CC
0007	001	100	uuu	000	14U0
0010	111	100	ccc	ccc	74CC
0011	111	001	ccc	ccc	71CC
0012	111	110	110	100	7664
0013	www	xxx	xxx	yyy	WXXY
0014	rrr	ppp	sss	sss	RPSS

DEADSTART PANEL SETTINGS (WARMSTART) FOR 667 OR 669 TAPE UNITS

Word on Panel	Setting				Octal
0001	111	101	ttt	ttt	75TT
0002	011	110	001	101	3615
0003	001	000	001	100	1014
0004	010	100	000	000	2400
0005	010	100	000	000	2400
0006	111	111	ttt	ttt	77TT
0007	000	010	110	uuu	026U
0010	111	100	ttt	ttt	74TT
0011	111	001	ttt	ttt	71TT
0012	110	100	000	000	6400
0013	www	xxx	xxx	yyy	WXXY
0014	rrr	ppp	sss	sss	RPSS

The contents of words 0004 and 0005 differ if a 6681 or 6684 controller is on the channel used to access the deadstart tape.

0004	111	111	ttt	ttt	77TT
0005	010	001	000	000	2100

KEY TO PANEL SETTINGS

1	Switch up
0	Switch down
CC / ccc ccc	Channel number used to access the card reader from which the control-ware is to be read
E / eee	Controller number to which the card reader is connected
F / fff	Tape controller number
P / ppp	Central processor options
R / rrr	Recovery options
SS / sss sss	System library assignments
TT / ttt ttt	Tape channel number
U / uuu	Physical unit number of the 667 or 669 tape unit on which dead-start tape is mounted
VV / vvvv	Physical unit number of 657 or 659 tape unit on which deadstart tape is mounted
W / www	LIBDECK number
XX / xxx xxx	CMRDECK number
Y / yyy	Deadstart options

WORD 13 AND WORD 14 OPTIONS

Y / yyy = 0	Automatic system deadstart.
= 1	System deadstart with options displayed.
= 2	Display PP0 memory (maintenance deadstart).
= 3	Deadstart dump (maintenance deadstart).
R / rrr = 0	Level 0 (initial) deadstart; no recovery. All PPU and CM confidence tested.
= 1	Level 1 recovery deadstart; the system, all jobs, all active files, and permanent files are recovered from checkpoint information on mass storage. All PPU and CM confidence tested.
= 2	Level 2 recovery deadstart; all jobs, active files, and permanent files are recovered from checkpoint information on mass storage; system is loaded from deadstart tape. All PPU and CM confidence tested.
= 3	Level 3 recovery deadstart; the system, all jobs, and active files are recovered from central memory tables; permanent files are also recovered. Memory confidence testing occurs in PPUs only.
P/ ppp	Bit 8 = 1 Disable CEJ/MEJ option Bit 7 = 1 Turn off CPU 1† Bit 6 = 1 Turn off CPU 0†
SS/ sss sss	For each bit set, place a copy of the system on the device with the corresponding EST entry.

Deadstart panel setting to transfer the contents of PPU 0 to another PPU.

Word on Panel	Setting				Octal
0001	010	000	000	000	2000
0002	111	111	111	110	7776
0003	111	011	ppp	ppp	73PP
0004	000	000	000	000	0000
0005	000	011	000	000	0300

PP/ ppp ppp — PPU to which transfer is to be made

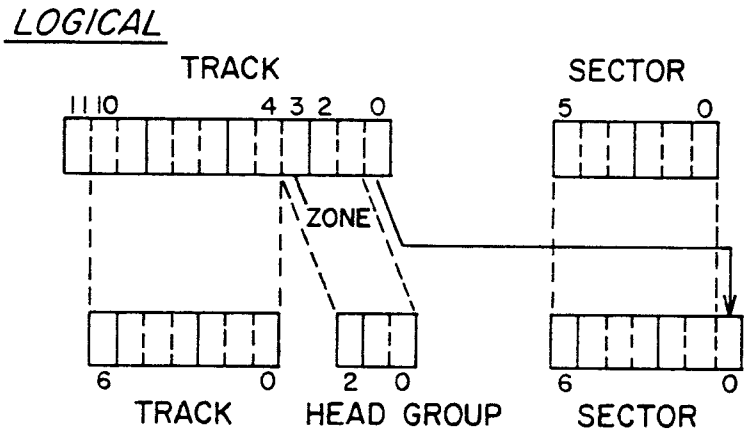
†If either CPU is disabled, detection of the compare/move unit (CMU) is also disabled. Also, both CPUs should not be disabled simultaneously.

MASS STORAGE DATA ORGANIZATION

6603 AND 6603-MOD 1 DISK FILES

KRONOS accesses each 6603 as a single device.

- Equipment type — DA
- Sectors/track — 64 in outer zone
50 in inner zone
- Tracks/device — 2048
- Words/device — 7,471,104
- Maximum data rate — 61.1K words per second, outer zone
48.5K words per second, inner zone
- Address mapping

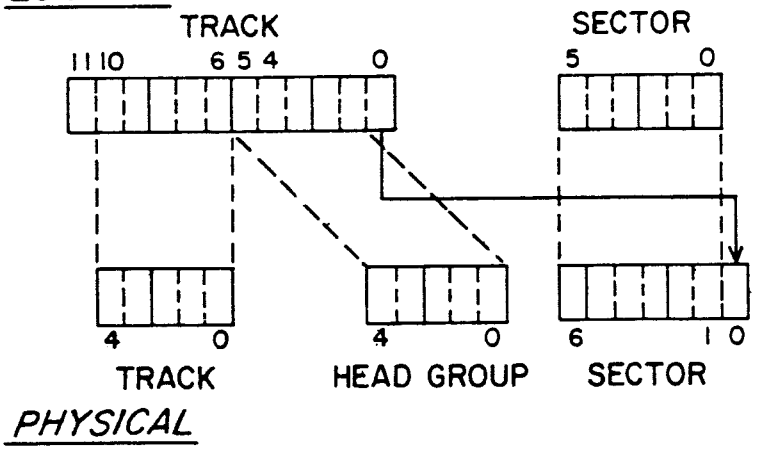


- Equipment connect code — e000
e = 1 normally

6638 DISK FILES

KRONOS accesses each disk unit as a single device whether the 6638 has the standard option 10037 or not. If the 6638 has the standard option 10037, the 6638 is accessed through two channels instead of one.

- Equipment type DB
- Sectors/track 49
- Tracks/device 2048
- Words/device 6,422,528
- Maximum data rate 62.9K words per second
- Address mapping:

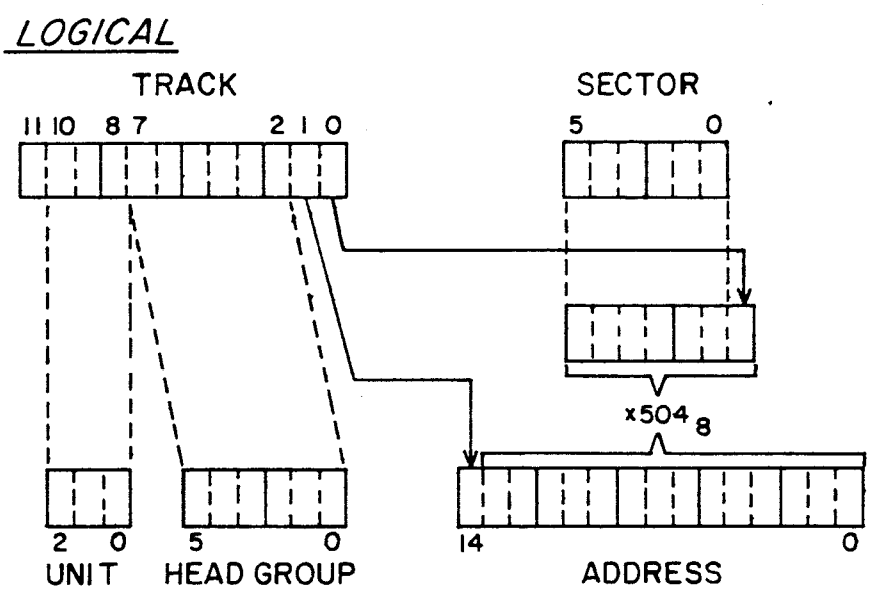


- Equipment connect code e00u
  - e = 1 normally
  - u = unit 0 or 1
  - u = 0 if SO 10037 in use

3637/3436/863 DRUMS

KRONOS accesses one to eight drums connected to one 3637-3436 which are referenced as a single device. For the 3637, only one channel may be used.

- Equipment type — DC
- Sectors/track — 25
- Tracks/drum — 256
- Words/drum — 409,600
- Maximum data rate — 48.0K words per second
- Address mapping:



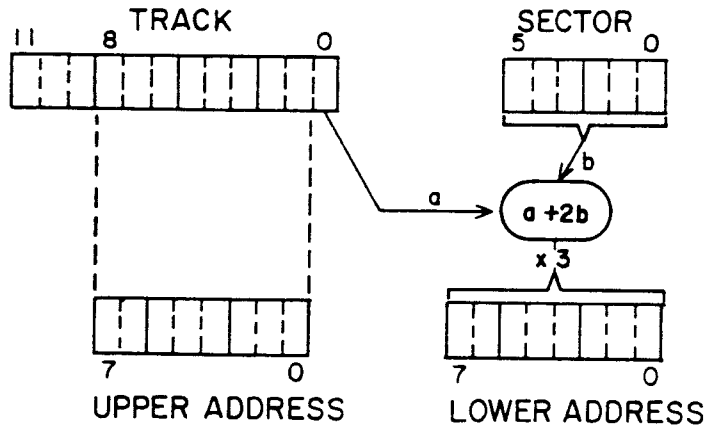
- Equipment connect code — e000
  e = 3637/3436 equipment number

3234/853/854 DISK DRIVES

KRONOS accesses the 3234 and n 853s or n 854s (n may range from 1 through 4)as a single device. Only one channel of the 3234 controller is used.

- Equipment type — DD
- Sectors/track — 26 x n
- Tracks/device — 400/854, 200/853
- Words/device — 665,600 x n/854s; 332,800 x n/853s
- Maximum data rate — 6.6K words per second
- Address mapping:

LOGICAL



PHYSICAL

- Equipment connect code — e00u
  - e = 3234 equipment number
  - u = 853/854 unit number

EXTENDED CORE STORAGE (ECS)

KRONOS accesses ECS as a single device, reserved for PPU transfers by pseudo channel 16.

- Equipment type: DE/DP
- Sectors/track: 16
- Tracks/device: 121K-125K of ECS
243K-250K of ECS
- Words/device: 123,904-125,000 of ECS
248,832-250,000 of ECS
- Maximum data rate: 80K words per second for PPU transfers
- Equipment connect code: 0000
- Address mapping:

System		Physical	
Unit	Bits	Unit	Bits
Track	0-10	Address	0-20
Sector	0-3		

Formula:

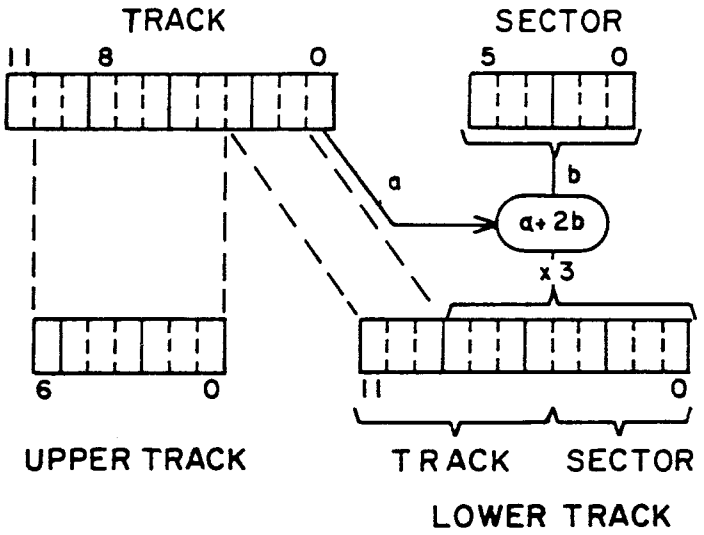
$$(S_{0-3} \times 101_8) + (T_{0-10} \times 2020_8)$$

3234/813/814 DISK FILES

KRONOS accesses each 3234/813/814 file as a single device. Only one channel of the 3234 controller is used.

- Equipment type — DF
- Sectors/track — 85
- Tracks/device — 2048
- Words/device — 11,141,120
- Maximum data rate — 6.8K words per second
- Address mapping:

LOGICAL



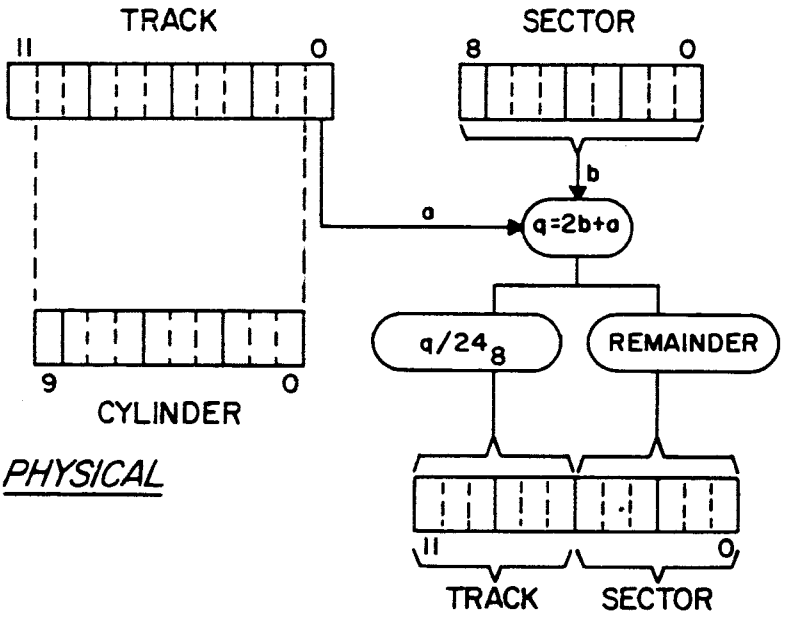
PHYSICAL

- Equipment connect code — e00u
  - e = 3234 equipment number
  - u = 813/814 unit number

3553—1/821 DISK FILES

KRONOS accesses each unit of an 821 as a single device.

- Equipment type DH
- Sectors/track 320
- Tracks/device 2048
- Words/device 41,943,040
- Maximum data rate 19.2K words per second
- Address mapping:



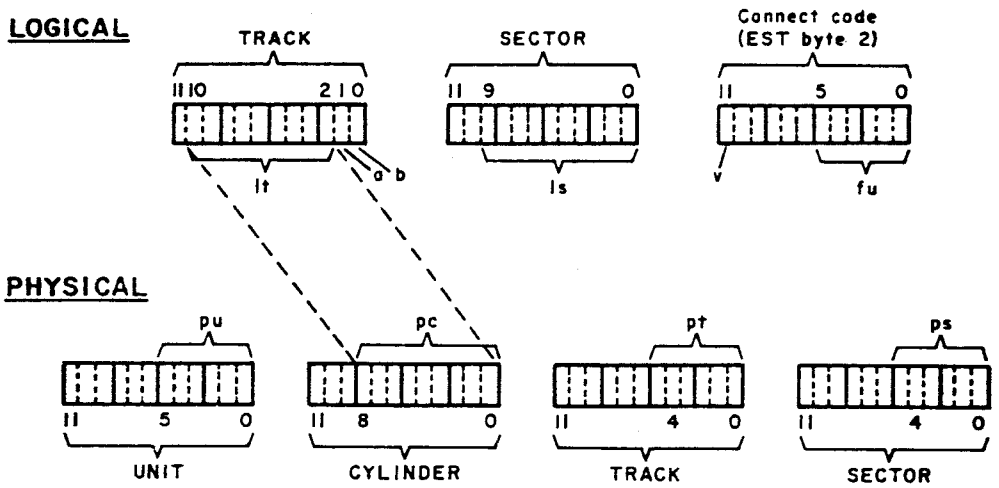
- Equipment connect code e00u

  e = 3553-1 equipment number

  u = unit number 0 or 1

7054/844 DISK STORAGE SUBSYSTEMS

- Equipment type — DI
- Sectors/tracks — 107 x n
- Tracks/device — 1632
- Words/device — 11,175,936 x n
- Maximum data rate — 46.1K words per second
- Address mapping:



lt	Logical track (bits 10 through 2)
ls	Logical sector (bits 9 through 0)
v	Vertically contiguous flag 0 Horizontally contiguous units 1 Vertically contiguous units
fu	Physical unit number of first unit of device
pu	Physical unit number (bits 5 through 0)
pc	Physical cylinder number (bits 8 through 0)
pt	Physical track number (bits 4 through 0)
ps	Physical sector number (bits 4 through 0)
lu	Logical unit (an intermediate result)
a	Bit 1 of logical track
b	Bit 0 of logical track

lu+c (remainder) = $ls/153_8$

d = a + (2*c)

e + ps (remainder) = $d/30_8$

pt = e + ($b*11_8$)

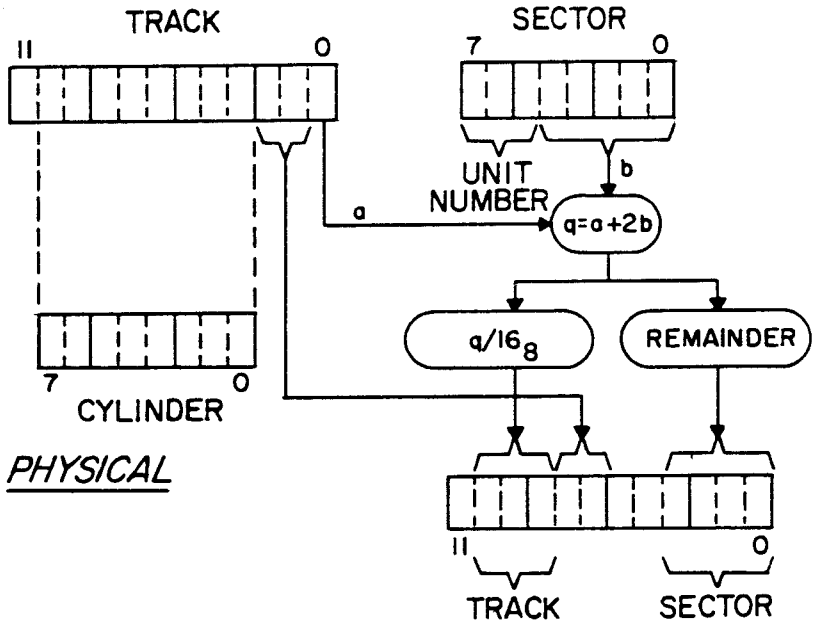
pu = fu + lu if v is 0

pu = fu + -(10_8*lu) if v is 1

3553—1/841—N MULTIPLE DISK DRIVES

The system accesses the 3553-1 and n 841s as a single device. n may range from 1 through 8.

- Equipment type — MD
- Sectors/track — 32 x n
- Tracks/device — 1600
- Words/device — 3,276,800 x n
- Maximum data rate — 17.8K words per second
- Address mapping:



- Equipment connect code — e01u
  - e = 3553-1 equipment number
  - u = unit number

FUNCTION REQUESTS

PPU FUNCTION REQUESTS

A PPU sets one of the following codes in the output register when a system request is made. The system replies to the request with a word in the output register as shown.

MTR FUNCTIONS

01 ASSIGN EQUIPMENT - AEQM

Request: OR 0001 00eq **** **** **** †

eq	Equipment number

Reply: OR 0000 0000 0000 0000 0000

02 ASSIGN MASS STORAGE SPACE - AMSM

Request: OR 0002 **** **** **ss ssss

ssss	Sector count requested

Reply: OR 0000 00eq **** **** tttt

eq	Equipment assigned
tttt	First track assigned

03 CHECK CHANNEL - CCHM

Request: OR 0003 cccc **** **** ****

cccc	Channel number

Reply: OR 0000 cccc 000r **** ****

cccc	Channel assigned if r is 1	
r	1	Channel assigned
	0	Channel not assigned

04 DROP CHANNEL - DCHM

Request: OR 0004 00ch **** **** ****

ch	Channel number

Reply: OR 0000 0000 0000 0000 0000

† *denotes contents unimportant, OR denotes output register.

05 DROP EQUIPMENT - DEQM

Request: OR 0005 00eq **** **** ****

eq Equipment number

Reply: OR 0000 0000 0000 0000 0000

06 PROCESS DAYFILE MESSAGE - DFMM

Request: OR 0006 00mc wwww **** ****

mc Message control:

- 0 Message to system dayfile, control point dayfile, control point message buffer
- 1 Normal message with no message at control point (NMSN)
- 2 Message to system dayfile only, with job name from message (JNMN)
- 3 Message to control point dayfile only (CPON)
- 4 Message to account file only (ACFN)
- 5 Message to account file, with job name from message (AJNN)
- 6 Message to error log only (ERLN)
- 7 Message to error log only, with job name from message (EJNN)

If bit 5 of mc is set, the dayfile buffers are flushed and left busy after the message is issued.

wwww Word count minus one of message

MB Dayfile message continuation; message begins in MB and is terminated by a zero byte. Message cannot exceed six words.

If message is completed:

Reply: OR 0000 0000 **** **** ****

If dayfile buffer is full:

Reply: OR 0000 dddd llll **** ****

dddd	Pointer address of buffer to be dumped
llll	Length minus 3 of dump buffer

Intermediate processing (buffer busy): OR 0006 wwww cccc tttt iiii rrrr

wwww	Option word (option obtained from table of message processing codes)
cccc	Word count of message data
tttt	Number of words transferred
iiii	Buffer index
rrrr	Reentry address

07 OFF EQUIPMENT - OFEM

Request: OR 0007 00eq **** **** ****

eq	Equipment number

Reply: OR 0000 0000 0000 0000 0000

10 ON EQUIPMENT - ONEM

Request: OR 0010 00eq **** **** ****

eq	Equipment number

Reply: OR 0000 0000 0000 0000 0000

11 PAUSE FOR STORAGE RELOCATION - PRLM

Request: OR 0011 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

12 REQUEST CHANNEL - RCHM

Request: OR 0012 bbaa ddcc **** ****

aa	First channel choice
bb	Second channel choice
cc	Third channel choice
dd	Fourth channel choice

Reply: OR 0000 00ch **** **** ****

ch	Channel assigned

13 REQUEST EXIT MODE - REMM

Request: OR 0013 eeee **** **** ****

eeee	Exit mode

Reply: OR 0000 0000 0000 0000 0000

14 REQUEST EQUIPMENT - REQM

Request: OR 0014 00eq **** **** ****

eq	Equipment number

Reply: OR 0000 00st **** **** ****

st	eq	If equipment is assigned
	0	If equipment is not available

15 ROLL OUT CONTROL POINT - ROCM

Request: OR 0015 00cp **** **** ****

cp	Control point number

Reply: OR 0000 0000 0000 0000 0000

16 REQUEST PRIORITY - RPRM

Request: OR 0016 pppp 000t **** ****

pppp	Priority	
t	0	CPU priority
	1	Queue priority

Reply: OR 0000 0000 0000 0000 0000

17 REQUEST JOB SEQUENCE NUMBER - RJSM

Request: OR 0017 **** **** **** ****

Reply: OR 0000 ssss ssss ssss ****

ss...s	Display code sequence number

20 SELECT CHANNEL - SCHM

Request: OR 0020 eeee eeee eeee eeee

ee...e	EST entry bytes 1-4

Reply: OR 0000 0000 0000 0000 0000
MB 0000 cccc dddd xxxx nnnn
MB+1 EST entry with selected channel in byte 1

cccc	Connect code
dddd	Device type
xxxx	Maximum sector limit
nnnn	Minimum sector limit

21 REQUEST STORAGE - RSTM

Request: OR 0021 ffff **** **** ****

ffff	Field length request (octal hundreds)

Reply: OR 0000 xxxx 0000 0000 0000

xxxx	0	Request honored, or move is in progress
	≠0	Storage not available

22 REQUEST SYSTEM - RSYM

Request: OR 0022 00ad **** **** ****

ad — Alternate device equipment number

Reply: OR 0000 00ch 00eq **** ****

ch — Channel

eq — Equipment number

23 SET MONITOR STEP - SMSM

This function is honored only from DSD.

Request: OR 0023 cpfn **** **** ****

cp — Special step flag and control point number

fn — Function to step on

Reply: OR 0000 0000 0000 0000 0000

24 STEP MONITOR - STPM

This function is honored only from DSD.

Request: OR 0024 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

25 TELEX GET POT - TGPM

Request: OR 0025 **** **** **** ****

Reply: OR 0000 pppp 0000 0000 0000

pppp — Pot pointer; 0 if pot unavailable

26 PROCESS TELEX REQUEST - TSEM

Request: OR 0026 **** **** **** ****

MB — TELEX request

Reply: OR 0000 0000 0000 0000 0000

27 DISK ERROR PROCESSOR - DEPM

Request: OR 0027 00ec 00op ℓ ℓ ℓ ℓ sfun

ec — Error code

op — Operator code (read or write)

ℓ ℓ ℓ ℓ — Link 1 byte from sector read

sfun — Status/function:

Bits	Description
11-9	6681 status if function reject (ec=FN)
8-0	Device function if function reject (ec=FN)
11-0	Device function code if function timeout error (ec=FT)

MB — Bits 59-48 exit address to main driver, bits 47-0 disk address message

MB+1 — Bits 59-0 disk address message

MB+2 — Bits 59-0 disk address message

MB+3 — Bits 59-48 device status; bits 47-36 zero; bits 35-24 retry count; bits 23-12 user error processing options; bits 11-0 connect code (not all devices)

MB+4 — Bits 59-48 link 2 byte from sector read; bits 47-24 sector limits; bits 23-0 zero

MB+5 — Bits 59-48 channel; bits 47-36 equipment number; bits 35-24 track; bits 23-12 sector; bits 11-0 contents of first word of PP program

Reply: OR 0000 00ec **** iiii ***r

ec		Error code
iiii		Index relative to exit address where exit address is set in code passed back to caller
r	0	Fatal error requires operator action
	≠0	Retry count unless fatal error
MB		Bits 59-0 error exit processing code
MB+1		Bits 59-0 error exit processing code
MB+2		Bits 59-0 dayfile message
MB+3		Bits 59-0 dayfile message
MB+4		Bits 59-0 dayfile message
MB+5		Bits 59-0 dayfile message

30 DRIVER RECALL CPU - DRCM

Request: OR 0030 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

31 SELECT CPUS ALLOWABLE FOR JOB EXECUTION - SCPM

Request: OR 0031 000c **** **** ****

c	0	Any CPU
	1	CPU 0 only
	2	CPU 1 only

Reply: OR 0000 0000 0000 0000 0000

32 ENTER/ACCESS SYSTEM EVENT TABLE - EATM

Request: OR 0032 000f **** **ee eeee

f
- 0 Enter event
- 1 Return event count
- 2 Return events to message buffer*

eeeeee Event

Reply: OR 0000 000s **** **** **** (f=0)

s 0 if event entered

OR 0000 cccc **** **** **** (f=1)

cccc Count of events in table presently

OR 0000 cccc **** **** wwww (f=2)

cccc Count of events in table presently

wwww CM word count of events returned

33 DRIVER SEEK WAIT — DSWM

Request: OR 0033 **** **** **** ****

MB+0 ffff **** **** **** ****

MB+1 lulu 00ch 00eq **** ****

ffff Status flags:

- 0 Hardware busy or reserved
- 10_8 Software reserve on unit

lulu Logical unit

ch Channel

eq Equipment

Intermediate processing:

OR 0033 tycd umum msms adad

ty Wait type:

- 0 Wait for channel (seek wait)
- 10_8 Wait for reserved unit

cd Channel description:

0 + channel = first channel for eq

40_8 + channel = second channel for eq

umum Unit mask = 2**(13-lulu)

msms MST/10_8 address

adad MTR reentry address

Reply: OR 0000 0000 0000 0000 0000

MB+0 0000 **** **** **** ****

MB+1 no change

NOTE

A HUNG PP. condition will be set by MTR if any of the following conditions exist for the DSWM call.

- Invalid equipment number (eq)
- Equipment not mass storage
- Invalid channel number (ch)
- Channel not assigned to PPU
- MTR needs to set a unit interlock bit for unit lulu of equipment eq on channel ch and the interlock is already set

CPU MTR FUNCTIONS

36 ABORT CONTROL POINT - ABTM

Request: OR 0036 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

37 CHANGE CONTROL POINT ASSIGNMENT - CCAM

Request: OR 0037 ffnn **** **** ****

ff Flags:

Bit	Description
11	Set if job name not required of new control point
10	Set if job advance flag set at new control point
9	If set, reject change if move flag set; if not set and move

flag is set on the new control point, a PRLM is entered in OR after change

nn — New control point number

Reply: OR 0000 00mm 0000 0000 0000

mm
- 0 — Control point changed
- ≠0 — Control point not changed

40 CHANGE ERROR FLAG - CEFM

Request: OR 0040 00ef **** **** ****

ef — Error flag to set

Reply: OR 0000 0000 0000 0000 0000

41 DROP CPU FROM CONTROL POINT - DCPM

Request: OR 0041 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

42 DISABLE JOB SCHEDULER - DJSM

Request: OR 0042 **** **** **** ****

Reply: OR 0000 00st **** **** ****

st
- 0 — If scheduler disabled
- ≠0 — If scheduler active

43 DROP TRACKS - DTKM

Request: OR 0043 00eq tttt ssss ****

eq — Equipment number

If bit 11 of the equipment byte is set (40eq), the checkpoint bit for this device is set upon completion of the function.

tttt First track

If bit 11 of tttt=1, all tracks from tttt to end of chain are dropped.

If bit 11 of tttt=0, all tracks after tttt are dropped and ssss is inserted in track byte.

ssss Sector number

Reply: OR 0000 0000 0000 00nn nnnn

nnnnnn Number of sectors contained in the tracks dropped

44 DROP PP - DPPM

Request: OR 0044 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

45 ECS TRANSFER - ECSM

Request: OR 0045 000f **** aaaa aaaa

f 0 Reads ECS
1 Writes ECS

aa...a Absolute ECS address

Reply: OR 0000 ssss 0000 aaaa aaaa

ssss 0 Complete transfer
-0 Aborted transfer

aa...a Absolute ECS address where error occurred if s=-0

46 RECALL CPU - RCLM

Request: OR 0046 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

47 REQUEST CPU - RCPM

Request: OR 0047 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

50 REQUEST DATA CONVERSION - RDCM

Request: OR 0050 000c 000w **** ****

c — If c = 0, the value to convert is in MB+0. Otherwise, c is the number of values (1 through 6) to convert in MB+0 through MB+5.

w — Word containing SRU value. If c = 0, w is ignored.

MB+0 **** **** **nn nnnn nnnn

MB+1 **** **** **nn nnnn nnnn

.
.
.

MB+5 **** **** **nn nnnn nnnn

nn...n 30-bit integer

Reply: OR 0000 0000 0000 0000 0000

MB+0 cccc cccc cccc cccc cccc

MB+1 cccc cccc cccc cccc cccc

.
.
.

MB+5 cccc cccc cccc cccc cccc

cc..c Display code conversion in F10.3 format

51 READ ECS WORD - REWM

Request: OR 0051 **** **** aaaa aaaa

aa...a Absolute ECS address

Reply: OR 0000 0000 0000 0000 0000

MB ECS word read

Account block begin (option ABBF)

Request: OR 0052 0001 **** **** ****

MB aaaa bbbb cccc dddd eeee

aaaa SRU M1 multiplier

bbbb SRU M2 multiplier

cccc SRU M3 multiplier

dddd SRU M4 multiplier

eeee SRU adder

Reply: OR 0000 0000 0000 0000 0000

Compute SRU working multipliers (option ABSF)

Request: OR 0052 0002 **** **** ****

Reply: OR 0000 0000 0000 0000 0000

Account block change (option ABCF)

Request: OR 0052 0003 **** **** ****

MB aaaa bbbb cccc dddd eeee

aaaa SRU M1 multiplier

bbbb SRU M2 multiplier

cccc SRU M3 multiplier

dddd SRU M4 multiplier

eeee SRU adder

Reply: OR 0000 0000 0000 0000 0000

Compute and convert elapsed SRUs (option ABEF)

Request: OR 0052 0004 **** **** ****

MB+0 **** aaaa aaaa aaaa aaaa

MB+1 **** bbbb bbbb bbbb bbbb

aa...a Old SRU value

bb...b New SRU value

Reply: OR 0000 0000 0000 0000 0000

MB cccc cccc cccc cccc cccc

cc...c Display code SRU, F10.3 format

Compute accounting accumulators (option ABVF)

Request: OR 0052 0005 **** **** ****

MB+0 **** ssss ssss ssss ssss

MB+1 **** **** **cc cccc cccc

MB+2 iiii iiii iiii iiii iiii

MB+3 **** **** **** *aaa aaaa

ss...s	SRU value
cc...c	CPU time
ii...i	I/O accumulators
aa..a	Application adder

Reply: MB+0 ssss ssss ssss ssss ssss

MB+1 cccc cccc cccc cccc cccc

MB+2 mmmm mmmm mmmm mmmm mmmm

MB+3 tttt tttt tttt tttt tttt

MB+4 pppp pppp pppp pppp pppp

MB+5 aaaa aaaa aaaa aaaa aaaa

The following values are in display code, F10.3 format.

ss...s	SRU value
cc...c	CPU time
mm...m	Mass storage activity
tt...t	Magnetic tape activity
pp...p	Permanent file activity
aa...a	Application adder activity

53 REQUEST PPU - RPPM

Request: OR 0053 **** **** **** ****

MB Input register for PPU

Reply: OR 0000 ssss **** **** ****

ssss	Address of assigned PPU's input register
	0 if no PPU assigned

54 REQUEST JOB SCHEDULER - RSJM

Request: OR 0054 **** **** **** ****

Reply: OR 0000 0000 0000 0000 0000

55 REQUEST TRACK CHAIN - RTCM

Request: OR 0055 00eq tttt **ss ssss

eq	Equipment number
tttt	Current track
ssssss	Sectors requested

Reply: OR 0000 00eq **** **** tttt

eq	Equipment number
tttt	First track assigned

56 SET FILE BUSY - SFBM

Request: OR 0056 **** **** **aa aaaa

aaaaaa	Address of file status word
MB	Value compare with file name word (aaaaaa-1)

Reply: OR 0000 ssss **** **** ****

ssss	0	File was set busy
	1	File is busy
	2	Comparison failed

Comparison is not performed if aaaaaa is not within the file name table.

57 SET TRACK BIT - STBM

Request: OR 0057 00eq tttt nnnn ****

eq — Equipment number. If bit 11 of the equipment byte is set (40eq), the checkpoint bit for this device is set upon completion of the function. If bit 10 of the equipment byte is set (20eq), this request is ignored if queue protect is disabled.

tttt — Track

nnnn — Subfunction code:

- 00 Set preserved file bit
- 01 Set track interlock bit
- 03 Set track flawed status
- 04 Set checkpoint requested bit
- 74_8 Clear track flaw status
- 76_8 Clear track interlock bit
- 77_8 Clear preserved file bit

Reply: OR 0000 000s 0000 0000 0000

s
- 0 Function performed
- 1 Bit is already set or flaw function not complete

60 UPDATE ACCOUNTING AND DROP PPU — UADM

Request: OR 0060 wwww dddd 0000 0000

MB+0 opop aaaa bbbb rrrr iiii

MB+1 opop aaaa bbbb rrrr iiii

.
.
.

MB+5 opop aaaa bbbb rrrr iiii

wwww — Word count of options in MB+0 through MB+5

dddd — Drop PP flag:

- 0 Drop PP
- 1 Do not drop PP

opop	Options: 00 Increment low core register 02 Increment low core register by one 04 Decrement low core register by one 06 Decrement low core register 10_8 Increment control point register 12_8 Increment control point register by one 14_8 Decrement control point register by one 16_8 Decrement control point register 20_8 Increment control point accounting register and perform input/output SRU calculation 30_8 Increment control point accounting register and perform application accounting SRU calculation
aaaa	Word address of the register (must be within the range of addresses 10_8 through 130_8)
bbbb	Low order bit address of the field to increment or decrement (0 through 59)
rrrr	Width of the register (1 through 59 bits)
iiii	18-bit signed value of an increment. If the operation is a decrement and the value is negative, the operation is an increment. A similar situation applies for increments.

Reply: OR 0000 eeee 0000 0000 0000

MB Unchanged

eeee Error indication underflow on the register increment or decrement. Bit 0 set indicates the operation at MB+0 was in error, bit 1 set indicates MB+1, and so on.

61 WRITE ECS WORD – WEWM

Request: OR 0061 **** **** aaaa aaaa

MB ECS word to write

aa...a Absolute ECS address

Reply: OR 0000 0000 0000 0000 0000

62 JOB ADVANCEMENT CONTROL – JACM

Request: OR 0062 000s **** **** ****

s

0 Clear job advancement flag.

1 Clear job advancement flag and control point area words associated with releasing control point.

2, 3 Same as for 0 and 1, respectively, except that PPU is dropped.

4 If no activity, or if CPU activity and/or PPU in recall plus rollout flag set, then set job advancement flag, drop CPU, and call 1AJ to advance the job.

Reply: OR 0000 0000 0000 0000 0000

63 DELINK TRACKS -DLKM

Request: OR 0063 00eq ffff nnnn llll

eq	Equipment number If bit 11 of the equipment byte is set (40eq), then the checkpoint bit for this device is set upon completion of the function.
ffff	Track onto which nnnn is linked (bit 11 of ffff must be clear)
nnnn	Track to be linked to ffff
llll	Last track in chain to drop

Reply: OR 0000 0000 0000 0000 0000

64 TRANSFER DATA TO/FROM JOB - FROM/TO MESSAGE BUFFER - TDAM

Request OR 0064 000r qqqq wwaa aaaa

r	0	Read
	1	Write
qqqq		Queue priority of job
ww		Number of words to transfer
aa...a		Relative address

MB Up to six words of data to be sent or to be read from job

Reply: OR 0000 000s 0000 0000 0000

s	0	Operation complete
	1	Move in progress
	2	Not ready for data
	3	Reject (write request to nonzero first word)
	4	Inactive

65 TAPE I/O PROCESSOR - TIOM

Request: OR 0065 uuuu iiii mmcc cccc

- uuuu — MAGNET unit descriptor table address to be cleared
- iiii — Accounting increment
- mm — Accounting multipliers
- cc...c — FET completion code

Reply: OR 0000 ssss uuuu uuuu uuuu

- ssss — 0 Operation complete; 1 Function must not be reissued
- uu...u — Unchanged

MB Unchanged

66 REQUEST CPU TIME LIMIT - RTLM

Request OR 0066 tttt tttt **** ****

- tt...t — Time limit in seconds

Reply: OR 0000 0000 0000 0000 0000

67 LOAD CENTRAL PROGRAM - LCEM

Request: OR 0067 00aa aaaa pppp pppp

- aa...a — User-specified load address
- pp...p — Program location:
  - If ECS resident, pp...p is tttt ssss
    - tttt Track
    - ssss Sector
  - If CM resident, pp...p is 00cc cccc
    - cc...c CM address

Reply: OR 0000 0011 llll 00ff ffff (normal)

- ll...l — Last word address of load
- ff...f — First word address of load

OR 0000 7777 eeee 00aa aaaa (error)

eeee	Error flag
aa...a	Address in error:
eeee=0	ECS read error
eeee≠0, aa...a≠0	Illegal load address
eeee≠0, aa...a=0	Insufficient field length

70 CLEAR STORAGE - CSTM

Request: OR 0070 0000 wwww wwaa aaaa

ww...w Word count

aa...a First word address

Reply: OR 0000 0000 0000 0000 0000

71 - CHECKSUM SPECIFIED AREA -CKSM

Request: OR 0071 00ff ffff 00ll llll

ffffff	Absolute first word address of checksum area
llllll	Absolute last word address + 1 of checksum area

MB Checksum compare value

Reply: OR 0000 0000 0000 0000 ssss

ssss	Status
0	Calculated checksum equals specified checksum
≠0	Calculated checksum does not equal specified checksum

MB Calucated checksum

72 LOAD DISK ADDRESS — LDAM

Request: OR 0072 **** **** **** ****

MB **** 00ch 00eq ltlt lsls

ch	Channel
eq	Equipment
ltlt	Logical track
lsls	Logical sector

Reply: OR 0000 0000 0000 0000 rsrs

MB+0 ffff pupu pcpc ptpt psps

MB+1 lulu 00ch 00eq ltlt lsls

rsrs	Remaining sector count for lulu (used internally by driver)
ffff	Status flags:
	0 Unit not reserved (software)
	4 Logical address error (lsls greater than sector limit)
	10_8 Unit reserved (software)
pupu	Physical unit
pcpc	Physical cylinder
ptpt	Physical track
psps	Physical sector
lulu	Logical unit
ch	Channel
eq	Equipment
ltlt	Logical track
lsls	Logical sector

NOTE

The LDAM function has no PP HUNG. conditions.

CPU FUNCTION REQUESTS

The CPU issues the following requests to the system as needed. These requests are processed directly by CPUMTR.

ABT — ABORT CONTROL POINT

Request: AB T00 0000 0000 0000

CPM — RESIDENT CPM FUNCTIONS

Request: CP M00 ffff 00pp pppp

ffff Function number

pp...p Parameter

END — TERMINATE CURRENT CPU PROGRAM

Request: EN D00 0000 0000 0000

LDR — REQUEST OVERLAY LOAD

Request: LD R00 0000 00aa aaaa

aaaaaa Specifies address of parameters for overlay load

LDV — REQUEST LOADER ACTION

Request: LD V00 0000 0000 0000

Request: LD V00 0000 00aa aaaa

aaaaaa Specifies address of parameters for overlay load

LOD — REQUEST AUTOLOAD OF RELOCATABLE FILE, FILE NAME IN (64_8)

Request: LO D00 0000 0000 0000

MEM — REQUEST MEMORY

Request: ME M00 0000 00aa aaaa

aaaaaa Address of request word

Request word: 0000 nfff ff00 0000 0000

n No-reduce override

ff...f Field length request (if ff...f=0, current field length is returned)

Reply: 0000 ffff ff00 0000 0001

ffffff Field length

MSG — SEND MESSAGE TO SYSTEM

Request: MS Gr0 aaaa 00ff ffff

r Recall (if desired)

aaaa Message option

0	System dayfile
1	Console line 1
2	Console line 2
3	Job dayfile
4	Error log (system origin or SSJ= only)
5	Account log (SSJ= only)

ffffff Address of message

PFL — SET (P) AND CHANGE FIELD LENGTH

Request: PF L00 pppp ppff ffff

pppppp New (P)

ffffff New FL

RCL — PLACE PROGRAM ON RECALL

If the program desires recall until system recall delay has expired:

Request: RC L00 0000 0000 0000

If the programmer desires recall until bit 0 is set:

Request: RC L20 0000 00aa aaaa

aaaaaa	Program is placed on recall until bit 0 of aaaaaa is set

RFL — REQUEST FIELD LENGTH

Request: RF L00 aaaa aanf ffff

aaaaaa	Address of status response
n	No-reduce override
ff...f	Field length; if ff...f=0, current field length is returned.

Reply: 0000 ffff ff00 0000 0001

ff...f	Field length

RSB — READ SUBSYSTEM PROGRAM BLOCK

Request: RS Br0 00qq qqss ssss

r	1	Auto recall selected
qqqq		Subsystem queue priority; if qqqq=0, block is read from absolute core memory or relative to caller's control point.
ss...s		Address of status word in format.

Status word: 0000 wwww aaaa aabb bbbb

wwww	Number of words to be read
aa...a	Address to read from in subsystem
bb...b	Address of buffer to receive data. If (bb...b) <0, read is from absolute memory. If (bb...b) ≥0, read is relative to caller's control point.

Reply: rrrr wwww aaaa aabb bbbb

rrrr	4000	Transfer successfully completed
	2000	Subsystem not present

wwww Number of words to be read.

aa...a Address to read from in subsystem.

bb...b Address of buffer to receive data.

SIC — SEND INTERCONTROL POINT BLOCK TO SUBSYSTEM PROGRAM

Request: SI Cr0 bbbb bbss ssss

r 1 Auto recall selected

bb...b Address of buffer to be transferred to subsystem.

ss...s Address of status word in format.

Status word: nnnn nnqq qq00 0000 0000

nn...n Buffer number of subsystem for transfer.

qqqq Destination subsystem queue priority.

Reply: nnnn nnqq qqrr rrrr rrrr

nn...n Buffer number of subsystem for transfer.

qqqq Destination subsystem queue priority.

rr...r
- 1 Transfer completed successfully.
- 3 Destination subsystem is not present in the system.
- 5 Subsystem buffer is full, subsystem is being moved, or subsystem job is advancing.
- 7 Block length as specified in first word is larger than that permitted by the subsystem.
- 11 Destination buffer is undefined by subsystem.

TIM — REQUEST SYSTEM TIME

Request: TI M00 rrrr 00ff ffff

ff...f Address for response

If rrrr=0, the system replies with accumulated CPU time

Reply: 2sss ssss ssss ssss mmmm

ss...s Seconds

mmmm Milliseconds

If rrrr=1, the system replies with the date line.

Reply: yy.mm.dd

If rrrr=2, the system replies with the clock line.

Reply: hh.mm.ss

If rrrr=3, the system replies with the Julian date (right-justified).

Reply: yyddd

If rrrr=4, the system replies with SCOPE format real-time.

Reply: 2sss ssss ssss ssss mmmm

ss...s Seconds

mmmm Milliseconds

If rrrr=5, the system replies with real-time.

Reply: ssss ssss mmmm mmmm mmmm

ss...s Seconds

mm...m Milliseconds

If rrrr=6, the system replies with packed date/time.

Reply: 0000 0000 yymo ddhh mmss

yy	Year-70 decimal
mo	Octal month
dd	Octal day
hh	Octal hour
mm	Octal minutes
ss	Octal seconds

TLX — PROCESS SPECIAL REQUEST

This function can process special PPU requests from any subsystem with queue priority of MXPS or above. It provides two capabilities.

- PPU programs with names starting with 1 (such as 1TA) can be called.
- If no PPU is available, control is returned to the running program.

Request: TL X00 0000 00aa aaaa

aa...a Address of PPU request

Reply: aa...a is not cleared if no PPU is available

XJP — INITIATE SUBCONTROL POINT

Request: XJ P00 tttt ttaa aaaa

ttttt	CPU time limit (in milliseconds) for subcontrol point
aaaaaa	Address of subcontrol point exchange package

Reply:

Register	Bits	Contents
X2	59-0	Milliseconds of CPU time used by caller before control was given to subcontrol point.
X6	59-48	2000B + ef ef Error flag set by control point.

Register	Bits	Contents
X7	59-0	Milliseconds of CPU time used by subcontrol point.

XJR — PROCESS EXCHANGE JUMP REQUEST

Request: XJ R00 ffff 00aa aaaa

ffff Function code

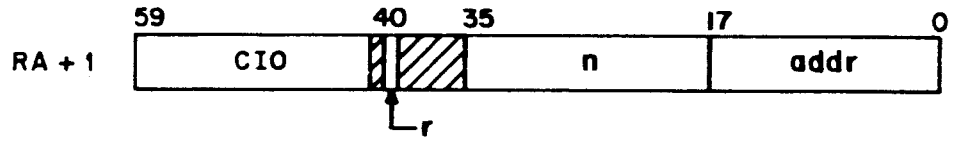
- 0 Start job with exchange package at aaaaaa.
- 1 Save current exchange package at aaaaaa.

aaaaaa Address for function code

FUNCTION PROCESSORS

CIO - COMBINED INPUT/OUTPUT

Call:

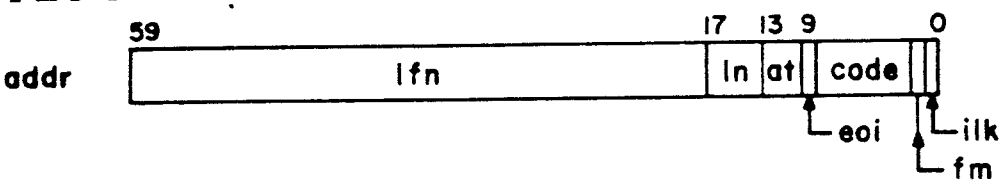


r Auto recall, if desired

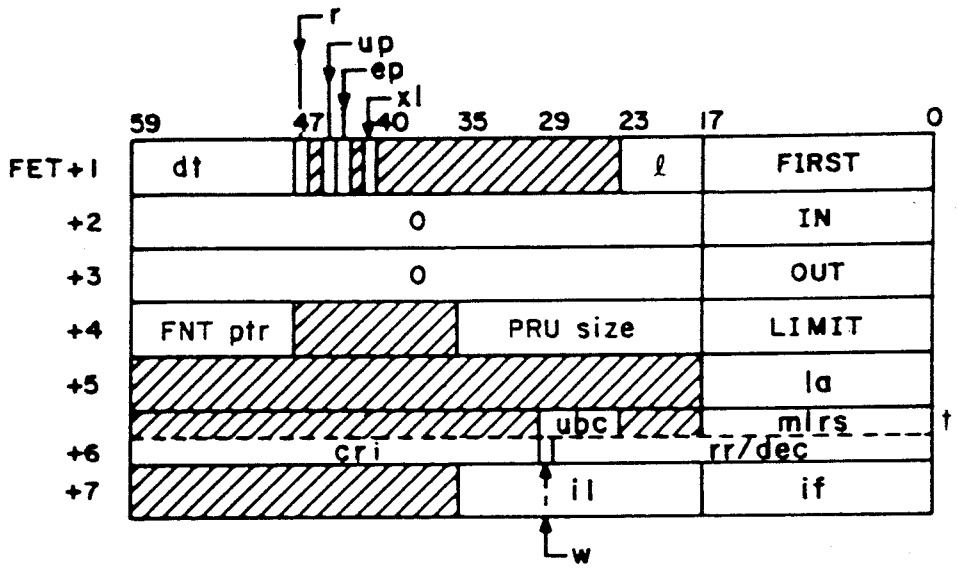
n Count for skip operations

addr Address of the FET

FET Format:



lfn	Logical file name
ln	Level number ($0 \leq ln \leq 17_8$) for an EOR/EOF operation on the file:
	0 — EOR operation
	$1\text{-}16_8$ — Same as level 0
	17_8 — EOF operation
at	Status information returned by CIO
	01 — End of reel/end of device
	02 — Parity error
	11_8 — Other error (applies only to mass storage files; refer to FET+6, dec field)
eoi	End of information bit
code	Request/return code:
	xx1 — Operation complete
	xx2 — Binary operation (applies only to SI, S, and L formatted tapes)
	xx0 — Coded operation (applies only to SI, S, and L formatted tapes)



dt	Device type
r	Random processing bit. This bit is set if random processing is to be performed on the mass storage file; r is checked only if $\ell \neq 0$.
up	User processing bit. This bit is set if the user processes magnetic tape end-of-reel conditions; up is checked only if $\ell \neq 0$.
ep	Error processing bit. This bit is set if the user processes errors; ep is checked only if $\ell \neq 0$.
xl	Extended label processing. xl is 0 for standard label processing and 1 for extended label processing.
ℓ	FET length-5
FIRST	First address of buffer
IN	Next input address
OUT	Next output address
LIMIT	Limit address of buffer
la	Address of a list of random addresses to be used with READLS or RPHRLS mass storage operations
ubc	Unused bit count for S and L format tapes

†These fields apply only to S and L format tapes.

mlrs — Maximum logical record size for S and L format tapes

cri — Current random index (for mass storage files only)

w — Random rewrite request (for mass storage files only)

rr/dec

rr — Random request (for mass storage files only); if rr ≠ 0, and the request is a read request, rr is the random index.

If rr ≠ 0, w=0, and the request is a write request, rr is the address for return of random index (the write operation is at the current position).

If rr ≠ 0, w=1, and the request is a write request, rr is the random index.

dec — Detail error return code (for mass storage files only):

Code	Type of Error
x001	Parity error
x002	Address error
x003	Device status error
x004	6681 function reject or function code issued to mass storage device timed out with no response
x005	Device reserved
x006	Device not ready
4007	Track limit (device full)

After an error, the file is positioned at the erroneous PRU. If the operation was a read and the system has verified that the proper PRU was read (although it probably contains incorrect data), then x in the code is 0 and the data is placed in the buffer. Otherwise, x is 4. If the file is random, the current random index is set as usual.

il	Length of random index area (for mass storage files only)
if	First word address of random index area (for mass storage files only)

OPEN FUNCTIONS

Code	Name	Description
100	READNR	Read, no rewind
104	WRITENR	Write, no rewind
120	NR	No rewind
120	ALTERNR	Alter, no rewind
140	READ	Read and rewind
144	WRITE	Write and rewind
160	ALTER	Alter and rewind
300	REELNR	Read reel, no rewind
340	REEL	Read reel and rewind

CLOSE FUNCTIONS

Code	Name	Description
130	NR	No rewind
150	REWIND	Rewind
170	UNLOAD	Rewind and unload
174	RETURN	Rewind (decrement scheduled tape units)
330	NR	No rewind
350	REWIND	Rewind
370	UNLOAD	Rewind and unload

CLOSER FUNCTIONS

Code	Name	Description
330	NR	No rewind
350	default	Rewind
370	UNLOAD	Rewind and unload

READ AND WRITE FUNCTIONS

Code	Name	Description
000	RPHR	Reads physical record
004	WPHR	Writes physical record
010	READ	Buffer read
014	WRITE	Buffer write
020	READSKP	Reads skip
024	WRITER	Writes end of record
034	WRITEF	Writes end of file
200	READCW	Nonstop read of PRUs bounded by control words
204	WRITECW	Nonstop write of PRUs bounded by control words
210	READLS	Reads nonstop with list (mass storage only)
214	REWRITE	Buffer rewrite in place (mass storage only)
224	REWRITER	End-of-record rewrite in place (mass storage only)
230	RPHRLS	Reads PRUs with list (mass storage only)
234	REWRITEF	End-of-file rewrite in place (mass storage only)
250	READNS	Reads nonstop until buffer is full or EOF or EOI
260	READN	Reads data from an S or L formatted tape. Reads until buffer full or EOF or EOI
264	WRITEN	Writes nonstop on S or L formatted tape
600	READEI	Reads information until buffer full or EOI

FILE POSITIONING FUNCTIONS

Code	Name	Description
040	BKSP	Backspaces file one logical record
044	BKSPRU	Backspaces user-specified number of PRUs
050	REWIND	Rewinds file
060	UNLOAD	Rewinds and unloads file (if mass storage file, same as RETURN)
070	RETURN	Releases file space and releases file from job control
110	POSMF	Positions multifile tape set to member of set
114	EVICT	Releases file space
240	SKIPF	Skips forward user-specified number of records or files
240	SKIPFF	Skips forward user-specified number of records or files
240	SKIPEI	Positions file at EOI
640	SKIPB	Backspaces file user-specified number of records
640	SKIPFB	Backspaces file user-specified number of files

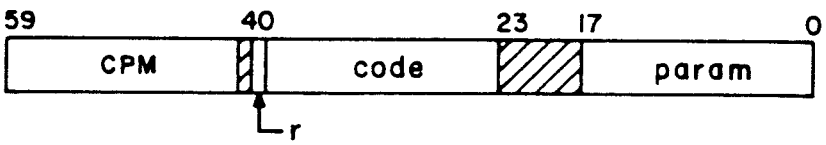
DATA TRANSFER MACROS

Name	Function
READC	Reads coded line from I/O buffer to working buffer
WRITEC	Writes coded line from working buffer to I/O buffer
READH	Reads coded line with space fill from I/O buffer to working buffer
WRITEH	Writes coded line, deleting all trailing spaces, from working buffer to I/O buffer

Name	Function
READO	Reads one word from I/O buffer to X6
WRITEO	Writes one word from X6 to I/O buffer
READS	Reads line image to character buffer
WRITES	Writes line image from character buffer
READW	Fills working buffer from I/O buffer
WRITEW	Writes data from working buffer to I/O buffer

CPM - CONTROL POINT MANAGER

Call:



r	Auto recall bit (must be set)
code	CPM function code
param	Parameter for the function

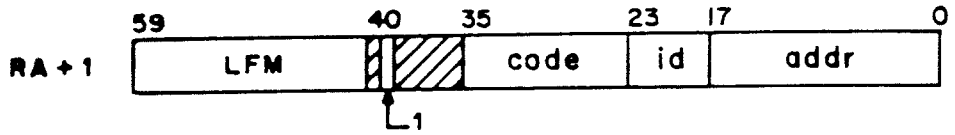
CPM FUNCTIONS

Code	Name	Description
000	SETQP	Sets job queue priority
001	SETPR	Sets job CPU priority
002	MODE	Sets exit mode flags
003	SETTL	Sets CPU time limit for job
004	EREXIT	Sets error exit address; when job aborts, control is returned to this address
005	CONSOLE	Transfers information to/from console
006	ROLLOUT	Rolls out job
007	NOEXIT	Suppresses processing of EXIT statement if job aborts
011	ONSW	Sets sense switches for user job

Code	Name	Description
012	OFFSW	Clears sense switches
013	GETJN	Gets job name
014	GETQP	Gets job queue priority
015	GETPR	Gets job CPU priority
016	GETEM	Gets exit mode control
017	GETTL	Gets job time limit
020	---	Sets demand file random index (SSJ= only)
021	SETUI	Sets user index (system origin job only)
022	SETLC	Sets first loader control word
023	SETRFL	Sets new field length restoration
024	GETJCR	Gets last error flag and KCL job control registers
025	SETJCR	Sets KCL job control registers
026	SETSS	Set subsystem (TXOT jobs only)
027	GETJO	Gets job origin code
030	GETJA	Gets job accounting information
031	USECPU	Specifies CPU to be used
032	USERNUM	Returns user number
033	GETFLC	Gets field length control word
034	EESET	Enters event in system event table (SYOT only)
035	PACKNAM	Writes default pack name in control point area
036	PACKNAM	Gets pack name from control point area
037	GETSS	Get subsystem (TXOT only)
040	VALID	Validates user number (SSJ= only)
041	FAMILY	Enters family name (SYOT only)
042	---	Special CHARGE functions
043	DISSJ	Disable SSJ
044	VERSION	Returns version name
045	GETLC	Get first loader control word
046	GETGLS	Get global library set
047	SETGLS	Set global library set

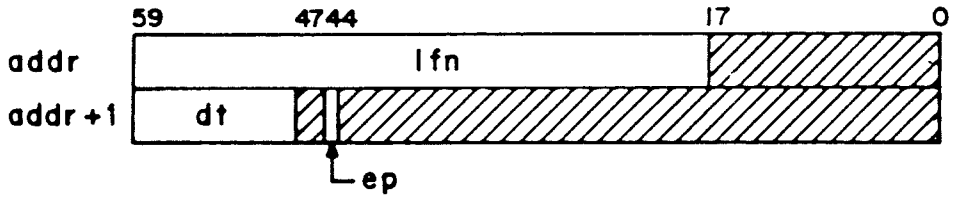
LFM - LOCAL FILE MANAGER

Call:



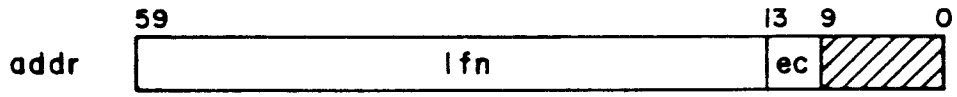
code	Function code
id	File id number (refer to SETID, function code 017)
addr	Address of the FET

FET format:



lfn	File name
dt	Device type
ep	Error processing bit

After the request is completed, the first word of the FET contains the following information.



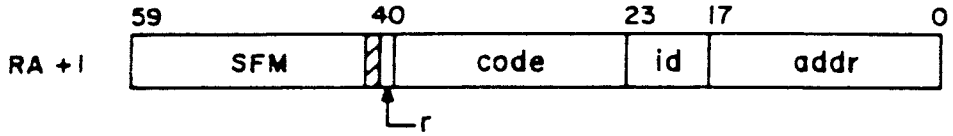
ec	Error code

LFM FUNCTIONS

Code	Name	Description
000	RENAME	Renames local file
001	ASSIGN	Accesses library file
002	COMMON	Changes file type to library
004-7, 016, 030	RELEASE	Releases file to user-specified output queue

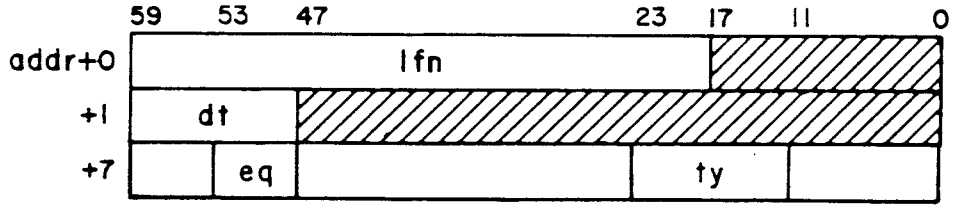
Code	Name	Description
010	LOCK	Sets write lockout bit for file
011	UNLOCK	Clears write lockout bit for file
012	STATUS	Obtains last status of file
013	STATUS	Returns current position and status of file
014	REQUEST	Requests operator assignment of equipment to file
015	REQUEST	Assigns file to user-specified equipment
017	SETID	Sets identifier code for file
020	ASSIGN	Accesses library file
021	ACCSF	Attaches control statement file as read-only file
022	ENCSF	Replaces the control statement file
023	PSCSF	Positions control statement file
024	LABEL	Assigns file to tape and processes tape
025	GETFNT	Generates table of FNT/FST entries for all local files
026	---	Requests tape assignment (SSJ= only)
027	---	Enters VSN file entry (SSJ= only)
031	PRIMARY	Change primary file

Call:



r	Auto recall bit
code	Function code
id	File identification number
addr	Address of the FET for the file

FET format:



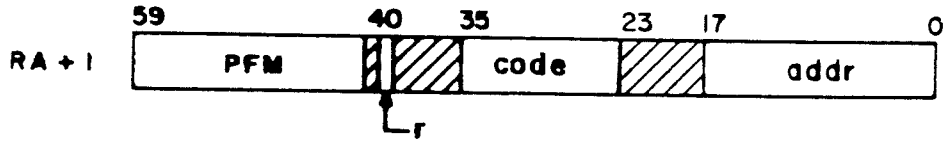
lfn	File name
dt	Device type
eq	Equipment number
ty	Dayfile type: 1 System dayfile 2 Account dayfile 3 Error log dayfile

SFM FUNCTIONS

Code	Name	Description
000	---	Terminate active dayfile (SSJ= only)
001-3 005	DAYFILE	Accesses system, account, error log, and user dayfiles
004	ESYF	Enters file attached to control point as a system file
006	RDVT	Obtains device type
007	---	Protect active dayfile (SSJ= only)
010	---	Clear dayfile byte (SSJ= only)
011	---	Enters fast attach file (SSJ= only)
012	---	Deletes fast attach file (SSJ= only)

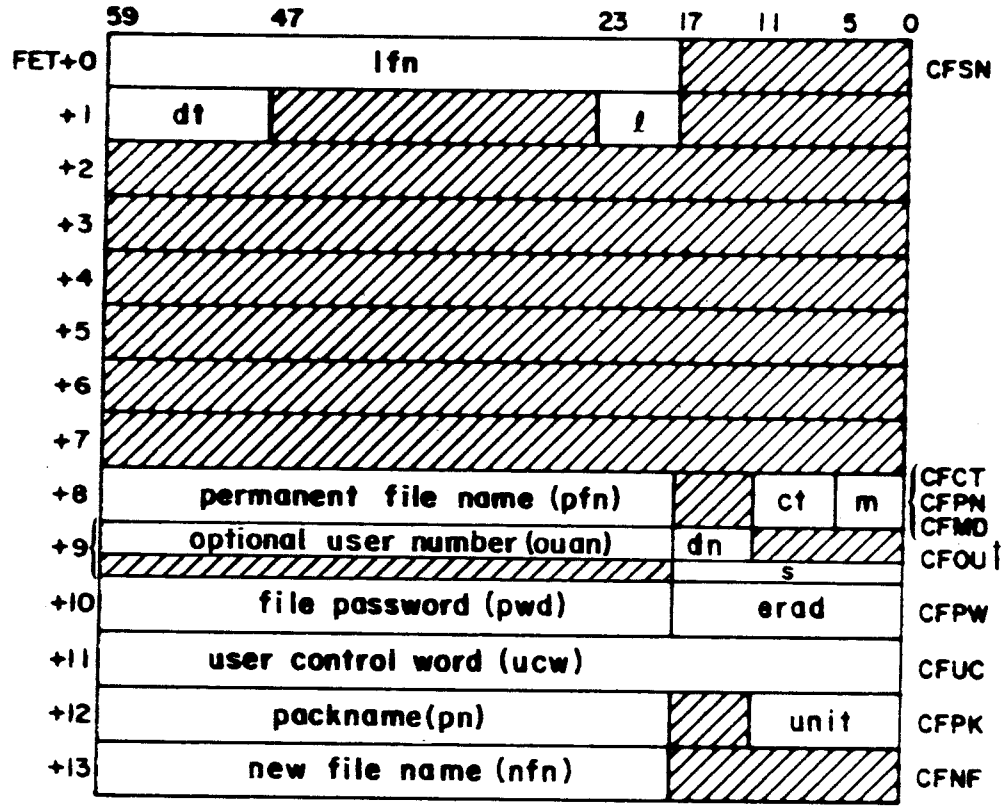
PFM - PERMANENT FILE MANAGER

Call:



r	Auto recall bit (must be set)
code	Function code
addr	Address of the FET

FET format:



lfn	Local file name
dt	Device type
ℓ	FET length
pfn	Permanent file name
ct	File category
m	File access mode
ouan	Optional user number
dn	Device number for CATLIST option
s	Number of PRUs desired
pwd	Optional file password
erad	Error message return address
ucw	User control word
pn	Pack name of auxiliary device
unit	Number of units
nfn	New file name

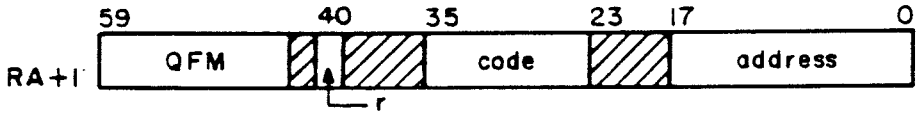
†If optional user number is not specified, word 9 of the FET contains the name of the alternate catalog.

PFM FUNCTIONS

Code	Name	Description
001, CCSV	SAVE	Saves copy of local file as indirect access permanent file
002, CCGT	GET	Generates working copy of indirect access permanent file
003, CCPG	PURGE	Removes file from permanent file system
004, CCCT	CATLIST	Provides catalog information
005, CCPM	PERMIT	Grants permission to alternate user to access private file
006, CCRP	REPLACE	Purges old file and saves new file as indirect access permanent file
007, CCAP	APPEND	Appends contents of working files to indirect access permanent file
010, CCDF	DEFINE	Specifies file as direct access permanent file
011, CCAT	ATTACH	Attaches direct access permanent file to user's control point
012, CCCG	CHANGE	Alters parameters associated with permanent file

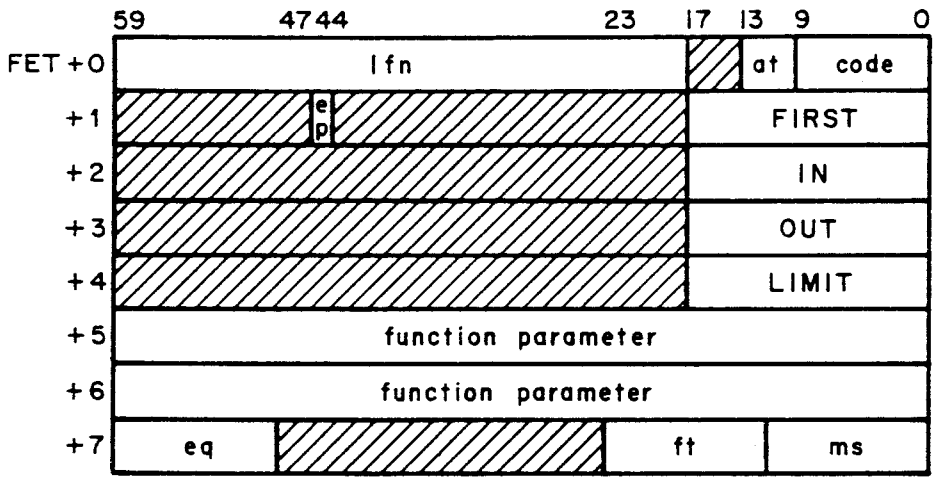
QFM-QUEUE FILE MANAGER

Call:



r	Auto recall bit (must be set)
code	Function code
addr	Address of FET for the call

FET format:



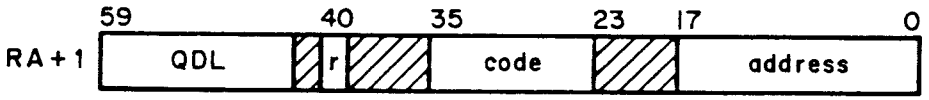
lfn	File name
at	Abnormal termination code
code	Completion code
ep	Error processing bit
eq	Equipment number
ft	File type: 1 System dayfile 2 Account dayfile 3 Error log dayfile 4 Inactive queue file table (IQFT) file
ms	Mass storage error code

QFM FUNCTIONS

Code	Name	Description
001	---	Attach preserved file
002	---	Detach preserved file
003	---	Purge preserved file
004	---	Set IQFT file
005	---	Initialize IQFT file
006	---	Requeue FNT/FST list
007	---	Release FNT/FST list
010	---	Dequeue list
015	RERUN	Set rerun status
016	NORERUN	Clear rerun status
017	SUBMIT	Release file to input queue
020	---	Assign file using MSAL control

QDL — QUEUE DUMP LOAD PROCESSOR

Call:



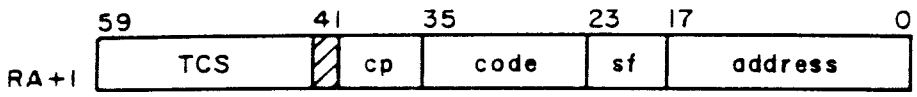
r	Auto recall bit (must be set)
code	Function code
addr	Address of FET for the call

QDL FUNCTIONS

Code	Name	Description
000	---	Search FNT for a queue-type file and change its file to local
001	---	Release local mass storage file to the input, print, or punch queue

TCS-TRANSLATE CONTROL STATEMENT

Call:



cp Calling program control point

code Function code:

Code	Macro
004	CONTROL
005	EXCST

sf Subfunction code for CONTROL macro. Field not used for EXCST macro

sf	Action
00	Read control statement, advance pointer
01	Read control statement if not local file call
02	Read control statement If local file call, set bit 17 of RA+65_8
4x	Product set format

addr FWA of buffer to store or read control statement

TCS FUNCTIONS

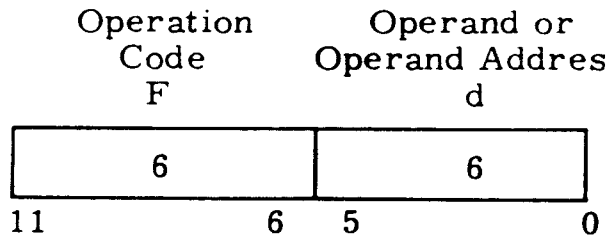
Code	Name	Description
004	CONTROL	Read next control statement in control statement stream and transfer it to specified address
005	EXCST	Specified buffer contains control statement

INSTRUCTIONS

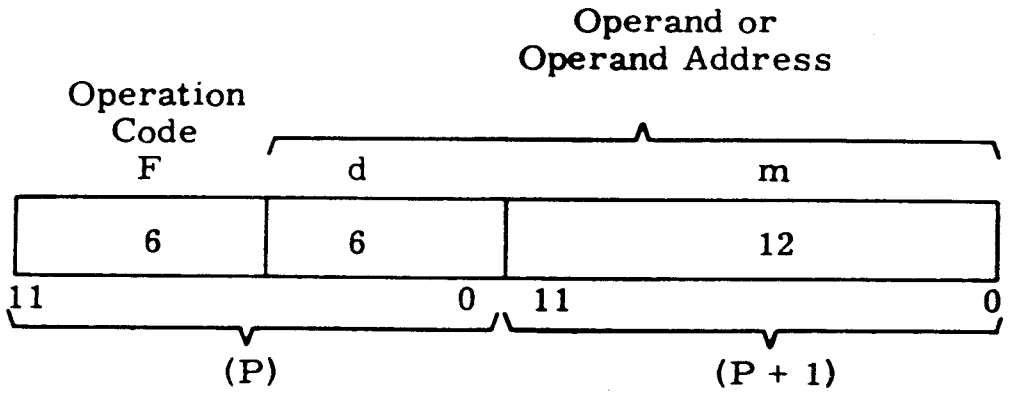
PERIPHERAL PROCESSOR (PPU) INSTRUCTION FORMATS

PPU INSTRUCTION FORMATS

An instruction may have a 12-bit or a 24-bit format. The 12-bit format has a 6-bit operation code F and a 6-bit operand or operand address d.



The 24-bit format uses the 12-bit quantity m, which is the contents of the next program address (P+1), with d to form an 18-bit operand or operand address.



SYMBOLS USED IN PPU INSTRUCTION LISTINGS

d	Implies d itself
(d)	Implies the contents of d
((d))	Implies the contents of the location specified by d
m m	Implies m itself used as an address
m + (d)	Contents of d is added to m to form an operand (jump address)
(m + (d))	Contents of d is added to m to form the address of the operand
dm	Implies an 18-bit quantity with d as the upper 6 bits and m as the lower 12 bits

PPU INSTRUCTION EXECUTION TIMES

All times are given in multiples of 1000 nanoseconds. Execution times are PPU times only. Instructions that interact with the CPU or CM do not include the time required by the CPU or CM to respond.

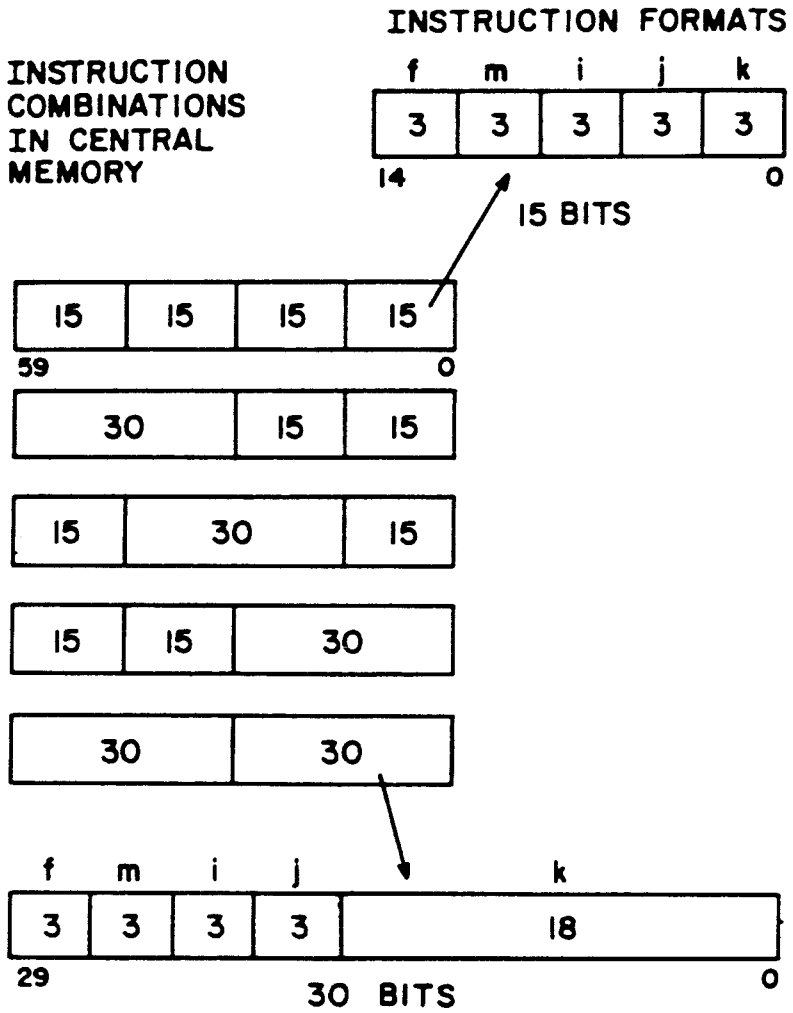
F	Description	PPU
00	Pass	1
01	Long jump to m + (d)	2-3
02	Return jump to m + (d)	3-4
03	Unconditional jump d	1
04	Zero jump d	1
05	Nonzero jump d	1
06	Plus jump d	1
07	Minus jump d	1
10	Shift d	1
11	Logical difference d	1
12	Logical product d	1
13	Selective clear d	1
14	Load d	1
15	Load complement d	1
16	Add d	1
17	Subtract d	1
20	Load dm	2
21	Add dm	2
22	Logical product dm	2
23	Logical difference dm	2
24	Pass	1
25	Pass	1
260	Exchange jump CPU d	1

F	Description	PPU
261	Monitor exchange jump CPU d to (A)	1
262	Monitor exchange jump CPU d to (MA)	1
270	Read program address of CPU d	1
30	Load (d)	2
31	Add (d)	2
32	Subtract (d)	2
33	Logical difference (d)	2
34	Store (d)	2
35	Replace add (d)	3
36	Replace add one (d)	3
37	Replace subtract one (d)	3
40	Load ((d))	3
41	Add ((d))	3
42	Subtract ((d))	3
43	Logical difference ((d))	3
44	Store ((d))	3
45	Replace add ((d))	4
46	Replace add one ((d))	4
47	Replace subtract one ((d))	4
50	Load (m + (d))	3-4
51	Add (m + (d))	3-4
52	Subtract (m + (d))	3-4
53	Logical difference (m + (d))	3-4
54	Store (m + (d))	3-4
55	Replace add (m + (d))	4-5
56	Replace add one (m + (d))	4-5
57	Replace subtract one (m + (d))	4-5

F	Description	PPU
60	Central read from (A) to d	minimum of 6
61	Central read (d) words from (A) to m	6 plus 5/word
62	Central write to (A) from d	minimum of 6
63	Central write (d) words to (A) from m	6 plus 5/word
64	Jump to m if channel d active	2
65	Jump to m if channel d inactive	2
66	Jump to m if channel d full	2
67	Jump to m if channel d empty	2
70	Input A from channel d	2
71	Input (A) words to m from channel d	5 plus 1/word
72	Output from A on channel d	2
73	Output (A) words from m on channel d	5 plus 1/word
74	Activate channel d	2
75	Disconnect channel d	2
76	Function (A) on channel d	2
77	Function m on channel d	2

CENTRAL PROCESSOR (CPU) INSTRUCTION FORMATS

CPU INSTRUCTION FORMATS



SYMBOLS USED IN CPU INSTRUCTION LISTINGS

A	One of eight address registers (18 bits)
B	One of eight index registers (18 bits); B0 is fixed and equal to zero
fm	Instruction code (6 bits)
i	Specifies which of eight designated registers (3 bits); is also used in 03x instructions as part of a 9-bit operation code.
j	Specifies which of eight designated registers (3 bits)
jk	Constant, indicating number of shifts to be taken (6 bits)
k	Specifies which of eight designated registers (3 bits)
K	Constant, indicating branch designation or operand (18 bits)
X	One to eight operand registers (60 bits)

INSTRUCTION EXECUTION TIMES
CDC CYBER 70/MODELS 72, 73, 74

All times are given in multiples of 100 nanoseconds.

Octal Code	Description	M72	M73	M74 CPU0	M74 CPU1
00	Stop	-	-	-	-
01	Return jump to K	24	21	13	21
011	Read extended core storage	-†	-†	-†	-†
012	Write extended core storage	-†	-†	-†	-†
013	Central exchange jump	49	46	-	-
02	Go to K + (Bi)	16††	13††	14	15
030	Go to K if (Xj) = zero	16††	13††	9	15
031	Go to K if (Xj) ≠ zero	16††	13††	9	15
032	Go to K if (Xj) = positive	16††	13††	9	15
033	Go to K if (Xj) = negative	16††	13††	9	15
034	Go to K if (Xj) is in range	16††	13††	9	15
035	Go to K if (Xj) is out of range	16††	13††	9	15
036	Go to K if (Xj) is definite	16††	13††	9	15
037	Go to K if (Xj) is indefinite	16††	13††	9	15
04	Go to K if (Bi) = (Bj)	16††	13††	8	15
05	Go to K if (Bi) ≠ (Bj)	16††	13††	8	15
06	Go to K if (Bi) ≥ (Bj)	16††	13††	8	15
07	Go to K if (Bi) < (Bj)	16††	13††	8	15
10	Transmit (Xj) to Xi	8	5	3	5
11	Logical product of (Xj) and (Xk) to Xi	8	5	3	5
12	Logical sum of (Xj) and (Xk) to Xi	8	5	3	5
13	Logical difference of (Xj) and (Xk) to Xi	8	5	3	5

† Refer to ECS Description/Programming Manual.
†† If the jump conditions are not present, requires only n cycles (for M72, n=8 and for M73, n=5).

Octal Code	Description	M72	M73	M74 CPU0	M74 CPU1
14	Transmit (Xk) comp. to Xi	8	5	3	5
15	Logical product of (Xj) and (Xk) comp. to Xi	8	5	3	5
16	Logical sum of (Xj) and (Xk) comp. to Xi	8	5	3	5
17	Logical difference of (Xj) and (Xk) comp. to Xi	8	5	3	5
20	Shift (Xi) left jk places	9	6	3	6
21	Shift (Xi) right jk places	9	6	3	6
22	Shift (Xk) nominally left (Bj) places to Xi	9	6	3	6
23	Shift (Xk) nominally right (Bj) places to Xi	9	6	3	6
24	Normalize (Xk) in Xi and Bj	10	7	4	7
25	Round and normalize (Xk) in Xi and Bj	10	7	4	7
26	Unpack (Xk) to Xi and Bj	10	7	3	7
27	Pack Xi from (Xk) and Bj	10	7	3	7
43	Form jk mask in Xi	9	6	3	6
30	Floating sum of (Xj) and (Xk) to Xi	14	11	4	11
31	Floating difference of (Xj) and (Xk) to Xi	14	11	4	11
32	Floating DP sum of (Xj) and (Xk) to Xi	14	11	4	11
33	Floating DP difference of (Xj) and (Xk) to Xi	14	11	4	11
34	Round floating sum of (Xj) and (Xk) to Xi	14	11	4	11
35	Round floating difference of (Xj) and (Xk) to Xi	14	11	4	11
36	Integer sum of (Xj) and (Xk) to Xi	9	6	3	6
37	Integer difference of (Xj) and (Xk) to Xi	9	6	3	6

Octal Code	Description	M72	M73	M74 CPU0	M74 CPU1
40	Floating product of (Xj) and (Xk) to Xi	60	57	10	57
41	Round floating product of (Xj) and (Xk) to Xi	60	57	10	57
42	Floating DP product of (Xj) and (Xk) to Xi	60	57	10	57
44	Floating divide (Xj) by (Xk) to Xi	60	57	29	57
45	Round floating divide (Xj) by (Xk) to Xi	60	57	29	57
46	Pass	6	3	1	3
47	Sum of 1's in (Xk) to Xi	71	68	8	68
50	Sum of (Aj) and K to Ai	-†	-†	3	-††
51	Sum of (Bj) and K to Ai	-†	-†	3	-††
52	Sum of (Xj) and K to Ai	-†	-†	3	-††
53	Sum of (Xj) and (Bk) to Ai	-†	-†	3	-††
54	Sum of (Aj) and (Bk) to Ai	-†	-†	3	-††
55	Difference of (Aj) and (Bk) to Ai	-†	-†	3	-††
56	Sum of (Bj) and (Bk) to Ai	-†	-†	3	-††
57	Difference of (Bj) and (Bk) to Ai	-†	-†	3	-††
60	Sum of (Aj) and K to Bi	8	5	3	5
61	Sum of (Bj) and K to Bi	8	5	3	5
62	Sum of (Xj) and K to Bi	8	5	3	5
63	Sum of (Xj) and (Bk) to Bi	8	5	3	5
64	Sum of (Aj) and (Bk) to Bi	8	5	3	5
65	Difference of (Aj) and (Bk) to Bi	8	5	3	5
66	Sum of (Bj) and (Bk) to Bi	8	5	3	5
67	Difference of (Bj) and (Bk) to Bi	8	5	3	5

† When i=0, time=6 minor cycles; i=1-5, 12 minor cycles; i=6 or 7, 10 minor cycles.

†† When i=0, time=6 minor cycles; i=1-5, 14 minor cycles; i=6 or 7, 12 minor cycles.

Octal Code	Description	M72	M73	M74 CPU0	M74 CPU1
70	Sum of (Aj) and K to Xi	9	6	3	6
71	Sum of (Bj) and K to Xi	9	6	3	6
72	Sum of (Xj) and K to Xi	9	6	3	6
73	Sum of (Xj) and (Bk) to Xi	9	6	3	6
74	Sum of (Aj) and (Bk) to Xi	9	6	3	6
75	Difference of (Aj) and (Bk) to Xi	9	6	3	6
76	Sum of (Bj) and (Bk) to Xi	9	6	3	6
77	Difference of (Bj) and (Bk) to Xi	9	6	3	6

INSTRUCTION EXECUTION TIMES CDC 6400/6500/6600

All times are given in multiples of 100 nanoseconds.

Octal Code	Description	6500 and 6400	6600
00	Stop	-	-
01	Return jump to K	21	13
011	Read extended core storage	††	††
012	Write extended core storage	††	††
02	Go to K+(Bi)	13	14
030	Go to K if (Xj)=zero	13 †††	9†
031	Go to K if (Xj) ≠ zero	13 †††	9†
032	Go to K if (Xj) = positive	13 †††	9†
033	Go to K if (Xj) = negative	13 †††	9†
034	Go to K if (Xj) is in range	13 †††	9†
035	Go to K if (Xj) is out of range	13 †††	9†

† Modify the execution time (T) according to this table.

	Branch	No Branch
Loop (in stack)	T	T+2
Jump (out of stack)	T+6	T+5

†† Refer to ECS Description/Programming Manual.

††† No branch condition requires 5.

Octal Code	Description	6500 and 6400	6600
036	Go to K if (Xj) is definite	13 ††	9†
037	Go to K if (Xj) is indefinite	13 ††	9†
04	Go to K if (Bi)=(Bj)	13 ††	8†
05	Go to K if (Bi)≠(Bj)	13 ††	8†
06	Go to K if (Bi)≥(Bj)	13 ††	8†
07	Go to K if (Bi)<(Bj)	13 ††	8†
10	Transmit (Xj) to Xi	5	3
11	Logical product of (Xj) and (Xk) to Xi	5	3
12	Logical sum of (Xj) and (Xk) to Xi	5	3
13	Logical difference to (Xj) and (Xk) to Xi	5	3
14	Transmit (Xk) comp. to Xi	5	3
15	Logical product of (Xj) and (Xk) comp. to Xi	5	3
16	Logical sum of (Xj) and (Xk) comp. to Xi	5	3
17	Logical difference of (Xj) and (Xk) comp. to Xi	5	3
20	Shift (Xi) left jk places	6	3
21	Shift (Xi) right jk places	6	3
22	Shift (Xk) nominally left (Bj) places to Xi	6	3
23	Shift (Xk) nominally right (Bj) places to Xi	6	3
24	Normalize (Xk) in Xi and Bj	7	4
25	Round and normalize (Xk) in Xi and Bj	7	4
26	Unpack (Xk) to Xi and Bj	7	3
27	Pack Xi from (Xk) and Bj	7	3
43	Form jk mask in Xi	6	3
30	Floating sum of (Xj) and (Xk) to Xi	11	4
31	Floating difference of (Xj) and (Xk) to Xi	11	4
32	Floating DP sum of (Xj) and (Xk) to Xi	11	4
33	Floating DP difference of (Xj) and (Xk) to Xi	11	4

† Modify the execution time (T) according to this table.

	Branch	No Branch
Loop (in stack)	T	T+2
Jump (out of stack)	T+6	T+5

†† No branch condition requires 5.

Octal Code	Description	6500 and 6400	6600
34	Round floating sum of (Xj) and (Xk) to Xi	11	4
35	Round floating difference of (Xj) and (Xk) to Xi	11	4
36	Integer sum of (Xj) and (Xk) to Xi	6	3
37	Integer difference of (Xj) and (Xk) to Xi	6	3
40	Floating product of (Xj) and (Xk) to Xi	57	10
41	Round floating product of (Xj) and (Xk) to Xi	57	10
42	Floating DP Product of (Xj) and (Xk) to Xi	57	10
44	Floating divide (Xj)	57	29
45	Round floating divide (Xj) by (Xk) to Xi	57	29
46	Pass	3	1
47	Sum of 1's in (Xk) to Xi	68	8
50	Sum of (Aj) and K to Ai	†	3
51	Sum of (Bj) and K to Ai	†	3
52	Sum of (Xj) and K to Ai	†	3
53	Sum of (Xj) and (Bk) to Ai	†	3
54	Sum of (Aj) and (Bk) to Ai	†	3
55	Difference of (Aj) and (Bk) to Ai	†	3
56	Sum of (Bj) and (Bk) to Ai	†	3
57	Difference of (Bj) and (Bk) to Ai	†	3
60	Sum of (Aj) and K to Bi	5	3
61	Sum of (Bj) and K to Bi	5	3
62	Sum of (Xj) and K to Bi	5	3
63	Sum of (Xj) and (Bk) to Bi	5	3
64	Sum of (Aj) and (Bk) to Bi	5	3
65	Difference of (Aj) and (Bk) to Bi	5	3
66	Sum of (Bj) and (Bk) to Bi	5	3
67	Difference of (Bj) and (Bk) to Bi	5	3
70	Sum of (Aj) and K to Xi	6	3
71	Sum of (Bj) and K to Xi	6	3
72	Sum of (Xj) and K to Xi	6	3
73	Sum of (Xj) and (Bk) to Xi	6	3
74	Sum of (Aj) and (Bk) to Xi	6	3
75	Difference of (Aj) and (Bk) to Xi	6	3
76	Sum of (Bj) and (Bk) to Xi	6	3
77	Difference of (Bj) and (Bk) to Xi	6	3

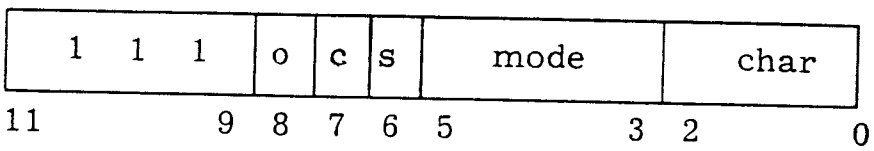
† When i = 0, time = 6
i = 1-5, time = 12
i = 6-7, time = 10

EXTERNAL FUNCTION CODES

EXTERNAL FUNCTION CODES AND STATUS RESPONSES

SYSTEM CONSOLE DISPLAY

Select Word



c = 0 Console 0
= 1 Console 1

s = 0 Left screen
= 1 Right screen

mode = 0 Character mode
= 1 Dot mode
= 2 Keyboard input request

char = 0 64 characters/line
= 1 32 characters/line
= 2 16 characters/line

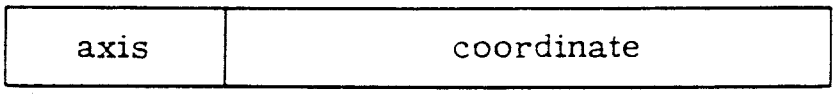
SELECT CODES

Console 0	Console 1	Description
7000	7200	Select 64 characters/line, left screen
7001	7201	Select 32 characters/line, left screen
7002	7202	Select 16 characters/line, left screen
7010	7210	Select 512 dots/line
7020	7220	Select keyboard input
7100	7300	Select 64 characters/line, right screen
7101	7301	Select 32 characters/line, right screen
7102	7302	Select 16 characters/line, right screen

† KRONOS does not support all of the equipment presented in this section. For a list of devices supported by KRONOS, refer to the KRONOS 2.1 Operator's Guide.

Data Word

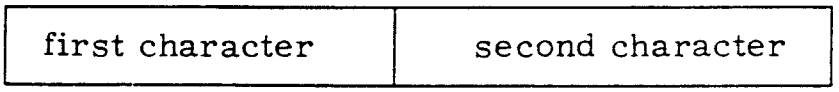
Dot Mode



11 9 8 0

axis = 6 x axis
= 7 y axis

Character mode



11 6 5 0

Function Word

11 10 9 8 6 5 0

f = 0 Read sector xx (sectors 00-77)
= 1 Read sector xx (sectors 100-177)
= 2 Write sector xx (sectors 00-77)
= 3 Write sector xx (sectors 100-177)
= 4 Select track xx (tracks 00-77)
= 5 Select track xx (tracks 100-177)
= 6 Select head group x
= 7 Status request (xx = 0)

Status Reply Word

11 9 8 7 6 0

x = 0 Ready
= 1 Not ready

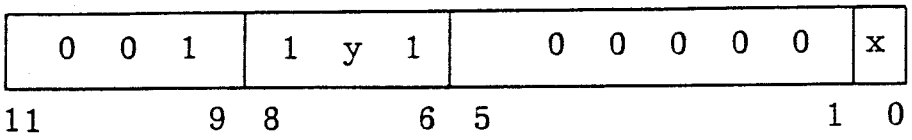
y = 0 No parity error
= 1 Parity error

Data Word

11 0

†When f = 6, bits 0-2 are head group and bits 3-5 are the read sample time. Normal sampling occurs when these bits are cleared.

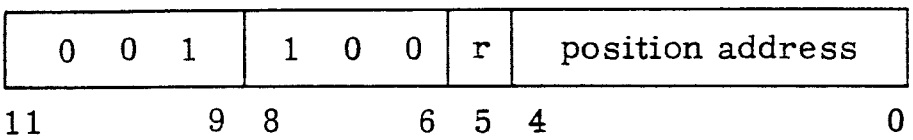
Connect and Status



x = unit

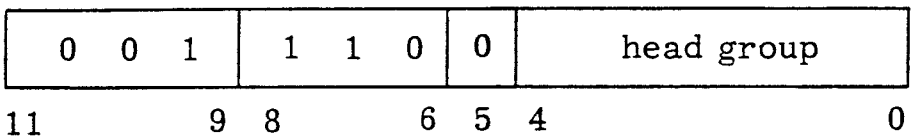
y = 0 Second status word
= 1 First status word

Position Select

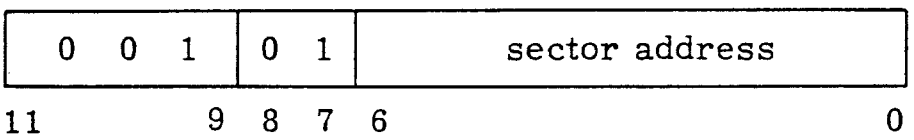


r = 0 No retract
= 1 Retract

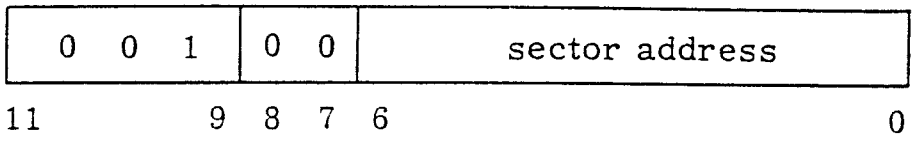
Head Group Select



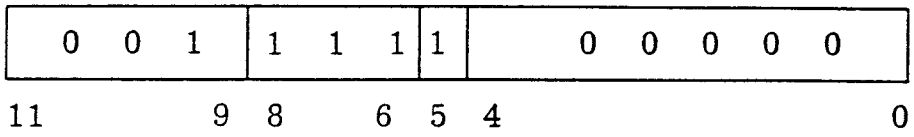
Write



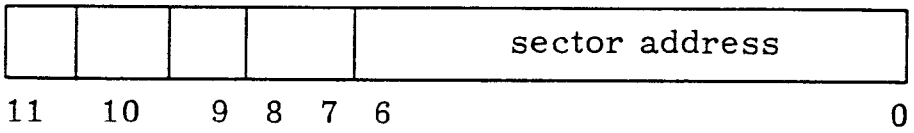
Read



Disconnect

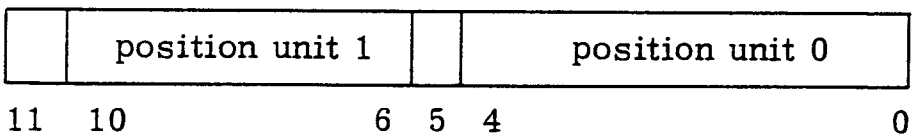


First Status Word



Bit 11 = Lost data
Bit 10 = Not connect
Bit 9 = Not ready
Bit 8 = Parity error
Bit 7 = Stack

Second Status Word



Bit 11 = Retract 1
Bit 5 = Retract 0

Equipment Select

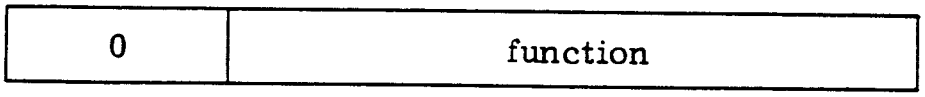
xxxx = 2000 select converter
= 2100 deselect converter

Mode I Connect Word

y = 4 Connect external equipment 4.
= 5 Connect external equipment 5.
= 6 Connect external equipment 6.
= 7 Connect external equipment 7.

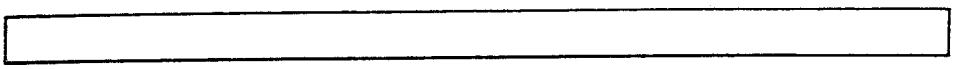
xxx = Unit to be connected

Mode I Function Word



function = 9-bit function code

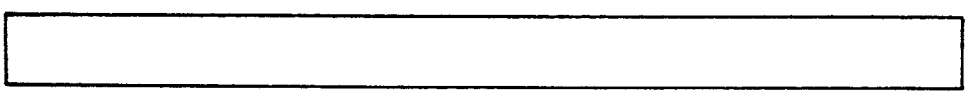
Mode II Function Word



11 0

Connect:	1000	Select 668X to output a 12-bit connect code
Function:	1100	Select 668X to output a 12-bit function code to external equipment already selected
Status:	1200	668X status request
	1300	External equipment status request
Status reply:	xxx1	Reject (internal or external)
	xxx2	Internal reject
	xxx4	Transmission parity error
	1xxx	Abnormal end of operation (for xx4x I/O function code)
	xx1x - 2xxx	Eight interrupt lines
	4xxx	Parity error on data channel
Data I/O:	14a0	Input to end-of-record
	15a0	Input until PP sends inactive signal
	16a0	Output until PP sends inactive signal
		a=6 Deactivate option code (for controllers with interrupt override signal)
		a=4 Deactivate option code (for controllers without interrupt override signal)
		A 1 in the lowest bit of data I/O codes negates BCD conversion. The BCD negated is normal mode of operation.
	1700	Master clear

Data Word



11 0

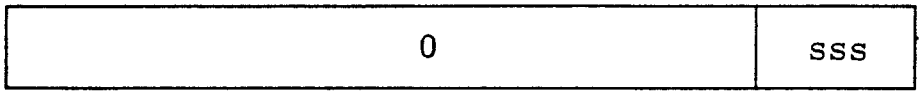
6682/6683 SATELLITE COUPLER

Equipment Select

sss = Select code established at installation for the 6682/6683.

ccc = 0 Output
= 1 Input
= 2 Status request

Status



sss = 1 Output channel request
= 2 Input channel request
= 4 Busy

Data Word

6411/6414 AUGMENTED I/O BUFFER AND CONTROLLER

All instructions are the same as 6000 peripheral processors except:

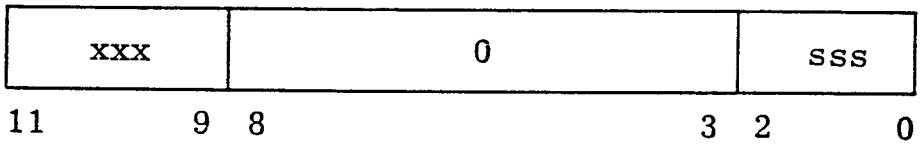
26 ETN d	Extended core transfer; initiate extended core storage operation
27 ESN d	Read extended core coupler status

Status Reply: (Read into upper 3 bits of peripheral processor A register)

Bit 17	Extended core storage transfer in progress
Bit 16	Parity error occurred during last read extended core storage operation
Bit 15	At least one address of the last extended core storage transfer was not available (power off, in maintenance mode, address not in system).

6671 DATA SET CONTROLLER

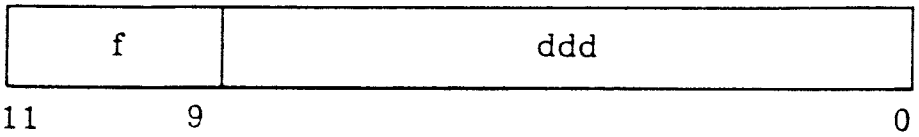
Function Select Word



xxx = Setting of the equipment number switches

sss = 1 Select output
= 2 Select status request
= 3 Select input

Controller Data Word Function Codes

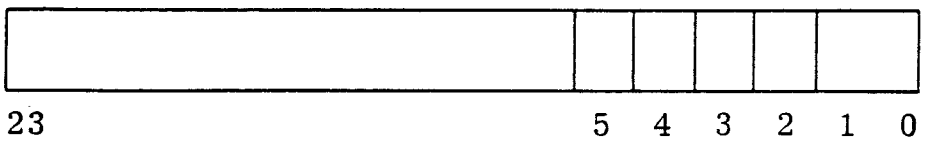


f = 0 Do nothing.
= 1 Enables receiver section of the DSC to resync.
= 2 Turns off carrier.
= 3 Turns off carrier and allows receiver to resync.
= 4 Turns on the carrier. Must be appended to all data words.
= 5 Turns on the carrier and resyncs the reciever.
= 6 Resyncs the receiver and enables the carrier, and disconnects the telephone connection.
= 7 Resyncs the receiver and enables the telephone connections for data transmissions.

ddd = Data to be transmitted if f is equal to 4 or 6.

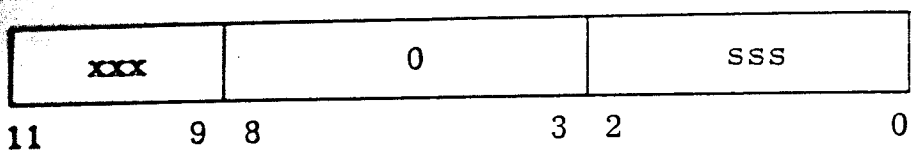
If only bit 8 of the controller data word is set, a modem is disconnected. This is used when output operation has failed in the middle of a character.

Status Word



Bit 0 = Lost data
1 = Input required
2 = Channel A selected (always 1)
3 = Not used
4 = Output failure
5 = Memory parity

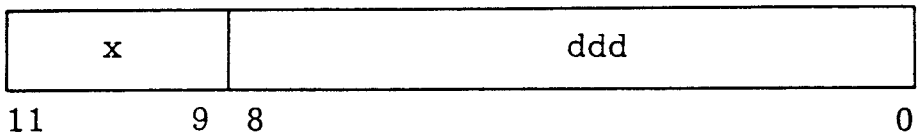
Function Select Word



xxx = Equipment select switch setting

sss = 1 Select output
= 2 Select status request
= 3 Select input

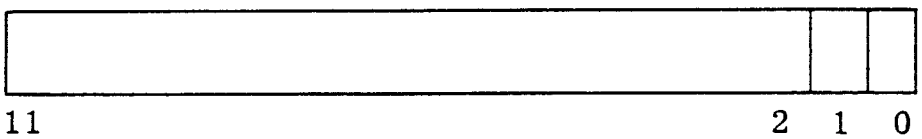
I/O Control Codes



x = 6 Disconnect modem
= 4 Output required

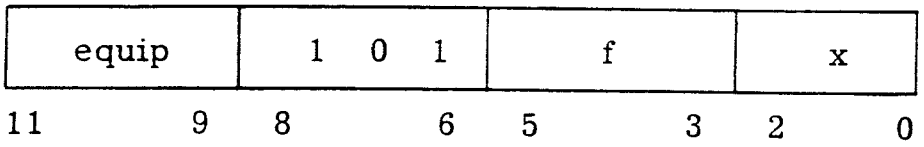
ddd = Data, when x is set to 4; otherwise, it is zero

Status Word Format



Bit 0 = Service failure
1 = Input required
2 = Channel A reserved

External Function Code Word

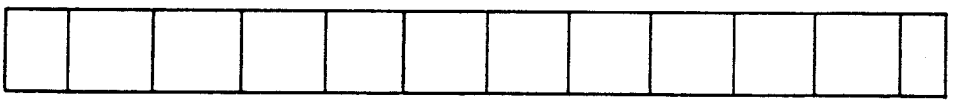


equip = Equipment number

f = 0 Request status-all
= 1 Request status
= 2 Select
= 3 Clear
= 4 Select transmit
= 5 Select receive
= 6 Clear interrupt word received status bit

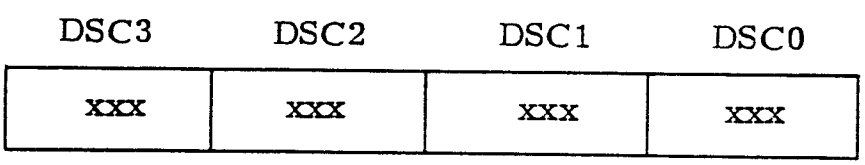
x = Number assigned to the selected DSC, except in status-all request where x=4.

Status DSCx Word



Bit 0 = Interrupt received
1 = DSC busy
2 = Sync word not acknowledged
3 = Cyclic error
4 = Receive and $\overline{COO}$
5 = Transmit and $\overline{CS}$
6 = $\overline{IT}$ + $\overline{COO}$
7 = This bit added when DSC is selected, but is physically disconnected
8 = Not used
9 = Not used
10 = Full and receive
11 = Empty and transmit

Status-all Word



xxx = 1 Full and receive
= 2 Empty and transmit
= 4 Error

FUNCTION CODES

0000	Connect
0001	Seek, 1:1 interlace
0002	Seek, 2:1 interlace
0003	I/O length
0004	Read
0005	Write
0006	Write verify
0007	Read checkword
0010	Operation complete
0011	Disable reserve
0012	General status
0013	Detailed status
0014	Continue
0015	Drop seeks
0016	Format packs
0017	On-sector status
0020	Drive release
0021	Return cylinder address
0022	Set/clear flow
0024	Gap sector - read
0025	Gap sector - write
0026	Gap sector - write verify
0027	Gap sector - read checkword
0030	Read factory data
0031	Read utility map
0414	Start memory load

GENERAL STATUS WORD

Bit	Description
11	Abnormal termination
10	Dual access coupler reserved
9	Nonrecoverable error
8	Recovery in progress
7	Checkword error
6	Correctable address error
5	Correctable data error
4	DSU malfunction
3	DSU reserved
2	Miscellaneous error
1	Busy
0	Noncorrectable data error

DETAILED STATUS (bits set in 12-word block)

Word	Bits	Description
1	11-4	Strobe/offset retry count
	3	Disk address specified by PP does not compare with address field read from disk sector
	2	Incorrect cylinder number read
	1	Incorrect track number read
	0	Incorrect sector number read
2	11	Checkword error occurred reading address field
	10	Address field read from disk sector cannot be corrected
	9	Checkword error occurred reading data field
	8	Data field read from disk sector cannot be corrected
	7-0	Number of sectors within current data block that were successfully processed
3	11-4	Lower eight bits of PP command causing detailed status block
	3	Compare operation for address field or data field did not complete
	2	Write verify operation failed; data field is in error
	1	Not used
	0	Channel parity error (6TPP only)
4	11-6	Controlware revision number (6TPP only)
	5-0	DSU number
5	11-3	Cylinder number
	2-0	Track number (continues in word 6)
6	11-10	Track number (continued from word 5)
	9-5	Sector number
	4	Sector flaw bit
	3	Track flaw bit
	2	Factory data sector
	1	Utility map
	0	Zero

Word	Bits	Description
7	11	Invalid command
	10	Sector length error
	9	Lost data
	8	Sync error (address field)
	7	DSC memory parity error
	6	DSC hardware error
	5	Defective factory sector
	4	Defective track
	3	Defective sector
	2	Sync error (data field)
	1	Deadman timer expired
	0	Utility flaw map overflow
8	11	Zero
	10-0	11-bit correction vector
9	11	Sector alert
	10	DSU seek error
	9	DSU busy
	8	DSU selected
	7	DSU ready
	6	DSU on-line
	5	Not used
	4	Amplitude monitor 3
	3	Amplitude monitor 2
	2	DSU end of cylinder
	1	Amplitude monitor 1
	0	Track index
10	11	On cylinder
	10	Seek error
	9	Disk pack unsafe
	8	Sector mark
	7	Seek error
	6	DSU negative voltages more positive than normal
	5	DSU positive voltages more negative than normal
	4	Current fault
	3	Read and write operation attempted simultaneously
	2	DSC attempted a data transfer when DSU was not on cylinder
	1	Not used
	0	DSU logic temperature is normal

Word	Bits	Description
11	11	DSU power supply temperature is normal
	10	Spindle motor is on
	9	DSU power sequencing is not under control of DSC
	8	DSU start switch is on
	7	Disk pack brush cycle is in progress
	6	Heads are loaded
	5	Sector block is in position to sense sector disk
	4	Disk pack is mounted
	3-0	Upper 4 bits of 16-bit address of the first bit of a correctable read error
12	11-0	Lower 12 bits of 16-bit address of a correctable read error

FUNCTION CODES

xx00	Release
xx01	Odd parity
xx02	Even parity
xx03	556 CPI density
xx04	200 CPI density
xx05	Clear
xx06	800 CPI density
xx07	1600 CPI density
xx10	Rewind
xx11	Rewind unload
xx12	Backspace
xx13	Search file mark forward/search tape mark forward
xx14	Search file mark backward/search tape mark backward
xx15	Write end-of-file mark/write tape mark
xx16	Skip bad spot
xx2u	Select unit u
xx40	Clear reverse read
xx41	Set reverse read
xx42	Clear memory mode
xx43	Set memory mode
xx44	Clear conversion mode
xx45	Set conversion mode
xx46	Select write
xx47	Select read
xx50	Clear read
xx51	Clear opposite control (used in 2x8 only)
xx52	Clear character discard
xx53	Select character discard
xx54	Clear CPU mode
xx55	Select CPU mode
xx56	Clear status 2 - return to status 1
xx57	Select status 2

STATUS CODES

STATUS 1

xxx1	Ready
xxx2	R/W control and/or tape unit busy
xxx4	Write enable
xx1x	File mark/tape mark detected
xx2x	Load point
xx4x	End of tape
x1xx	Density
x2xx	Density
x4xx	Lost data
1xxx	End of operation
2xxx	Alert
4xxx	Tape unit reserved (2x8 only)

STATUS 2

xxx1	Vertical and/or longitudinal parity error
xxx2	Memory parity error
xxx4	Memory flag bit error
xx1x	CRC error
xx2x	Multitrack phase error or uncorrectable CRC error (NRZI)
xx4x	Character fill (7/9 track)
x1xx	Character crowding or droupout, or false postamble detection
x2xx	Phase error correction
x4xx	Discard error
1xxx	End of operation
2xxx	Alert
4xxx	Tape unit reserved (2x8 only)

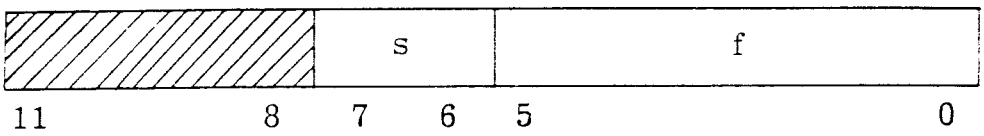
DISTRIBUTIVE DATA PATH

Function	Code	Address Bit 23	Address Bit 22	Address Bit 21
Block read ECS	5001	0	0	0
Block write ECS	5002	0	0	0
Select status	5004	0	0	0
Master clear port	5010	0	0	0
Read ECS, one reference	5001	0	1	0
Select maintenance mode	5001	0	0	1
Function flag register	5001	1	X	X

Status Bits (Function Code 5004):

Bit	Description
0	ECS abort
1	ECS accept
2	ECS parity error
3	ECS write selected
4	Channel parity error
5	6640 parity error

Function Word



s = Subfunction code

f = Function code

General Status Word

al	cs	nu	noi	wr	ut	oc	tm	eot	lp	ub	ur
11	10	9	8	7	6	5	4	3	2	1	0

Field	Value	Description
al - Alert	1	Error detected
cs - Coupler status	1	Status originated in coupler
nu - No unit	1	No unit connected
noi - Noise	1	Block shorter than minimum
wr - Write ring	1	Write ring in tape reel
ut - Unit type	0, 1	0=7-track, 1=9-track
oc - Odd count	1	Odd number of entries read
tm - Tapemark	1	Tapemark read or written
eot - End of tape	1	Tape at end of tape marker
lp - Load point	1	Tape at load point marker
ub - Unit busy	1	Tape is in motion
ur - Unit ready	1	Unit loaded and ready

Function Code	Subfunction Code	Function Name	General Status Returned
01		Release Unit	
02		Clear All Reserves	
03		Clear Opposite Reserve	
05	0	Opposite Parity Mode	
05	1	Opposite Density	
06	0	Select Normal Read Clip	
06	1	Select High Read Clip	
06	2	Select Low Read Clip	
06	3	Select Hyper Read Clip	
07	0	Nominal Read Sprocket Delay	
07	1	Increase Read Sprocket Delay	
07	2	Decrease Read Sprocket Delay	
10	0	Rewind	Yes
10	1	Rewind/Unload	Yes
11		Stop Motion	Yes
12	0	General Status	Yes
12	1	Detailed Status	
12	2	Cumulative Status	
12	3	Units Ready Status	
13	0	Forespace	Yes
13	1	Backspace	Yes
13	2	Long Forespace	Yes
13	3	Long Backspace	Yes
14	0	Controlled Forespace	Yes
14	1	Controlled Backspace	Yes
15	0	Search Tapemark Forward	Yes
15	1	Search Tapemark Backward	Yes
16	0	Erase Reposition	Yes
16	1	Erase Reposition to Erase	Yes
17	0	Write Reposition	Yes
17	1	Write Reposition to Erase	Yes

Function Code	Subfunction Code	Function Name	General Status Returned
2x	0	Connect Unit	
30		Format Unit	Yes
31	1	Code Translation Table 1 to Processor Memory	Yes
31	2	Code Translation Table 2 to Processor Memory	Yes
31	3	Code Translation Table 3 to Processor Memory	Yes
32	1	Load Read RAM	Yes
32	2	Load Write RAM	Yes
32	3	Load Read/Write RAM	Yes
33	1	Copy Read RAM	
33	2	Copy Write RAM	
34		Format TCU Status	Yes
35		Copy TCU Status	
36		Send TCU Command	Yes
40	0	Read Forward	Yes
40	1	Read Backward	Yes
40	3	Read Backward with Odd Length Parity	Yes
41	0	Reread Forward	Yes
41	1	Reread Backward	Yes
41	3	Reread Backward with Odd Length Parity	Yes
42		Repeat Read	Yes
50	0	Write	Yes
50	2	Write Odd Length	Yes
51		Write Tapemark	Yes
52	0	Erase	Yes
52	1	Erase to End of Tape	Yes

DETAILED STATUS (bits set in 8-word block)

Word	Bits	Description
1	11	During read, EOR signal was not received before next frame and all data registers were full or during write, an EOR signal was not received and data was not available for writing next frame
	10	Unerased flux changes were detected at a low read clip setting
	9	Error detected requiring that block be reread or rewritten
	8	Unerased flux changes were detected in interlock gap prior to current operation
	7	Unerased flux changes detected at low read clip setting after write operation or normal clip setting after read
	6	Data not available at write access time and within next 0.4 inch of tape
	5-0	Nonzero indicates fatal error code detected
2	11	Too many frames written before first frame was read
	10	More frames were read than were written
	9	Fewer frames read than written
	8	Frame containing all zeros was read (7-track NRZI only)
	7	LRCC had even vertical parity (9-track NRZI only)
	6	One or more frames have incorrect vertical parity
	5	One or more tracks had odd longitudinal parity (NRZI only)
	4	CRCC parity error (9-track NRZI only)
	3	Unexpected frames detected before longitudinal check character or postamble

Word	Bits	Description
	2	Excessive phase mode skew occurred
	1	Velocity of tape varied more than 7 percent after reaching operation speed
	0	Missing or defective postamble detected
3	11	Interblock gap lengthened during write by more than 0.2 inch
	10	Odd (NRZI) or even (PHASE) number of frames read or written
	9	Postamble detected during phase read or write
	8	More than four frames of skew occurred during phase read
	7	Opposite channel in 2x8 configuration is inoperable
	6	More than one frame of skew detected during phase read
	5	A 1 was detected in bit 6 of one or more translated characters read from tape
	4	Unit lost tape loop
	3	Air pressure fault
	2	Current in erase head is abnormal
	1	Unit failed to load
	0	Temperature in unit is near automatic power cutoff
4	11	Correction was attempted to tracks indicated in bits 8 through 0 of this word
	10	CRC detected error reading or writing
	9	More than one track was in error during read operation
	8-0	Data correction attempted on tracks identified by corresponding bits

Word	Bits	Description
5	11	Forward tape motion if zero, backward if set
	10-8	Tape speed; 1=100 ips, 2=150 ips, 4=200 ips
	7-6	Tape density; 0=200 or 556 cpi, 1=800 cpi, 2=1600 cpi
	5	Access error
	4	Unit write and erase currents are on
	3-0	Unit cable connector address in the tape control unit
6	11-9	Not used
	8-4	Largest noise block length in frames
	3-0	Number of blocks passed over during the last operation
7, 8	11-0	24-bit frame count field

3000 SERIES PERIPHERAL EQUIPMENT CODES

3127/322X/342X/362X MAGNETIC TAPE CONTROLLER

FUNCTION CODES

0000	Release
0001	Binary
0002	Coded
0003	556 cpi
0004	200 cpi
0005	Clear
0006	800 cpi†
0010	Rewind
0011	Rewind unload
0012	Backspace††
0013	Search forward to filemark
0014	Search backward to filemark
0015	Write file mark
0016	Skip bad spot
0020	Select interrupt on ready and $\overline{\text{Busy}}$
0021	Release interrupt on ready and $\overline{\text{Busy}}$
0022	Select interrupt on end of operation
0023	Release interrupt on end of operation
0024	Select interrupt on abnormal end of operation
0025	Release interrupt on abnormal end of operation
0040	Clear reverse read†††
0041	Set reverse read†††

†602, 604, and 607 tape units only.

††Backspace moves tape forward if reverse read is selected.

†††362x, 342x only.

STATUS CODES

xxx1	Ready
xxx2	Channel and/or read/write control and/or unit busy
xxx4	Write enable
xx1x	Filemark
xx2x	Loadpoint
xx4x	End of tape
x1xx	Density †
x2xx	Density † †
x4xx	Lost data
1xxx	End of operation
2xxx	Vertical or longitudinal parity error
4xxx	Reserved (by other channel) † † †

† 1 in bit 6 = 556 cpi; 0 in bits 6 and 7 = 200 cpi

† † 1 in bit 7 = 800 cpi

† † † 362x, 342x only

FUNCTION CODES

0000	Release
0001	Binary
0002	Coded
0003	556 cpi density
0004	200 cpi density
0005	Clear
0006	800 cpi density
0007	1600 cpi density
0010	Rewind
0011	Rewind unload
0012	Backspace
0013	Search filemark forward/search tapemark forward
0014	Search filemark reverse/search tapemark reverse
0015	Write end-of-filemark/write tapemark
0016	Skip bad spot
0020	Interrupt on ready
0021	Release interrupt on ready
0022	Interrupt on end of operation
0023	Release interrupt on end of operation
0024	Interrupt on abnormal end of operation
0025	Release interrupt on abnormal end of operation
0040	Clear reverse read
0041	Set reverse read
0042	Clear memory mode
0043	Set memory mode
0044	Clear conversion mode
0045	Set conversion mode
0051	Clear opposite channel (used in 2x8 only)
0056	Clear status 2, return to status 1
0057	Set status 2

STATUS CODES

STATUS 1

xxx1	Ready
xxx2	R/W control busy
xxx4	Write enable
xx1x	File mark/tape mark detected
xx2x	Load point
xx4x	End of tape
x1xx	Density
x2xx	Density
x4xx	Lost data
1xxx	End of operation
2xxx	Alert (further defined in status 2)
4xxx	Tape unit reserved for other control (used in 2x8 only)

STATUS 2

xxx1	Transverse and/or longitudinal parity error
xxx2	Memory parity error
xxx4	Memory flag bit error
xx1x	CRC error
xx2x	Multitrack phase error or uncorrectable CRC error (NRZI)
xx4x	Character fill 7/9 track
	Not used Not used Not used
1xxx	End of operation
2xxx	Alert
3xxx	Tape unit reserved for other control (not used in 1x8)

FUNCTION CODES

0000	Release and disconnect
0001	Negate BCD to Hollerith conversion
0002	Release negate BCD to Hollerith conversion
0003	Select offset stacker †
0004	Check last card
0005	Clear
0020	Select interrupt on ready and $\overline{\text{Busy}}$
0021	Release interrupt on ready and $\overline{\text{Busy}}$
0022	Select interrupt on end of operation
0023	Release interrupt on end of operation
0024	Select interrupt on abnormal end of operation
0025	Release interrupt on abnormal end of operation

STATUS CODES

xxx1	Ready
xxx2	Busy
x1xx	Fail to feed
x2xx	Ready and $\overline{\text{Busy}}$ interrupt
x4xx	End of operation interrupt
1xxx	Abnormal end of operation interrupt
2xxx	Compare error
4xxx	Reserved (by other channel) † †

† Applicable to 415 Card Punch

† † 3644 only

FUNCTION CODES

0000	Release and disconnect
0001	Negate Hollerith to internal BCD conversion
0002	Release negate Hollerith to internal BCD conversion
0004	Set gate card
0005	Clear
0020	Select interrupt on ready and $\overline{\text{Busy}}$
0021	Release interrupt on ready and $\overline{\text{Busy}}$
0022	Select interrupt on end of operation
0023	Release interrupt on end of operation
0024	Select interrupt on abnormal end of operation
0025	Release interrupt on abnormal end of operation

STATUS CODES

xxx1	Ready
xxx2	Busy
xxx4	Binary card
xx1x	File card
xx2x	Fail to feed or stacker full or jam
xx4x	Input tray empty
x1xx	End of file
x2xx	Ready and $\overline{\text{Busy}}$ interrupt
x4xx	End of operation interrupt
1xxx	Abnormal end of operation interrupt
2xxx	Read compare or preread error or illegal suppress assembly
4xxx	Reserved (for other channel) †

†3649 only

FUNCTION CODES

0000,0040 †	Release and disconnect
0001	Single space
0002	Double space
0003	Advance to last line
0004	Page eject
0005	Auto page eject
0006	Suppress space
0010	Clear format selection
	Select format tape level for postprint spacing:
0011	Level 1
0012	Level 2
0013	Level 3
0014	Level 4
0015	Level 5
0016	Level 6
0020	Select preprint spacing
	Select format tape level for preprint spacing:
0021	Level 1
0022	Level 2
0023	Level 3
0024	Level 4
0025	Level 5
0026	Level 6
0030	Select interrupt on ready and $\overline{\text{Busy}}$
0031	Release interrupt on ready and $\overline{\text{Busy}}$
0032	Select interrupt on end-of-operation
0033	Release interrupt on end-of-operation
0034	Select interrupt on abnormal end-of-operation
0035	Release interrupt on abnormal end-of-operation

† 3256/3659 only

STATUS CODES

xxx1	Ready
xxx2	Busy
xx1x	Paper out
xx2x	Last line of form
x2xx	Ready and busy interrupt
x4xx	End-of-operation interrupt
1xxx	Abnormal end-of-operation interrupt
2xxx	Error †
4xxx	Reserved (by other channel) ††

3555—1 LINE PRINTER CONTROLLER/580 LINE PRINTER

FUNCTION CODES

0000	Release and disconnect
0001	Single space
0002	Double space
0003	Advance to last line
0004	Page eject
0005	Auto page eject
0006	Suppress space
0007	Conditional clear format
0010	8 line select
0011	6 line select
0012	Fill image memory
0013	Select extended array
0014	Clear extended array
0020	Select interrupt on ready and not busy
0021	Clear interrupt on ready and not busy
0022	Select interrupt on end-of-operation

†3256 equipped with error checking option only

††3659 only.

0023	Clear interrupt on end-of-operation
0024	Select interrupt on abnormal end-of-operation
0025	Clear interrupt on abnormal end-of-operation
0026	Reload memory enable
0030	Clear format selections (postprint spacing mode)
0031	Select format level 1 for postprint line spacing
0032	Select format level 2 for postprint line spacing
0033	Select format level 3 for postprint line spacing
0034	Select format level 4 for postprint line spacing
0035	Select format level 5 for postprint line spacing
0036	Select format level 6 for postprint line spacing
0037	Select format level 7 for postprint line spacing
0040	Select format level 8 for postprint line spacing
0041	Select format level 9 for postprint line spacing
0042	Select format level 10 for postprint line spacing
0043	Select format level 11 for postprint line spacing
0044	Select format level 12 for postprint line spacing
0050	Preprint spacing mode
0051	Select format level 1 for preprint line spacing
0052	Select format level 2 for preprint line spacing
0053	Select format level 3 for preprint line spacing
0054	Select format level 4 for preprint line spacing
0055	Select format level 5 for preprint line spacing

0056	Select format level 6 for preprint line spacing
0057	Select format level 7 for preprint line spacing
0060	Select format level 8 for preprint line spacing
0061	Select format level 9 for preprint line spacing
0062	Select format level 10 for preprint line spacing
0063	Select format level 11 for preprint line spacing
0064	Select format level 12 for preprint line spacing
0065	Maintenance status mode. Refer to Maintenance Status Codes for signals sent over the status lines when in this mode. †
0066	Clear maintenance status mode †

STATUS CODES

xxx1	Ready
xxx2	Busy
xxx4	Compare fault
xx1x	Paper fault
xx2x	Last line of form
xx4x	Format tape level 9
x1xx	Memory busy
x2xx	Ready and not busy interrupt
x4xx	End-of-operation interrupt
1xxx	Abnormal end-of-operation interrupt
2xxx	Print error
4xxx	6/8 line coincident

†Applicable to 580 Line Printer only.

MAINTENANCE STATUS CODES†

xxx1	Internal train home signal
xxx2	Internal train subscan signal
xxx4	Six line-per-inch emitter pulse
xx1x	Eight line-per-inch emitter pulse
xx4x	Paper motion in low speed slew
xx2x	Internal timing emitter signal
x1xx	Start paper motion
x2xx	Stop paper motion
x4xx	Printer busy

3436/3637 DRUM CONTROLLER

CONNECT CODES

n00u	Connect drum
n	Equipment number of drum controller
u	Drum storage unit number

†Applicable to 580 Line Printer only.

FUNCTION CODES

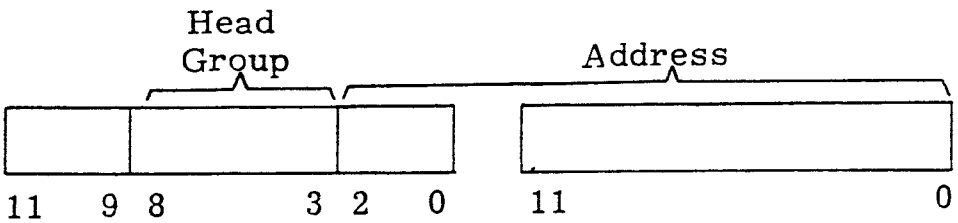
0000	Release and disconnect
0020	Select interrupt on ready and Busy
0021	Release interrupt on ready and Busy
0022	Select interrupt on end-of-operation
0023	Release interrupt on end-of-operation
0024	Select interrupt on abnormal end-of-operation
0025	Release interrupt on abnormal end-of-operation
0026	Select interrupt on opposite channel release †
0027	Release interrupt on opposite channel release †
0030	Select interrupt on address compare
0031	Release interrupt on address compare
0040	Load address
0041	Read
0042	Write
0043	Write check
0044	Read angular count

STATUS CODES

xxx1	Ready
xxx2	Busy
xxx4	Drum reject
xx1x	Write check error
xx2x	End of drum
xx4x	Release interrupt †
x1xx	Address compare interrupt

†3637 drum controller only

x2xx	Interrupt on ready and $\overline{\text{Busy}}$
x4xx	Interrupt on end of operation
1xxx	Interrupt on abnormal end-of-operation
2xxx	Read parity error
4xxx	Reserved †



3234 MASS STORAGE CONTROLLER

CONNECT CODES

n0du ††	Connect 3234

FUNCTION CODES

0000	Release and Disconnect
0001	Restore
0005	Clear
0010	Load address
0011	Return address
0020	Select interrupt on ready and $\overline{\text{Busy}}$
0021	Release interrupt on ready and $\overline{\text{Busy}}$
0022	Select interrupt on end-of-operation
0023	Release interrupt on end-of-operation

† 3637 drum controller only

†† n=equipment number of controller
d=device type (1=disk drive, 2=disk file, and 3=data cell)
u=unit number of storage device

0024	Select interrupt on abnormal end-of-operation
0025	Release interrupt on abnormal end-of-operation
0026	Select interrupt on opposite channel release
0027	Release interrupt on opposite channel release
0030	Select interrupt on end-of-seek
0031	Release interrupt on end-of-seek
0040	Read
0041	Write
0042	Search compare
0043	Masked search compare
0044	Checkword verify
0045	Read checkword
0050	Magnitude search (record≤buffer)
0051	Magnitude search (record≥buffer)
0052	Magnitude search (record=buffer)
0053	Buffer mode
0054	End-of-record mode

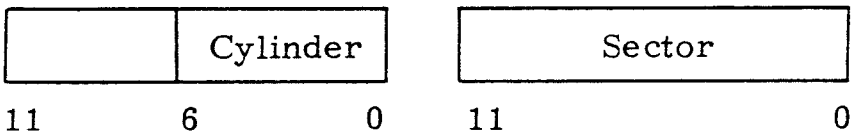
STATUS CODES

xxx1	Ready
xxx2	Busy
xxx4 †	Abnormal/unavailable
xx1x	On sector
xx14 †	Address error
xx2x	No compare
xx24 †	Lost data
xx4x	End-of-record
xx44 †	Checkword error
x1xx	Write lockout on read (normal)

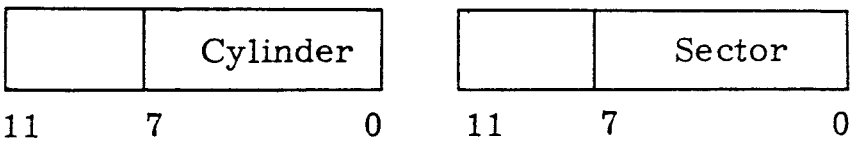
†On an unsuccessful connect, xxx4 indicates equipment or unit unavailable. On any function, an abnormal condition is indicated by xxx4 and xx1x, xx2x, xx4x, x1xx, or 4xxx.

x1x4 †	Write lockout on write (abnormal)
x2xx	Positioner ready
x4xx	End-of-operation interrupt
1xxx	Abnormal end-of-operation interrupt
2xxx	Seek interrupt
4xxx	Reserved
4xx4 †	Defective track

814 Disk Files:



853/854 Disk Drives:



3553 DISK STORAGE CONTROLLER

CONNECT CODES

n0du † †	Connect 3553 and storage unit

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†On an unsuccessful connect, xxx4 indicates equipment or unit unavailable. On any function, an abnormal condition is indicated by xxx4, and xx1x, xx2x, xx4x, x1xx, or 4xxx.

† †n=equipment number of controller
d=device type (1=disk drive and 2=disk file)
u=logical unit number of storage device.

FUNCTION CODES

0000	Channel release
0001	Restore
0005	Clear
0007	Drive release
0010	Load address at 1:1 interlace
0011	Return address
0012	Load address at 2:1 interlace †
0014	Load address at 4:1 interlace †
0016	Load address at 8:1 interlace †
0020	Select interrupt on ready and Busy
0021	Release interrupt on ready and Busy
0022	Select interrupt on end-of-operation
0023	Release interrupt on end-of-operation
0024	Select interrupt on abnormal end-of-operation
0025	Release interrupt on abnormal end-of-operation
0026	Select interrupt on opposite channel release
0027	Release interrupt on opposite channel release
0030	Select interrupt on end-of-seek
0031	Release interrupt on end-of-seek
0040	Read
0041	Write
0042	Search compare
0043	Masked search compare
0044	Checkword verify
0045	Read checkword
0050	Magnitude search (record≤buffer)
0051	Magnitude search (record≥buffer)
0052	Equality search (record=buffer)
0053	Buffer mode
0054	End-of-record mode

†3553-2 only

STATUS CODES

xxx1	Ready
xxx2	Busy
xxx4	Abnormal/unavailable
xxx6	Unit reserved
xx10	On sector
xx14	Address error
xx20	No compare
xx24	Operation error (3553-2) Lost data (3553-1)
xx40	End-of-record
xx44	Checkword error
x1x0	Write lockout on read (normal)
x1x4	Write lockout on write (abnormal)
x2xx	Positioner ready
x4xx	End-of-operation interrupt
1xxx	Abnormal end-of-operation interrupt
2xxx	Seek interrupt
4xx0	Reserved
4xx4	Defective track