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

KRONOS® 2.1
INSTANT MANUAL

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PREFACE

The KRONOS® Time-Sharing System provides four types of job processing to users of CONTROL DATA® CYBER 70 Series Model 72, 73, or 74 or CONTROL DATA® 6000 Series Computer Systems.

- Local batch processing
- Remote batch processing
- Time-sharing processing
- Deferred batch processing

This manual provides condensed descriptions of console commands, control cards, central memory tables, function requests, machine instructions, external function codes, and character sets for analysts, programmers, and operators. The following manuals provide more detailed descriptions of these subjects.

Control Data Publication	Publication No.
KRONOS 2.1 Reference Manual	60407000
KRONOS 2.1 Operator's Guide	60407700
KRONOS 2.1 Installation Handbook	60407500
COMPASS 3.0 Reference Manual	60360900
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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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:

x. (CR)

or

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 tables (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	File type:
A	All files
C	Common files
I	Input 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

mx, aaaaaa.

m	Letter designation of a storage display (C, D, F, or G).
x	Type of display modification:
x=0-3	Changes the specified group to display the eight words beginning at location aaaaaa
x=4	Changes the entire display to display the memory contents beginning at location aaaaaa
x=5	Increments the display by aaaaaa locations
x=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, 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.

DAYFILE,xx. Requests that the system dayfile be dumped to equipment xx.

ERRLOG,xx. Requests that error log dayfile be dumped to equipment xx.

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 xxx,...,$t_n$xxx. Changes system delay parameters:

t_i	Delay
JSxxx	Job scheduler delay interval in seconds
CRxxx	CPU recall period in milliseconds

ARxxx	PPU auto recall interval in milliseconds
JAxxx	Job advance interval in milliseconds
CSxxx	CPU job switch interval in milliseconds

n.DROP.	Drops the job currently assigned to control point n.
DUMP,xx,yy.	Requests that all files in the print queue with an assigned identifier yy be dumped to equipment xx.
ENID,yy,zzz.	Enters identifier; assigns a numeric identifier yy ($0\text{-}67_8$) to the queue type file specified by FNT ordinal zzz.
n.ENPR,xx.	Enters CPU priority xx ($1\text{-}70_8$) 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 ($0\text{-}67_8$).
LPxx,yy. or LQxx,yy.	Assigns identifier yy ($0\text{-}67_8$) to the line printer identified by equipment number xx. LP directs output to 501, 505, or 512 printers; LQ directs output only to 512 printers.
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) are 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 $\leq$ xxxx $\leq$ MXPS).

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.
INITIALIZE, xx.	Sets initialize status for mass storage device xx. Enter the INITIALIZE command for each device to be initialized and then assign the K display. If more that one device is to be initialized, enter the K. RERUN. command. 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
FN=	1- to 7-character family name
PN=	1- to 7-character pack name
UN=	1- to 7-character user number
TY=D	Initialized device may contain direct and indirect access permanent files.

Device Definition Option	Description
TY=I	Initialized device may contain only indirect access permanent files.
TY=X	Initialized device is an auxiliary device.
DM=	3-digit device mask ($0\text{-}377_8$)
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.
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.
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

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 clears any portion of the repeat count specified for that buffer point.
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≤yyyy≤MXPS).

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).

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. Reverses 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 ACCOUNT card.
AUTOROLL	Enables or disables automatic rollout of jobs.
BATCHIO	Enables or disables BATCHIO subsystem.
EI200	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.
VALIDATION	Enables or disables user validation.

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.

MAINTENANCE. 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.
SYSGO.	Clears pause bit at system control point.
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. • 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, greater than the default is required.
99.	Disables or enables syntax overlay processing.

MEMORY ENTRY COMMANDS

aaaaaa, nnnn...n.	Changes contents of location aaaaaa to nnnn...n (20 digits).
aaaaaa,b, nnnn.	Changes contents of byte b at location aaaaaa to nnnn; b represents a 12-bit byte numbered 0-4 from left to right.
aaaaaa, Dnnnn...n.	Changes contents of location aaaaaa with left-justified zero-filled display code characters nnnn...n.
aaaaaa± nnnn...n.	Changes contents of location aaaaaa to nnnn...n and increments or decrements aaaaaa by 1.
aaaaaa±b, nnnn.	Changes the contents of byte b at address aaaaaa to nnnn and increments or decrements aaaaaa by 1; b represents a 12-bit byte numbered 0-4 from left to right.

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.
SYSTEM BUSY - DISK.	DSD is waiting for an overlay to be loaded from a mass storage device.
SYSTEM BUSY - PPU.	DSD is waiting for a PPU to be assigned so that it can process a command.
SYSTEM BUSY - MTR.	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.

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.
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 (Γ-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.
CALL (lfn)	Calls procedure file lfn into control card buffer for processing.
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, x.	Sets exit mode to x ($0 \leq x \leq 7$).
ENFL, xxxxxx.	Sets FL=xxxxxx in the exchange package area.
ENP, xxxxxx.	Sets P=xxxxxx.
ENPR, xx.	Sets job priority to xx ($1 \leq xx \leq 70_8$).

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.
GOTO, ccc ...ccc.	Sets AUTO mode and transfers control to statement or tag defined by ccc...ccc.
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.
mx, aaaaaa.	m — Letter designation of a display (C, D, F, or G).
	x — Type of display modifications:
	x=0-3 — Changes the specified group to display the eight words beginning at location aaaaaa.
	x=4 — Changes the entire display to display the memory contents beginning at aaaaaa.
	x=5 — Increments the display by aaaaaa locations.
	x=6 — Decrements the display by aaaaaa locations.
	aaaaaa — Location parameter

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 card processing.
RNS.	Reads and processes the next control statement in the DIS control card buffer.
ROLLOUT.	Allows the job to roll out.
ROLLOUT, xxxx.	Places job in rollout queue for xxxx seconds; 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.
RE,xx.	Releases reservation of equipment xx.
SCS.	Clears AUTO mode and stops automatic control card 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 (default is *).
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 card processing, xxx is interpreted as a direct DIS command rather than a control card.
xxxx.	xxxx is processed as a control statement if it is not a recognizable DIS command.
aaaaaa, yy...yy.	Changes the contents of the word at aaaaaa (relative to its RA) to yy...yy. Leading zeros may be dropped. If in absolute mode, the entry is at central memory absolute location aaaaaa.
aaaaaa,b, yyyy.	Enters yyyy in byte b of memory location aaaaaa.
aaaaaa, Dccc...ccc.	Changes to contents of the word at aaaaaa (relative to its RA) to the display-coded value of character string ccc...ccc. The entry is left-justified with trailing zero fill.
aaaaaa,Iy, nnnnn.	Changes to contents of instruction y (0-3) at location aaaaaa to nnnnn; nnnnn may be a 15- or 30-bit instruction.
aaaaaa,Lyy... yy.	Enters yy...yy, left-justified in memory location aaaaaa.
aaaaaa+ yy...yy.	Enters yy...yy in memory location aaaaaa; command leaves address at aaaaaa+1 followed by the + sign, allowing immediate entry for the next memory location.

PP CALL COMMANDS

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

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 6612 console. A central memory buffer is used to store and edit the BCD lines before writing the file.

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
<	(
>	)
≤	+
≥	-
;	,

PRODUCT SET CONTROL CARD FORMATS

ALGOL (A=lfn$_1$, B=lfn$_2$,C,D, F,G=lfn$_3$, I=lfn$_4$,L=lfn$_5$, M,N,O, P=lfn$_6$,Q, R=lfn$_7$,S=lfn$_8$, U=lfn$_9$,Z)	Calls the ALGOL compiler to the control point.
BASIC(L=lfn$_1$, K=lfn$_2$,I=lfn$_3$, B=lfn$_4$,A=lfn$_5$, N=lfn$_6$)	Calls the BASIC compiler.
COBOL(A,B=lfn$_1$, BUF,C,D, E=program-name, F,H,I=lfn$_2$, L=lfn$_3$,N, OB=lfn$_4$,P, S=ulib,SUB,T,U, W,Z)	Calls the COBOL compiler.
COMPASS(A, B=fname,D, F=name, G=fname/ovl, I=fname,L=fname, LO=chars, ML=chars,N, O=fname, PC=chars,P, S=lib/ovl,X=fname)	Calls the COMPASS assembler.
FTN(A,B=lfn$_1$,C, D=lfn$_2$,E=lfn$_3$, G=lfn$_4$,I=lfn$_5$, GT=lfn$_6$/ovl, OPT=n,PL=n,Q, R=r,ROUND=s, S=lfn$_7$,SYSEDIT, T,V,x=lfn$_8$,Z)	Calls the FORTRAN Extended compiler.

MODIFY(I=lfn_1, P=lfn_2, C=lfn_3, N=lfn_4, S=lfn_5, L=lfn_6, LO=chars, A, D, F, U, NR, X=prog, Q=prog, Z, CB=lfn_7, CL=lfn_8, CS=lfn_9, CG=lfn_{10})	Calls the Modify utility program.
PERT66.	Local file call to execute PERT binaries. PERT input must be included in local file INPUT.
RUN(cm, fl, bl, if, of, bf, lc, as, cs)	Calls the FORTRAN RUN 2.3 compiler.
SIMSCRIPT (I=lfn_1, L=lfn_2, A=lfn_3, B=lfn_4, G=g, D=d)	Calls the SIMSCRIPT compiler.
SIMULA(A=lfn_1, B=lfn_2, G=lfn_3, I=lfn_4, L=lfn_5, N, P=lfn_6, R=lfn_7, S=lfn_8, U=lfn_9, X=lfn_{10})	Calls the SIMULA compiler.
SORTMRG. or SORTMRG(7C)	Calls the Sort/Merge program.
TSRUN(cm, if, rf, bl, fl, cl)	Calls the Time-Sharing FORTRAN compiler.
UPDATE(A, B, C=lfn_1, D, E, F, G=lfn_2, I=lfn_3, K=lfn_4, L=char, M=lfn_5, N=lfn_6, O=lfn_7, P=lfn_8, Q, R=char, S=lfn_9, T=lfn_{10}, U, W, X, Z, 8, *=char, /=char)	Calls the Update utility program.

SYSTEM CONTROL CARD FORMATS

ACCOUNT (usernum, passwrd, familyname)

Sets validation for a user's account number and password.

APPEND(pfn, lfn_1, lfn_2, . . . , lfn_n/PW=passwrd, UN=usernum, PN=packname, R=r, NA)

Copies local files lfn_1 through lfn_n to end of indirect access permanent file pfn.

ASSIGN(nn, lfn, D=den, {FC=fcount / C=ccount}, CV=conv, {MT / NT}, PO=$p_1p_2 \cdots p_n$, F=format, NS=ns, LB=l, VSN=vsn, {CK / CB})

Assigns file lfn to the device or device type specified by nn.

ATTACH(lfn_1=pfn_1, lfn_2=pfn_2, . . . , lfn_n=pfn_n/UN=usernum, PW=password, M=m)

Attaches permanent files pfn_1 through pfn_n as local files lfn_1 through lfn_n for direct access.

BKSP(lfn, n)

Backspaces file lfn n logical records.

BLANK(D=den, {MT / NT}, VSN=vsn, FA=fa, VA=va, OWNER=usernum/familyname, LSL=lsl, U)

Blank labels a magnetic tape.

CATALOG(lfn, p_1, p_2, . . . , p_n)

Catalogs file lfn:

p_i	Description
N=0	Catalog until an empty file is encountered.
N=x	Catalog x files; default is 1.
N	Catalog to end of information.
L=fname	Specifies output file.
U	Select user library list.

	D	Suppress comment field and page heading following first 1.
	R	Rewind lfn before and after cataloging.
CATLIST(LO=p, FN=pfn, UN=usernum, PN=packname, R=r, L=lfn, NA)	Lists information about user's permanent files and permanent files he can access in catalogs of alternate users.	
CHANGE(nfn=ofn/CT=ct, M=m, PW=passwrd, PN=packname, R=r, NA)	Allows originator of a permanent file to alter any of several parameters.	
CHARGE(chargenum, projectnum)	Specifies user's charge and project numbers for user profile control validation.	
CKP(lfn_1, lfn_2, ..., lfn_n)	Directs system to take a checkpoint dump; each lfn_i is included in the dump.	
COMMENT.comments or *comments	Enters comments in system and user's dayfile.	
COMMON(lfn_1, lfn_2, ..., lfn_n)	Accesses a file that was already assigned common status or assigns a local file to common status.	
COPY(lfn_1, lfn_2, x)	Copies lfn_1 to lfn_2. If x is present, files are rewound before copy and rewound, verified, and rewound after copy.	
COPYBF(lfn_1, lfn_2, n)	Copies n binary files beginning at current position of lfn_1 to lfn_2.	
COPYBR(lfn_1, lfn_2, n)	Copies n binary records beginning at current position of lfn_1 to lfn_2.	

COPYCF(lfn_1, lfn_2, n, fchar, nchar)

Copies n coded files beginning at current position of lfn_1 to lfn_2. Portion of each line image to copy is specified by fchar (first character position) and lchar (last character position).

COPYCR(lfn_1, lfn_2, n, fchar, lchar)

Copies n coded records beginning at current position of lfn_1 to lfn_2. Portion of each line image to copy is specified by fchar and lchar.

COPYEI(lfn_1, lfn_2, x)

Copies lfn_1 (current position to EOI) to lfn_2. If x is present, files are rewound before copy and rewound, verified, and rewound after copy.

COPYSBF(lfn_1, lfn_2, n)

Copies n coded files beginning at current position of lfn_1 to lfn_2, shifting each line image one character to the right and adding a leading space.

COPYX(lfn_1, lfn_2, x, b)
or
COPYX(lfn_1, lfn_2, type/name, b)

Copies logical records from lfn_1 to lfn_2 beginning at current position of lfn_1 and continuing until terminator specified by x or type/name is encountered. Files are then backspaced according to b parameter.

type/name — name is first 7 characters of record; type is:

ABS	Multiple entry point overlay
COS	Chippewa format CP program
OPL	Modify OPL deck
OPLC	Modify OPL common deck

	OPLD	Modify OPL directory
	OVL	CP overlay
	PP	6000 series PP program
	PPU	7600 PP program
	REL	Relocatable CP program
	TEXT	Unrecognizable as a program
	ULIB	User library program
x	Terminator type:	
	00	Zero record
	n	n records (default is 1)
	name	Record name
b	Backspace control:	
	0	No backspace (default)
	1	Backspace lfn_1
	2	Backspace lfn_2
	3	Backspace lfn_1 and lfn_2

COPY67(lfn_1,lfn_2)	Copies KRONOS-formatted file lfn_1 to lfn_2, adding blocking pointers so lfn_2 conforms to 7600 format.
COPY76(lfn_1,lfn_2)	Copies 7600-formatted file lfn_1 to lfn_2, reformatting it so it conforms to KRONOS format.
CTIME.	Enters accumulated CPU time in system and user's dayfile.

DAYFILE(lfn)	Write user's dayfile on lfn; default is OUTPUT.
DEFINE(lfn_1=pfn_1, lfn_2=pfn_2,...,lfn_n=pfn_n/PW=passwrd, CT=ct, M=m, R=r, S=space, PN=packname, NA)	Creates an empty direct access permanent file or defines an existing local file as a direct access file.
DFSORT(D=lfn_1, L=lfn_2, S=sss, F=fff)	Sorts dayfiles by job names and lists accounting information.
DISPOSE(lfn_1=q_1, lfn_2=q_2,...,lfn_n=q_n/ ot=usernum)	Releases files to specified output queues.
DMD(fwa, lwa) or DMD(lwa) or DMD.	Dumps central memory from first word address to last word address minus 1; output contains display code equivalences. If lwa alone is present, fwa=0 is assumed. If neither fwa nor lwa is present, DMD dumps exchange package and 40_8 locations before and after program address in exchange package.
DMP(fwa, lwa) or DMP(lwa) or DMP.	Dumps central memory from first word address to last word address minus 1. If lwa alone is present, fwa=0 is assumed. If neither fwa nor lwa is present, DMP dumps exchange package and 40_8 locations before and after program address in exchange package.
DOCMENT(I=lfn_1, S=lfn_2, L=lfn_3, N=nn, T=type, C=cc, P=pp, NT, TC)	Extracts the external or internal documentation from file lfn_2 containing COMPASS source code.
EVICT(lfn_1, lfn_2,...,lfn_n)	Releases file space for lfn_i but does not release the file attachment to the job.

EXECUTE (ep, p_1, p_2, . . . , p_n)	Causes loader to complete program loading and passes parameters; must immediately follow a LOAD card.
EXIT.	Indicates where in control card record to resume control card processing if an error is encountered or where to terminate normal control card processing.
FAMILY(familyname)	Allows user to change the family name associated with his job.
GET(lfn_1=pfn_1, lfn_2=pfn_2, . . . , lfn_n=pfn_n/UN=usernum, PW=passwrd, PN=packname, R=r, NA)	Retrieves a copy of indirect access permanent file pfn_i for use as a local file lfn_i.
GTR(lfn_1, lfn_2, D, NR, S) selection directives	Copies records specified by selection directives from lfn_1 to lfn_2, starting at previous EOI of lfn_2.
jobname(Tt, CMfl, Pp) or jobname(p, t, fl)	Specifies name, time limit, field length, and priority of job.
KRONREF(P=lfn_1, L=lfn_2, S=lfn_3, G=lfn_4)	Generates a cross-reference listing of system symbols used by decks on a MODIFY OPL.
LABEL(lfn, D=den, FC=fcount, CV=conv, {MT / NT}, PO=$p_1p_2 \ldots p_n$, F=format, NS=ns, LB=1, VSN=vsn, {CK / CB}, {FI=fileid / L=fileid}, FA=fa, {SI=setid / M=setid}, {SN=secno / V=secno}, {QN=seqno / P=seqno}, G=genno, E=gvn, {CR=cdate / C=cdate}, {RT=rdate / T=retcycle}, {W / R})	Assigns lfn to a tape unit and creates a new or accesses an existing tape.

LBC(addr)	Loads binary corrections, beginning at addr, into central memory.
LDI(lfn, id)	Copies batch job image on lfn to mass storage and submits it to the input queue.
LDSET(LIB=libname$_1$/libname$_2$/libname$_3$, .../libname$_n$, MAP=p option, PRESET=p option, ERR=p option, {REWIND / NOREWIN}, USEP=pname$_1$/pname$_2$/.../pname$_n$, USE=eptname$_1$/eptname$_2$/.../eptname$_n$, SUBST=pair$_1$/pair$_2$/.../pair$_n$, OMIT=eptname$_1$/eptname$_2$/.../eptname$_n$, FILES=lfn$_1$/lfn$_2$/.../lfn$_n$)	Provides user control of a variety of load operations.
LIBEDIT(I=lfn$_1$, P=lfn$_2$, N=lfn$_3$, {L=0 / L=1}, LO=lfn$_4$, B=lfn$_5$, C, R, V, D)	Edits and replaces records on a file with records from one or more correction files.
LIBGEN(F=lfn$_1$, P=lfn$_2$, N=lfn$_3$, NX=n)	Generates a user library file named lfn$_3$ on lfn$_2$ using records from lfn$_1$.
LIBRARY(ulib)	Sets ulib as the name of the user library from which to satisfy external references.
LIMITS.	Lists validation information for user named on current ACCOUNT card.
LINK(F=lfn$_1$, P=lfn$_2$, B=lfn$_3$, L=lfn$_4$, E=name, LO=c...c, {X / XP})	Loads and links relocatable code from lfn$_1$ and reformats into absolute code on lfn$_3$.

LISTLB(D=den, {MT / NT}, VSN=vsn, SI=setid, QN=seqno, LO=ltype, L=out)	Reads ANSI labels on tape specified by vsn and writes them on file specified by L.
LIST80(lfn_1, lfn_2, NR)	Reads file lfn_1 containing COMPASS source code and writes it, compressed to 80 columns, on lfn_2.
LOAD(lfn, lib_1, lib_2, ..., lib_n)	Loads lfn and the programs on lib_i required to satisfy external references occuring in lfn.
LOC(fwa, lwa) or LOC(lwa) or LOC.	Enters octal correction card images from INPUT into central memory in specified area.
LOCK(lfn_1, lfn_2, ..., lfn_n)	Sets write lockout bit in FNT/FST entry for local file lfn_i.
LO72(I=lfn_1, S=lfn_2, L=lfn_3, T=x, H=xxx, LP, NR, Nx=y, Ix=y, Ox=y)	Reforms data on lfn_2 and writes it in 72-column format on lfn_3.
MAP(p_1, p_2, ..., p_n)	Sets loader map flags; loader generates core map. Options are: p_i — Description P — Partial map F — Full map S — Statistics and errors B — Block assignments E — Entry points X — External references C — Symbols not used R — Relative address references ON — Turn on full map OFF — Turn off full map
MODE(n)	Sets CPU exit mode to n.

MODVAL(I=lfn_1, P=lfn_2, N=lfn_3, S=lfn_4, L=lfn_5, U=lfn_6, CV, D, OP=char, LO=char)	Creates, modifies or inquires about VALIDUX.
NOEXIT.	Suppresses transfer to card following next EXIT card if an error occurs.
NOGO.	Processes loaded program in same way as EXECUTE card but does not execute the program.
NOMAP.	Clears loader map flag for control point.
OFFSW($s_1, s_2, \ldots, s_n$)	Clears pseudo-sense switches for reference by user's program.
ONEXIT.	Reverses effect of NOEXIT card.
ONSW($s_1, s_2, \ldots, s_n$)	Sets pseudo-sense switches for reference by user's program.
OPLEDIT(I=lfn_1, P=lfn_2, N=lfn_3, S=lfn_4, L=lfn_5, LO=x, F, D)	Removes specified modification decks and identifiers from an OPL.
OUT.	Releases output files from control point to the output queue.
PACK(lfn_1, lfn_2, x)	Packs lfn_1 into one record on lfn_2.
PACKNAM (PN=packname) or PACKNAM(packname)	Directs subsequent permanent file requests to the specified auxiliary device.
PASSWOR(oldpswd, newpswd)	Changes user's password from oldpswd to newpswd.
PBC(fwa, lwa)	Writes one record from specified area in central memory on PUNCHB.

PERMIT(pfn, usernum$_1$=m$_1$, usernum$_2$=m$_2$,..., usernum$_n$=m$_n$, PN=packname, R=r, NA)	Allows user to explicitly permit another user to access a private file in his permanent file catalog.
PROFILE(I=lfn$_1$, L=lfn$_2$, P=lfn$_3$, S=lfn$_4$, OP=option, CN=chargenum, PN=projnum, LO=option)	Enables site to create, update, and inquire about a project profile file for user profile control.
PURGALL(CT=ct, AD=ad, MD=md, CD=cd, DN=dn, TY=ty, TM=tm, PN=packname, R=r, NA)	Purges all permanent files that satisfy specified criteria.
PURGE(pfn$_1$, pfn$_2$,..., pfn$_n$/ UN=usernum, PW=passwrd, PN=packname, R=r, NA)	Allows user to remove a file from the permanent file device.
RBR(n, name)	Loads one binary record from specified file.
REDUCE. or REDUCE (-)	Clears or sets field length reduction flag for the job.
RELEASE(lfn$_1$, lfn$_2$,..., lfn$_n$)	Changes FNT/FST entry of common file lfn$_i$, currently assigned to job, to a local file.
RENAME(nlfn$_1$=olfn$_1$, nlfn$_2$=olfn$_2$,..., nlfn$_n$=olfn$_n$)	Changes name of file olfn$_i$ to nlfn$_i$ in FNT/FST.
REPLACE(lfn$_1$=pfn$_1$, lfn$_2$=pfn$_2$,..., lfn$_n$=pfn$_n$/UN=usernum, PW=passwrd, PN=packname, R=r, NA)	Substitutes new file lfn$_i$ for old file pfn$_i$.

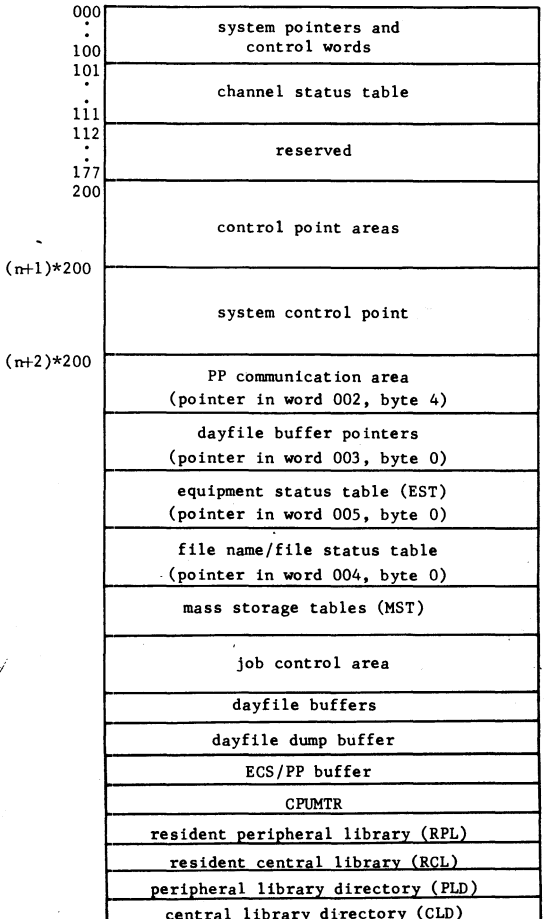
REQUEST(lfn, D=den, {FC=fcount | C=ccount}, CV=conv, {MT | NT}, PO=$p_1p_2\ldots p_n$, F=format, NS=ns, LB=1, VSN=vsn, {CK | CB})	Requests operator to assign a device to lfn.
RESEQ(lfn, t, xxx, yy)	Resequences source files that have leading sequence numbers.
RESOURC($rt_1=u_1$, $rt_2=u_2, \ldots, rt_n=u_n$)	Specifies maximum number of tape units and/or disk packs that job will use concurrently.
RESTART(lfn, nn, x_i)	Restarts a previously terminated job from a specified checkpoint.
RETURN(lfn_1, $lfn_2, \ldots, lfn_n$)	Releases job attachment and/or file space of lfn_i.
REWIND($lfn_1, lfn_2, \ldots, lfn_n$)	Rewinds the files and positions them to the BOI.
RFL(nnnnnn)	Changes job field length from that specified on the job card.
ROLLOUT.	Rolls out user's job and releases all memory assigned to the job.
RTIME.	Issues current time in milliseconds to dayfile.
SAVE($lfn_1=pfn_1$, $lfn_2=pfn_2\ldots$, $lfn_n=pfn_n$/PW=passwrd, CT=ct, M=m, PN=packname, R=r, NA)	Retains copy of local file lfn_i as an indirect access file pfn_i.
SETCORE(p) or SETCORE(-p)	Sets each word within the field length to the fill character specified by p.
SETID($lfn_1=x_1$, $lfn_2=x_2, \ldots, lfn_n=x_n$)	Assigns a new identification code for lfn_i.

SETPR(p)	Specifies a new CPU priority for user's job.
SETTL(t)	Specifies a new time limit for user's job.
SKIPEI(lfn)	Positions lfn at EOI.
SKIPF(lfn,x)	Bypasses x files, in the forward direction, from the current position on lfn.
SKIPR(lfn,x)	Bypasses x records in the forward direction, from the current position on lfn.
SORT(lfn,NC=n)	Sorts a file, lfn, of line or card images in numerical order based on leading line numbers consisting of n digits.
STAGE(lfn, p_1, p_2,...,p_n)	Copies the specified number of files from the specifield device to mass storage file lfn.
SUBMIT(lfn,q,NR)c	Submits a batch job on lfn to the input queue for processing.
SUI(n)	Allows user to access a permanent file catalog without using an ACCOUNT card.
SWITCH(s_1, s_2,...,s_n)	Sets the pseudo-sense switches for reference by the user's program.
SYSEDIT(I=lfn_1, B=lfn_2,L=lfn_3,R=n)	Performs modifications to the system library.
TDUMP(I=lfn_1,{O/A}, R=rcount,F=fcount, N=lines,NR)	Lists file lfn_1 on lfn_2 in octal and/or alphanumeric form.
UNLOAD(lfn_1, lfn_2,...,lfn_n)	Rewinds and unloads the specified files but does not release them from the control point.
UNLOCK(lfn_1, lfn_2,...,lfn_n)	Clears the write lockout bit for local file lfn_i.

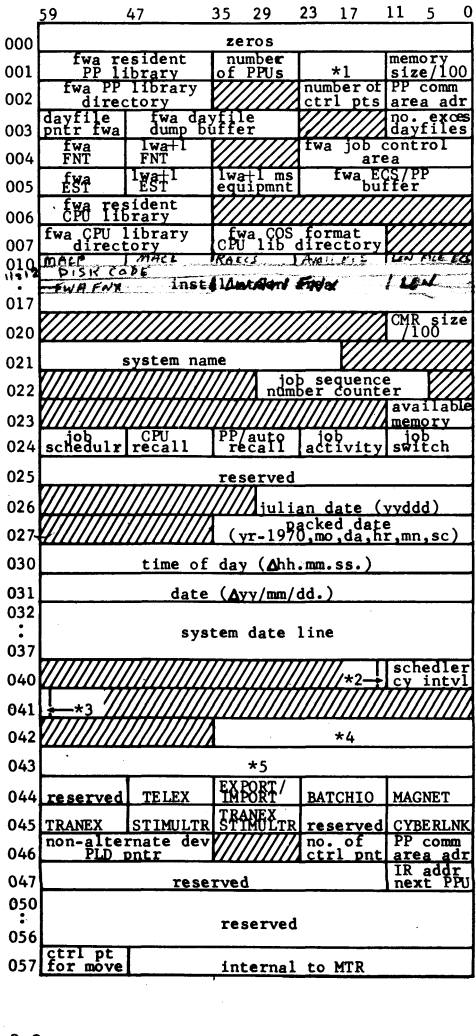
UPMOD(P=lfn_1, N=lfn_2, M=lfn_3, F, NR)	Converts Update-formatted old program library file lfn_1 to Modify-formatted old program library lfn_3 and writes it on lfn_2.
USECPU(n)	Specifies which CPU (6600 for n=1 and 6400 for n=2) is to be used for processing.
VERIFY(lfn_1, lfn_2, p_1, p_2, . . . , p_n)	Performs a binary comparison of all data from the current position of lfn_1 and lfn_2.
VFYLIB(lfn_1, lfn_2, lfn_3, NR)	Performs a comparison of binary records on files lfn_1 and lfn_2 and lists replacements, deletions, and insertions on lfn_3.
VSN(lfn_1=vsn_1, lfn_2=vsn_2, . . . , lfn_n=vsn_n)	Associates volume serial number vsn_i with file lfn_i.
WBR(n, rl)	Writes a binary record from central memory on the specified file, beginning at its current position.
WRITEF(lfn, x)	Writes x file marks on lfn.
WRITER(lfn, x)	Writes x empty records on lfn.

CENTRAL MEMORY RESIDENT

CENTRAL MEMORY LAYOUT



POINTERS AND CONSTANTS



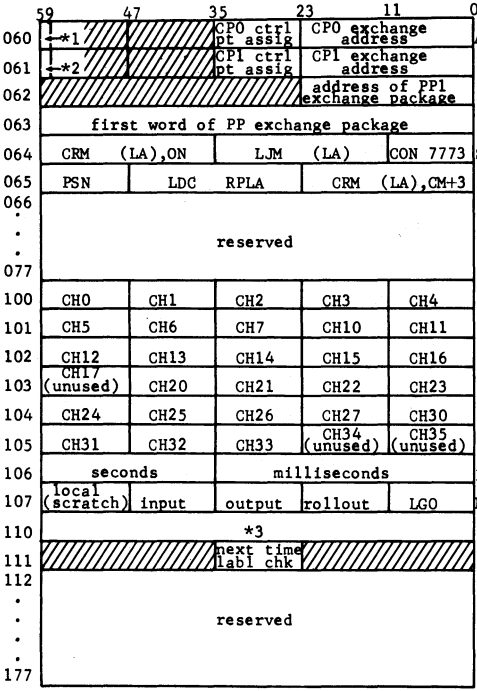
*1 Bits 23-16 unused; bit 15 set if CMU present; bit 14 set if CEJ/MEJ present; bit 13 set if CPU0 is 6600; bit 12 set if CPU1 present.

*2 Bit 12 is scheduler requested flag.

*3 Bit 59 is scheduler active flag.

*4 Bits 35-24 assumed character conversion set (0=63 ch. set, 1=64 ch. set); bits 23-12 assumed conversion mode (1=ASCII/USASI, 2=EBCDIC); bits 11-0 assumed tape density (1=200, 2=556, 3=800, 4=1600)

*5 Bits 59-50 unused; bit 49 ignore ACCOUNT card; bit 48 disable account verification; bit 47 disable BATCHIO; bit 46 disable TELEX; bit 45 disable EI200; bit 44 disable MAGNET; bit 43 disable TRANEX; bit 42 disable removable device checking; bits 41-14 unused; bit 13 console initial lock status; bit 12 DEBUG switch; bits 11-3 unused; bit 2 disable priority evaluation; bit 1 disable job scheduler; bit 0 disable AUTOROLL.

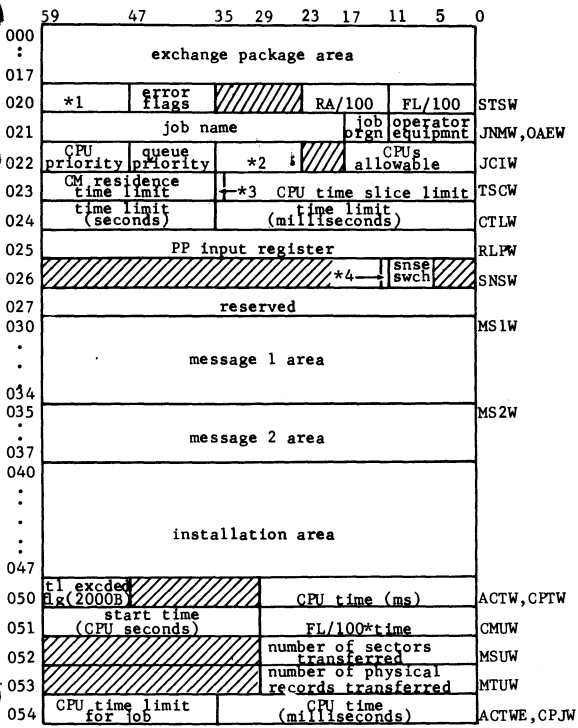


*1 Bit 59 set if CPU 0 off.

*2 Bit 59 set if CPU 1 off.

*3 Bit 59 total PF system interlock; bit 58 request total PF system interlock; bits 57-54 reserved; bits 53-48 PF activity count; bits 47-18 reserved; bits 17-12 default family equipment number; bits 11-6 alternate family count; bits 5-1 reserved; bit 0 word interlock.

CONTROL POINT AREA

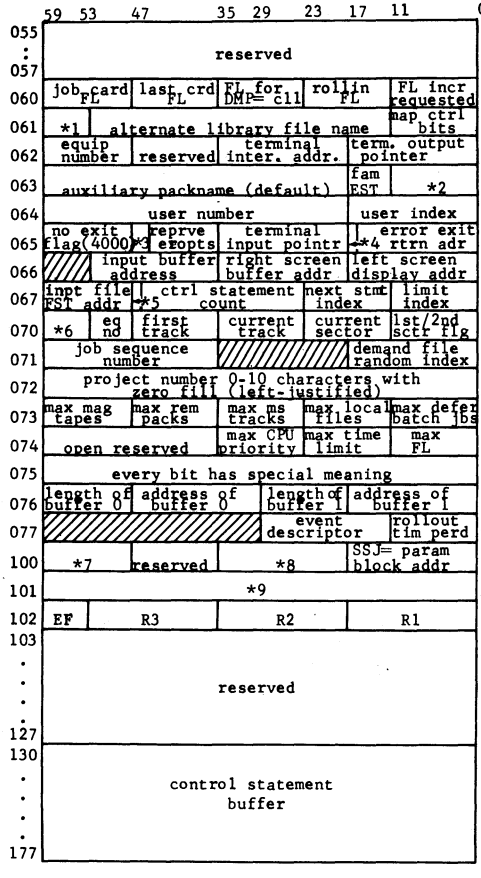


*1 Bits 59 CPU W status; bit 58 CPU X status; bit 57 CPU auto recall; bit 56 CPU subcontrol point active status; bits 55-54 unused; bit 53 job advancement flag; bits 52-48 number of PPUs assigned to job.

*2 Bits 35-33 CPU status for rollout; bits 32-28 unused; bit 27 set if rollout in process; bits 26-25 unused; bit 24 set if rollout requested.

*3 Bit 35 set if CPU time slice active.

*4 Bit 12 PP pause flag.


59 53 47 35 29 23 17 11 0
055
reserved
057
job card FL
last crd FL
FL for DMP= cll
rollin FL
FL incr requested
FCLW
060
*1
alternate library file name
map ctrl bits
LDCW
061
equip number
reserved
terminal inter. addr.
term. output pointer
TIOW,TIAW
062
auxiliary packname (default)
fam EST
*2
PFCW
063
user number
user index
UIDW
064
no exit flag (4000)
*3
reprve eropts
terminal input pointr
*4
error exit rtrn adr
EECW,TINW
065
input buffer address
right screen buffer addr
left screen display addr
DBAW
066
inpt file FST addr
*5
ctrl statement count
next stmt index
limit index
CSPW
067
*6
eq nd
first track
current track
current sector
lst/2nd sctr flg
070
job sequence number
demand file random index
RFCW
071
project number 0-10 characters with zero fill (left-justified)
AFJW
072
max mag tapes
max rem packs
max ms tracks
max local files
max defer batch jbs
APUW
073
open reserved
max CPU priority
max time limit
max FL
ACUW
074
every bit has special meaning
AACW
075
length of buffer 0
address of buffer 0
length of buffer 1
address of buffer 1
ICAW
076
event descriptor
rollout tim perd
UPCW
077
*7
reserved
*8
SSJ= param block addr
SEPW
100
*9
SPCW
101
EF
R3
R2
R1
JCRW
102
reserved
103
127
CSBW
130
control statement buffer
177

*1 Bits 59-57 unused; bit 56 no FL reduction flag; bits 55-54 unused.

*2 Bits 11-9 reserved; bits 8-0 index into table of limits (bits 8-6 limit for size of indirect access file; bits 5-3 limit for number of permanent files; bits 2-0 limit for cumulative size of indirect access files).

*3 Bit 47 set if bits 46-36 are error flag instead of reprieve error option.

*4 Bit 17 reprieve error return address.

*5 Bit 47 set if EOR on control statement file.

*6 Bit 59 set if information is for INPUT file; bit 58 skip to EXIT flag; bits 57-53 unused.

*7 Bit 59 set indicates presence of entry points; bits 58-54 reserved; bit 53 set if ARG= entry point present; bit 52 set if DMP= entry point present; bit 51 set if SDM= entry point present; bit 50 set if SSJ= entry point present; bit 49 set if VAL= entry point present; bit 48 reserved.

8 Bit 35 restart flag; bit 34 unused; bit 33 suppress DMP= if control card call; bit 32 create DM file only flag; bit 31 dump FNTs with control point area; bit 30 leave DM* file unlocked; bits 29-18 DMP= FL/100B (if field is 0, dump entire FL).

*9 For input: bits 59-42, entry point if RA+1 request, 770000B if control card call; bit 41 special program request active (1AJ only); bit 40 clear RA+1 upon completion; bit 39: if set, parameter list is in bits 35-0, if clear, address of parameter list is in bits 17-0; bit 38 does not start CPU at completion of control card call (1AJ only); bits 37-36 unused; bits 35-0 (refer to description of bit 39).

For output: bits 59-36 unused, bits 35-24 status return, bits 23-0 unused.

EXCHANGE PACKAGE AREA

	59 53	35	17 0
000	P	A0	--
001	RA_{CM}	A1	B1
002	FL_{CM}	A2	B2
003	EM	A3	B3
004	RA_{ECS}	A4	B4
005	FL_{ECS}	A5	B5
006	MA	A6	B6
007		A7	B7
010	X0		
011	X1		
012	X2		
013	X3		
014	X4		
015	X5		
016	X6		
017	X7		

P Program address

RA Reference address

FL Field length

MA Monitor address

Ai Address registers

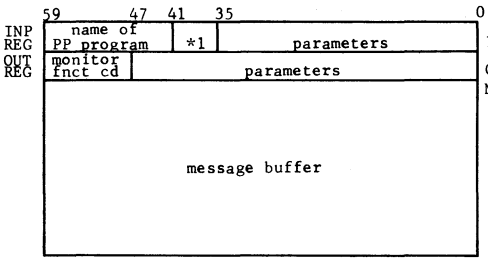
Bi Increment registers

Xi Operand registers

EM Exit mode:

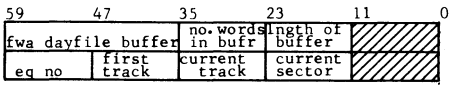
000000	Disable exit mode
010000	Address out of range
020000	Operand out of range
030000	Address or operand out of range
040000	Indefinite operand
050000	Indefinite operand or address out of range
060000	Indefinite operand or operand out of range
070000	Indefinite operand or address out of range or operand out of range

PP COMMUNICATION AREA



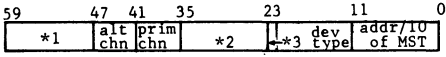
*1 Bit 41 set if called with auto recall, bits 40-36 control point assignment

DAYFILE BUFFER POINTERS

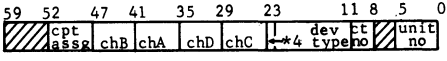


EQUIPMENT STATUS TABLE (EST) FORMATS

MASS STORAGE DEVICES



NONMASS STORAGE DEVICE (3000 TYPE EQUIPMENT)



*1 Bit 59 set to indicate mass storage device; bit 58 set if device has copy of system; bit 57 set if device contains permanent files; bit 56 set if removable device; bit 55 set if checkpoint request pending; bit 54 set if device is not available for automatic assignment by system.

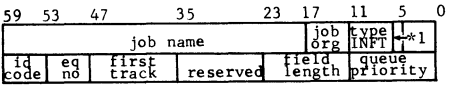
*2 Bits 35-33 physical equipment number; bits 32-30 number of physical units for device minus 1; bits 29-27 device selection for connect code; bits 26-24 first physical unit for device.

*3 Bit 23 ON/OFF flag (set if access not allowed)

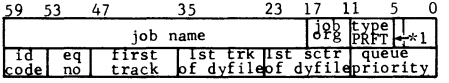
*4 Bit 23 ON/OFF flag (set if access not allowed)

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

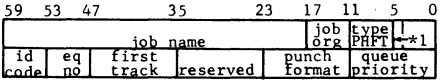
FILE IN INPUT QUEUE



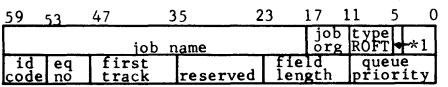
FILE IN PRINT QUEUE



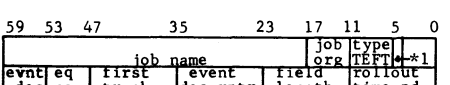
FILE IN PUNCH QUEUE



FILE IN ROLLOUT QUEUE

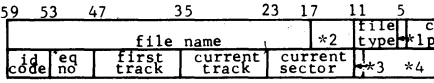


FILE IN TIMED/EVENT ROLLOUT QUEUE

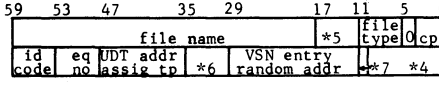


*1 Bit 5 set if system sector contains control information.

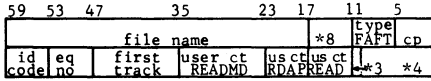
MASS STORAGE FILES
NOT TYPE INPUT, PRINT, PUNCH, OR ROLLOUT



MAGNETIC TAPE FILES



FAST ATTACH PERMANENT FILES



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

*2 Bit 17 unused; bit 16 set if extend-only file; bit 15 set if alter-only file; bit 14 set if execute-only file; bit 13 unused; bit 12 write lockout.

*3 Bit 11 unused.

*4 Bits 10-9 unused; bit 8 set if file opened; bit 7 set if file written since last open; bit 6 set if file written on; bits 5-4 unused; bits 3-2 read status (0= incomplete read, 1= EOR, 2= FOF, 3=EOI); bit 1 set if last operation write; bit 0 ~~set~~ clear if busy status.

*5 Bits 17-14 unused; bit 13 set if opened; bit 12 write lockout.

*6 Bits 35-32 data format; bits 31-30 type (0= VSN entry, 1=7-track, 2=9-track).

*7 Bit 11 set if labeled tape.

*8 Bit 17 unused; bit 16 set if modify; bit 15 set if append; bit 14 set if execute; bit 13 set if write; bit 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

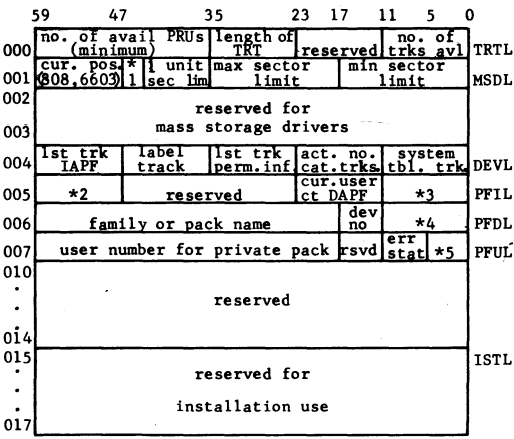
Other Files

Type	Value	Description
SYFT	5	System
LOFT	6	Local
CMFT	7	Common
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)



*1 Bit 47 set if FORMAT PACK request pending (844 only); bit 46 set if release reservation when channel released; bit 45 reserved.

*2 Bit 59 set if mass storage device; bit 58 set if system on device; bit 57 set if permanent files on device; bit 56 set if removable device; bits 55-54 reserved; bit 53 set if direct access files may reside on device; bit 52 set if INITIALIZE request pending; bit 51 set if not available for PF access (UNLOAD status); bit 50 set if auxiliary permanent file device; bit 49 set if available for system allocation; bit 48 set if alternate system device.

*3 Bits 11-6 next equipment in multiple equipment chain; bits 5-3 original number of units for equipment; bit 2 set if device in use (in multiple equipment chain); bit 1 device interlock (set means utility active); bit 0 device interlock (clear means device busy).

*4 Bit 11 set if catalog track continuous with label track; bit 10 set if continuous tracks have overflowed; bits 9-8 reserved; bits 7-0 device mask.

*5 Bits 5-3 relative unit on multiunit device; bits 2-0 number of units in multiunit device.

TRACK RESERVATION TABLE (TRT)

WORD FORMAT

*1 Bits 11-8 each bit set indicates corresponding byte (0-3) is first track of direct access file; bits 7-4 track interlock bits; bits 3-0 track reservation bits.

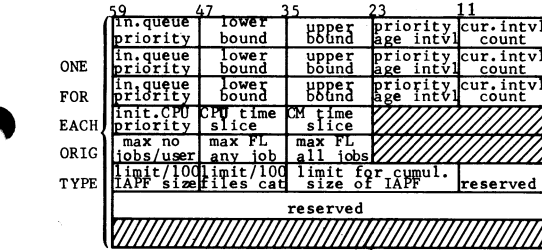
TRACK LINK BYTE (FORMAT 1)

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

TRACK LINK BYTE (FORMAT 2)

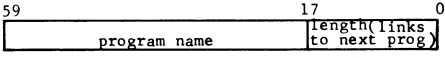
Bit	Contents
11	Clear
10-0	End of chain (EOI sector in file)

JOB CONTROL AREA (JCB)

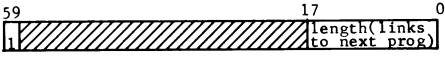


RESIDENT CPU LIBRARY (RCL)

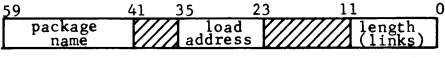
TYPE OVL



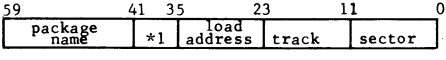
TYPE ABS



RESIDENT PPU LIBRARY (RPL)

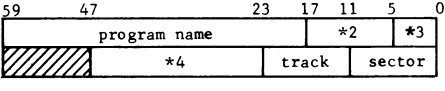


PPU LIBRARY DIRECTORY (PLD)

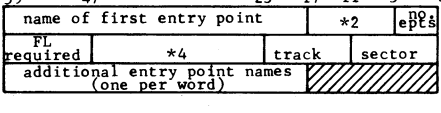


CPU LIBRARY DIRECTORY (CLD)

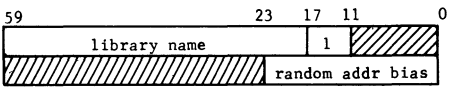
TYPE OVL



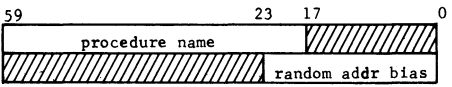
TYPE ABS



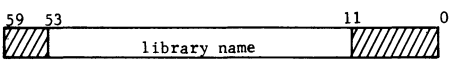
TYPE ULIB



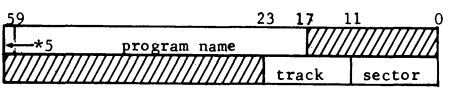
TYPE PROC



USER LIBRARY DEFINITION, ENTRY AFTER (0,0) OVERLAY OF COMPILER



TYPE COS



*1 Alternate device equipment number (if applicable)

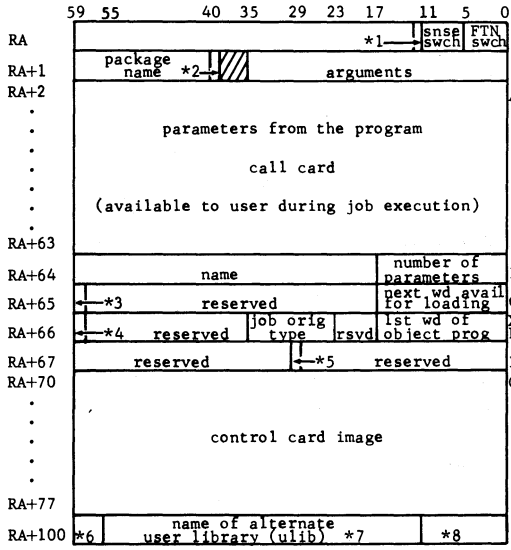
*2 Bits 17-14 unused; bit 13 SCOPE record flag; bit 12 unused; bits 11-6 alternate device equipment number.

*3 If ULIB associated with program, field is set to 1 and ULIB name is added to entry.

*4 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.

*5 Bit 59 type (0=P mode, 1=I mode)

JOB COMMUNICATION AREA



*1 Bit 12 pause flag.

*2 Bit 40 auto recall.

*3 Bit 59 set if compare/move unit (CMU) is present.

*4 Bit 59 set if CEJ/MEJ option is available.

*5 Bit 29 set if load has completed.

*6 Bit 59 unused; bit 58 set if program called from DIS; bit 57 unused; bit 56 set if no automatic field length reduction.

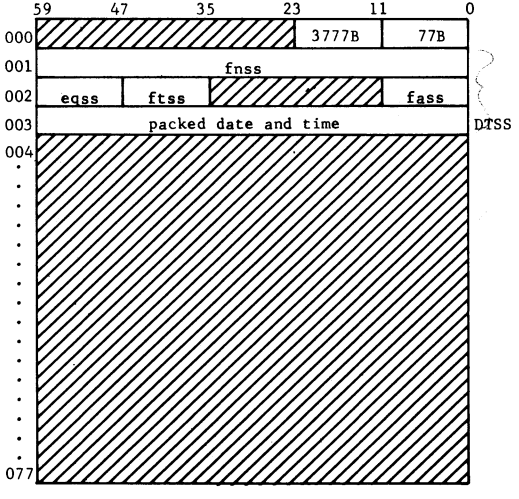
*7 If an overlay is loaded, then ULIB is overlayed in bits 35-18 with lwa+1 of last and largest overlay.

*8 Map flags:

0001	Statistics and errors
0002	Block assignments
0004	Entry points
0014	Cross-reference of entry points

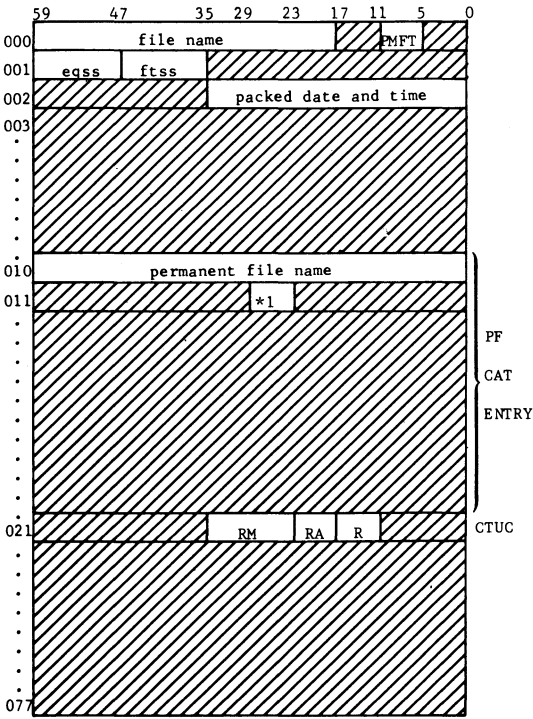
SYSTEM SECTOR FORMAT

STANDARD FORMAT



fnss	FNT entry
eqss	Equipment number
ftss	First track
fass	Address of FST entry

DIRECT ACCESS FILE FORMAT

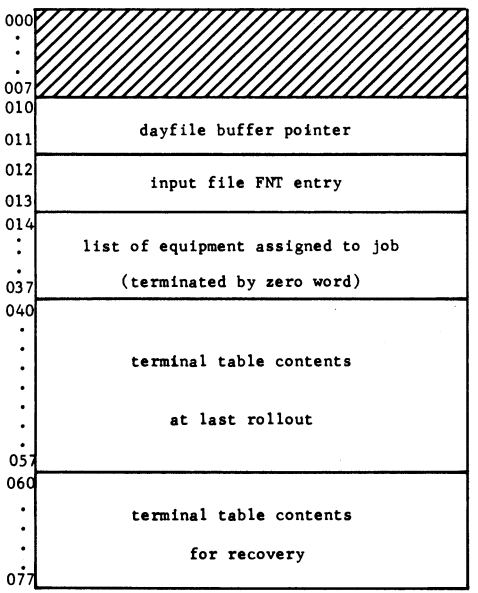


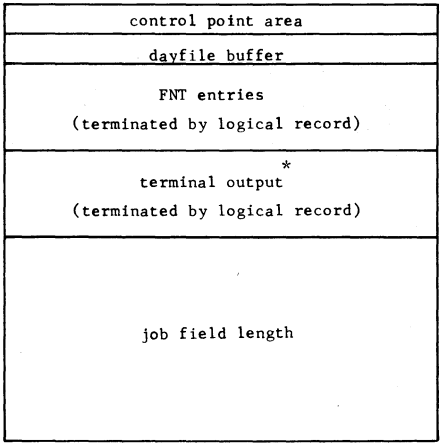
eqss	Equipment number
ftss	First track
ctuc	Current user counts:
	RM READMD users
	RA READAP users
	R Read/Write users

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

ROLLOUT FILE

SYSTEM SECTOR

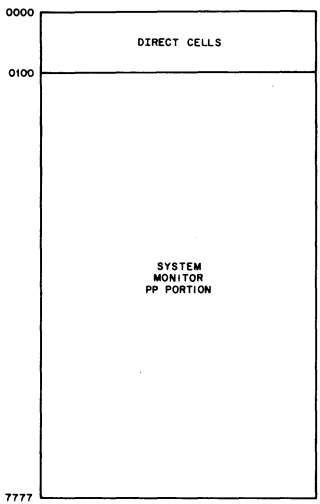




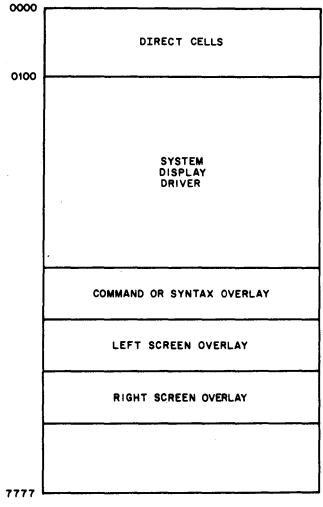
*This is the only part of the rollout file used for TXOT jobs.

PPU MEMORY LAYOUT

PP0 - SYSTEM MONITOR (PPU PORTION)

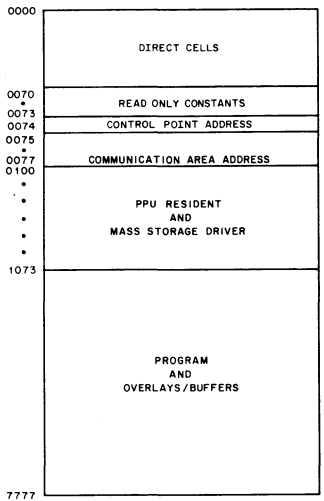


PP1 - SYSTEM DISPLAY DRIVER (DSD)



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 (3447/3649-405)
DA	Disk file (6603/6603 MOD1)
DB	Disk file (6638/6639)
DC	Drum (3436/3637-863)
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 (6612)
LP	Line printer (3256/3659-501/505)
LQ	Line printer (3555-512)
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

Word on Panel	Setting			
0001	111	101	ccc	ccc
0002	111	111	ccc	ccc
0003	eee	000	00u	uuu
0004	111	111	ccc	ccc
0005	000	000	001	000
0006	111	111	ccc	ccc
0007	001	100	000	000
0010	111	100	ccc	ccc
0011	111	001	ccc	ccc
0012	110	110	000	110
0013	www	xxx	xxx	yyy
0014	rrr	ppp	sss	sss

1	Switch up
0	Switch down
ccc ccc	Tape channel number (must be 12 or 13)
eee	Tape controller number
uuuu	Tape unit number
xxx xxx	CMRDECK number
yyy	Deadstart options
rrr	Recovery options
ppp	Central processor options
sss sss	System library assignments
www	LIBDECK number

yyy	= 0	Automatic system deadstart.
	= 1	System deadstart with options displayed.
	= 2	Display PP0 memory (maintenance deadstart).
	= 3	Deadstart dump (maintenance deadstart).
rrr	= 0	Level 0 (initial) deadstart; no recovery.
	= 1	Level 1 recovery deadstart; the system, all jobs, all active files, and permanent files are recovered from checkpoint information on mass storage.
	= 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.
	= 3	Level 3 recovery deadstart; the system, all jobs, and active files are recovered from central memory tables; permanent files are also recovered.
ppp		Bit 8 = 1 Disable CEJ/MEJ option
		Bit 7 = 1 Turn off CPU 1†
		Bit 6 = 1 Turn off CPU 0†
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			
0001	010	000	000	000
0002	111	111	111	110
0003	111	011	ppp	ppp
0004	000	000	000	000
0005	000	011	000	000

ppp ppp PPU to which transfer is to be made

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

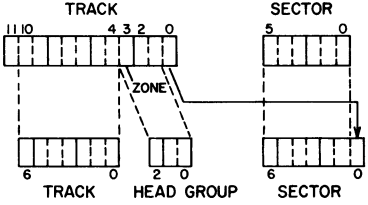
MASS STORAGE DATA ORGANIZATION

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

LOGICAL



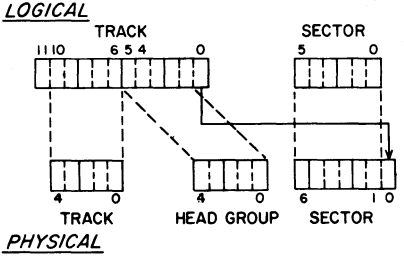
PHYSICAL

- 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:

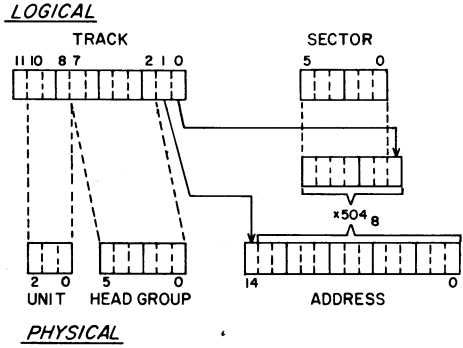


- Equipment connect code e00u
  - e = 1 normally
  - u = unit 0 or 1
  - u = 0 if SO 10037 in use

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:



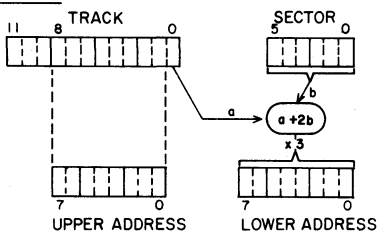
- Equipment connect code e000
  e = 3637/3436 equipment number

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:

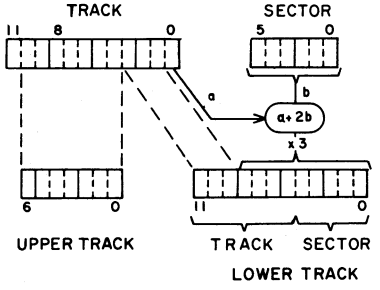
$$(S_{0-3} \times 101_8) + (T_{0-10} \times 2020_8)$$

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



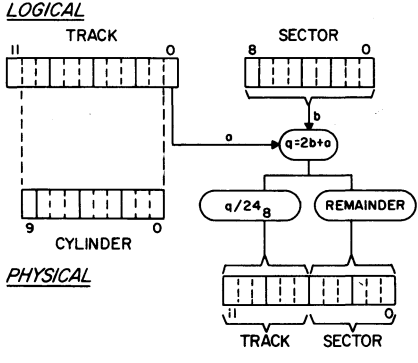
PHYSICAL

- 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.

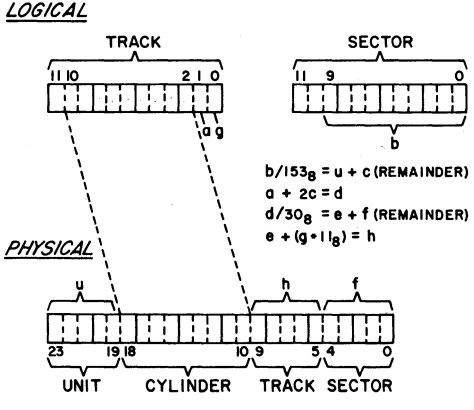
- Equipment type DH
- Sectors/track 320
- Tracks/device 2048
- Words/device 41,943,040
- Maximum data rate 19.2K words per second
- Address mapping:



- Equipment connect code e00u
  - e = 3553-1 equipment number
  - u = unit number 0 or 1

7054/844 DISK STORAGE SUBSYSTEMS

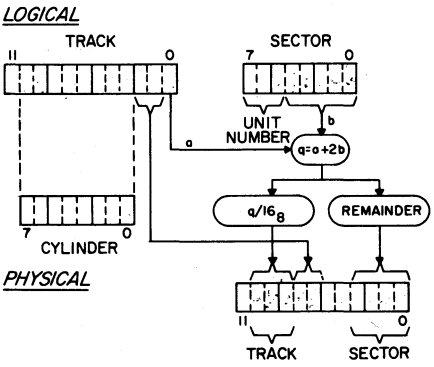
- Equipment type DI
- Sectors/tracks 107 x n
- Tracks/device 1616
- Words/device 11,066,368 x n
- Maximum data rate 46.1K words per second
- Address mapping:



3553—1/841—N MULTIPLE DISK DRIVES

KRONOS 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:

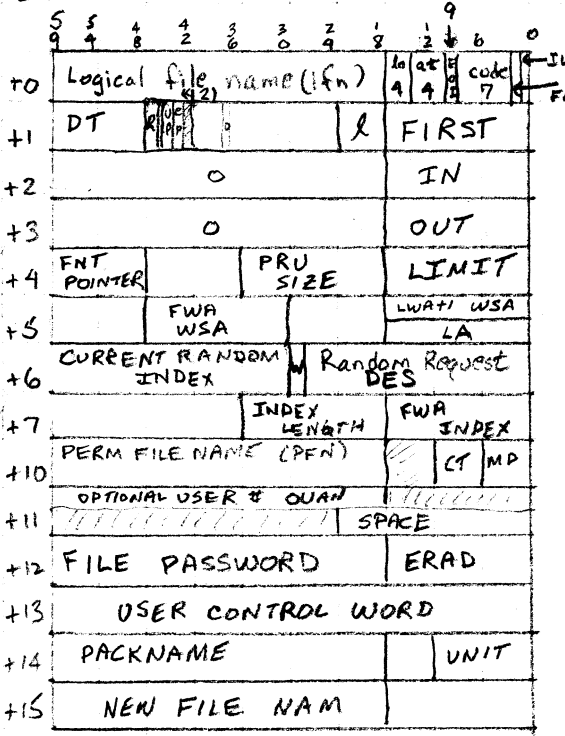


- Equipment connect code e00u

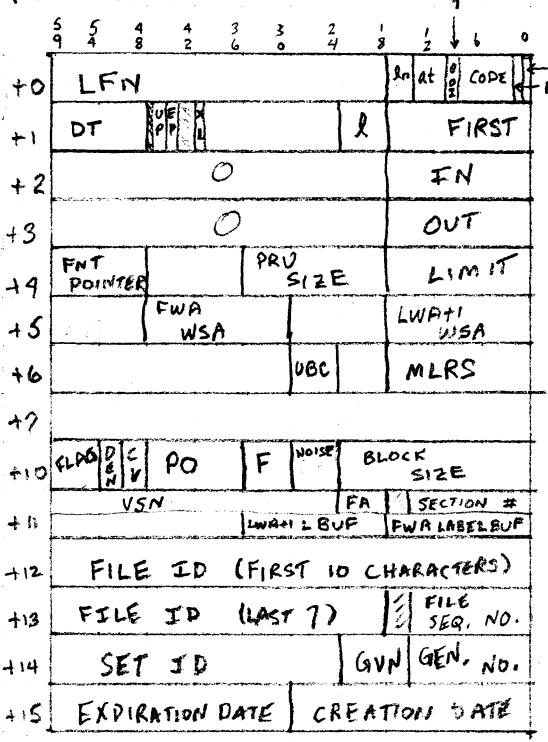
  e = 3553-1 equipment number

  u = unit number

FET (MASS STORAGE FILES)



FET (TAPE)



DT: KRONOS (I, X, E, B, F)

MT + 4000B (7TR)
NT + 4000B (9TR)

SCOPE (SI, S, L)

40nn 7TR
41nn 9TR

nn= XXXX10 800 BPI
XX00XX UNLABELED
XX01XX ANSI LABEL
00XXXX SI
10XXXX S
11XXXX L

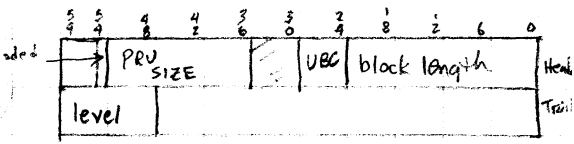
	WORD	POSITION	(LEN)	DESCRIPTION
	0	18-59	(42)	LFN
	0	14-17	(4)	Level number
	0	10-13	(4)	Abnormal terminate (ep set)
	0	9	(1)	eol bit
	0	2-8	(7)	Code 3&4 10=EOR 11=EOF
	0	1	(1)	filemode 0=coded 1=Binary.
	0	0	(1)	FET INTERLOCK 0=Busy
	1	48-59	(12)	device type MNEMONIC (KRONOS)
	1	47	(1)	RANDOM
*	1	46	(1)	READ RELEASE (SCOPE)
	1	45	(1)	UP (USER PROCESS) END OF DEVICE
	1	44	(1)	EP (error processing)
*	1	43	(1)	Norecovery (MT) (SCOPE)
*	1	42	(1)	MUI (SCOPE)
	1	41	(1)	Extended label
	1	40	(1)	Extended error (SCOPE)
*	1	39	(1)	Reserved SCOPE
	1	38	(1)	Nonstd Label (SCOPE)
	1	37	(1)	No overflow NADC Reserved SCOPE
	1	18-23	(6)	length of FET-5
	1	0-17	(18)	FIRST
	2	0-17	(18)	IN
	3	0-17	(18)	OUT

WORD	POSITION (LEN)	DESCRIPTION
4	48-59 (12)	FNT POINTER (L=1
4	18-35 (18)	PRU SIZE (OPEN)
4	0-17 (18)	LIMIT
5	30-47 (18)	FWA WSA L=1
5	0-17 (18)	LWA+1 WSA (L=1)
		LIST Address for READLS .
6	30-59 (30)	Current random index ## position ; rel. sector add
6	29 (1)	1= write 0= place
6	24-29 (6)	Unused bit count S/L
6	0-28 (29)	relative sector addr random read. / Detailed Error st
6	0-17 (18)	MLRS
7	18-35 (18)	LEN. OF RANDOM INDEX
7	0-17 (18)	FWA Index buffer
10	18-59 (42)	PFN
10	6-11 (6)	CT 0= PRIVATE 1= SEMI-? 2= PUBLIC
10	0-5 (6)	MD 0= all 1= read/execute 2= Append 3= Execute 4= Remove Perm 5= No size chg (DA) 6= Read w/ MD (DA 7= Read w/ Appl (D
10 FLAGS	59	1=OPEN/WRITE labels
	58	1= LABELED
	57	1= Non STD LABELS
	56	1 = 9 TR (NT)
10	51-53 (3)	DEN 0= default 1= 556 4= 1600 2= 800 3= 800

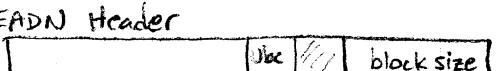
WORD	POSITION (LEN)	DESCRIPTION
10	48-50 (3)	CONVERSION 0 = Default 1 = ASCII 2 = EBCDIC
10	36-47 (12)	Processing Options:
	45-47 (3)	EOT/EOR Real 0 = Def 1 = option 2 2 = " 1 4 = " 3
	49	
	† 43	Full user message ? write system noise
	42	
	41	Inhibit Unload (U)
	40	Ring IN (W)
	39	Ring out (R)
	38	Inhibit error (E)
	37	Do Not Abort (N)
	36	Abort
10	30-35 (6)	format 0 = I 1 = SI 2 = X 3 = S 4 = L 5 = E 6 = B 7 = F
10	24-29 (6)	Noise size
10	0-23 (24)	Max block size
11	18-59 (42)	optimal user no.
11	0-23 (24)	SPACE (PRU's)
11	24-59 (36)	VSN
11	18-23 (6)	file accessability (HDR)
11	0-14 (15)	file section no.
11	18-35 (18)	length XL label buffer
11	0-17 (18)	Fwa label buffer (XL
12	18-59 (42)	PASSWORD
12	0-17 (18)	PFM error message addr

Word	Position (Len)	Description
12	0-59 (60)	first 10 chars File ID
13	18-59 (42)	Last 7 chars File ID
13	0-14 (15)	file sequence no.
13	0-59 (60)	User control word (PFM)
14	18-59 (42)	Packname
14	0-11 (12)	No. units if Multi-unit
14	24-59 (36)	SETID
14	15-23 (9)	Generation Ver no.
15	18-59 (42)	new file name
15	30-59 (30)	Expiration date (disp)
15	0-29 (30)	Creation " (disp)

Readcw control word:



READN Header



UDT

	5 4 8	1 2	3 6	3 0	2 4	1 8	1 2	6	0	
RQ	RS	FUNCTION		MODE		PA		PB		0
CIA	ICIO	SKIP COUNT				FET Addr				1
CIB	RP	ECIO	FOPS		LN	Record Request Ret.				2
C	FL	FIRST				LIMIT				3
ST1	ED	HP		EC		ES		DS		4
ST2	DISK PRUS			BLOCK COUNT				User OPS		5
T3	LAST GOOD RECORD			ERROR PARAM				DEV	LV	6
ST4	WC	OV		FORMAT	EST	NB		SP		7
UST5	MTS Detail Status									10
UST6	MTS Detail Status					MTS Format				11
ULRQ	MAGNET Last Request									12
UREQ	Shift	Proc Addr	B2	B3		X5				13
UFLA	MAGNET FLAGS									14
UJSQ	JOB SEQ. NO.	CP NO				VSN RANDOM INDEX				15
JN	JOBNAME					OT				16
UFN	USER NO.					FAM	ESW	VA		17
UVSN	VSN					FLAGS	REEL NO.			20
FID	FILE IDENTIFIER									21
FSN	FILE ID (Cont)					File Section No.				22
USID	SETID					FA	SEQUENCE NO.			23
NU				GEN VER		GEN NO.				24
DAT	CREATION DATE			EXPIRATION DATE						25

MT, C13-5-02, ABCDEF, RD, 53, 500, 3207, 3001.

MT, C13, F04, I13, B0000123, L5004, P000 0.

MT C13, E00, H24000000.

1) Ch 13, EQ 5, UN 2
2) VSN = ABCDEF
3) OP = Read
4) EST written on (53)
5) 6681 Status
   Status 1 of Controller
   " 2 " "

1) Ch 13
2) Software fcn 14
3) Error iteration
4) Block no.
5) Block len (bytes)
6) 1 MT internal error params

1) Ch 13
2) Ctl error code
3) Controller options
   Each 2 digits is function code

UDT

Word

0 RS Completion: 1 = IN Progress
2 = Normal Complete
3 = Requeue delay
4 = error

FN Function
1 = SET EQ DEFN
2 = COMPLETE USER FET
3 = MESSAGE AND ABORT
4 = Process function (FNH).
5 = SKIP
6 = OPEN FUNCTION
7 = READ DATA
10 = READ LABEL
11 = WRITE DATA
12 = WRITE LABEL

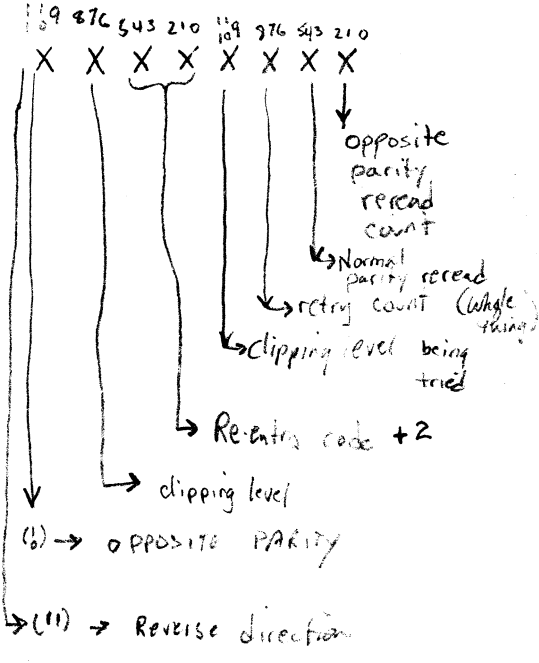
MD Modes
0 None
1 Read Skip
2,3 0 - PRU operation
1 - EOR "
2 - EOF "
3 - EOI "
4 260/264 Control word
5 200/204 " "
6 Coded
10 EOR THIS OP
12 SET IN=OUT=FIRST
12 REVERSE (READ LABEL)
13 " (" DATA)

1 ICIO internal CIO code

2 R auto-recall
D Data in buffer (=1)
ECIO user CIO code
FOPS user FET OPTIONS
LN Level Number

3 FL of Job

P


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
X X X X X X X X
opposite parity reread count
Normal parity reread
retry count (Whole thing)
clipping level being tried
Re-entry code +2
clipping level
(1) → OPPOSITE PARITY
(11) → Reverse direction

UPT

Word

4 ED Equip Connect (13-11, 3-0)
Channel desig. (10-4)

HP Hardware Ops
0 9TR
1 STATUS 2 Avail
2 Conversion Mode
3 Controlled BKSP
4 Programmable Clk
5 MTS Controller
11 Blank tape
12 LAST BLOCK EOR/EOF
13 LAST OP WRITE

EC error codes
1 BOT/EOT/BOI/EOI } Chg of st
2 end of reel message }
3 Blank tape
4 No write enable
5 Buffer Control word err
6 Read after write
7 Opposite Parity
10 multi-file not found
11 end fatal user
fatal user
12 Label missing
13 Label Content error
14 Label block cnt "
15 Label Parameter error
16 Illegal Label type
Non fatal user if EP
17 BLOCK TOO LARGE
20 BLOCK NO. error
21 Noise block error
user or hardware
22 ON THE FLY correction
23 Ready drop
24 Function Reject
25 Wait EOP/ Busy timeout
26 Connect reject
27 Load memory error
30 Status error
31 erase error
32 Position Lost
33 Density change
34 Channel malfunction
35 MTS buffer control reset
Hard-ware

UDT

Word

4 ES extended status

DS device status
(for MTS conv. to 3000)

5 UP Useroptions 0 coded
12 Non std label, 13=label

6 EP Error parameters
1=200 3=800
DEN 2=556 4=1600
0=def 3=EBCDIC
CV 1=ASCII

7 WC Block Word Count

OV Unused char count (E,B)

Chunk Count (L)
0=I 2=X 4=L 6=B
FM 1=SI 3=S 5=E 7=F

NB Noise byte defn.
E=Fill decay
0-4 No. bytes of noise

SP Software op
0 Abort RPE/WPE with EP
1 accept data w/o ep
2 Inhibit error proc.
3 Ring out
4 Ring In
5 Inhibit Unload
6 write system Noise
10 Full error diag to user
11 system stop Param
13-12 End of rec
0 - Read to TM
1 - Accept data
2 - discard "

17 ESW1 est written

20 Flags 0 Remount tape
1 Label expired
2 Default label
5 Ignore expir. dte.
11 File opened
12 Scratch VSN
13 Label check in Progress

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 **** **** 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	0	Channel assigned
	1	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)

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

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	TFLEX request

Reply: OR 0000 0000 0000 0000 0000

Request: OR 0027 00ec 00op ℓℓℓℓ sfun

ec — Error code

op — Operator code (read or write)

ℓℓℓℓ — Link 1 byte from sector read

sfun — Status/function:

Bits	Description
11-9	S81 (6681 status if function reject)
8-0	Device function if function reject

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

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
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 0000 0000

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 000s 0000 aaaa aaaa

s	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 ***c **** **** ****

c 1 if data to be converted is CM usage

MB **** **** **nn nnnn nnnn

nn...n 30-bit integer

Reply: OR 0000 0000 0000 0000 0000

MB cccc cccc cccc cccc cccc

cc...c Display code conversion (F10.3 conversion)

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

52 REQUEST JOB ACCOUNTING - RJAM

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

Reply: OR 0000 0000 0000 0000 0000

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 ssss ****

eq	Equipment number
tttt	Current track
ssss	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
tttt		Track
n	0	Set permanent file bit
	1	Set write reservation bit
	7777_8	Clear permanent file bit
	7776_8	Clear write reservation bit

Reply: OR 0000 000s 0000 0000 0000

s	0	Function performed
	1	Bit is already set

60 UPDATE ACCOUNTING AND DROP PPU - UADM

Request: OR 0060 aaaa **** **** ****

MB **** **** **ii iiii iiii

aaaa	Address of accounting word in control point area (if aaaa=0, activity count is incremented by one).
ii...i	Increment value for update.

Reply: OR 0000 0000 0000 0000 0000

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
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 bbbb 00cc cccc

- uuuu — MAGNET unit descriptor table address to be cleared
- bbbb — Blocks transferred (added to MTUW)
- 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 1111 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 0011 1111

ffffff	Absolute first word address of checksum area
111111	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

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

RC - 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 000I

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 CM 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

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.

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

tttttt	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

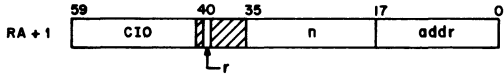
- 0 Start job with exchange package at aaaaaa.
- 1 Save current exchange package at aaaaaa.

aaaaaa Address for function code

FUNCTION PROCESSORS

CIO - COMBINED INPUT/OUTPUT

Call:

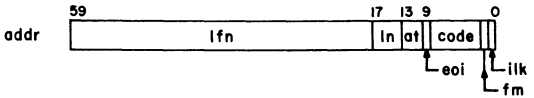


r Auto recall, if desired

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:

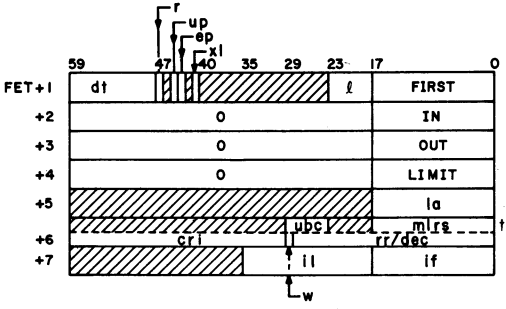
0	EOR operation
$1\text{-}16_8$	Same as level 0
17_8	EOF operation

at	Status information returned by CIO

02	End of reel
04	Parity error
22	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
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

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
code	CPM function code
param	Parameter for the function

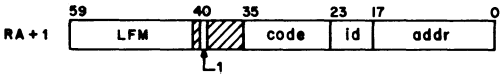
CPM FUNCTIONS

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 loader control words
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
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
040	VALID	Validates account number (SSJ= only)
041	FAMILY	Enters family name (SYOT only)
042	---	Special CHARGE functions

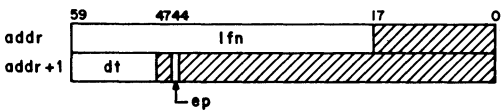
LFM - LOCAL FILE MANAGER

Call:



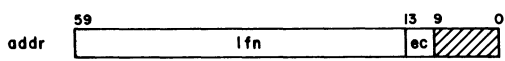
code	Function code
id	File id number (refer to SETID, function code 017)
addr	Address of the FET

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

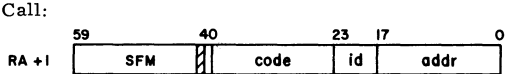
LFM FUNCTIONS

Code	Name	Description
000	RENAME	Renames local file
001	ASSIGN	Accesses common file
002	COMMON	Changes file type to common
003	RELEASE	Changes file type from common to local
004-7, 016	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)

SFM - SYSTEM FILE MANAGER

Call:



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

FET format:

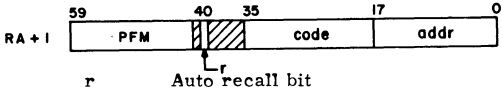
lfn	File name
dt	Device type

SFM FUNCTIONS

Code	Name	Description
000	SUBMIT	Enters batch job image in input queue
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	SFQUE	Searches FNT for a queue-type file and changes it to a local file
010	REQUE	Releases local file to print or punch queue
011	---	Enters fast attach file (SSJ= only)
012	---	Deletes fast attach file (SSJ= only)
013	---	Releases file to CYBERLINK transmit queue

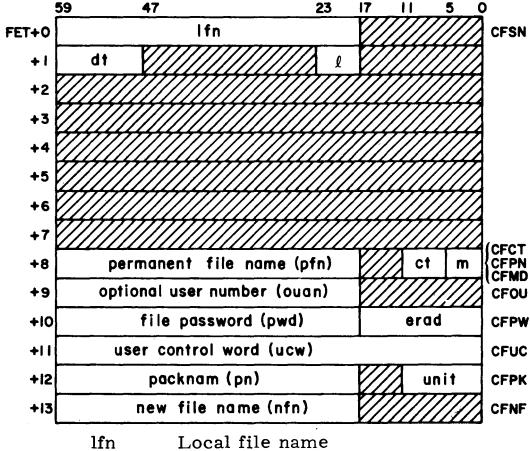
PFM - PERMANENT FILE MANAGER

Call:



r	Auto recall bit
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
pwd	Optional file password
erad	Error message return address
ucw	User control word
pn	Alternate packname
unit	Number of units
nfn	New file name

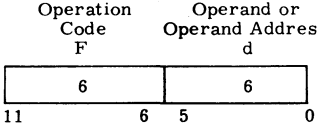
PFM FUNCTIONS

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

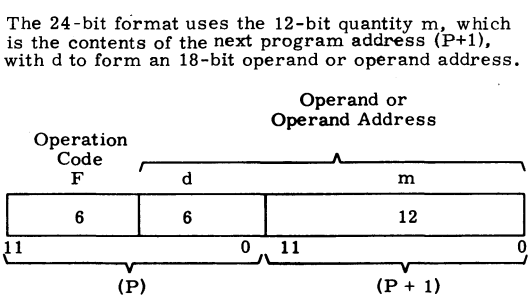
PERIPHERAL PROCESSOR (PPU) INSTRUCTION FORMATS

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	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

NUMERICAL LISTING

All times are given to major cycles; one major cycle equals 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	Mnemonic	Address	Name	Time (major cycles)
00	PSN		Pass	1
01	LJM	m d	Long jump to m + (d)	2-3
02	RJM	m d	Return jump to m + (d)	3-4
03	UJN	d	Unconditional jump d	1
04	ZJN	d	Zero jump d	1
05	NJN	d	Nonzero jump d	1
06	PJN	d	Plus jump d	1
07	MJN	d	Minus jump d	1
10	SHN	d	Shift d	1
11	LMN	d	Logical difference d	1
12	LPN	d	Logical product d	1
13	SCN	d	Selective clear d	1
14	LDN	d	Load d	1
15	LCN	d	Load complement d	1
16	ADN	d	Add d	1
17	SBN	d	Subtract d	1
20	LDC	dm	Load dm	2
21	ADC	dm	Add dm	2
22	LPC	dm	Logical product dm	2
23	LMC	dm	Logical difference dm	2
24	PSN		Pass	1
25	PSN		Pass	1
260	EXN	d	Exchange jump CPU d	1

F	Mnemonic	Address	Name	Time (major cycles)
261	MXN	d	Monitor exchange jump CPU d to (A)	1
262	MAN	d	Monitor exchange jump CPU d to (MA)	1
270	RPN	d	Read program address of CPU d	1
30	LDD	d	Load (d)	2
31	ADD	d	Add (d)	2
32	SBD	d	Subtract (d)	2
33	LMD	d	Logical difference (d)	2
34	STD	d	Store (d)	2
35	RAD	d	Replace add (d)	3
36	AOD	d	Replace add one (d)	3
37	SOD	d	Replace subtract one (d)	3
40	LDI	d	Load ((d))	3
41	ADI	d	Add ((d))	3
42	SBI	d	Subtract ((d))	3
43	LMI	d	Logical difference ((d))	3
44	STI	d	Store ((d))	3
45	RAI	d	Replace add ((d))	4
46	AOI	d	Replace add one ((d))	4
47	SOI	d	Replace subtract one ((d))	4
50	LDM	m d	Load (m + (d))	3-4
51	ADM	m d	Add (m + (d))	3-4
52	SBM	m d	Subtract (m + (d))	3-4
53	LMM	m d	Logical difference (m + (d))	3-4
54	STM	m d	Store (m + (d))	3-4
55	RAM	m d	Replace add (m + (d))	4-5
56	AOM	m d	Replace add one (m + (d))	4-5
57	SOM	m d	Replace subtract one (m + (d))	4-5

F	Mnemonic	Address	Name	Time (major cycles)
60	CRD	d	Central read from (A) to d	minor 6
61	CRM	m d	Central read (d) words from (A) to m	5 plus 5/word
62	CWD	d	Central write to (A) from d	minor 6
63	CWM	m d	Central write (d) words to (A) from m	5 plus 5/word
64	AJM	m d	Jump to m if channel d active	2
65	IJM	m d	Jump to m if channel d inactive	2
66	FJM	m d	Jump to m if channel d full	2
67	EJM	m d	Jump to m if channel d empty	2
70	IAN	d	Input A from channel d	2
71	IAM	m d	Input (A) words to m from channel d	4 plus 1/word
72	OAN	d	Output from A on channel d	2
73	OAM	m d	Output (A) words from m on channel d	4 plus 1/word
74	ACN	d	Activate channel d	2
75	DCN	d	Disconnect channel d	2
76	FAN	d	Function (A) on channel d	2
77	FNC	m d	Function m on channel d	2

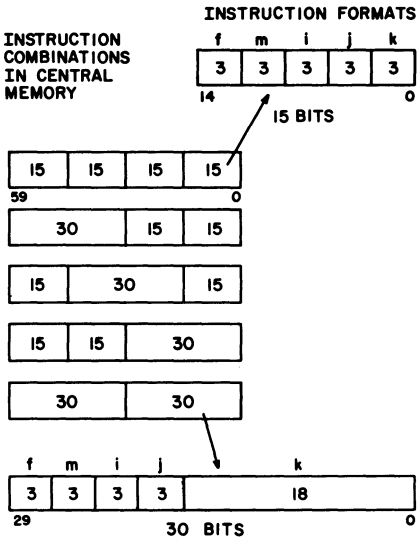
Mnemonic	F	Address	Name	Time (major cycles)
ACN	74	d	Activate channel d	2
ADC	21	dm	Add dm	2
ADD	31	d	Add (d)	2
ADI	41	d	Add ((d))	3
ADM	51	m d	Add (m + (d))	3-4
ADN	16	d	Add d	1
AJM	64	m d	Jump to m if channel d active	2
AOD	36	d	Replace add one (d)	3
AOI	46	d	Replace add one ((d))	4
AOM	56	m d	Replace add one (m + (d))	4-5
CRD	60	d	Central read from (A) to d	minor 6
CRM	61	m d	Central read (d) words from (A) to m	5 plus 5/word
CWD	62	d	Central write to (A) from d	minor 6
CWM	63	m d	Central write (d) words to (A) from m	5 plus 5/word
DCN	75	d	Disconnect channel d	2
EJM	67	m d	Jump to m if channel d empty	2
EXN	260	d	Exchange jump CPU d	1
FAN	76	d	Function (A) on channel d	2
FJM	66	m d	Jump to m if channel d full	2
FNC	77	m d	Function m on channel d	2
IAM	71	m d	Input (A) words to m from channel d	4 plus 1/word
IAN	70	d	Input to A from channel d	2

Mnemonic	F	Address	Name	Time (major cycles)
IJM	65	m d	Jump to m if channel d inactive	2
LCN	15	d	Load complement d	1
LDC	20	m	Load dm	2
LDD	30	d	Load (d)	2
LDI	40	d	Load ((d))	3
LDM	50	m d	Load (m + (d))	3-4
LDN	14	d	Load d	1
LJM	01	m d	Long jump to m + (d)	2-3
LMC	23	dm	Logical difference dm	2
LMD	33	d	Logical difference (d)	2
LMI	43	d	Logical difference ((d))	3
LMM	53	m d	Logical difference (m + (d))	3-4
LMN	11	d	Logical difference d	1
LPC	22	dm	Logical product dm	2
LPN	12	d	Logical product d	1
MAN	262	d	Monitor exchange jump CPU d to (MA)	1
MXN	261	d	Monitor exchange jump CPU d	1
MJN	07	d	Minus jump d	1
NJN	05	d	Nonzero jump d	1
OAM	73	m d	Output (A) words from m on channel d	4 plus 1/word
OAN	72	d	Output from A on channel d	2
PJN	06	d	Plus jump d	1
PSN	00		Pass	1
PSN	24		Pass	1
PSN	25		Pass	1
RAD	35	d	Replace add (d)	3
RAI	45	d	Replace add ((d))	4
RAM	55	m d	Replace add (m + (d))	4-5

Mnemonic	F	Address	Name	Time (major cycles)
RJM	02	m d	Return jump to m + (d)	3-4
RPN	27	d	Read program address of CPU d	1
SBD	32	d	Subtract (d)	2
SBI	42	d	Subtract ((d))	3
SBM	52	m d	Subtract (m + (d))	3-4
SBN	17	d	Subtract d	1
SCN	13	d	Selective clear d	1
SHN	10	d	Shift d	1
SOD	37	d	Replace subtract one (d)	3
SOI	47	d	Replace subtract one ((d))	4
SOM	57	m d	Replace subtract one (m + (d))	4-5
STD	34	d	Store (d)	2
STI	44	d	Store ((d))	3
STM	54	m d	Store (m + (d))	3-4
UJN	03	d	Unconditional jump d	1
ZJN	04	d	Zero jump d	1

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)

NUMERICAL LISTING

The functional unit designation applies only to 6600/6700.

BRANCH UNIT †

fm (i)	Mnemonic	Address	Name
00	PS		Program stop
010	RJ	K	Return jump to K
011	RE	Bj ± K	Read extended core storage
012	WE	Bj ± K	Write extended core storage
013	XJ	Bj + K	Exchange jump to (Bj) + K
02	JP	Bi + K	Go to (Bi) + K
030	ZR	Xj, K	Go to K if (Xj) = 0
031	NZ	Xj, K	Go to K if (Xj) ≠ 0
032	PL	Xj, K	Go to K if (Xj) = positive
033	MI	Xj, K	Go to K if (Xj) = negative
033	NG	Xj, K	Go to K if (Xj) = negative
034	IR	Xj, K	Go to K if (Xj) is in range
035	OR	Xj, K	Go to K if (Xj) is out of range
036	DF	Xj, K	Go to K if (Xj) is definite
037	ID	Xj, K	Go to K if (Xj) is indefinite
04	EQ	K	Go to K
04	EQ	Bi, Bj, K	Go to K if Bi = Bj
04	ZR	K	Go to K

†Go to K + Bi and Go to K if Bi; tests made in increment unit.
'Go to K if Xj; tests made in long add unit.

fm (i)	Mnemonic	Address	Name
04†	ZR	Bi, K	Go to K if (Bi) = B0
05	NE	Bi, Bj, K	Go to K if (Bi) ≠ (Bk)
05†	NZ	Bi, K	Go to K if (Bi) ≠ B0
06	GE	Bi, Bj, K	Go to K if (Bi) ≥ (Bj)
06	GE	Bi, K	Go to K if (Bi) ≥ 0
06	LE	Bj, Bi, K	Go to K if (Bj) ≤ (Bi)
06	LE	Bj, K	Go to K if (Bj) ≤ 0
06†	PL	Bi, K	Go to K if Bi > B0
07	GT	Bj, Bi, K	Go to K if (Bj) > (Bi)
07	GT	Bj, K	Go to K if (Bj) > 0
07	LT	Bi, Bj, K	Go to K if (Bi) < (Bj)
07	LT	Bi, K	Go to K if (Bi) < 0
07	MI	Bi, K	Go to K if (Bi) < 0
07†	NG	Bi, K	Go to K if (Bi) ≤ B0

BOOLEAN UNIT

fm (i)	Mnemonic	Address	Name
10	BXi	Xj	Transmit (Xj) to Xi
11	BXi	Xj*Xk	Logical product of (Xj) + (Xk) to Xi
12	BXi	Xj+Xk	Logical sum of (Xj) + (Xk) to Xi
13	BXi	Xj-Xk	Logical difference of (Xj) + (Xk) to Xi
14	BXi	-Xk	Transmit the comp. of (Xk) to Xi
15	BXi	-Xk*Xj	Logical product of (Xj) + (Xk) comp. to Xi
16	BXi	-Xk+Xj	Logical sum of (Xj) + (Xk) comp. of Xi
17	BXi	-Xk-Xj	Logical difference of (Xj) + (Xk) comp. to Xi

†For these instructions, COMPASS packs the instruction so Bi is compared with B0 rather than Bj.

SHIFT UNIT

fm (i)	Mnemonic	Address	Name
20	LXi	jk	Left shift (Xi), ± jk places
21	AXi	jk	Arithmetic right shift (Xi), ± jk places
22	LXi	Bj, Xk	Logical shift (Xk) nominally (Bj) places to Xi
22	LXi	Bj	Logical shift (Xi) by (Bj) to Xi
22	LXi	Xk	Transmit (Xk) to Xi
22	LXi	Xk, Bj	Logical shift (Xk) by (Bj) to Xi
23	AXi	Bj, Xk	Arithmetic right shift (Xk) nominally (Bj) places to Xi
23	AXi	Bj	Arithmetic shift (Xi) by (Bj) to Xi
23	AXi	Xk	Transmit (Xk) to Xi
23	AXi	Xk,Bj	Arithmetic shift (Xk) by (Bj) to Xi
24	NXi	Bj, Xk	Normalize (Xk) in Xi and Bj
24	NXi, Bj	Xk	Normalize (Xk) to Xi and Bj
24	NXi		Normalize (Xi) to Xi
24	NXi, Bj		Normalize (Xi) to Xi and Bj
24	NXi	Xk	Normalize (Xk) to Xi
24	NXi	Xk, Bj	Normalize (Xk) to Xi and Bj
25	ZXi	Bj, Xk	Round and normalize (Xk) to Xi and Bj
25	ZXi, Bj	Xk	Round and normalize (Xk) to Xi and Bj
25	ZXi		Round and normalize (Xi) to Xi
25	ZXi, Bj		Round and normalize (Xi) to Xi and Bj
25	ZXi	Xk	Round and normalize (Xk) to Xi

fm (i)	Mnemonic	Address	Name
25	ZXi	Xk, Bj	Round and normalize (Xk) to Xi and Bj
26	UXi	Bj, Xk	Unpack (Xk) to Xi and Bj
26	UXi, Bj	Xk	Unpack (Xk) to Xi and Bj
26	UXi		Unpack (Xi) to Xi
26	UXi, Bj		Unpack (Xi) to Xi and Bj
26	UXi	Xk	Unpack (Xk) to Xi
26	UXi	Xk, Bj	Unpack (Xk) to Xi and Bj
27	PXi	Bj, Xk	Pack (Xk) and (Bj) to Xi
27	PXi		Pack (Xi) to Xi
27	PXi	Bj	Pack (Xi) and (Bj) to Xi
27	PXi	Xk	Pack (Xk) to Xi
27	PXi	Xk, Bj	Pack (Xk) and (Bj) to Xi
43	MXi	±jk	Form mask in Xi, ± jk bits

ADD UNIT

fm (i)	Mnemonic	Address	Name
30	FXi	Xj+Xk	Floating sum of (Xj) and (Xk) to Xi
31	FXi	Xj-Xk	Floating difference (Xj) and (Xk) to Xi
32	DXi	Xj+Xk	Floating DP sum of (Xj) and (Xk) to Xi
33	DXi	Xj-Xk	Floating DP difference of (Xj) and (Xk) to Xi
34	RXi	Xj+Xk	Round floating sum of (Xj) and (Xk) to Xi
35	RXi	Xj-Xk	Round floating difference of (Xj) and (Xk) to Xi
36	IXi	Xj+Xk	Integer sum of (Xj) and (Xk) to Xi
37	IXi	Xj-Xk	Integer difference of (Xj) and (Xk) to Xi

MULTIPLY UNIT

fm (i)	Mnemonic	Address	Name
40	FXi	Xj*Xk	Floating product of (Xj) and (Xk) to Xi
41	RXi	Xj*Xk	Round floating product of (Xj) and (Xk) to Xi
42	DXi	Xj*Xk	Floating DP product of (Xj) and (Xk) to Xi
42	IXi	Xj*Xk	Integer product of (Xj) and (Xk) to Xi

DIVIDE UNIT

fm (i)	Mnemonic	Address	Name
44	FXi	Xj/Xk	Floating divide (Xj) by (Xk) to Xi
45	RXi	Xj/Xk	Round floating divide (Xj) by (Xk) to Xi
46	NO		No operation
47	CXi	Xk	Count the number of 1's in (Xk) to Xi

INCREMENT UNIT

fm (i)	Mnemonic	Address	Name
50	SAi	Aj+K	Set Ai to (Aj) + K
50†	SAi	Aj-K	Set Ai to (Aj) + comp. of K
51	SAi	Bj + K	Set Ai to (Bj) + K
51†	SAi	Bj-K	Set Ai to Bj + comp. of K
51	SAi	K	Set Ai to K + 0
52	SAi	Xj+K	Set Ai to (Xj) + K
52†	SAi	Xj-K	Set Ai to (Xj) + comp. of K

†If the sign in the address field is minus, COMPASS complements the 18-bit quantity K.

INCREMENT UNIT

fm (i)	Mnemonic	Address	Name
53	SAi	Xj+Bk	Set Ai to (Xj)+(Bk)
53	SAi	Bk+Xj	Set Ai to (Bk)+(Xj)
53	SAi	Xj	Set Ai to (Xj)
54	SAi	Aj+Bk	Set Ai to (Aj)+(Bk)
54	SAi	Bk+Aj	Set Ai to (Bk)+(Aj)
54	SAi	Aj	Set Ai to (Aj)+0
55	SAi	Aj-Bk	Set Ai to (Aj)-(Bk)
55	SAi	-Bk+Aj	Set Ai to (Aj)-(Bk)
56	SAi	Bj+Bk	Set Ai to (Bj)+(Bk)
56	SAi	Bj	Set Ai to (Bj)+0
57	SAi	Bj-Bk	Set Ai to (Bj)-(Bk)
57	SAi	-Bk	Set Ai to 0-(Bk)
57	SAi	-Bk+Bj	Set Ai to (Bj)-(Bk)
60	SBi	Aj+K	Set Bi to (Aj)+K
60†	SBi	Aj-K	Set Bi to (Aj)+complement of K
61	SBi	Bj+K	Set Bi to (Bj)+K
61†	SBi	Bj-K	Set Bi to (Bj)+complement of K
61	SBi	K	Set Bi to K+0
62	SBi	Xj+K	Set Bi to (Xj)+K
62†	SBi	Xj-K	Set Bi to (Xj)+complement of K
63	SBi	Bk+Xj	Set Bi to (Bk)+(Xj)
63	SBi	Xj	Set Bi to (Xj)+0
64	SBi	Aj+Bk	Set Bi to (Aj)+(Bk)
64	SBi	Bk+Aj	Set Bi to (Bk)+(Aj)
64	SBi	Aj	Set Bi to (Aj)+0
65	SBi	Aj-Bk	Set Bi to (Aj)-(Bk)
65	SBi	-Bk+Aj	Set Bi to (Aj)-(Bk)
66	SBi	Bj+Bk	Set Bi to (Bj)+(Bk)
66	SBi	Bj	Set Bi to (Bj)+0

†If the sign in the address field is minus, COMPASS complements the 18-bit quantity K.

INCREMENT UNIT

fm (i)	Mnemonic	Address	Name
67	SBi	Bj-Bk	Set Bi to (Bj)-(Bk)
67	SBi	-Bk	Set Bi to 0-(Bk)
67	SBi	-Bk+Bj	Set Bi to (Bj)-(Bk)
70	SXi	Aj+K	Set Xi to (Aj)+K
70†	SXi	Aj-K	Set Xi to (Aj)+complement of K
71	SXi	Bj+K	Set Xi to (Bj)+K
71†	SXi	Bj-K	Set Xi to (Bj)+complement of K
71	SXi	K	Set Xi to K+0
72	SXi	Xj+K	Set Xi to (Xj)+K
72†	SXi	Xj-K	Set Xi to (Xj)+complement of K
73	SXi	Xj+Bk	Set Xi to (Xj)+(Bk)
73	SXi	Xj	Set Xi to (Xj)+(B0)
73	SXi	Bk+Xj	Set Xi to (Bk)+(Xj)
74	SXi	Aj+Bk	Set Xi to (Aj)+(Bk)
74	SXi	Bk+Aj	Set Xi to (Bk)+(Aj)
74	SXi	Aj	Set Xi to (Aj)+(B0)
75	SXi	Aj-Bk	Set Xi to (Aj)-(Bk)
75	SXi	-Bk+Aj	Set Xi to (Aj)-(Bk)
76	SXi	Bj+Bk	Set Xi to (Bj)+(Bk)
76	SXi	Bj	Set Xi to (Bj)+(B0)
77	SXi	Bj-Bk	Set Xi to (Bj)-(Bk)
77	SXi	-Bk	Set Xi to (B0)-(Bk)
77	SXi	-Bk+Bj	Set Xi to (Bj)-(Bk)

†If the sign in the address field is minus, COMPASS complements the 18-bit quantity K.

Mnemonic	fm (i)	Address	Name
AXi	21	jk	Arithmetic right shift (Xi), ± jk places
AXi	23	Bj, Xk	Arithmetic right shift (Xk) nominally (Bj) places to Xi
AXi	23	Bj	Arithmetic shift (Xi) by (Bj) to Xi
AXi	23	Xk	Transmit (Xk) to Xi
AXi	23	Xk, Bj	Arithmetic shift (Xk) by (Bj) to Xi
BXi	10	Xj	Transmit (Xj) to Xi
BXi	11	Xj*Xk	Logical product of (Xj) and (Xk) to Xi
BXi	12	Xj+Xk	Logical sum of (Xj) and (Xk) to Xi
BXi	13	Xj-Xk	Logical difference of (Xj) and (Xk) to Xi
BXi	14	-Xk	Transmit the complement of (Xk) to Xi
BXi	15	-Xk*Xj	Logical product of (Xj) and (Xk) complement to Xi
BXi	16	-Xk+Xj	Logical sum of (Xj) and (Xk) complement of Xi
BXi	17	-Xk-Xj	Logical difference of (Xj) and (Xk) complement to Xi
CXi	47	Xk	Count number of 1's in (Xk) to Xi
DF	036	Xj, K	Go to K if Xj is definite
DXi	32	Xj+Xk	Floating DP sum of Xj and Xk to Xi
DXi	33	Xj-Xk	Floating DP difference of Xj and Xk to Xi
DXi	42	Xj*Xk	Floating DP product of Xj and Xk to Xi
EQ	04	K	Go to K
EQ	04	Bi, Bj, K	Go to K if Bi=Bj
FXi	30	Xj+Xk	Floating sum of (Xj) and (Xk) to Xi
FXi	31	Xj-Xk	Floating difference of (Xj) and (Xk) to Xi

Mnemonic	fm (i)	Address	Name
FXi	40	Xj*Xk	Floating product of (Xj) and (Xk) to Xi
FXi	44	Xj/Xk	Floating divide (Xj) by (Xk) to Xi
GE	06	Bi, Bj, K	Go to K if (Bi) $\geq$ (Bj)
GE	06	Bi, K	Go to K if (Bi) $\geq$ 0
GT	07	Bj, Bi, K	Go to K if (Bj) > (Bi)
GT	07	Bj, K	Go to K if (Bj) > 0
ID	037	Xj, K	Go to K if Xj is indefinite
IR	034	Xj, K	Go to K if Xj is in range
IXi	36	Xj+Xk	Integer sum of Xj and Xk to Xi
IXi	37	Xj-Xk	Integer difference of Xj and Xk to Xi
IXi	42	Xj*Xk	Integer product of (Xj) and (Xk) to Xi
JP	02	Bi+Bk	Go to Bi+K
LE	06	Bj, Bi, K	Go to K if (Bj) $\leq$ (Bk)
LE	06	Bj, K	Go to K if (Bj) $\leq$ 0
LT	07	Bi, Bj, K	Go to K if (Bi) < (Bj)
LT	07	Bi, K	Go to K if (Bi) < 0
LXi	22	Bj, Xk	Logical shift (Xk) nominally (Bj) places to Xi
LXi	22	Bj	Logical shift (Xi) by (Bj) to Xi
LXi	22	Xk	Transmit (Xk) to Xi
LXi	22	Xk, Bj	Logical shift (Xk) by (Bj) to Xi
MI	033	Xj, K	Go to K if (Xj) = negative
MI	07	Bi, K	Go to K if (Bi) < 0
MXi	43	$\pm$jk	Form mask in Xi, $\pm$ jk bits
NE	05	Bi, Bj, K	Go to K if Bi $\neq$ Bj
NG	033	Xj, K	Go to K if Xj = negative
NG	07	Bi, K	Go to K if Bi < B0
NO	46		No operation
NXi	24	Bj, Xk	Normalize (Xk) in Xi and Bj

Mnemonic	fm (i)	Address	Name
NXi, Bj	24	Xk	Normalize (Xk) to Xi and Bj
NXi	24		Normalize (Xi) to Xi
NXi, Bj	24		Normalize (Xi) to Xi and Bj
NXi	24	Xk	Normalize (Xk) to Xi
NXi	24	Xk, Bj	Normalize (Xk) to Xi and Bj
NZ	031	Xj, K	Go to K if Xj ≠ 0
NZ	05	Bi, K	Go to K if Bi ≠ B0
OR	035	Xj, K	Go to K if Xj is out of range
PL	032	Xj, K	Go to K if Xj = positive
PL	06	Bi, K	Go to K if Bi ≥ B0
PS	00		Program stop
PXi	27		Pack (Xi) to Xi
PXi	27	Bj, Xk	Pack (Xk) and (Bj) to Xi
PXi	27	Bj	Pack (Xi) and (Bj) to Xi
PXi	27	Xk	Pack (Xk) to Xi
PXi	27	Xk, Bj	Pack (Xk) and (Bj) to Xi
RE	011	Bj+K	Read extended core storage
RJ	01	K	Return jump to K
RXi	34	Xj+Xk	Round floating sum of Xj and Xk to Xi
RXi	35	Xj-Xk	Round floating difference of Xj and Xk to Xi
RXi	41	Xj+Xk	Round floating product of Xj and Xk to Xi
RXi	45	Xj/Xk	Round floating divide Xj by Xk to Xi
SAi	50	Aj+K	Set Ai to (Aj) + K
SAi	50†	Aj-K	Set Ai to (Aj) + comp. of K
SAi	51	Bj+K	Set Ai to (Bj) + K
SAi	51†	Bj-K	Set Ai to Bj + comp. of K

†If the sign in the address field is minus, COMPASS complements the 18-bit quantity K.

Mnemonic	fm (i)	Address	Name
SAi	51	K	Set Ai to K+0
SAi	52	Xj+K	Set Ai to (Xj)+K
SAi	52 †	Xj-K	Set Ai to (Xj) + comp. of K
SAi	53	Xj+Bk	Set Ai to (Xj)+(Bk)
SAi	53	Bk+Xj	Set Ai to (Bk)+(Xj)
SAi	53	Xj	Set Ai to (Xj)
SAi	54	Aj+Bk	Set Ai to (Aj)+(Bk)
SAi	54	Bk+Aj	Set Ai to (Bk)+(Aj)
SAi	54	Aj	Set Ai to (Aj)+0
SAi	55	Aj-Bk	Set Ai to (Aj)-(Bk)
SAi	55	-Bk+Aj	Set Ai to (Aj)-(Bk)
SAi	56	Bj+Bk	Set Ai to (Bj)+(Bk)
SAi	56	Bj	Set Ai to (Bj)+0
SAi	57	Bj-Bk	Set Ai to (Bj)-(Bk)
SAi	57	-Bk	Set Ai to 0-(Bk)
SAi	57	-Bk+Bj	Set Ai to (Bj)-(Bk)
SBi	60	Aj+K	Set Bi to (Aj)+K
SBi	60 †	Aj-K	Set Bi to (Aj) complement of K
SBi	61	Bj+K	Set Bi to (Bj)+K
SBi	61 †	Bj-K	Set Bi to (Bj)+complement of K
SBi	61	K	Set Bi to K+0
SBi	62	Xj+K	Set Bi to (Xj)+K
SBi	62	Xj-K	Set Bi to (Xj)+complement of K
SBi	63	Bk+Xj	Set Bi to (Bk)+(Xj)
SBi	63	Xj	Set Bi to (Xj)+0
SBi	64	Aj+Bk	Set Bi to (Aj)+(Bk)
SBi	64	Bk+Aj	Set Bi to (Bk)+(Aj)
SBi	64	Aj	Set Bi to (Aj)+0
SBi	65	Aj-Bk	Set Bi to (Aj)-(Bk)
SBi	65	-Bk+Aj	Set Bi to (Aj)-(Bk)

†If the sign in the address field is minus, COMPASS complements the 18-bit quantity K.

Mnemonic	fm (i)	Address	Name
SBI	66	Bj+Bk	Set Bi to(Bj)+(Bk)
SBi	66	Bj	Set Bi to (Bj)+0
SBi	67	Bj-Bk	Set Bi to (Bj)-(Bk)
SBi	67	-Bk	Set Bi to 0-(Bk)
SBi	67	-Bk+Bj	Set Bi to (Bj)-(Bk)
SXi	70	Aj+K	Set Xi to (Aj)+K
SXi	70†	Aj-K	Set Xi to (Aj)+complement of K
SXi	71	Bj+K	Set Xi to (Bj)+K
SXi	71†	Bj-K	Set Xi to (Bj)+complement of K
SXi	71	K	Set Xi to K+0
SXi	72	Xj+K	Set Xi to (Xj)+K
SXi	72†	Xj-K	Set Xi to (Xj)+complement of K
SXi	73	Xj+Bk	Set Xi to (Xj)+(Bk)
SXi	73	Xj	Set Xi to (Xj)+(B0)
SXi	73	Bk+Xj	Set Xi to (Bk)+(Xj)
SXi	74	Aj+Bk	Set Xi to (Zj)+(Bk)
SXi	74	Bk+Aj	Set Xi to (Bk)+(Aj)
SXi	74	Aj	Set Xi to (Aj)+(B0)
SXi	75	Aj-Bk	Set Xi to (Aj)-(Bk)
SXi	75	-Bk+Aj	Set Xi to (Aj)-(Bk)
SXi	76	Bj+Bk	Set Xi to (Bj)+(Bk)
SXi	76	Bj	Set Xi to (Bj)+(B0)
SXi	77	Bj-Bk	Set Xi to (Bj)-(Bk)
SXi	77	-Bk	Set Xi to (B0)-(Bk)
SXi	77	-Bk+Bj	Set Xi to (Bj)-(Bk)
UXi	26	Bj,Xk	Unpack (Xk) to Xi and Bj
UXi,Bj	26	Xk	Unpack (Xk) to Xi and Bj
UXi	26		Unpack (Xi) to Xi
UXi,Bj	26		Unpack (Xi) to Xi and Bj
UXi	26	Xk	Unpack (Xk) to Xi

†If the sign in the address field is minus, COMPASS complements the 18-bit quantity K.

Mnemonic	fm (i)	Address	Name
UXi	26	Xk, Bj	Unpack (Xk) to Xi and Bj
WE	012	Bj+K	Write extended core storage
XJ	013		Exchange jump
ZR	030	Xj, K	Go to K if Xj = 0
ZR	04†	Bi, K	Go to K if Bi = B0
ZXi	25	Bj, Xk	Round and normalize (Xk) to Xi and Bj
ZXi, Bj	25	Xk	Round and normalize (Xk) to Xi and Bj
ZXi	25		Round and normalize (Xi) to Xi
ZXi, Bj	25		Round and normalize (Xi) to Xi and Bj
ZXi	25	Xk	Round and normalize (Xk) to Xi
ZXi	25	Xk, Bj	Round and normalize (Xk) to Xi and Bj

EXIT MODE

EM = 000000	Normal stop
= 010000	Address out of range; an attempt to reference memory outside established limits
= 020000	Operand out of range; floating point arithmetic generated or regenerated an infinite result
= 030000	Address or operand out of range
= 040000	Indefinite operand; floating point arithmetic generated or regenerated an indefinite result
= 050000	Indefinite operand or address out of range
= 060000	Indefinite operand or operand out of range
= 070000	Indefinite operand or operand or address out of range

†For this instruction, COMPASS packs the instruction so Bi is compared with B0 rather than Bj.

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

All times are given the minor cycles: one minor cycle equals 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	Unack (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 - 6400/6500/6600

All times are given in minor cycles; one minor cycle equals 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 five minor cycles.

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	Noramlize (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 five minor cycles.

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 minor cycles
i = 1-5, time = 12 minor cycles
i = 6-7, time = 10 minor cycles

EXTERNAL FUNCTION CODES

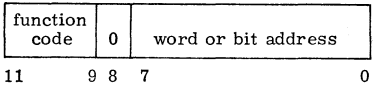
EXTERNAL FUNCTION CODES AND STATUS RESPONSES †

STATUS/CONTROL REGISTERS

DESCRIPTOR WORD FORMAT

The descriptor word has 12 bits and defines a word or bit address and a function code.

Descriptor Word



Function Code	Description
0	Read word
1	Test bit
2	Clear bit
3	Test/clear bit
4	Set bit
5	Test/set bit
6	Clear all bits
7	Test error bits

†NOS does not support all of the equipment presented in this section. For a list of devices supported by NOS, refer to the NOS Operator's Guide, publication no. 60435600.

BIT ASSIGNMENTS

The significance of each column, in the following list, is as follows:

Column	Description
Word	Register word listed in octal
Bit No.	Register bit listed in decimal
Mod	CDC CYBER 170 models that bit is applicable to (All = all models, 2 = 172, 3 = 173, 4 = 174, 5 = 175)
S/C	Status (S) or control (C) bit
Prgm Fctn	Applicable programming functions:
	TE Read, test, clear, test/clear, set, test/set, clear all, and test error (status bit included in test error)
	R Read
	D Read, test, clear, test/clear, test, test/set, and clear all
	blank Read, test, clear, test/clear, set, test/set, and clear all
Notes	Applicable notes follow list

The channel 36 S/C register is available for 20 PPU systems and is applicable to bits 0, 6, 7, 12-35, 37, 38, 60-83, 85, 95, 120-126, 174, 175, 188, and 189.

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
0	0	Read pyramid parity error	All	S	TE	
	1	CSU-0 address parity error	All	S	TE	
	2	CSU-1 address parity error	All	S	TE	
	3	SECDED error	All	S	TE	1
	4	Not used				
	5	CMC parity error	All	S	TE	2
	6	PE on data received from external channel	All	S	TE	
	7	PE on data transmitted from external PP	All	S	TE	
	8	CSU-0 fault	All	S	TE	
	9	CSU-1 fault	All	S	TE	
	10	Error in second PPS	All	S	TE	3
	11	ECS error	All	S	TE	4
1	12	CP-0 P register parity error	All	S	TE	
	13	CP-1 P register parity error	4	S	TE	
	14	PP0 memory parity error	All	S	TE	
	15	PP1 memory parity error	All	S	TE	
	16	PP2 memory parity error	All	S	TE	
	17	PP3 memory parity error	All	S	TE	
	18	PP4 memory parity error	All	S	TE	
	19	PP5 memory parity error	All	S	TE	
	20	PP6 memory parity error	All	S	TE	

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
	21	PP7 memory parity error	All	S	TE	
	22	PP8 memory parity error	All	S	TE	
	23	PP9 memory parity error	All	S	TE	
2	24	Channel 0 parity error	All	S	TE	5
	25	Channel 1 parity error	All	S	TE	5
	26	Channel 2 parity error	All	S	TE	5
	27	Channel 3 parity error	All	S	TE	5
	28	Channel 4 parity error	All	S	TE	5
	29	Channel 5 parity error	All	S	TE	5
	30	Channel 6 parity error	All	S	TE	5
	31	Channel 7 parity error	All	S	TE	5
	32	Channel 10 parity error	All	S	TE	5
	33	Channel 11 parity error	All	S	TE	5
	34	Channel 12 parity error	All	S	TE	5
	35	Channel 13 parity error	All	S	TE	5

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
3	36	Mains power failure	All	S	TE	6
	37	Shutdown imminent	All	S	TE	6
	38	Not used			TE	
	39	Not used			TE	
	40	Syndrome bit 0	All	S	R	7
	41	Syndrome bit 1	All	S	R	7
	42	Syndrome bit 2	All	S	R	7
	43	Syndrome bit 3	All	S	R	7
	44	Syndrome bit 4	All	S	R	7
	45	Syndrome bit 5	All	S	R	7
	46	Syndrome bit 6	All	S	R	7
	47	Syndrome bit 7	All	S	R	7
4	48	Syndrome address bit 0	All	S	R	7
	49	Syndrome address bit 1	All	S	R	7
	50	Syndrome address bit 2	All	S	R	7
	51	Syndrome address bit 16	All	S	R	7
	52	Syndrome address bit 17	All	S	R	7
	53	Syndrome address bit 3	All	S	R	7
	54	Parity error port code bit 0	All	S	R	8
	55	Parity error port code bit 1	All	S	R	8
	56	Breakpoint port code bit 0	All	S	R	9
	57	Breakpoint port code bit 1	All	S	R	9
	58	Breakpoint function code bit 0	All	S	R	9
	59	Breakpoint function code bit 1	All	S	R	9

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
5	60	PPS P register bit 0	All	S	R	10
	61	PPS P register bit 1	All	S	R	10
	62	PPS P register bit 2	All	S	R	10
	63	PPS P register bit 3	All	S	R	10
	64	PPS P register bit 4	All	S	R	10
	65	PPS P register bit 5	All	S	R	10
	66	PPS P register bit 6	All	S	R	10
	67	PPS P register bit 7	All	S	R	10
	68	PPS P register bit 8	All	S	R	10
	69	PPS P register bit 9	All	S	R	10
	70	PPS P register bit 10	All	S	R	10
	71	PPS P register bit 11	All	S	R	10
6	72	PP code bit 0	All	S	R	10
	73	PP code bit 1	All	S	R	10
	74	PP code bit 2	All	S	R	10
	75	PP code bit 3	All	S	R	10
	76	PPS breakpoint bit	All	S		
	77	CMC break-point match	All	S		11
	78	Clear central memory busy	All	C		12
	79	Set C5 full	All	C		13
	80	Force zero parity on channels	All	C	D	13
	81	Force zero parity on PPM	All	C	D	

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
	82	Not used				
	83	PPS breakpoint mode select	All	C	D	10
7	84	All PPs 500-nsec major cycle	All	C	D	14
	85	Inhibit PPS request to CMC	All	C	D	
	86	Not used				
	87	Not used				
	88	Not used				
	89	Not used				
	90	Not used				
	91	Not used				
	92	Not used				
	93	Not used				
	94	Not used				
	95	Stop on PPM parity error	All	C	D	15
10	96	Breakpoint address bit 0	All	C		16
	97	Breakpoint address bit 1	All	C		16
	98	Breakpoint address bit 2	All	C		16
	99	Breakpoint address bit 3	All	C		16
	100	Breakpoint address bit 4	All	C		16
	101	Breakpoint address bit 5	All	C		16
	102	Breakpoint address bit 6	All	C		16
	103	Breakpoint address bit 7	All	C		16
	104	Breakpoint address bit 8	All	C		16
	105	Breakpoint address bit 9	All	C		16

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
	106	Breakpoint address bit 10	All	C		16
	107	Breakpoint address bit 11	All	C		16
11	108	Breakpoint address bit 12	All	C		
	109	Breakpoint address bit 13	All	C		
	110	Breakpoint address bit 14	All	C		
	111	Breakpoint address bit 15	All	C		
	112	Breakpoint address bit 16	All	C		
	113	Breakpoint address bit 17	All	C		
	114	Breakpoint condition code bit 18	All	C		17
	115	Breakpoint condition code bit 19	All	C		17
	116	Breakpoint condition code bit 20	All	C		17
	117	Breakpoint condition code bit 21	All	C		17
	118	Inhibit single error report	All	C		29
	119	Not used				
12	120	PP select code bit 0	All	C	D	18
	121	PP select code bit 1	All	C	D	18
	122	PP select code bit 2	All	C	D	18
	123	PP select code bit 3	All	C	D	18
	124	PP select auto/ manual mode	All	C	D	19

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
	125	Force exit on selected PP	All	C	D	13
	126	Force PP dead-start on selected PP	All	C	D	20
	127	CSU, CMC, CPU master clear	All	C	D	
	128	Force zero SECDED code and parity CMC to CM	All	C		
	129	Force zero address parity CMC to CM	All	C		
	130	Not used				
	131	Not used				
13	132	Force zero parity code 0	All	C		21
	133	Force zero parity code 1	All	C		21
	134	Refresh margin slow	All	C		
	135	Refresh margin fast	All	C		
	136	ECS transfer error code 0	All	S	R	4
	137	ECS transfer error code 1	All	S	R	4
	138	ECS transfer error code 2	All	S	R	4
	139	CMC adrs/data parity error	All	S	R	
	140	Not used				
	141	Clock frequency magnitude 0	All	C	D	22
	142	Clock frequency magnitude 1	All	C	D	22
	143	Clock frequency slow/fast	All	C	D	23

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
14	144	RVM address bit 0 status	5	S		24
	145	RVM address bit 1 status	5	S		24
	146	RVM address bit 2 status	5	S		24
	147	RVM address bit 3 status	5	S		24
	148	RVM address bit 4 status	5	S		24
	149	RVM address bit 5 status	5	S		24
	150	RVM hi/lo	5	S		25
	151	RVM all/one	5	S		26
	152	Clock pulse width narrow	5	C		
	153	Clock pulse width wide	5	C		
	154	Select hi/lo RVM	5	C		25
	155	Select all/one RVM	5	C		26
15	156	RVM quadrant 0 select	5	C		
	157	RVM quadrant 1 select	5	C		
	158	RVM quadrant 2 select	5	C		
	159	RVM quadrant 3 select	5	C		
	160	RVM quadrant 4 select	5	C		
	161	RVM quadrant 5 select	5	C		
	162	RVM quadrant 6 select	5	C		
	163	RVM quadrant 7 select	5	C		
	164	RVM quadrant 8 select	5	C		

Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
	165	RVM quadrant 9 select	5	C		
	166	RVM quadrant 10 select	5	C		
	167	RVM quadrant 11 select	5	C		
16	168	RVM module address bit 0	5	C		
	169	RVM module address bit 1	5	C		
	170	RVM module address bit 2	5	C		
	171	RVM module address bit 3	5	C		
	172	RVM module address bit 4	5	C		
	173	RVM module address bit 5	5	C		
	174	PPS to CMC zero address parity	All	C		
	175	PPS to CMC zero data parity	All	C		
	176	Not used				
	177	Not used				
	178	Not used				
	179	Not used				
17	180	Not used				
	181	Not used				
	182	Not used				
	183	Double error	All	S		
	184	CP-0 to CMC zero address parity	2,3,4	C		
	185	CP-1 to CMC zero address parity	4	C		
	186	CP-0 to CMC zero data parity	2,3,4	C		

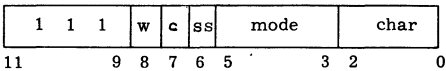
Word	Bit No.	Description	Mod	S/C	Prgm Fctn	Notes
	187	CP-1 to CMC zero data parity	4	C		
	188	Software flag 0	All	C		27
	189	Software flag 1	All	C		27
	190	Not used				
	191	Not used				
20	192	CP-0 stopped	All	S	R	
	193	CP-1 stopped	4	S	R	
	194	ECS in progress flag	All	S	R	
	195	Monitor flag CP-0	All	S	R	
	196	Monitor flag CP-1	4	S	R	
	197	PPM reconfiguration bit 0	All	S	R	
	198	PPM reconfiguration bit 1	All	S	R	
	199	PPM reconfiguration bit 2	All	S	R	
	200	PPM reconfiguration bit 3	All	S	R	
	201	PPM reconfiguration bit 4	All	S	R	28
	202	Not used				
	203	Not used				

NOTES

1. Loads and blocks bits 40 through 53
2. Loads and locks bits 54, 55, and 139
3. Tests 0 through 39 of PPS-1
4. Bit 11 loads and locks bits 136 through 138
5. For channel 36, channel numbers 20 through 33 (octal) apply
6. Power/environmental abnormal condition
7. Loaded and locked by bit 3
8. From CMC, identifies port, loaded and locked by bit 5
9. Loaded and locked by bit 77
10. If bit 83 is clear, bits 60 through 71 display P of the PPU selected by bits 120 through 123, and bits 72 through 75 display selected PP. If bit 83 is set, the content of P register is latched and retained on every CM breakpoint bit. If bit 76 sets when bit 83 is set, bits 60 through 75 are held until bit 76 is cleared.
11. Loads and locks bits 56 through 59
12. Clear busy FF in PPS
13. One-shot operation
14. Controls PPS-0 and PPS-1
15. Applies to all PPUs
16. Absolute 18-bit address (Bits 96 through 113 are sent to and used by CMC to establish breakpoint address when bits 116 and/or 117 are set.)
17. Select function RD/WT/RNI or all three to CMC for port selection
18. Select 1 of 10 PPUs for forced exit, deadstart, or display
19. Clear = manual
20. Set forces deadstart (PPU remains in deadstart condition until bit is cleared.)
21. ECS coupler
22. Bits 141 through 143 are coded bits for selecting clock margins
23. Clear = fast
24. Indicates module with reference voltage margins (RVM) applied
25. Clear = lo
26. Clear = one
27. Diagnostic aids
28. PPS select
29. Single errors are not recorded in SCR when set

SYSTEM CONSOLE DISPLAY

Select Word



w	= 0	Single screen display†
	= 1	Simultaneous screen display†
c	= 0	Console 0
	= 1	Console 1
ss	= 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

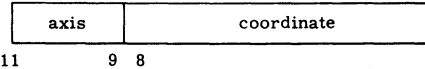
†Applicable to CDC CYBER 170 series only.

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

Data Word

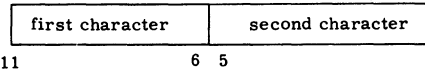
Dot Mode



11 9 8 0

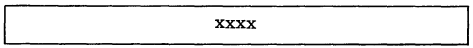
axis = 6 x axis
= 7 y axis

Character mode



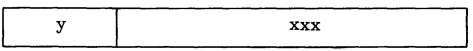
11 6 5 0

Equipment Select



xxxx = 2000 select converter
= 2100 deselect converter

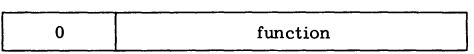
Mode I Connect Word



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

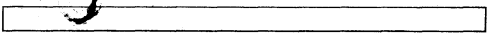
xxx = Unit to be connected

Mode I Function Word



function = 9-bit function code

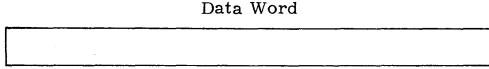
Mode II Function Word



11 0

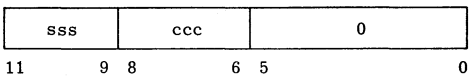
Connect:	1000	Select 668X to output a 12-bit connect code
Function:	1100	Select 668X to output a 12-bit function code to external equipment already selected
Status:	1200	668X status request
	1300	External equipment status request
Status reply:	xxx1	Reject (internal or external)
	xxx2	Internal reject
	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

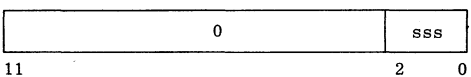
Equipment Select



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

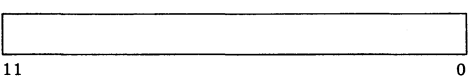
ccc = 0 Output
= 1 Input
= 2 Status request

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:

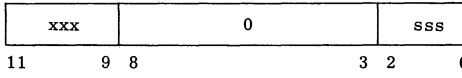
26 ETN d	Extended core transfer; initiate extended core storage operation
27 ESN d	Read extended core coupler status

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

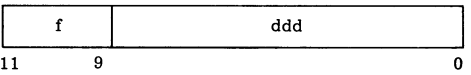
Function Select Word



xxx = Setting of the equipment number switches

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

Controller Data Word Function Codes

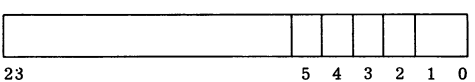


f = 0 Do nothing.
= 1 Enables receiver section of the DSC to resync.
= 2 Turns off carrier.
= 3 Turns off carrier and allows receiver to resync.
= 4 Turns on the carrier. Must be appended to all data words.
= 5 Turns on the carrier and resyncs the reciever.
= 6 Resyncs the receiver and enables the carrier,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

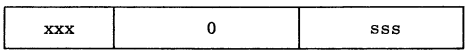
Status Word



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

6676 DATA SET CONTROLLER

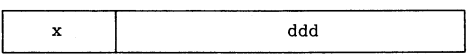
Function Select Word



xxx = Equipment select switch setting

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

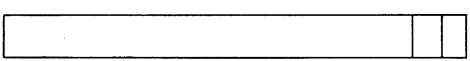
I/O Control Codes



x = 6 Disconnect modem
= 4 Output required

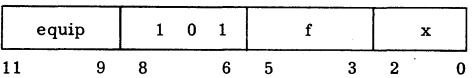
ddd = Data, when x is set to 4; otherwise, it is zero

Status Word Format



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

External Function Code Word

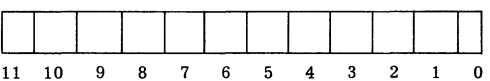


equip = Equipment number

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

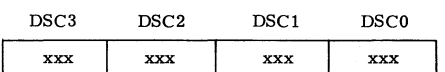
x = Number assigned to the selected DSC, except in status-all request where x=4.

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

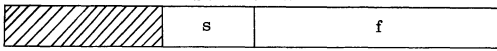
DISTRIBUTIVE DATA PATH

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



f = Function code

s = Subfunction 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

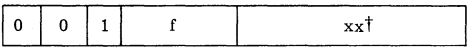
DETAILED STATUS (bits set in 8-word block)

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

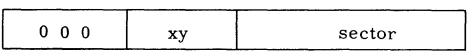
Word	Bits	Description
5	11	Forward tape motion if zero, backward if set
	10-8	Tape speed; 1=100 ips, 2=150 ips, 4=200 ips
	7-6	Tape density; 0=200 or 556 cpi, 1=800 cpi, 2=1600 cpi
	5	Access error
	4	Unit write and erase currents are on
	3-0	Unit cable connector address in the tape control unit
6	11-9	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

Function Word



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)

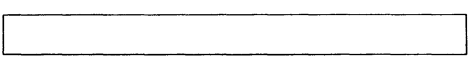
Status Reply Word



x = 0 Ready
= 1 Not ready

y = 0 No parity error
= 1 Parity error

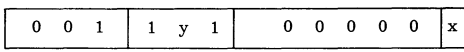
Data Word



†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.

6638 DISK SYSTEM (6639 DISK CONTROLLER)

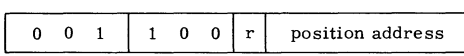
Connect and Status



x = unit

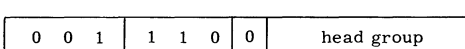
y = 0 Second status word
= 1 First status word

Position Select



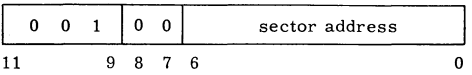
r = 0 No retract
= 1 Retract

Head Group Select

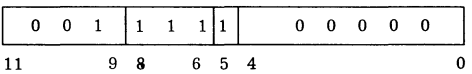


Write

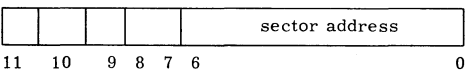
Read



Disconnect

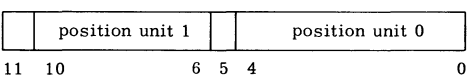


First Status Word



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

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)

3518/3528 MAGNETIC TAPE CONTROLLER

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-file mark/write tape mark
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
0X50	Set Clip X = 0 IRG ^ Norm
STATUS CODES	1 " Low
	2 Write
	3 Hi

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
x1xx	Not used Crowd, Dropout, false ECC
x2xx	Not used Phase error corrected
x4xx	Not used false postamble
1xxx	End of operation
2xxx	Alert
4xxx	Tape unit reserved for other control (not used in 1x8)

or cold start?

3446/3644 CARD PUNCH CONTROLLER

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 $\overline{\text{Busy}}$ 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

3553 DISK STORAGE CONTROLLER

CONNECT CODES

n0du††	Connect 3553 and storage unit

†Applicable to 580 Line Printer only.

††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 $\overline{\text{Busy}}$
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
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 $\leq$ buffer)
0051	Magnitude search (record $\geq$ 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 (8553-2) 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

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

3436/3637 DRUM CONTROLLER

CONNECT CODES

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

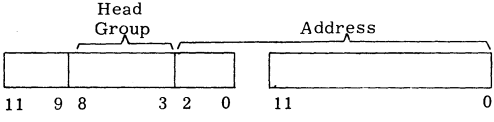
FUNCTION CODES

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

†3637 drum controller only

STATUS CODES

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

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

† 3637 drum controller only

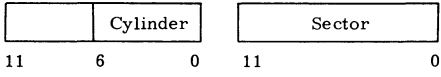
FUNCTION CODES

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
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$\leq$buffer)
0051	Magnitude search (record$\geq$buffer)
0052	Magnitude search (record=buffer)
0053	Buffer mode
0054	End-of-record mode

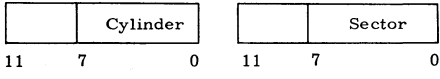
STATUS CODES

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)
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:



†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.

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