1.2 Scheduler - IOCS Interface

I/O Initiation

A task issues an SVC to enter IOCS. I/O services for pretransfer processing are then executed at the software priority level of the requesting task. Once the I/O request has been initiated (or queued for initiation), an H.EXEC entry point is called to report the event to the CPU and swapping scheduler:

<table>
<thead>
<tr>
<th>Entry Point</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.EXEC,1</td>
<td>Interactive input starting</td>
</tr>
<tr>
<td>H.EXEC,2</td>
<td>Terminal output starting</td>
</tr>
<tr>
<td>H.EXEC,3</td>
<td>Wait I/O starting</td>
</tr>
<tr>
<td>H.EXEC,4</td>
<td>No-wait I/O starting</td>
</tr>
</tbody>
</table>

Wait I/O Post Processing

A return will be made to IOCS from H.EXEC,1, 2, or 3 only upon completion of the I/O request. Post transfer processing may then occur at the software priority level of the requesting task.

No-Wait I/O Post Processing

A return from H.EXEC,4 will be made immediately after recording the no-wait I/O event. Since IOCS will also make an immediate return to the user task, no-wait I/O post transfer processing will occur as a task interrupt service.

No-Wait I/O Completion Task Interrupt Service

When the I/O handler interrupt service routine fields a completion interrupt for a no-wait I/O request, it will call the executive subroutine S.EXEC4 to report the event. The I/O queue entry associated with the call will be linked to the task interrupt list in the DQE of the task which made the I/O request. When the scheduler attempts to dispatch control to the task, it will discover that a task interrupt is outstanding. It should be noted that task interrupts are inhibited during execution of any system service on behalf of a task. It should also be noted that no task interrupt will be honored while a higher priority task interrupt is active. When the task interrupt is honored, control will be transferred to the IOCS routine specified in the Preemptive System Service Header of the I/O queue entry. Post transfer processing may then occur at the software priority level of the requesting task. When post processing of the no-wait I/O request is complete, the task interrupt service may be exited by a call to S.EXEC6 or H.EXEC,12.

No-Wait I/O Restrictions for System Services

Post transfer processing for a no-wait I/O request is processed as a task interrupt. Task interrupts are not honored while the task is executing in a system service (PC .LE. TSA address). An exception to this rule is made for a task that is in a wait-for-any-no-wait-I/O-completion state. A task interrupt generated by the completion of no-wait I/O will be honored if the task is in the wait-for-any-no-wait-I/O-completion state. A system service desiring to do no-wait I/O may issue a series of no-wait calls followed by a wait-for-any-call. Care should be exercised to insure that all outstanding calls are completed as appropriate.
Scheduler - IOCS Interface - IOCS No-Wait I/O Post Processing Overview

IOCS TASK INTERRUPT FROM SCHEDULER

POST PROCESSING COMPLETE

RETRY

RECONSTRUCT INITIATION ENVIRONMENT

USER NO-WAIT I/O SERVICE

H.EXEC, 12 NO RETURN CONTINUE TASK AT POINT OF INTERRUPT OR CONTINUE WAIT FOR ANY I/O COMPLETION

INITIATE I/O

IOCS FROM SVC TO EXIT USER NO-WAIT I/O SERVICE

S.EXEC6 NO RETURN CONTINUE TASK AT POINT OF INTERRUPT OR CONTINUE WAIT FOR ANY I/O COMPLETION

H.EXEC, 12 NO RETURN CONTINUE TASK AT POINT OF INTERRUPT OR CONTINUE WAIT FOR ANY I/O COMPLETION

MPX-32 Technical Manual System Description 1-5
Scheduler - IOCS Interface - IOCS Initiate I/O Procedure

INITIATE I/O PROCEDURE
FROM WAIT I/O SVC,
OR FROM NO-WAIT
TASK INTERRUPT

BEI

HANDLER
ENTRY
POINT 2

M.SHUT

UEI

H.EXEC, 1
INTERACTIVE
INPUT
STARTING

H.EXEC, 2
TERMINAL
OUTPUT
STARTING

H.EXEC, 3
WAIT I/O
STARTING

H.EXEC, 4
NO-WAIT I/O
STARTING

RETURN WHEN
I/O COMPLETE

RETURN
TO IOCS
POINT OF CALL

RETURN
AFTER
EVENT RECORDED
Scheduler - I/O Interrupt - Interface, Procedures

START

ENTER UNBLOCKED WITH LEVEL ACTIVE

INCREMENT GLOBAL INTERRUPT COUNT

PROCESSING AS REQUIRED FOR THIS LEVEL

S.EXEC1 REPORT EVENT INTERACTIVE INPUT COMPLETE
S.EXEC2 REPORT EVENT TERMINAL OUTPUT COMPLETE
S.EXEC3 REPORT EVENT WAIT I/O COMPLETE
S.EXEC4 REPORT EVENT NO-WAIT I/O COMPLETE

SET BLOCKED, DEACTIVATE LEVEL

S.EXEC5 STANDARD INTERRUPT EXIT PROCEDURE
Scheduler - I/O Interrupt Interface, Reentrant Subroutines

INTERRUPT SERVICE ROUTINES

X3 = ADDRESS OF SCRATCHPAD

INTERRUPT CONTEXT BLOCK 22 WORD SCRATCHPAD

X3 = ADDRESS OF SCRATCHPAD

S.EXECX

S.EXECX

TSA PUSH DOWN LEVEL 22 WORD SCRATCHPAD

SVC

SVC

MONITOR SERVICE

X3 = ADDRESS OF SCRATCHPAD

S.EXECX

USE X3 AS SCRATCHPAD INDEX

M.RTRN

TRSW R0 RETURN

830666A
Preemptive System Service List Entry Header Format

<table>
<thead>
<tr>
<th>0</th>
<th>String Forward Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>String Back Address</td>
</tr>
<tr>
<td>2</td>
<td>Priority</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>PSD Word 1</td>
</tr>
<tr>
<td>5</td>
<td>PSD Word 2</td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>
1.3 I/O Overview From User Request to I/O Complete
name is the name of a system module

num is an entry point number (1,2,3,...) within the system module

### 1.12.3 M.CLSE

This macro marks a file closed to subsequent service. An end-of-file mark can be written and a rewind can be performed.

Calling Sequence:

```
M.CLSE  addr, [EOF], [REW]
```

addr is the FCB address

EOF specifies an end-of-file mark is to be written

REW specifies the file is to be rewound

### 1.12.4 M.DFCB

This macro creates a File Control Block (FCB) and sets the appropriate parameters and specifications common to I/O requests which will be issued for the file.

Calling Sequence:

```
M.DFCB  label, lfc, [count], [addr1], [addr2], [addr3],
        [NWT], [NER], [DF1],
        [NST], [RAN], [ASC]  [LDR], [INT], [EVN], [556],
        [BIN], [MLD], [PCK], [OOD], [800]
```

label is the ASCII character string to be used as the symbolic label for the address of the FCB

lfc is the 1-3 character ASCII string to be used as the logical file code in the FCB

count is the transfer count (bytes)

addr1 is the data transfer address

addr2 is the error return address

addr3 is the random access address expressed as the hexadecimal block number (zero origin) relative to the base of the random access file
NWT is the no-wait I/O specification indicator
NER is the inhibit peripheral error processing indicator
DFI is the inhibit data formatting indicator
NST is the inhibit status testing indicator
RAN is the random access mode indicator
ASC or BIN is the forced ASCII or forced binary mode specification, respectively, for read operations performed when the file code for this file is assigned to a card reader
LDR or NLD is the skip leader or do not skip leader specification, respectively, when the file code for this file is assigned to a paper tape reader/punch device
INT or PCK is the interchange or packed mode specification, respectively, when the file code for this file is assigned to a magnetic tape device
EVEN or ODD is the even or odd parity specification, respectively, when the file code for this file is assigned to a magnetic tape device
556 or 800 is the 556 or 800 bpi tape density specification, respectively, when the file code for this file is assigned to a magnetic tape device

1.12.5 M.DFCBE

This macro creates an expanded File Control Block (FCB) and sets the appropriate parameters and specifications common to I/O requests which will be issued for the file.

Calling Sequence:

M.DFCBE label,lfc, [count], [addr1], [addr2], [addr3], [NWT], [NER], [DFI],
[NST], [RAN], [ASC], [BIN], [LDR], [INT], [EVEN], [ODD], [556], [800],
[addr4], [addr5]

label is the ASCII character string to be used as the symbolic label for the address of the FCB
lfc is the 1-3 character ASCII string to be used as the logical file code in the FCB
count is the transfer count in bytes
1.12.7 MFCBEXP

This macro defines a File Control Block (FCB) to be used for an Execute Channel Program request.

Calling Sequence:

\[
\text{M.FCBEXP \ label, lfc, [cpaddr], [tout], [PCP], [NWI], [NST], [ssize], [sbuffer], [nowait], [nowaiterror], [waiterror], [psize], [ppciadr]}
\]

- \text{label} is the ASCII string to use as the symbolic label for the address of the FCB
- \text{lfc} is the logical file code, word 0, bits 8-31 of the FCB
- \text{cpaddr} is the logical address of the channel program to be executed
- \text{tout} is the timeout value specified in seconds
- \text{PCP} specifies physical channel program
- \text{NWI} specifies no-wait I/O request
- \text{NST} specifies status checking not requested
- \text{ssize} is the size of the user specified sense buffer
- \text{sbuffer} is the address of the user specified sense buffer
- \text{nowait} is normal no-wait end action return address
- \text{nowaiterror} is no-wait end action error return address
- \text{waiterror} is wait end action error return address
- \text{psize} is size of PPCI status buffer to use
- \text{ppciaddr} PPCI end action address

1.12.8 MFWRD

This macro advances the current address of a blocked file by the number of file or record marks specified.

Calling Sequence:

\[
\text{M.FWRD \ addr, [R], [num]}
\]

- \text{addr} is the FCB address
### 2.7 Controller Definition Table (CDT)

The Controller Definition Table (CDT) is a system resident structure used to identify information required by handlers and the I/O processor for a specific controller. The CDT is built by the SYSGEN process, one for each controller configured on the system. The CDT identifies devices (UDTs) associated with the controller, the handler address associated with the controller, and defines other pertinent controller information.

<table>
<thead>
<tr>
<th>Word</th>
<th>0</th>
<th>7 8</th>
<th>15 16</th>
<th>23 24</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>String forward address (CDT.FIOQ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>String backward address (CDT.BIOQ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link priority (CDT.LPRI) See Note 1</td>
<td>Number of entries in list (CDT.IOCT) See Note 2</td>
<td>Class (CDT.CLAS) See Note 3</td>
<td>Reserved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDT index (CDT.INDX)</td>
<td>Device type code (CDT.DTC)</td>
<td>Interrupt priority level (CDT.IPL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number units on controller (CDT.NUOC)</td>
<td>Number requests outstanding (CDT.IORO)</td>
<td>Channel number (CDT.CHAN)</td>
<td>Subaddress of first device (CDT.SUBA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program number if reserved (CDT.PNRC)</td>
<td>Interrupt handler address (CDT.SIHA) or controller information block (CDT.CIF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flags (CDT.FLGS) See Note 4</td>
<td>UDT address of first device on controller (CDT.UDTA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I/O status (CDT.IOST) See Note 5</td>
<td>TI address (CDT.TIAD) or SI address if extended I/O (CDT.SIAD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UDT address unit 0* (CDT.UT0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UDT address Unit 1* (CDT.UT1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UDT address unit 15* (CDT.UTF)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Initialized by SYSGEN
Notes

1. Always zero (head cell)

2. Number of entries in list (zero if none)

3. Bits in CDT.CLAS are assigned as follows.

   X'0D'  TCW type with extended addressing capability
   X'0E'  TCW type
   X'0F'  Extended I/O

4. Bits in CDT.FLGS are assigned as follows.

   0  Extended I/O device (CDT.FCLS)
   1  I/O outstanding (set by handler, reset by IOCS) (CDT.IOU1)
   2  GPMC device (CDT.GPMC)
   3  Set if initialization (INC) needs to be performed for this controller
      (CDT.FINT)
   4  Set if D class (16MB GPMC) (CDT.XGPM)
   5  Used only when IOGs are linked to the CDT. Set when SIO is accepted by
      controller. Reset when IOQ is unlinked from CDT or when I/O is reported
      complete to IOCS in the case of operator intervention type errors
      (CDT.IOU5).
   6  If set, IOP controller (CDT.IOP)
   7  If set, controller malfunction (CDT.MALF)

5. Bits in CDT.IOST are assigned as follows.

   0  If set, IOQ linked to UDT (CDT.NIOQ)
   1  Multiplexing controller (CDT.MUXC)
   2  If set, use standard XIO interface
   3  If set, D-class GPMC (CDT.XGPM)
   4  If set, cache controller (CDT.CAC)
   5  If set, H.F8XIO has determined if the controller is pre-8512-2 or not
      (CDT.CKFL)
   6  If set, controller not pre-8512-2 (CDT.FLOW)
   7  Reserved for FMS

6. CDT.SIZE = 24W
### 2.8 Device Context Area (DCA)

A Device Context Area (DCA) exists for each active subchannel and serves as a storage area for information regarding the subchannel and its operation. The DCAs are physically located at the end of each device dependent handler (H.??XIO). The first 33 words of each DCA are identical; however, additional words may be added to suit the needs of the particular device. The following represents the first 33 words of each DCA.

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
<th>Value(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DCA size (DCA.SIZE)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Device address (DCA.UADD)</td>
<td>4000 0000</td>
</tr>
<tr>
<td></td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CHT address (DCA.CHTA)</td>
<td>46 20</td>
</tr>
<tr>
<td>3</td>
<td>CDT address (DCA.CDTA)</td>
<td>3E A0</td>
</tr>
<tr>
<td>4</td>
<td>UDT address (DCA.UDTA)</td>
<td>42 80</td>
</tr>
<tr>
<td>5</td>
<td>IOQ address (DCA.IOQA)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lost interrupt count (DCA.LINC)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Spurious interrupt count (DCA.SINC)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Total retry count this device (DCA.RETC)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Flags (DCA.FLAG) See Note 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retry count this request (DCA.RCNT)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>UDT address (DCA.NUDT) See Note 2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Status word 1 (DCA.WST1)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Status word 2 (DCA.WST2)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Number of reserves outstanding (DCA.RESC)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Time out value opcode 0 (DCA.TIM0) See Note 3</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Time out value opcode 1 See Note 3</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Time out value opcode F See Note 3</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Sense IOCD (DCA.SENI)</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Sense buffer (DCA.SENS)</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Notes

1. Bits in DCA.FLAG are assigned as follows.
   
   0     If set, interrupts not expected
   1     If set, HIO issued at LI.XIO
   2     If set, HIO needs to be reissued
   3     If set, device rewinding or seeking
   4     If set, sense issued without an IOQ
   5     If set, device is an XIO magnetic tape
   6-15  Reserved for common subroutine usage
   16-23 Reserved for device dependent handler usage

2. This UDT address is the UDT address of the device for which a SIO or HIO was issued when a status stored response was generated on behalf of this device. It indicates the need to reissue the I/O request for that device.

3. Time out values corresponding to opcodes 0 through F (16 entries).
<table>
<thead>
<tr>
<th>Word # (Decimal)</th>
<th>Byte (Hex)</th>
<th>0</th>
<th>7</th>
<th>8</th>
<th>15</th>
<th>16</th>
<th>23</th>
<th>24</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>DGE.SF</td>
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</tr>
<tr>
<td>1</td>
<td>4</td>
<td>DGE.SB</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2</td>
<td>8</td>
<td>DGE.CUP</td>
<td>DGE.BUP</td>
<td>DGE.IOP</td>
<td>DGE.US</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>DGE.NUM/DGE.TAN</td>
<td>DGE.ON</td>
<td>DGE.LMN</td>
<td>DGE.PSN</td>
<td>DGE.USW</td>
<td>DGE.UHF</td>
<td>DGE.MSD</td>
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</tr>
<tr>
<td>4-5</td>
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</table>

| 38-40 | 98 |      |      |      |      |      |      |      |      |
|        |    |      |      |      |      |      |      |      |      |
|        |    |      |      |      |      |      |      |      |      |
|        |    |      |      |      |      |      |      |      |      |

Dispatch Queue Entry (DGE) Table

The table above lists the dispatch queue entry (DGE) table, which contains various fields with hexadecimal values corresponding to different system tables and variables. The columns represent different offsets, with specific entries indicating which fields are encoded in those positions.
<table>
<thead>
<tr>
<th>Byte (Hex)</th>
<th>Symbol</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DGE.SF</td>
<td>String forward linkage address; Standard linked list format; Contains address of next (top-to-bottom) entry in chain.</td>
</tr>
<tr>
<td>4</td>
<td>DGE.SB</td>
<td>String backward linkage address; Standard linked list format; Contains address of next (bottom-to-top) entry in chain.</td>
</tr>
<tr>
<td>8</td>
<td>DGE.CUP</td>
<td>Current user priority; Field length = 1B; Standard linked list format; This priority is adjusted for priority migration based on situational priority increments. Situational priority increments are based on the base level priority (DGE.BUP) of the task.</td>
</tr>
<tr>
<td></td>
<td>DGE.BUP</td>
<td>Base priority of user task; Field length = 1B; Used by scheduler to generate DGE.CUP (current priority) based on any situational priority increments.</td>
</tr>
<tr>
<td></td>
<td>DGE.IOP</td>
<td>I/O priority; Field length = 1B; Initially set from base priority; Used for I/O queue priority.</td>
</tr>
<tr>
<td></td>
<td>DGE.US</td>
<td>State chain index for this user task; Field length = 1B; Range: Zero thru X'1E'; Indicates current state of this task e.g., ready-to-run priority, I/O wait, resource block, etc..</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Label</th>
<th>Index</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREE</td>
<td>00</td>
<td>DGE is available (in free list)</td>
</tr>
<tr>
<td>PREA</td>
<td>01</td>
<td>Task activation in progress</td>
</tr>
<tr>
<td>CURR</td>
<td>02</td>
<td>Task is currently executing task or is preempted time distribution task in quantum stage 1</td>
</tr>
<tr>
<td>SQRT</td>
<td>03</td>
<td>Task is ready to run (PRI.LEV. 1-54)</td>
</tr>
<tr>
<td>SQ55</td>
<td>04</td>
<td>Task is ready to run (PRI.LEV. 55)</td>
</tr>
<tr>
<td>SQ56</td>
<td>05</td>
<td>Task is ready to run (PRI.LEV. 56)</td>
</tr>
<tr>
<td>SQ57</td>
<td>06</td>
<td>Task is ready to run (PRI.LEV. 57)</td>
</tr>
<tr>
<td>SQ58</td>
<td>07</td>
<td>Task is ready to run (PRI.LEV. 58)</td>
</tr>
<tr>
<td>SQ59</td>
<td>08</td>
<td>Task is ready to run (PRI.LEV. 59)</td>
</tr>
<tr>
<td>SQ60</td>
<td>09</td>
<td>Task is ready to run (PRI.LEV. 60)</td>
</tr>
<tr>
<td>SQ61</td>
<td>0A</td>
<td>Task is ready to run (PRI.LEV. 61)</td>
</tr>
<tr>
<td>SQ62</td>
<td>0B</td>
<td>Task is ready to run (PRI.LEV. 62)</td>
</tr>
<tr>
<td>SQ63</td>
<td>0C</td>
<td>Task is ready to run (PRI.LEV. 63)</td>
</tr>
<tr>
<td>SQ64</td>
<td>0D</td>
<td>Task is ready to run (PRI.LEV. 64)</td>
</tr>
<tr>
<td>SWT1</td>
<td>0E</td>
<td>Task is waiting for terminal input</td>
</tr>
</tbody>
</table>

System Tables and Variables
Task is waiting for I/O
Task is waiting for message complete
Task is waiting for run req complete
Task is waiting for low speed output
Task is waiting for:
1) timer expiration, or
2) resume request, or
3) message interrupt
Task is waiting for:
1) timer expiration, or
2) run request
Task is waiting for a continue req.
Task is waiting for:
1) timer expiration, or
2) no-wait I/O complete, or
3) no-wait msg complete, or
4) no-wait run req complete, or
5) message interrupt, or
6) break interrupt
Task is waiting for disc space
Task is waiting for dev allocation
Task is waiting for file system
Task is waiting for memory
Task is waiting in general wait queue
Current IPU task in execution
IPU requesting state

DQE.NUM  DQE entry number;
          Field length = 1B;
          Used as an index to DQE address table (DAT);
          Range: One thru "N" (for MPL index compatibility);
          Used by scheduler to set C.PRNO to reflect the currently
          executing task.

This value is also used as the MPL index. It is used by the
scheduler to initialize the CPIX in the PSD before loading the
map for this task.

DQE.TAN  Task activation sequence number;
          Field length = 1W;
          This number is assigned by the activation service and uniquely
          identifies a task.

NOTE: The most significant byte of this value is the DQE entry
number and may be accessed as DQE.NUM.

DQE.ON   Owner name;
          Field length = 1D

DQE.LMN   Load module name;
          Field length = 1D
DGE.PSN  Pseudonym associated with task;
Field length = 1W;
This parameter is an optional argument accepted by the pseudo
task activation service. It may be used to uniquely identify a task
within a subsystem, for example, multibatch. It contains
descriptive information useful to the system operator or to other
tasks within a subsystem. Conventions used to generate a
pseudonym are determined by the associated subsystem. A
system-wide convention should be used to establish pseudonym
prefix conventions to avoid confusion between subsystems.

DGE.USW  User status word;
Field length = 1W

DGE.USHF  Scheduling flags;
Field length = 1W;
Used by the scheduler to indicate special status conditions.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>DGE.LPI</td>
<td>Load protection image requested</td>
</tr>
<tr>
<td>01</td>
<td>DGE.SING</td>
<td>Single copy load module</td>
</tr>
<tr>
<td>02</td>
<td>DGE.INDC</td>
<td>Task is indirectly connected</td>
</tr>
<tr>
<td>03</td>
<td>DGE.PRIV</td>
<td>Task is privileged</td>
</tr>
<tr>
<td>04</td>
<td>DGE.MSGR</td>
<td>Task has message receiver</td>
</tr>
<tr>
<td>05</td>
<td>DGE.BRKR</td>
<td>Task has break receiver</td>
</tr>
<tr>
<td>06</td>
<td>DGE.GS1X</td>
<td>Task quantum stage 1 expired</td>
</tr>
<tr>
<td>07</td>
<td>DGE.GS2X</td>
<td>Task quantum stage 2 expired</td>
</tr>
<tr>
<td>08</td>
<td>DGE.INER</td>
<td>Inswap I/O error</td>
</tr>
<tr>
<td>09</td>
<td>DGE.WIOA</td>
<td>Wait I/O request outstanding</td>
</tr>
<tr>
<td>10</td>
<td>DGE.WIOC</td>
<td>Wait I/O complete before in-progress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>notification</td>
</tr>
<tr>
<td>11</td>
<td>DGE.INMI</td>
<td>Inhibit message pseudo interrupt</td>
</tr>
<tr>
<td>12</td>
<td>DGE.BAOR</td>
<td>Batch origin task</td>
</tr>
<tr>
<td>13</td>
<td>DGE.TMOR</td>
<td>Running in TSM environment</td>
</tr>
<tr>
<td>14</td>
<td>DGE.ABRT</td>
<td>Task abort in progress</td>
</tr>
<tr>
<td>15</td>
<td>DGE.PRXT</td>
<td>Task is in preexit state</td>
</tr>
<tr>
<td>16</td>
<td>DGE.RRMD</td>
<td>Run receiver mode</td>
</tr>
<tr>
<td>17</td>
<td>DGE.WMSA</td>
<td>Wait-send msg outstanding</td>
</tr>
<tr>
<td>18</td>
<td>DGE.WMSC</td>
<td>Wait msg complete before link to wait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>queue</td>
</tr>
<tr>
<td>19</td>
<td>DGE.WRRA</td>
<td>Wait mode send run request outstanding</td>
</tr>
<tr>
<td>20</td>
<td>DGE.WRRC</td>
<td>Wait mode send run request complete</td>
</tr>
<tr>
<td></td>
<td></td>
<td>before link to wait queue</td>
</tr>
<tr>
<td>21</td>
<td>DGE.DBAT</td>
<td>Debug associated with task</td>
</tr>
<tr>
<td>22</td>
<td>DGE.RT</td>
<td>Real time task</td>
</tr>
<tr>
<td>23</td>
<td>DGE.TDID</td>
<td>Time distribution task initial dispatch.</td>
</tr>
</tbody>
</table>

Set by:
1. HALOC1 on activation of T/D task
2. S.EXEC51 when task is linked to WAIT state
3. H.EXEC7 on completion of inswap or other memory request
Cleared by S.EXEC20 on initial dispatch of task after activation, wait-state termination, or inswap.

24  DGE.DELP  Task delete in progress
25  DGE.ABRA  Task abort (with abort receiver) in progress
26  DGE.ABRC  Abort receiver established
27  DGE.ADIN  Asynchronous abort/delete inhibited
28  DGE.ADDF  Asynchronous delete deferred
29  DGE.INAC  Task is inactive
30  DGE.AADF  Asynchronous abort deferred
31  DGE.ACTT  Activation timer in effect

30  DGE.MSD  Physical address of MIDL in TSA;
        Field length = 1W
34  Reserved  Field length = 1W
38  DGE.MMSG  Maximum number of no wait messages allowed to be sent by this task;
        Field length = 1B
DGE.MRUN  Maximum number of no-wait run requests allowed to be sent by this task;
        Field length = 1B
DGE.MNWI  Maximum number of no-wait I/O requests allowed to be concurrently outstanding for this task;
        Field length = 1B
DGE.GQFN  Contains the generalized queue (SWGQ) function code;
        Field length = 1B
01 = Queued for volume resource (QVRES)
02 = Queued for ART space (QART)
03 = Queued for mount in progress (QMNT)
04 = Queued for resourcemark lock (QRMK)
05 = Reserved for eventmark (QEVN)
06 = Queued for read wait for writer (QRWN)
07 = Queued for Shared Memory Table (QSM)
08 = Queued for synchronous resource lock (QSRL)
09 = Queued for Mounted Volume Table (QMVT)
0A = Queued for dual port lock (QDPLK)
3C  DGE.UF2  Scheduling flags;
        Field length = 1B

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DGE.EDB</td>
<td>Enable debug mode break</td>
</tr>
<tr>
<td>1</td>
<td>DGE.GQTO</td>
<td>Generalized wait queue time-out</td>
</tr>
<tr>
<td>2</td>
<td>DGE.SYNC</td>
<td>Task interrupts are synchronized</td>
</tr>
<tr>
<td>3</td>
<td>DGE.JOB</td>
<td>Task is part of a job</td>
</tr>
<tr>
<td>4</td>
<td>DGE.ACX</td>
<td>ACX-32 task flag</td>
</tr>
<tr>
<td>5-7</td>
<td>Reserved</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

MPX-32 Technical Manual  System Tables and Variables  2-41
DGE.IPUF  IPU flag byte
Field length = 1B

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DGE.IPUH</td>
<td>IPU inhibit flag</td>
</tr>
<tr>
<td>1</td>
<td>DGE.IPUB</td>
<td>IPU bias flag</td>
</tr>
<tr>
<td>2</td>
<td>DGE.IPUR</td>
<td>CPU only</td>
</tr>
<tr>
<td>3</td>
<td>DGE.OSD</td>
<td>OS execution direction flag (set when PSD is in user area)</td>
</tr>
<tr>
<td>4</td>
<td>DGE.BASE</td>
<td>Base register task</td>
</tr>
<tr>
<td>5</td>
<td>DGE.ADA</td>
<td>Ada task</td>
</tr>
<tr>
<td>6-7</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

DGE.NWIO  Number of no-wait I/O requests
Field length = 1B

DGE.SOPO  Priority bias only swapping control flags;
Field length = 1B

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DGE.GQPO</td>
<td>SWGG state priority based swapping</td>
</tr>
<tr>
<td>1</td>
<td>DGE.BMAP</td>
<td>Swap inhibit due to bit map access</td>
</tr>
<tr>
<td>2-7</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

DGE.CQC   Current quantum count;
Field length = 1W;
Used by the scheduler to accumulate elapsed execution time for
the task for comparison with the level unique stage1 and stage2
time distribution values.

44  Reserved
Field length = 1H

DGE.TIFC  Timer function code;
Field length = 1B;
00 = Not active
01 = Request interrupt
02 = Resume program from suspend (SUSP) queue
03 = Resume program from any-wait (ANYW) queue
04 = Resume program from run-request-wait (RUNW) queue
05 = Resume program from generalized (SWGG) queue
06 = Resume program from peripheral device (SWDV) queue
07 = Resume program from disc space (SWDC) queue

DGE.RILT  Request interrupt (RI) level for timer;
Field length = 1B;
Identifies the interrupt level to be requested upon timer
expiration.

DGE.UTS1  User timer slot word 1;
Field length = 1W;
Current timer value;
Contains negative number of timer units before time-out.
4C  DQE.UTS2  User timer slot word 2;
Field length = 1W;
Reset timer value;
Contains negative number of time units;
Used to reset the current timer value when it expires.

50  DQE.DSW  Base mode debugger status word (PCALL);
Field length=1W.

54  DQE.PRS  Peripheral requirement specification;
Field length = 1W;

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>Reserved</td>
</tr>
<tr>
<td>8-15</td>
<td>Device type code</td>
</tr>
<tr>
<td>16-23</td>
<td>Channel address</td>
</tr>
<tr>
<td>24-31</td>
<td>Subchannel address or contains first word of SWGQ id</td>
</tr>
</tbody>
</table>

58  DQE.PRM  Peripheral requirements mask;
Field length = 1W;
X'00FF0000' = Any device of this type code
X'00FFFF00' = Any device of the specified type code on the
specified channel
X'00FFFFFF' = The specified device as described by type
code, channel, and subchannel address, or
contains second word of SWGQ id.

5C  Reserved  Field length = 3B.

DQE.MST  Static memory type specification;
Field length = 1B;
01 = Class 'E' memory
02 = Class 'H' memory
03 = Class 'S' memory
This field is used to specify the type of memory required for
inswap.

60  DQE.PSSF  Preemptive system service head cell
String forward linkage address;
Standard head cell format;
Field length = 1W;
Contains address of next (top-to-bottom) entry in chain.

64  DQE.PSSB  Preemptive system service head cell
String backward linkage address;
Standard head cell format;
Field length = 1W;
Contains address of next (bottom-to-top) entry in chain.
DQE.PSPR  Preemptive system service head cell
            Dummy priority (always = 0);
            Standard head cell format;
            Field length = 1B.

DQE.PSCT  Preemptive system service head cell
            Number of entries in list;
            Standard head cell format;
            Field length = 1B;

DQE.ILN   Interrupt level number;
            Field length = 1B;
            Identifies associated interrupt level for interrupt connected tasks.

DQE.RESU  Reserved usage index
            Field length = 1B

DQE.TISF  Task interrupt head cell
            String forward linkage address;
            Standard head cell format;
            Field length = 1W;
            Contains address of next (top-to-bottom) entry in chain.

DQE.TISB  Task interrupt head cell
            String backward linkage address;
            Standard head cell format;
            Field length = 1W;
            Contains address of next (bottom-to-top) entry in chain.

DQE.TIPR  Task interrupt head cell
            Dummy priority (always = 0);
            Standard head cell format;
            Field length = 1B

DQE.TICT  Task interrupt head cell
            Number of entries in list;
            Standard head cell format;
            Field length = 1B;

DQE.SWIF  Swapping inhibit flags;
            Field length = 1B;

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DQE.RESP</td>
<td>Task is resident</td>
</tr>
<tr>
<td>1</td>
<td>DQE.LKIM</td>
<td>Task is locked in memory</td>
</tr>
<tr>
<td>2</td>
<td>DQE.IO</td>
<td>Task has unbuffered I/O in progress</td>
</tr>
<tr>
<td>3</td>
<td>DQE.OTSW</td>
<td>Task is outswapped</td>
</tr>
<tr>
<td>4</td>
<td>DQE.TLVS</td>
<td>Task is leaving system</td>
</tr>
<tr>
<td>5</td>
<td>DQE.FCUS</td>
<td>Task forced unswappable during terminal output</td>
</tr>
</tbody>
</table>

System Tables and Variables

MPX-32 Technical Manual
6  DGE.FCRS  Task forced unswappable because swap file has not been allocated for it
7  DGE.INOS  Task is imbedded in the operating system

DGE.UBIO  Number of unbuffered I/O requests currently outstanding;
            Field length = 1B.

78  DGE.RRSF  Run receiver head cell
            String forward linkage address;
            Standard head cell format;
            Field length = 1W;
            Contains address of next (top-to-bottom) entry in chain.

7C  DGE.RRSB  Run receiver head cell
            String backward linkage address;
            Standard head cell format;
            Field length = 1W;
            Contains address of next (bottom-to-top) entry in chain.

80  DGE.RRPR  Run receiver head cell
            Dummy priority (always = 0);
            Standard head cell format;
            Field length = 1B.

DGE.RRCT  Run receiver head cell
            Number of entries in list;
            Standard head cell format;
            Field length = 1B;

DGE.NSCT  Number of map blocks out swapped;
           Field length = 1H.

84  DGE.MRSF  Message receiver head cell
            String forward linkage address;
            Standard head cell format;
            Field length = 1W;
            Contains address of next (top-to-bottom) entry in chain.

88  DGE.MRSB  Message receiver head cell
            String backward linkage address;
            Standard head cell format;
            Field length = 1W;
            Contains address of next (bottom-to-top) entry in chain.
### DQE.MRPR
Message receiver head cell
- Dummy priority (always = 0)
- Standard head cell format
- Field length = 1B

### DQE.MRCT
Message receiver head cell
- Number of entries in list
- Standard head cell format
- Field length = 1B

### DQE.NWRR
Number of no-wait mode run requests outstanding
- Field length = 1B

### DQE.NWMR
Number of no-wait mode msg requests outstanding
- Field length = 1B

### DQE.RTI
Requested task interrupt flags
- Field length = 1B

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>1</td>
<td>DQE.EA1R</td>
<td>Priority 1 end action request. Used for preemptive system services.</td>
</tr>
<tr>
<td>2</td>
<td>DQE.DBBR</td>
<td>Debug break request</td>
</tr>
<tr>
<td>3</td>
<td>DQE.UBKR</td>
<td>User break request</td>
</tr>
<tr>
<td>4</td>
<td>DQE.EA2R</td>
<td>End action request (priority 2)</td>
</tr>
<tr>
<td>5</td>
<td>DQE.MSIR</td>
<td>Message interrupt request</td>
</tr>
<tr>
<td>6-7</td>
<td></td>
<td>Reserved</td>
</tr>
</tbody>
</table>

### DQE.ATI
Active task interrupt flags
- Field length = 1B

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>1</td>
<td>DQE.AEA1</td>
<td>Active end action priority 1</td>
</tr>
<tr>
<td>2</td>
<td>DQE.ADM</td>
<td>Active debug break</td>
</tr>
<tr>
<td>3</td>
<td>DQE.AUB</td>
<td>Active user break</td>
</tr>
<tr>
<td>4</td>
<td>DQE.AEA</td>
<td>Active end action priority 2</td>
</tr>
<tr>
<td>5</td>
<td>DQE.AMI</td>
<td>Active message interrupt</td>
</tr>
<tr>
<td>6-7</td>
<td></td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Reserved Field length = 1B
**DQE.SAIR** System action task interrupt request;

<table>
<thead>
<tr>
<th>Bit</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DQE.DELR</td>
<td>Request for delete of this task</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Reserved</td>
</tr>
<tr>
<td>2</td>
<td>DQE.HLDR</td>
<td>Hold task request</td>
</tr>
<tr>
<td>3</td>
<td>DQE.ABTR</td>
<td>Abort task request</td>
</tr>
<tr>
<td>4</td>
<td>DQE.EXTR</td>
<td>Exit task request</td>
</tr>
<tr>
<td>5</td>
<td>DQE.SUSR</td>
<td>Suspend task request</td>
</tr>
<tr>
<td>6</td>
<td>DQE.RRQ</td>
<td>Run receiver mode request</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Reserved</td>
</tr>
</tbody>
</table>

**DQE.TAD** TSA address (logical);  
Field length = 1W (byte 0 contains DQE.SAIR)

**DQE.ABC** Abort code;  
Field length = 3W

**DQE.MPP** Memory pool pointer;  
Field length = 1W

**DQE.SRID** Used swapspace linked list;  
Field length = 2W

**DQE.CDIR** Load module RID at activation;  
Field length = 8W

**DQE.CVOL** Current working volume at activation;  
Field length = 8W

**DQE.ACX1** Outswap time;  
Field length = 1W

**DQE.ACX2** Advance communication word 2;  
Field length = 1W

**DQE.MREQ** Memory request doubleword;  
Reserved Field length=1B

**DQE.MEM** Type of memory requested;  
Field length = 1B;  
01=Class 'E' memory  
02=Class 'H' memory  
03=Class 'S' memory

**DQE.MEMR** Number of memory blocks required;  
Field length=1H;
DC DQE.MRT Memory request type code;
Field length=1B;
00=Inswap only
01=Preactivation request
02=Activation request
03=Memory expansion request
04=IOCS buffer request
05=Shared memory request
06=System buffer request

If DQE.MRT equals 05, the next three bytes will contain the address of the Shared Memory Table entry.

Reserved Field length=1B

DQE.RMMR Map register for requested memory;
Field length=1H

E0 DQE.MAPN Inclusive span of maps in use;
Field length=1H

DQE.CME Number of swappable class 'E' map blocks currently allocated;
Field length=1H

E4 DQE.CMH Number of swappable class 'H' map blocks currently allocated;
Field length=1H

DQE.CMS Number of swappable class 'S' map blocks currently allocated;
Field length=1H
### 2.14 File Assignment Table (FAT)

The File Assignment Table (FAT) is used to provide an association between a logical file code (LFC) and a resource. It also coordinates access to the resource referenced via an LFC. The FAT is linked to the Unit Definition Table (UDT) and the Controller Definition Table (CDT) when the resource is allocated.

The FAT must contain information related to the requestor of the resource such as position within the file (segment and byte within the segment) and current access mode. For efficiency considerations, information pertaining to allowable access modes, segmentation, and extendibility are also included.

<table>
<thead>
<tr>
<th>Word</th>
<th>Access</th>
<th>CDT index (DFT.CDTX)</th>
<th>UDT index (DFT.UDTOX)</th>
<th>Number of segments (DFT.NSEG)</th>
<th>Append record pointer (DFT.AREC)</th>
<th>Resource type code (DFT.TYPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Status bits (DFT.STB)</td>
<td>Access flags or system file code (DFT.ACF)</td>
<td>Segment definition area address (DFT.SEGA) or Volume name for dismount message (DFT.VNAM)</td>
<td>Number of FPTs assigned (DFT.NAS)</td>
<td>Relative end block number (DFT.EOF)</td>
<td>File attributes field (DFT.ATTR) See Note 5</td>
</tr>
<tr>
<td>1</td>
<td>Flags (DFT.FLGS)</td>
<td>Number of FPTs assigned (DFT.NAS)</td>
<td>Relative file block position (DFT.POS)</td>
<td>Relative EOM block position (DFT.EOM) See Note 4</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Segment definition area address (DFT.SEGA) or Volume name for dismount message (DFT.VNAM)</td>
<td>Relative file block position (DFT.POS)</td>
<td>Relative EOM block position (DFT.EOM) See Note 4</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Relative file block position (DFT.POS)</td>
<td>Relative file block position (DFT.POS)</td>
<td>Relative EOM block position (DFT.EOM) See Note 4</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Relative EOM block position (DFT.EOM) See Note 4</td>
<td>Relative EOM block position (DFT.EOM) See Note 4</td>
<td>Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Relative end block number of current segment (DFT.SEGE) or Unformatted medium identifier (MTF.REEL)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Relative end block number of current segment (DFT.SEGE) or Unformatted medium identifier (MTF.REEL)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)</td>
<td>Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)</td>
<td>Relative EOF block number (DFT.EOF)</td>
<td>Append record pointer (DFT.AREC)</td>
<td>File attributes field (DFT.ATTR) See Note 5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Append record pointer (DFT.AREC)</td>
<td>File attributes field (DFT.ATTR) See Note 5</td>
<td>Append block number (DFT.ABLK) or Volume number for multivolume media (MTF.VOL)</td>
<td>Blocking buffer head cell address (DFT.BBA)</td>
<td>Associated VAT index (DFT.VATX)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>File attributes field (DFT.ATTR) See Note 5</td>
<td>Associated VAT index (DFT.VATX)</td>
<td>Current access mode (DFT.CACM)</td>
<td>Resource type code (DFT.TYPE)</td>
<td>Number of opens on this FAT (DFT.OPCT)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Append block number (DFT.ABLK) or Volume number for multivolume media (MTF.VOL)</td>
<td>Current access mode (DFT.CACM)</td>
<td>Resource type code (DFT.TYPE)</td>
<td>Associated VAT index (DFT.VATX)</td>
<td>Number of opens on this FAT (DFT.OPCT)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Blocking buffer head cell address (DFT.BBA)</td>
<td>Number of opens on this FAT (DFT.OPCT)</td>
<td>Associated VAT index (DFT.VATX)</td>
<td>Associated VAT index (DFT.VATX)</td>
<td>Number of opens on this FAT (DFT.OPCT)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Associated VAT index (DFT.VATX)</td>
<td>Number of opens on this FAT (DFT.OPCT)</td>
<td>Associated VAT index (DFT.VATX)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Associated VAT index (DFT.VATX)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Associated VAT index (DFT.VATX)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Associated VAT index (DFT.VATX)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Associated VAT index (DFT.VATX)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Notes

1. Bits in DFT.STB are assigned as follows.
   0  If set, file open
   1  If set, file opened read/write
   2  If set, permanent file
   3  If set, blocking buffer output active
   4  If set, unformatted medium
   5  If set, volume resource
   6  If set, read only access
   7  If set, TSM associated FAT

2. Bits 0-4 in DFT.ACF are assigned as follows.
   Volume resource only:
   0-1  Reserved
   2    If set, "$" read on SYC
   3-4  Reserved

   Unformatted medium only:
   0    If set, mount message has been inhibited or tape is shared
   1    If set, multivolume tape
   2    If set, mount message has been output
   3    If set, tape at EOT
   4    If set, tape at BOT

   Bits 5-7 in DFT.ACF apply only to volume usage and will contain one of the
   following values.
   Value=0  Not a system file
   Value=1  SYC file
   Value=2  SGO file
   Value=3  SLO file
   Value=4  SBO file

3. Bits in DFT.FLGS are assigned as follows.
   0    Blocking buffer present
   1    SMAP or DMAP assignment
   2    Reserved
   3    If set, file has been assigned to the NULL device
   4    If set, this FAT entry is not in use
   5    If set, TSM I/O (task is swappable)
   6-7  Reserved

4. Byte 3 of Word 4 contains tape density for high speed tape (DFT.DENS) and EOM
   does not apply (DFT.EOM).

5. Bits in DFT.ATTR are assigned as follows.
   0  If set, file is automatically extendable
   1  If set, file is implicitly shared
   2  If set, file data has been modified
   3  If set, unblocked specified at assignment
   4  If set, file opened for random access
   5  If set, file opened in blocked mode
   6  If set, expanded FCB
   7  If set, resource descriptor opened for modify
8 If set, current access mode specified at assignment
9 If set, resource to be marked blocked at close
10 If set, enqueue inhibit
11 If set, spool option requested
12 If set, EOF update required
13 Reserved for IOCS
14 If set, file assigned to nonpublic volume
15 If set, segmented file
16 If set, task in resource queue when deleted
17 If set, the date and time of last change field in the resource descriptor will not be changed on a rewrite
18-31 Reserved

6. Bytes in DFT.ACCS are assigned as follows.

Bytes 0-1 Contain bit pattern from RR.ACCS if specified at assignment (see Section 2.31 for details on RR.ACCS). If not specified, contains the bit pattern from the appropriate access restriction field (RD.AOWNR, RD.AUGRP, RD.AOOTH) in the resource descriptor. See M.RDCOM, Section 2.41.1 for details.

Byte 2 Bits are assigned as follows.

0 If set, assigned for explicit shared use
1 If set, assigned for exclusive use
2-7 Reserved

Byte 3 Contains the bit pattern specified in byte 3 of RD.SFLGS in the associated resource descriptor. See M.RDSPD, Section 2.41.2 for details.
2.15 File Control Block (FCB)

The File Control Block (FCB) is used to convey information about requested I/O operations and to report their status to the requestor. The table entry is generally located in the task's address space.

The task's FCB is linked to the File Assignment Table (FAT) when the resource is opened. This completes the logical connection from the task to the requested resource for subsequent use. The FCB is then linked to an I/O Queue (IOQ) entry when an operation for that logical connection is requested. When this is done, the status for the requested operation code is posted in the respective FCB.
WORD 0

Bits 0-3  This field is always zero.

Bits 4-7  Operation code - A single hexadecimal digit specifies the type of function requested of the device handler. The allowable functions and their definitions are unique to each peripheral device.

Bits 8-31 Logical file Code - Any combination of three ASCII characters is allowed.

WORD 1

Note: Words 8 and 9 are used instead of Word 1 if Bit 6 of Word 2 is set.

Bits 0-11  Quantity - Three hexadecimal digits specify the number of data items to be transferred. This quantity must include the carriage control character, if applicable. The transfer quantity is in units determined by the address in bits 12-31.

Bits 12, 30,31  Format Code - These bits specify byte, halfword or word addressing for data transfers. They are interpreted as follows:

<table>
<thead>
<tr>
<th>Type of Transfer</th>
<th>F</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(12)</td>
<td>(30,31)</td>
</tr>
<tr>
<td>Byte 0</td>
<td>1</td>
<td>00</td>
</tr>
<tr>
<td>Byte 1</td>
<td>1</td>
<td>01</td>
</tr>
<tr>
<td>Byte 2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Byte 3</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Left Halfword</td>
<td>0</td>
<td>01</td>
</tr>
<tr>
<td>Right Halfword</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Word</td>
<td>0</td>
<td>00</td>
</tr>
</tbody>
</table>

If a halfword or word transfer is specified for a device which accepts only bytes, IOCS adjusts the quantity accordingly. If a byte transfer is specified for a device which accepts only halfwords or words, IOCS will adjust the quantity accordingly if the number of bytes is an even multiple of the requested transfer mode and the data address is on the correct boundary. Otherwise, the request is treated as a specification error.

Bits 13-29  Data Address - The initial address data areas for read or write operations.
**WORD 2**

**Bits 0-7** General Control Specifications - These eight bits enable the user to specify the manner in which an operation is to be performed by IOCS. The interpretation of these bits is shown below:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>If set, IOCS will return to the user immediately after the I/O operation is queued. If reset, IOCS will exit to the calling program only when the requested operation has been completed.</td>
</tr>
<tr>
<td>1</td>
<td>If set, error processing will not be performed by either the device handler or IOCS. An error return address is ignored and a normal return will be taken to the caller, however the device status will be posted in the FCB (unless bit 3 is set). If reset, normal error recovery will be attempted. Normal error processing for disc and magnetic tape is automatic error retry. Error processing for unit record devices except the system console is accomplished by IOCS typing the message &quot;INOP&quot; to the console which allows the operator to retry or abort the I/O operation. If the operator aborts the I/O operation, or if automatic error retry for disc or magnetic tape is unsuccessful, an error status message is typed to the console and the error return address will be taken if provided; otherwise, the task is aborted.</td>
</tr>
<tr>
<td>2</td>
<td>If set, data formatting is inhibited. Otherwise, data formatting is performed by the appropriate device handler. See Bit 8 for further explanation.</td>
</tr>
<tr>
<td>3</td>
<td>If set, the device handlers perform no status checking and no status information is returned. Hence all I/O will appear to complete without error. Otherwise, status checking is performed and status information is returned as necessary.</td>
</tr>
<tr>
<td>4</td>
<td>If set, file accessing will occur in the random mode. Otherwise, sequential accessing will be performed.</td>
</tr>
<tr>
<td>5</td>
<td>If set, a blocked file is specified (disc or tape assignments only).</td>
</tr>
<tr>
<td>6</td>
<td>Expanded FCB present (Words 8-15). This takes advantage of a larger I/O transfer quantity in bytes, a 24-bit addressing field, and a 32-bit random access address. For Extended I/O operations, up to two interrupt status words are then returned after I/O complete. When this bit is set, IOCS assumes the FCB is 16 words long. The information in Words 8 and 9 is used instead of the data in Word 1. Also, the random access address in Word 10 is used instead of the data in word 2.</td>
</tr>
<tr>
<td>7</td>
<td>This bit is reserved for internal IOCS use. If set, it indicates the user's FCB is being used for physical I/O during blocked data handling and the FCB parameters are in the task's scratchpad.</td>
</tr>
</tbody>
</table>
Bit 8  Device Format Definition - If set, special definitions for 7-track magnetic tape, ALIMs, etc. are indicated in bits 9-12. Normally, bit 8 is examined only when bit 2 (data formatting inhibit) is set. The meaning is interpreted as shown in Section 2.15.1.

Bits 9-12  Special Control Specification - this field contains device control specifications unique to certain devices. Interpretation and processing of these specifications are performed by the device handlers. A bit setting is meaningful only when a particular type of device is assigned as indicated in Section 2.15.1, columns 2 and 3. (Column 1 indicates default control).

Bits 13-31  Random Access Address - This field contains a block number (zero origin) relative to the beginning of the disc file, and specifies the base address for read or write operations.

If bit 6 of Word 2 is set, the expanded random access address in Word 10 (FCB.ERAA) is used instead of bits 13-31.

For devices where random access is invalid, bits 13-31 have the following assignments:

Bit 13  If set, software read flow control required (FCB.RXON).

Bits 24-31  Console Teletype Type Control Parameter Block Flag Type.

For High Speed Data (HSD) interface applications, Word 2 bit meanings are as follows:

Bit 8  Request Device Status After Transfer - This bit indicates an IOCB should be added to the IOL to retrieve device specific status after the data transfer has completed.

Bit 9  Send Device Command Prior to Data Transfer - This bit indicates an IOCB should prefix the data transfer to transmit a device command word to the device. The value sent is the 32-bit expanded random access address.

Bit 10  Disable Timeout for this Request - This bit indicates the operation will take an indeterminable period of time and the handler should wait an indefinite period of time for the I/O to complete. This generally only has meaning on read operations.

Bit 11  Set UDDCMD from Least Significant Byte of Word 2 - This bit indicates the UDDCMD byte in the data transfer IOCB should be set to the least significant byte of the random access field of the FCB. This provides the ability to pass additional control information to the device without modifying the device driver.

Bits 24-31  If bit 11 is set, these bits define the UDDCMD field of the generated IOCB, overriding the default value from a handler table.
<table>
<thead>
<tr>
<th>Device</th>
<th>Default (Bit 2=0)</th>
<th>Override (Bit 2=1)</th>
<th>Bit 8</th>
<th>Bit 9</th>
<th>Bit 10</th>
<th>Bit 11</th>
<th>Bit 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card Reader (CR)</td>
<td>Read Auto Select Mode. First column - Rows 2-5, all punched = binary, no translation, max. 120 bytes. Not all punched = ASCII, translate, max 80 bytes. EOF = column 1, Rows 2-5 only punched. Binary, no translation (X'0F'). Max 120 bytes.</td>
<td>See Bit 8.</td>
<td>0=ASCII read 1=Binary read</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line Printer (LP)</td>
<td>Interpret first character as carriage control.</td>
<td>No carriage control interpretation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Speed Data (HSD)</td>
<td>Interface (Generic Handler)</td>
<td>See Word 2 definition</td>
<td>See Word 2 definition</td>
<td>See Word 2 definition</td>
<td>See Word 2 definition</td>
<td>See Word 2 definition</td>
<td>See Word 2 definition</td>
</tr>
<tr>
<td>Paper Tape Reader (PT)</td>
<td>Read in formatted mode, skipping leader.</td>
<td>Read unformatted</td>
<td>0=Do not skip leader 1=Skip leader</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MT 9-track only)</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discs (DM,DF,FL)</td>
<td>Report EOF if EOF encountered in word 0 of 1st block during read of unblocked record.</td>
<td>No EOF reporting on unblocked reads.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device (Bit 2=0)</td>
<td>Bit 2</td>
<td>Bit 8</td>
<td>Bit 9</td>
<td>Bit 10</td>
<td>Bit 11</td>
<td>Bit 12</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>ALIM</td>
<td>Read</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>(Asynchronous</td>
<td>Write</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td></td>
<td>1</td>
<td>N/A</td>
<td>1</td>
<td>N/A</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Module(3Y)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminals</td>
<td>Read</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Write</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

- **Read**: receive data (bytes) defined for transfer count.
- **Write**: formatted

- **Bit 2**: Blind mode reset
- **Bit 8**: Echo on read
- **Bit 9**: Receive data
- **Bit 10**: Inhibit conversion of lower case characters to upper case
- **Bit 11**: Convert

---

<table>
<thead>
<tr>
<th>System Tables and Variables</th>
<th>Read</th>
<th>Read</th>
<th>Transmit</th>
<th>Read</th>
<th>Read</th>
<th>Read (if Bit 2=0):</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-Line Asynchronous</td>
<td>n</td>
<td>n</td>
<td>break</td>
<td>0=Echo by controller</td>
<td>0=no special character detect</td>
<td>0=do not purge type ahead buffer</td>
</tr>
<tr>
<td>Communications</td>
<td>bytes</td>
<td>bytes</td>
<td>0=Stop</td>
<td>1=No echo by controller</td>
<td>1=special character detect</td>
<td>1=purge type ahead buffer</td>
</tr>
<tr>
<td>Multiplexer (TY)</td>
<td>with no formatting</td>
<td>with no formatting</td>
<td>transmitting break</td>
<td>Write 0=Normal write</td>
<td>Write 0=normal write</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1=Start</td>
<td>1=Initialize device (load UART parameters)</td>
<td>1=write with input subchannel monitoring plus software flow control</td>
<td></td>
</tr>
</tbody>
</table>
Status Word - 32 indicator bits are used by IOCS to indicate the status, error and abnormal conditions detected during the current or previous operation. The assignment of these bits is shown below:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Operation in progress. (Request has been queued.) (Note: Reset after post I/O processing complete.)</td>
</tr>
<tr>
<td>1</td>
<td>Error condition found.</td>
</tr>
<tr>
<td>2</td>
<td>Invalid Blocking Buffer control pointers have been encountered during file blocking or deblocking.</td>
</tr>
<tr>
<td>3</td>
<td>Write protect violation.</td>
</tr>
<tr>
<td>4</td>
<td>Device inoperable.</td>
</tr>
<tr>
<td>5</td>
<td>Beginning-of-medium (BOM) (load point) or illegal volume number (multi-volume magnetic tape).</td>
</tr>
<tr>
<td>6</td>
<td>End-of-file.</td>
</tr>
<tr>
<td>7</td>
<td>End-of-medium (end of tape, end of disc file).</td>
</tr>
</tbody>
</table>

Nonextended I/O Devices:

- **8-11**: Specifies general testing status as received from an 8000 level Test Device instruction.
- **12-15**: Specifies DCC testing status as received from a 4000 level Test Device instruction.
- **16-31**: Specifies a device status as received from a 2000 level Test Device instruction. These bits are not applicable for the Paper Tape, Card Reader, and Teletypewriter. Bit meanings for 2000 level testing for non-extended I/O devices are shown in Section 2.15.2.
<table>
<thead>
<tr>
<th>FCB Word 3 Bits</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All F-Class Devices</strong></td>
<td>ECHO</td>
<td>PPCI</td>
<td>INCORRECT LENGTH</td>
<td>PROGRAM CHECK</td>
<td>DATA CHECK</td>
<td>CONTROL CHECK</td>
<td>INTERFACE CHECK</td>
<td>CHANNEL CHAINING CHECK</td>
<td>BUSY</td>
</tr>
<tr>
<td><strong>High Speed Data Interface (Generic Handler) D-Class</strong></td>
<td>CD TERMINATION</td>
<td>ERROR STATUS FORMAT (See Word 3 description)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GPMC</strong></td>
<td>DEVICE DEPENDENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FCB Word 3 Bits</th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>29</th>
<th>30</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ALL F-Class Device</strong></td>
<td>STATUS MODIFIER</td>
<td>CONTROLLER END</td>
<td>ATTENTION</td>
<td>CHANNEL END</td>
<td>DEVICE END</td>
<td>UNIT CHECK</td>
<td>UNIT EXCEPTION</td>
</tr>
<tr>
<td><strong>High Speed Data Interface (Generic Handler) D-Class</strong></td>
<td>EXTERNAL TERMINATION</td>
<td>IOC B ADDR ERROR</td>
<td>ERROR ON T1 ADDR FETCH</td>
<td>DEVICE EOB</td>
<td>EP5 ERROR</td>
<td>PENDING</td>
<td>NONEXECUTIVE</td>
</tr>
<tr>
<td><strong>GPMC</strong></td>
<td>DEVICE DEPENDENT</td>
<td>TRANSMISSION ERROR</td>
<td>INCORRECT LENGTH</td>
<td>UNUSUAL END</td>
<td>ILLEGAL ORDER</td>
<td>INTERRUPT PENDING</td>
<td>CHANNEL END</td>
</tr>
</tbody>
</table>
For Extended I/O Devices Only

<table>
<thead>
<tr>
<th>Bit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Zero</td>
</tr>
<tr>
<td>9</td>
<td>Zero</td>
</tr>
<tr>
<td>10</td>
<td>Last command exceeded time out value and was terminated.</td>
</tr>
<tr>
<td>11-15</td>
<td>Zero</td>
</tr>
<tr>
<td>16-23</td>
<td>Channel status (see Section 2.15.3)</td>
</tr>
<tr>
<td>24-31</td>
<td>Controller/device status (see Section 2.15.3)</td>
</tr>
</tbody>
</table>

2.15.3 Channel Status and Controller/Device Status for Extended I/O Devices

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANNEL STATUS</td>
<td>16 Echo</td>
</tr>
<tr>
<td>17 Post program controlled interrupt</td>
<td></td>
</tr>
<tr>
<td>18 Incorrect length</td>
<td></td>
</tr>
<tr>
<td>19 Channel program check</td>
<td></td>
</tr>
<tr>
<td>20 Channel data check</td>
<td></td>
</tr>
<tr>
<td>21 Channel control check</td>
<td></td>
</tr>
<tr>
<td>22 Interface check</td>
<td></td>
</tr>
<tr>
<td>23 Chaining check</td>
<td></td>
</tr>
<tr>
<td>CONTROLLER/DEVICE STATUS</td>
<td>24 Busy</td>
</tr>
<tr>
<td>25 Status modified</td>
<td></td>
</tr>
<tr>
<td>26 Controller end</td>
<td></td>
</tr>
<tr>
<td>27 Attention</td>
<td></td>
</tr>
<tr>
<td>28 Channel end</td>
<td></td>
</tr>
<tr>
<td>29 Device end</td>
<td></td>
</tr>
<tr>
<td>30 Unit check</td>
<td></td>
</tr>
<tr>
<td>31 Unit exception</td>
<td></td>
</tr>
</tbody>
</table>
Bits 0-31  Record Length - This field is used by IOCS to indicate the actual number of bytes transferred during read/write operations.

With execute channel requests and an error occurs this word will contain the residual transfer count from the request.

WORD 6

Bit 0  No wait normal end action not taken
Bit 1  No wait error end action not taken
Bit 2  "Kill" command, I/O not issued
Bit 3  If set, exceptional condition has occurred in the I/O request
Bit 4  If set, software read flow control required.
Bits 5-7  Reserved.
Bits 8-31  Wait I/O Error Return Address - This field is set by the user and contains the address to which control is to be transferred in the case of an unrecoverable error when control bits 1 and 3 of word 2 are reset. If this field is not initialized and an unrecoverable error is detected under the above conditions, the user is aborted.

WORD 7

Bit 0-7  Index to FPT - This field points to the nth FPT in the File Pointer Table (FPT).

Bits 8-15  FAT Address - This field points to the File Assignment Table (FAT) entry associated with all I/O performed on behalf of this FCB. This field is supplied by IOCS.

Note: Words 8-15 are valid only if Bit 6 of Word 2 is set.

WORD 8

Bits 0-7  Reserved.
Bits 8-31  Expanded Data Address - Start address of data area for read or write operations. Must be a word address.
(or)
Expanded Data/Command Chain Address - Word address that points to the data or command chain list if using execute channel entry point (H.IOCS,10).
WORD 9

**Bits 0-31**

Expanded Quantity - Number of bytes of data to be transferred.

(or)

For GPMC devices which support data/command chaining: Expanded Number of Data/Command Chain Doublewords. If data/command chaining is desired (execute channel H.IOCS10), this is used to indicate the number of data/command chain doublewords in the list.

WORD 10

**Bits 0-31**

Expanded Random Access Address - This field contains a block number (zero origin) relative to the beginning of the disc file. It is the start address for the current read or write operation.

(or)

For High Speed Data (HSD) Interface requests in non-Execute Channel Program format, this word defines a device command.

WORD 11

**Bits 0-31**

Status Word 1 - For extended I/O, these are the 32 bits returned by the SENSE command.

(or)

For communications adapter interface, external asynchronous interrupt (EAI) status if Bit 12 of Word 2 is set.

WORD 12

**Bits 0-31**

Status Word 2 - Second status word as returned from the Extended I/O hardware.

(or)

For High Speed Data (HSD) Interface applications, this word contains status sent from the user's device.

WORD 13

**Bits 0-7**

Reserved.

**Bits 8-31**

No-Wait I/O normal completion service address return. This user service must be terminated by calling H.IOCS34 (no-wait I/O end action return).

(or)
For High Speed Data (HSD) Interface applications, this address plus 1 word is the location to which control is transferred on asynchronous notification.

WORD 14

Bits 0-7  Reserved.

Bits 8-31  No-Wait I/O error completion service address return. This user service must be terminated by calling H.IOCS34 (no-wait I/O end action return).

WORD 15

Bits 0-7  Number of 192W buffers if specifying large blocking buffers. A value of one or zero in this field specifies one blocking buffer.

Bits 8-31  Blocking Buffer Address - Defined for device independent I/O or a Post Programmed Controlled Interrupt End Action Receiver for device dependent I/O.
2.16 File Pointer Table (FPT)

The File Pointer Table (FPT) provides the linkage between the File Control Block (FCB) and the File Assignment Table (FAT). It also allows for multiple logical file code assignments to be equivalenced to the same FAT. The linkage to the FAT is performed at assignment. The linkage to the FCB is performed at opening. The FPT resides in the task's service area.

FPT entries 1-6 are reserved for the system as follows:

Entry 1 - System LFC *s*
Entry 2 - Load module LFC *LM
Entry 3 - H,VOMM resource descriptor LFC (1)
Entry 4 - H,VOMM directory LFC (2)
Entry 5 - H,VOMM DMAP/SMAP LFC (3)
Entry 6 - H,VOMM modify resource descriptor LFC X'FFFFFF'

Each FPT entry has the following format:

<table>
<thead>
<tr>
<th>Word</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Reserved</td>
<td>Logical file code (FPT,LFC)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Flags (FPT,FLGS)</td>
<td>FCB address (FPT,FCBA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>See Note 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Reserved</td>
<td>FAT address (FPT,FATA)</td>
<td></td>
</tr>
</tbody>
</table>

Notes

1. Bits in FPT,FLGS are assigned as follows

   0  Reserved
   1  If set, multiple FPT entries exist which point to the same FAT (i.e., $ASSIGN4 or $ASSIGN ffc TO LFC=ffc statements)
   2  Reserved
   3  If set, FPT open
   4  If set, this FPT entry is not in use
   5  If set, pseudo SYC assignment (used by TSM)
   6  If set, pseudo FPT for unassigned temporary file
   7  Reserved
2.17 I/O Queue (IOQ) Entry

The I/O Queue (IOQ) Entry is dynamically allocated from memory pool and contains information required to queue and process an I/O request. These entries are variable in length and support multiple device commands which are built starting at the end of the standard IOQ entry. The I/O queue consists of one or more I/O Queue Entries linked to either a Controller Definition Table (CDT) or a Unit Definition Table (UDT).

<table>
<thead>
<tr>
<th>Word</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>String forward address (IOQ.SFA)</td>
</tr>
<tr>
<td>1</td>
<td>String backward address (IOQ.SBA)</td>
</tr>
<tr>
<td>2</td>
<td>Queue priority (IOQ.PRI) I/O type (IOQ.TYPE) Channel number (IOQ.CHNO) Subaddress (IOQ.SUBA)</td>
</tr>
<tr>
<td>3</td>
<td>Reserved (IOQ.RTN)</td>
</tr>
<tr>
<td>4</td>
<td>PSD1 of task interrupt routine (IOQ.PSD) See Note 1</td>
</tr>
<tr>
<td>5</td>
<td>PSD2 of task interrupt routine</td>
</tr>
<tr>
<td>6</td>
<td>Status (IOQ.STAT) FCB or TCPB address (IOQ.FCBA) See Note 2</td>
</tr>
<tr>
<td>7</td>
<td>Program number (IOQ.PRGN) CDT address (IOQ.CDTA)</td>
</tr>
<tr>
<td>8</td>
<td>Handler function word 1 (IOQ.FCT1)</td>
</tr>
<tr>
<td>9</td>
<td>Handler function word 2 (IOQ.FCT2) See Note 3</td>
</tr>
<tr>
<td>10</td>
<td>Handler function word 3 (IOQ.FCT3) See Note 4</td>
</tr>
<tr>
<td>11</td>
<td>Handler function word 4 (IOQ.FCT4)</td>
</tr>
<tr>
<td>12</td>
<td>32-Bit flag word (IOQ.FLAGS) See Note 5</td>
</tr>
<tr>
<td>13</td>
<td>FAT address (IOQ.FATA)</td>
</tr>
<tr>
<td>14</td>
<td>Number of bytes transferred (IOQ.UTRN) See Note 6</td>
</tr>
<tr>
<td>15</td>
<td>OS buffer address (IOQ.FBUF)</td>
</tr>
<tr>
<td>16</td>
<td>User's buffer address (IOQ.TRUF)</td>
</tr>
<tr>
<td>17</td>
<td>I/O returned status word 1 (IOQ.IST)</td>
</tr>
<tr>
<td>18</td>
<td>I/O returned status word 2 (IOQ.IST1) See Note 7</td>
</tr>
<tr>
<td>19</td>
<td>I/O returned status word 3 (IOQ.IST2) See Note 8</td>
</tr>
<tr>
<td>20</td>
<td>UDT address (IOQ.UDTA)</td>
</tr>
<tr>
<td>21</td>
<td>Control information from word 2 of FCB (IOQ.CONT)</td>
</tr>
<tr>
<td>22</td>
<td>Address of context block (IOQ.CBLK) or Device context area address (IOQ.DCAA)</td>
</tr>
<tr>
<td>23</td>
<td>Mode bits (extended I/O) (IOQ.MODE) Queue priority temporary storage (IOQ.PSAV) Number of extra words in this queue entry (IOQ.XTRA)</td>
</tr>
<tr>
<td>24</td>
<td>Device inop buffer address (for I/O error processing) (IOQ.INOP)</td>
</tr>
<tr>
<td>25</td>
<td>Address of first word of dynamic IOC list (extended I/O)(IOQ.IOCD) See Note 10</td>
</tr>
</tbody>
</table>
Notes

1. For no-wait I/O this field is set to point to the I/O post processing routine (S.IOCS1). When I/O completes, control will be passed to this service.

2. Bits in IOQ.STAT are assigned as follows.
   0  If set, I/O queue is active (Note: Reset by device handler when physical I/O transfer completes.)
   1  If set, sense command was issued on behalf of this I/O request (extended I/O)
   2  If set, error retry was issued (rezero and retry entire IOCD list) (extended I/O)
   3  If set, operator intervention required; do not restart I/O
   4  Reserved
   5  If set, read ECC was issued (extended I/O)
   6  If set, error retry was issued (retry entire IOCD list) (extended I/O); backspace write or read sequence performed for extended I/O tape
   7  Reserved

3. For extended I/O devices, IOQ.FCT2 contains the 24-bit virtual address of the data (or) IOCL. (Bits 0-7=0)

4. For extended I/O devices, IOQ.FCT3 contains the adjusted byte transfer count in bits 0-31 (maximum is C.ADMASK+1).

5. Bits in IOQ.FLGS are assigned as follows.
   0  If set, multiplexed controller
   1  If set, OPCOM console request
   2  If set, TCW has been absolutized
   3  If set, IOQ will be linked to the UDT not the CDT
   4  If set, deallocate OS buffer
   5  If set, extended I/O
   6  If set, error found
   7  If set, system console queue
   8  If set, data move required (OS to user buffer)
   9  If set, rewind command in IOCD list for magnetic tape or Reserve command in IOCD list for disc (extended I/O)
   10 If set, nonexecute channel read command (extended I/O)
   11 If set, nonexecute channel write command (extended I/O)
   12 If set, special handler post processing required (Handler EP6)
   13 H.CCT00 has been called with an FCB, not with a TCPB (i.e., not via H.IOCS14)
   14 Reserved
   15 If set, terminal input
   16 If set, terminal output
   17 If set, task swappables during I/O
   18 If set, release command in IOCD list for disc (extended I/O)
   19 No-wait I/O (not TSM)
   20 If set, I/O restart entry
   21 If set, nondevice access I/O performed
   22 Kill command issued for this I/O request
   23 If set, execute channel program (extended I/O)
   24 If set, user privileged
   25 D-class controller (QPMC) only
   26 Physical I/O performed on behalf of a user requesting blocked I/O
   27-28 Reserved
   29 If set, EOF testing required for disc

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30  If set, movement in file is in negative direction
31  If set, continuous EOF search (disc and floppy disc only)

6. For extended I/O devices, IOQ.UTRN is a full word (Bits 0-31) and IOQ.WOSB is not applicable.

7. For extended I/O devices, IOQ.IST1 is initialized to the start address within the I/O queue for any dynamic IOCD's.

8. For extended I/O devices, IOQ.IST2 is initialized to the stop address within the I/O queue for any dynamic IOCD's.

9. Mode bits are peculiar to each device.

10. This cell contains the absolute data (or) IOCL address associated with the I/O request.
The Unit Definition Table (UDT) is a system resident structure used to identify device dependent information required by a handler for a specific device. The UDT is built by the SYSGEN process, one for each device configured in the system. During SYSGEN, each UDT is linked to its corresponding Controller Definition Table (CDT) and consequently its associated controller and handler.

<table>
<thead>
<tr>
<th>Word 0</th>
<th>7 8</th>
<th>15 16</th>
<th>23 24</th>
<th>5 31</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDT index (UDT.UDTI)</td>
<td>CDT index (UDT.CDTI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit status (UDT.STAT)</td>
<td>Logical channel number (UDT.CHAN)</td>
<td>Logical sub-address (UDT.SUBA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Note 1</td>
<td>See Note 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Reserved</td>
<td>Address of Dispatch Queue entry of task which has device allocated if device is not shared (UDT.DGEA)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Physical channel number (UDT.PCHN)</td>
<td>Physical sub-address (UDT.PSUB)</td>
<td>Sectors per block (UDT.SPB) or Number characters per line (UDT.CHAR) See Note 3</td>
<td></td>
</tr>
<tr>
<td>See Note 5</td>
<td>Number of sectors per track on disc or global line counter if a terminal (UDT.SPT)</td>
<td>Maximum byte transfer (UDT.MBX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Flags (UDT.FLAGS)</td>
<td>Number of sectors on disc or tab setting if a terminal (UDT.SEC5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Note 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Sector size, on disc or a tab setting if a terminal (UDT.SSZ)</td>
<td>Number of heads on disc or a tab setting if a terminal (UDT.NHDS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Serial number if tape or removable disc (UDT.SERN)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Reserved</td>
<td>Address of device context area (UDT.DCCA) or Handler name at initialization (UDT.HNAM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Bit flags See Note 6 (UDT.BIT2)</td>
<td>Associated Allocated Resource Table index if assigned (UDT.ARTI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Service interrupt handler address (UDT.SIHA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Device historical data address (UDT.HIST)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Address of first IOQ linked to this device (UDT.FIOQ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Address of last IOQ linked to this device (UDT.BIOQ)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Link Priority (UDT.LPRI1)</td>
<td>Link Count (UDT.IOCT)</td>
<td>Unit Status byte 2 (UDT.STA2) See Note 7</td>
<td></td>
</tr>
<tr>
<td>2C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Notes

1. Bits in UDT.STAT are assigned as follows.
   0  If set, on-line (UDT.ONLI)
   1  If set, dual ported XIO disc (UDT.DPDC)
   2  If set, allocated (UDT.ALOC)
   3  If set, in use (UDT.USE)
   4  If set, system output unable to allocate (UDT.NOAL)
   5  If set, shared device (UDT.SHR)
   6  If set, premounted (UDT.PREM)
   7  If set, terminal (TSM) device (UDT.TSM)

2. For example, 01 for any disc; 04 for any tape, etc. Valid device type codes are listed in Appendix A of the MPX-32 reference manual.

3. For discs, contains number of sectors per block (UDT.SPB). For terminals, contains number of characters per line (UDT.CHAR).

4. For discs, contains number of sectors per allocation unit (UDT.SPAU). For terminals, contains number of lines per screen (UDT.LINE).

5. Bits in UDT.FLGS are assigned as follows.
   0  If set, extended I/O device (UDT.FCLS)
   1  If set, I/O outstanding (UDT.IOO)
   2  If set, removable disc pack (UDT.RMDV)
   3  If set, terminal user logged on (UDT.LOGO)
   4  If set, autoselectable for batch SLO (UDT.BSLO)
   5  If set, autoselectable for batch SBO (UDT.BSBO)
   6  If set, autoselectable for real-time SLO (UDT.RSLO)
   7  If set, autoselectable for real-time SBO (UDT.RSBO)

6. Bits in UDT.BIT2 are assigned as follows.
   0  If set, port is private; else switched (UDT.DIAL)
   1  If set, port is connected to modem (UDT.MODM)
   2  If set, port has graphic capability (UDT.GRFC)
   3  If set, port is full duplex (UDT.FDUX)
   4  If set, port is configured multidrop (UDT.MDRA)
   5  If set, volume mounted on device (UDT.VOL)
   6  If set, echo by computer (UDT.ECHO)
   7  Device has failed. Log off TSM (UDT.DEAD)
   8  If set, cache device (UDT.CAC)
   9  If set, inhibit automatic line wrap (UDT.NRAP)
  10  Reserved
  11  If set, quarter inch cartridge tape drive (UDT.QITD)
  12  If set, software read flow control required (UDT.RXON)
  13  If set, software write flow control required (UDT.WXON)
  14  If set, hardware read flow control required (UDT.RHWF)
  15  If set, hardware write flow control required (UDT.WHWF)

7. Bits in UDT.STA2 are assigned as follows.
   0  If set, IOQ linked from UDT (UDT.IOQ)
   1  If set, IOP device (initialized by SYSGEN) (UDT.IOP)
   2  If set, device malfunction (UDT.MALF)
   3  If set, operator intervention applicable (UDT.INTV)
   4  If set, use standard XIO interface
TERM TERMINAL DEFINITION

HANDLER - SYSTEM INITIALIZATION EP.

- Increment C.TSMTOT (bits) by 1 for each term.
- Set UDT.TERM bit in UDT.STAT in UDT for each term.

HANDLER - O/S CODE ENTRY PT

- Since the HSO is not an IDP or a CPC, J.TWIT assumes it is an ADS and will issue a write with a FCB which has word 2, bits 2 and 9 set, ignore this write of UART setup parameters.

HANDLER - LOGGING ON

**Flowchart Diagram**

1. Unexpeceted character
   * If no, handle it
   * If yes, logon char

2. Logon char
   * If no, forget it
   * If yes, terminal already logged on (UDT.LOGO SET)

3. Terminal already logged on (UDT.LOGO SET)
   * If no, task connected to break? (UDT.DREA), page 6
     * If yes, S.EXEC13
       * Break TSM (C.TSMCQA)
     * If no, S.EXEC13
       * Break Task (UDT.DREA)

4. PROCESS HANDLE ERR

NOTE: BL: S.EXEC13 with X3 = ADDRESS OF DW BOUNCED SCRATCH AREA. The 8-line ASCII handlers claims 3 words are used, but the S.EXEC13 code only uses 2 words (one DW).
<table>
<thead>
<tr>
<th>Operation</th>
<th>IOCS Op Code</th>
<th>Handler = HASMP (ALIM)</th>
<th>Handler = F8XIO (8-Line)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open M.FILE</td>
<td>0 NOP</td>
<td>Initialize IOP</td>
<td>Channel if Necessary</td>
</tr>
<tr>
<td>Rewind M.RWND</td>
<td>1 NOP</td>
<td>SENSE Operation</td>
<td></td>
</tr>
<tr>
<td>Read Rec. M.READ</td>
<td>2 Read to Data Buffer</td>
<td>Read to Data Buffer</td>
<td></td>
</tr>
<tr>
<td>Write Rec. M.WRIT</td>
<td>3 Write Record to Terminal</td>
<td>Set Data Terminal Ready</td>
<td></td>
</tr>
<tr>
<td>Write EOF M.WEOF</td>
<td>4 NOP</td>
<td>NOP</td>
<td></td>
</tr>
<tr>
<td>Execute Channel</td>
<td>5 Execute Channel</td>
<td>Execute Channel</td>
<td></td>
</tr>
<tr>
<td>Advance Record M.FWRD</td>
<td>6 Connect Communications Channel</td>
<td>Set Data Terminal Ready</td>
<td></td>
</tr>
<tr>
<td>Advance File M.FWRD</td>
<td>7 Disconnect Communications Channel</td>
<td>Reset Data Terminal Ready</td>
<td></td>
</tr>
<tr>
<td>Backspace Record M.BACK</td>
<td>8 Initialize Device and Set Timeout Value</td>
<td>Used by J.TINIT to Initialize Terminals</td>
<td></td>
</tr>
<tr>
<td>Backspace File M.BACK</td>
<td>9 Clear Break Status Flag Word</td>
<td>Reset Request to Send</td>
<td></td>
</tr>
<tr>
<td>Upspace M.UPSP</td>
<td>A Spec Error</td>
<td>Set Request to Send</td>
<td></td>
</tr>
<tr>
<td>Erase/Punch Trailer</td>
<td>B Transmit Break</td>
<td>Set/Reset Break (depends on flags in FCB)</td>
<td></td>
</tr>
<tr>
<td>Eject/Punch Leader M.EJECT</td>
<td>C Spec Error</td>
<td>Define Special Character</td>
<td></td>
</tr>
<tr>
<td>Close M.CLOSE</td>
<td>D NOP</td>
<td>NOP</td>
<td></td>
</tr>
<tr>
<td>Reserve FHD Port</td>
<td>E Spec Error</td>
<td>Set Single Channel Operation (Default)</td>
<td></td>
</tr>
<tr>
<td>Release FHD Port</td>
<td>F Spec Error</td>
<td>Set Dual Channel Operation</td>
<td></td>
</tr>
</tbody>
</table>

**NOP = No operation performed**

**Spec Error = Illegal operation code**
### Table 5-8
Default and Special Device Formatting (Page 2 of 2)

<table>
<thead>
<tr>
<th>Device</th>
<th>(Bit 2=0)</th>
<th>(Bit 2=1)</th>
<th>Bit 8</th>
<th>Bit 9</th>
<th>Bit 10</th>
<th>Bit 11</th>
<th>Bit 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mag Tape</td>
<td>Binary, ODD parity, 800 bpi</td>
<td>See Bits 8-10</td>
<td>0=Interchange (binary coded decimal) 1=Packed (binary)</td>
<td>If Bit 8=0: 0=EVEN parity 1=ODD parity</td>
<td>0=800 bpi</td>
<td>1=556 bpi</td>
<td></td>
</tr>
<tr>
<td>(MT 9- track only)</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disc          (DM,DF,FL)</td>
<td>Report EOF if X'0FE0FE0FE0' encountered in word 0 of 1st block during read of unblocked record</td>
<td>No EOF reporting on unblocked reads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALIM (Asynchronous Line Interface Module) Terminals (TY)</td>
<td>Read: receive data (bytes) defined for transfer count</td>
<td>Write: formatted</td>
<td>Read</td>
<td>Bit 2</td>
<td>Bit 8</td>
<td>Bit 9</td>
<td>On Reads: 1=Inhibit conversion of lower case characters to upper case 0=Convert</td>
</tr>
<tr>
<td>Read</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>=Blind mode reset</td>
<td>=Echo on read</td>
<td>=Receive data</td>
<td>=Receive data</td>
</tr>
<tr>
<td>Write</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
<td>=Formatted write</td>
<td>=Initialize device</td>
<td>=Unformatted write</td>
<td></td>
</tr>
<tr>
<td>B-Line Asynchronous Communications Multiplexer (TY)</td>
<td>Read: perform special character formatting</td>
<td>Read: if formatting is inhibited, read n bytes.</td>
<td>Transmit break (erase, punch) (trailer): 0=Stop transmitting break 1=Start transmitting break</td>
<td>Read: 0=Echo by controller 1=No echo by controller</td>
<td>Read (if Bit 2=0): 0=convert lower case character to upper case 1=inhibit conversion</td>
<td>Read: 0=no special character detect 1=special character detect</td>
<td>Read: 0=do not purge type ahead buffer 1=purge type ahead buffer</td>
</tr>
<tr>
<td>Write</td>
<td>first character is for form control</td>
<td>Write n bytes with form control</td>
<td>Read: 1=ASCII control character detect</td>
<td>Write: 0=Normal write 1=Initialize device (load UART parameters)</td>
<td>Write: 0=normal write 1=write with input subchannel monitoring plus software flow control</td>
<td>Write</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5-9 Standard Terminal and Line Printer
Carriage Control Characters and Interpretation

<table>
<thead>
<tr>
<th>Control Character</th>
<th>Hex Value</th>
<th>Result on a Terminal</th>
<th>Result on a Line Printer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>20</td>
<td>One linefeed/carriage return before write.</td>
<td>Single space before print.</td>
</tr>
<tr>
<td>0</td>
<td>30</td>
<td>Two linefeed/carriage returns before write.</td>
<td>Double space before print.</td>
</tr>
<tr>
<td>1</td>
<td>31</td>
<td>Five linefeed/no carriage returns before write.</td>
<td>Page eject (slew) before print.</td>
</tr>
<tr>
<td>+</td>
<td>2B</td>
<td>No linefeed/carriage return before write (line append).</td>
<td>No space before print (overprint).</td>
</tr>
<tr>
<td>-</td>
<td>2D</td>
<td>Five linefeed/carriage returns before write.</td>
<td>Page eject, save and print up to three user supplied title lines. See Note 1 See Note 2</td>
</tr>
<tr>
<td>&lt;</td>
<td>3C</td>
<td>One linefeed/carriage return before write.</td>
<td>Set inhibit spooler title line in this file. See Note 2</td>
</tr>
<tr>
<td>&gt;</td>
<td>3E</td>
<td>One linefeed/carriage return before write.</td>
<td>Set enable spooler title line in this file. See Note 2</td>
</tr>
<tr>
<td>=</td>
<td>3D</td>
<td>One linefeed/carriage return before write.</td>
<td>Page eject and clear up to three user supplied title lines in this file. See Note 2</td>
</tr>
</tbody>
</table>

**Notes:**

1. User supplied title lines have the same effect as this character. Supplying a fourth title line clears the first three, but only one page is ejected. User supplied titles are retained by the spooler and are repeated at the top of each page until cleared or the spool file ends.

2. If the line printer is directly allocated this character is processed as a blank and the spooler title line is not produced.
**I/O Functions**

- **OPEN**
  - take SERVCOMP
  - return

- **CLOSE**
  - take SERVCOMP
  - return

- **WRITE**
  - Carriage control
    - Formatted - bit 2 clear
    - see table 5-9
    - Unformatted - bit 2 set
    - nothing
  - Character modification & paging
    - Clamp transfer count to 127 (printable chars)

- **READ**
  - Character control
    - Formatted - bit 2 clear
    - BS
      - DEL, RUB OUT
    - TAB - insert blanks (Typ setting in UDT, 52)
    - CR
      - ETX, EOT, Control-C
    - Formatted - bit 2 + 10 clear
    - convert LC to UC
    - Unformatted - bit 2 set
    - nothing
  - Allocate read buffer in system, if not there already, use task swapable
  - Echo control
    - FCB.SCFG bit 1 (set echo)
8.2.105 M.MEMB - Get Memory in Byte Increments

The M.MEMB service allows the task to dynamically expand its memory allocation in doubleword increments starting at the end of its DSECT up to the top of its logical address space. The additional memory will be of the same type specified when the task was cataloged. The task will be mapped in a logically contiguous manner up to the end of its address space. The task will be suspended until the allocation is successful. Repeated calls to this service are allowed. Allocation will not be contiguous with previously allocated space.

This service cannot be used in conjunction with the M.GE or M.GD services.

The base mode equivalent service is M.GETMEMBYTES.

Entry Conditions

Calling Sequence:

M.MEMB num

(or)

LW R4,num (or) LI R4,num
SVC 2,X'4B' (or) M.CALL H.REMM,28

where:

num is the number of bytes to allocate

Exit Conditions

Return Sequence:

M.RTRN R3,R4

Registers:

CC1=0
CC2=0

R3 contains the 24-bit starting logical doubleword address of allocated space

R4 contains the number of bytes actually allocated (modulo 2W)

(or)

CC1=0
CC2=1

R3 contains the 24-bit starting logical doubleword address of allocated space

R4 contains the number of bytes actually allocated (modulo 2W). However, the number is less than requested.
Error Conditions

Allocation Denied:

CC1 = 1
CC2 = 1
R3 = 0
R4 = 0
8.2.106 M.MEMFRE - Free Memory in Byte Increments

The M.MEMFRE service allows the task to dynamically deallocate acquired memory. Deallocation can be random. The space address must have been previously obtained from the M.MEMB service. All of the space obtained from a given call is deallocated.

This service cannot be used in conjunction with the M.FE or M.FD services.

The base mode equivalent service is M_FREEMEMBYTES.

**Entry Conditions**

**Calling Sequence:**

- M.MEMFRE addr
- (or)
- LW R3,addr
  SVC 2, X'4C' (or) M.CALL H.REMM,29

where:

- addr is the starting address of a previously acquired dynamic space from the M.MEMB service

**Exit Conditions**

**Return Sequence:**

- M.RTRN R3 (or) abort user with RM77

**Registers:**

- R3=0 if deallocation could not be performed. Deallocation address was not found in allocation table.

**Abort Cases:**

- RM77 A task has destroyed the allocation linkages in this dynamic expansion space.
3.2.130 M.READ - Read Record

The M.READ service performs the following functions:

- Provides special random access handling.
- Deblocks system files and blocked files.
- Reads one record into the buffer indicated by the Transfer Control Word (TCW) in the FCB.

The base mode equivalent service is M.READ.

**Entry Conditions**

**Calling Sequence:**

\[
\begin{align*}
\text{M.READ} & \quad \text{fcb} \\
\text{(or)} & \\
\text{LA} & \quad 1,\text{fcb} \\
\text{SVC} & \quad 1,\text{X'31'} \quad (\text{or}) \quad \text{M.CALL H.IOCS,3}
\end{align*}
\]

where:

- \text{fcb} is the FCB address. Appropriate transfer control parameters are defined in the TCW (see Section 7.9.1.2).

**Exit Conditions**

**Return Sequence:**

\[
\text{M.RTRN}
\]

**Registers:**

- None

**Abort Cases:**

- 1003: Nonprivileged user attempting transfer to a logical address outside legal boundaries.
- 1006: Invalid blocking buffer control cell for a system or blocked file.
- 1026: Read attempted for a system or blocked file while write in process.
- 1030: Illegal volume record. Either volume number or reel ID from volume record do not match FAT information.
- 1032: Second attempt to read a $ statement in a SYC file.

**Output Messages:**

- DISMOUNT/ MOUNT messages if EOT and multivolume magnetic tape
8.2.131  M_READ - Read Record

The M_READ service performs the following functions:

- Provides special random access handling for disc files.
- Deblocks system files and blocked files.
- Reads one record into the buffer indicated by the Transfer Control Word (TCW) in the FCB.

The nonbase mode equivalent service is M.READ.

Entry Conditions

Calling Sequence:

\[ \text{M_READ [FCBADDR ,addr} \text{] } \]

(or)

SVC 1,X'31' (or) M.CALL H.IOCS,3

where:

- \( \text{addr} \) is the FCB address. Appropriate transfer control parameters are defined in the TCW (see Section 7.9.1.2).

Registers:

- R1 contains addr

Exit Conditions

Return Sequence:

M.RTRN

Registers:

None

Abort Cases:

- IO03  Nonprivileged user attempting transfer to a logical address outside legal boundaries.
- IO06  Invalid blocking buffer control cell for a system or blocked file.
- IO26  Read attempted for a system or blocked file while write in process.
- IO30  Illegal volume record. Either volume number or reel ID from volume record do not match FAT information.
- IO32  Second attempt to read a $ statement in a SYC file.

Output Messages:

DISMOUNT/MOUNT messages if EOT and multivolume magnetic tape
8.2.178 M.WRIT - Write Record

The M.WRIT service performs the following functions:

Prevents a write to a read-only file.
Provides special random access handling for disc files.
Blocks records for system and blocked files.
Writes volume record if BOT on multivolume magnetic tape.
Performs ERASE/WRITE EOF if EOT on multivolume magnetic tape.
Writes one record from the buffer pointed to by the TCW in the FCB.

The base mode equivalent service is M_WRITE.

Entry Conditions

Calling Sequence:

M.WRIT   fcb
(or)
LA      1,fcb
SVC     1,X'32' (or) M.CALL H.IOCS,4

where:

fcb is the FCB address

Exit Conditions

Return Sequence:

M.RTRN

Registers:

None

Abort Cases:

IO96  Invalid blocking buffer control cell for a system or a blocked file.
IO99  Illegal operation on the SYC file
IO27  Write attempted while reading from a system or a blocked file.
IO38  Write attempted on a file opened in read only mode.

Output Messages:

DISMOUNT/MOUNT messages if EOT on multivolume magnetic tape
( 37000305 )

; SMP GOULD C.S.C. MPX-32 3.2C MFSYS000 PAGE

SEQUELE R1.2.03)

32

**.EXIT
SVC 1, X'55'
ENDM

* TASK DATAD 0

LOCAL VARIABLES

TIME DATAW 5

LDC_123 DATAW 0
LDC_734 DATAW 0

* MS2 DATAB 'EXITING FROM MAIN PROGRAM ...'

; MS2:4T EQU 6-MS2
BOUND 1W

MSG2TCW GEN 12/MSG2CNT+2332(MS2)

*** 10000.SI_INT.

SI_INT EQU 6

STP R1,SAVEREGS
DAB X'0A'

SAVE REGISTERS
DEACTIVATE MSO INTERRUPT
DISPLAY MESSAGE TO USER TO LET
THEM KNOW THAT THIS HANDLER IS
BEING EXECUTED.

1164 ST W R1,MSG2TCW
1164 MWRIT JTFGB 1,0004
1164 LR 1,UTFC3

1164 ANOP

1164 SVC 1, X'32'

1164 ENDM

123 SI_CNT EQU 1+SI_CNT+

BUMP COUNTER
SET CONTENTS OF VARIABLE LDC_128
STORE IT

123 LW R1, LDC_128
123 STW R1, X'128'

SET CONTENTS OF VARIABLE LDC_734
STORE IT

123 LW R1, LDC_734
123 STW R1, X'734'

RESTORE REGISTERS
RETURN TO POINT OF INTERRUPTION

1148 LPSCDM OLD_PSD

784 A

784 A

10000 A

10

MS1 DATAB 'IN INTERRUPT HANDLER ...'
LE R1,2.23

MSG1CNT EQU 3-MSG1
BOUND 1h

MSG1TXT GEN 12/MSG1CNT/20/3(MSG1)

BOUND 1D

ICOS EQU $ INPUT/OUTPUT CONTROL BLOCK
DATAW X'0000000D' OUTPUT 1 WORD OF DATA
DATAW X'00007E01D' STARTING AT LOCATION X'7E01D'
DATAW X'0000000D'
DATAW X'0000000D'
DATAW "TEST" OUTPUT DATA

IC0S_TXT DTAW 0

BOUND 1D INTERRUPT CONTEXT BLOCK

ICL3.txt GEN 32/0,32/0

NEW_PSC GEN 1/1,31/W(SI_INT)

UTRO DTAW 5'UT'- FILE CONTROL BLOCK

JMP RES 1h
RES 5h

END MSD_SEG