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:

Entry Point	Event
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

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

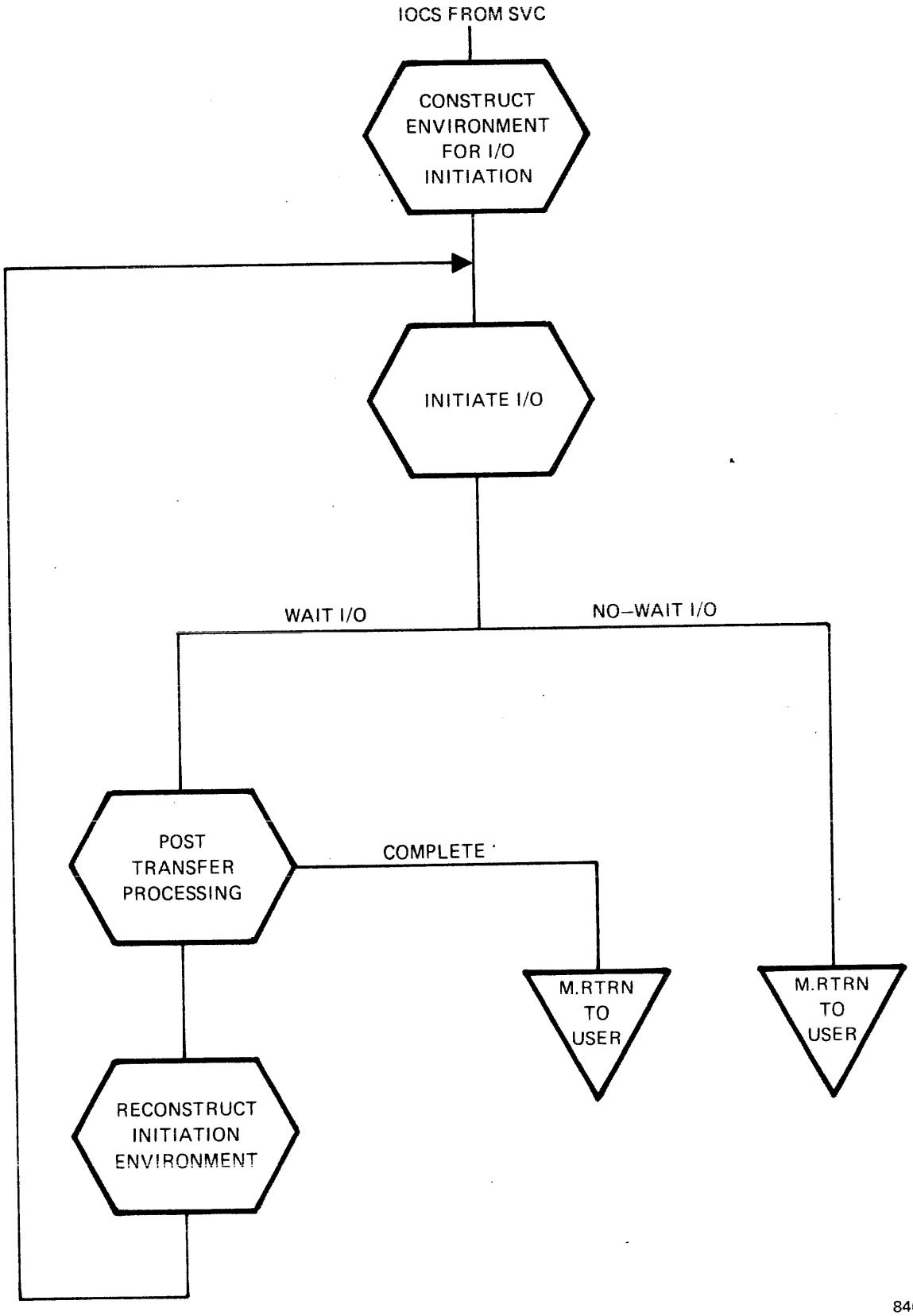
A return from H.EXEC,4 will be made immediately after recording the no-wait I/O event. Since IOCS will also make an immediate return to the user task, no-wait I/O post transfer processing will occur as a task interrupt service.

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.


IOCS FROM SVC
CONSTRUCT ENVIRONMENT FOR I/O INITIATION
INITIATE I/O
WAIT I/O
NO–WAIT I/O
POST TRANSFER PROCESSING
COMPLETE
M.RTRN TO USER
M.RTRN TO USER
RECONSTRUCT INITIATION ENVIRONMENT

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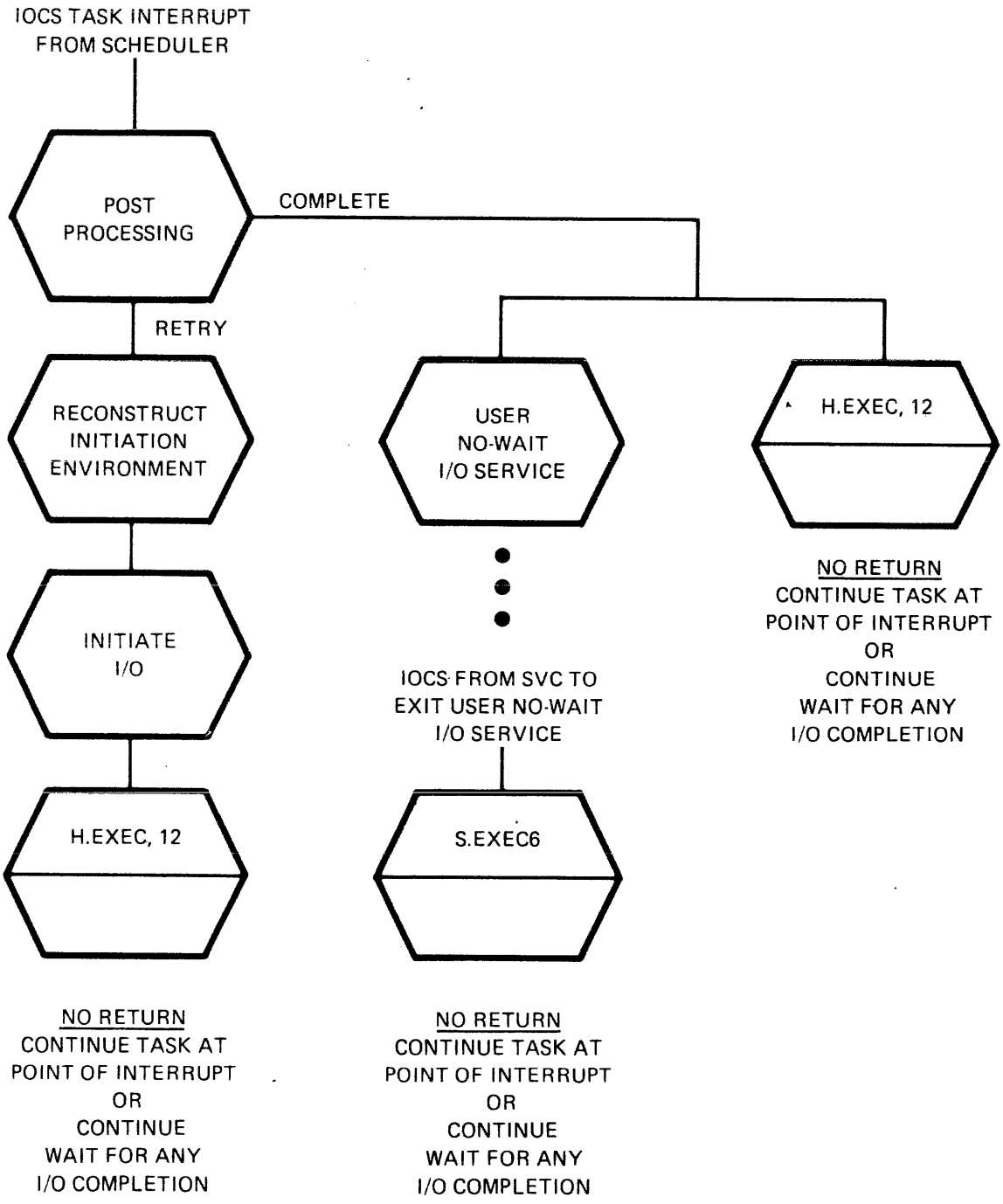
Scheduler - IOCS Interface - IOCS No-Wait I/O Post Processing Overview



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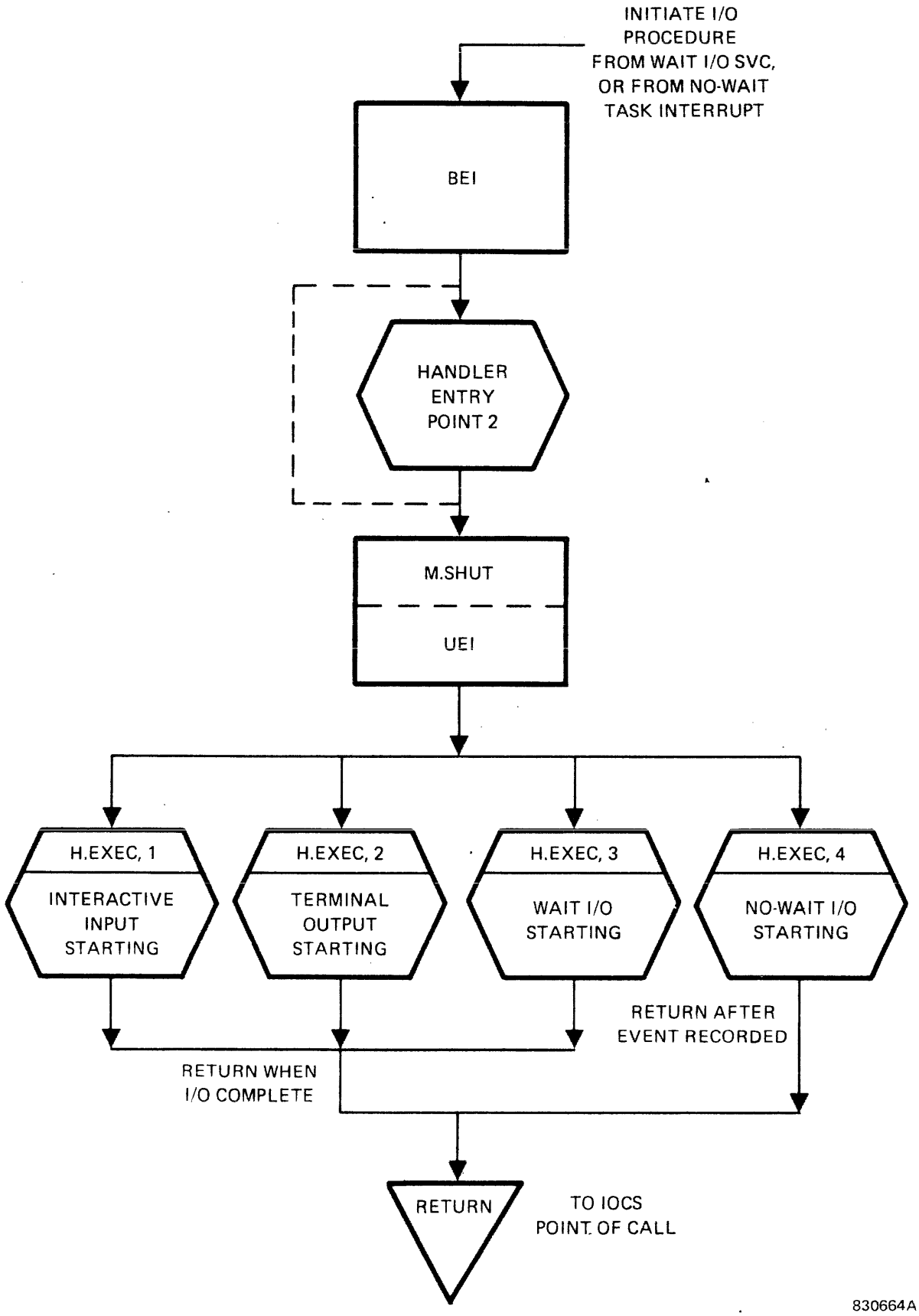
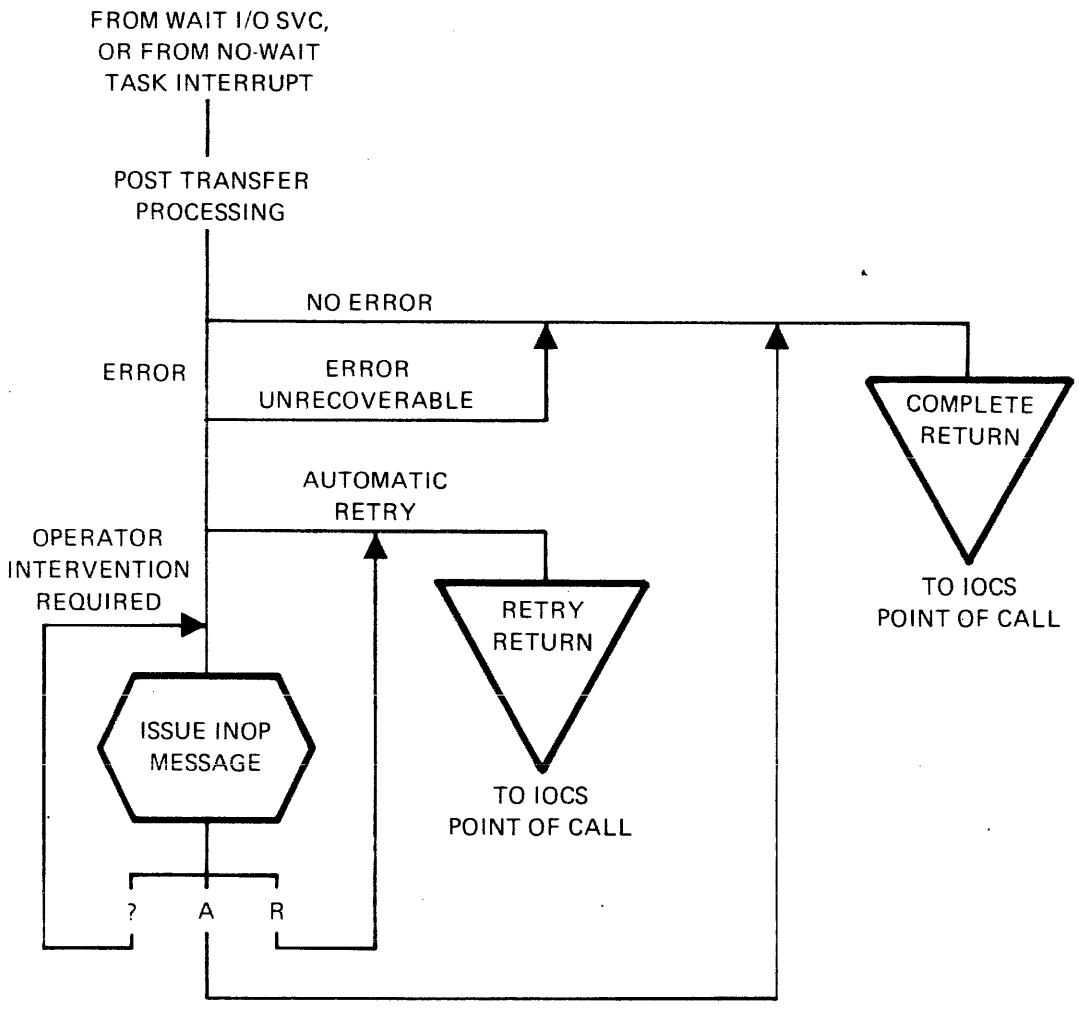
Scheduler - IOCS Interface - IOCS Initiate I/O Procedure



Scheduler - IOCS Interface - IOCS Post Processing Procedure



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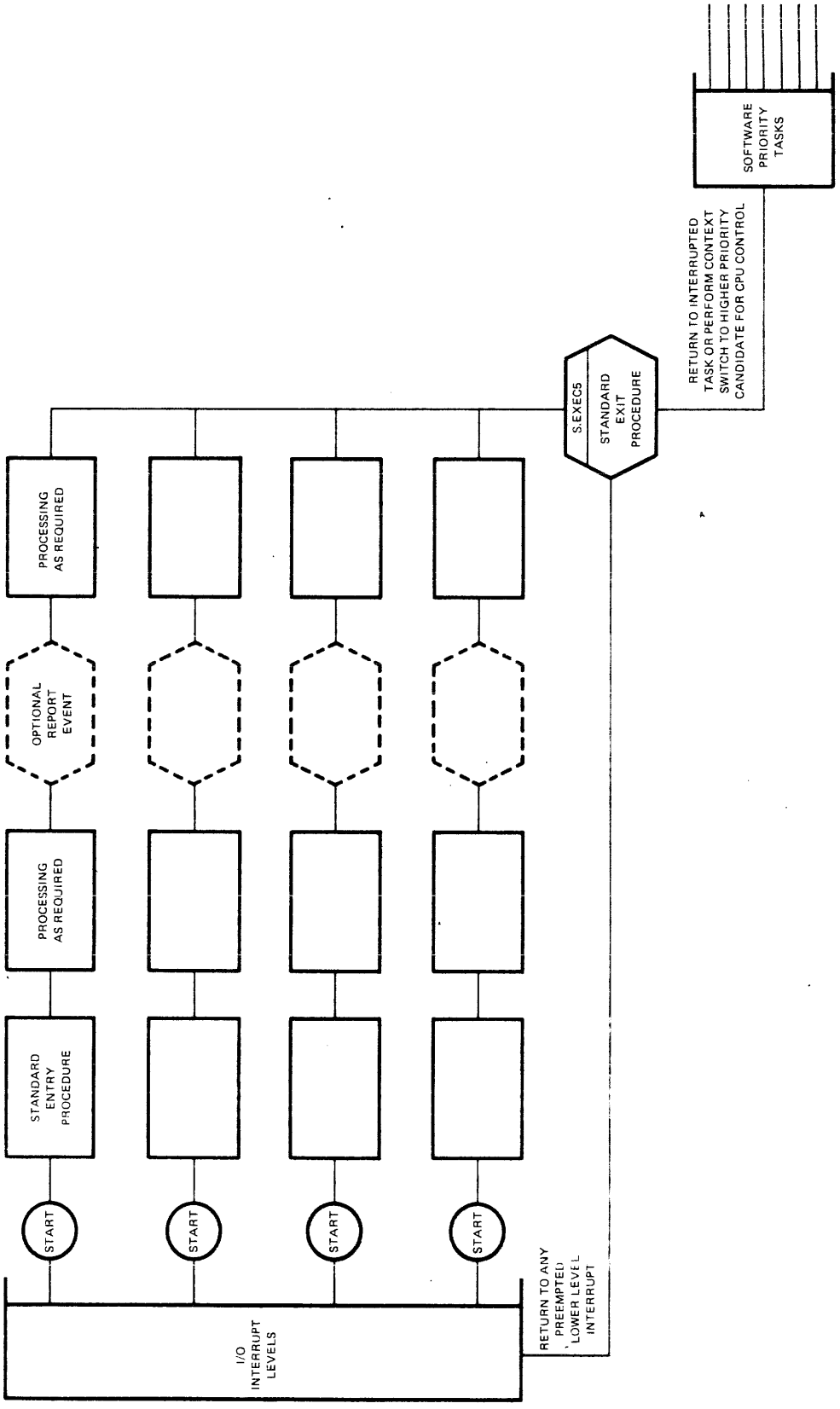
Scheduler - I/O Interrupt Interface Overview



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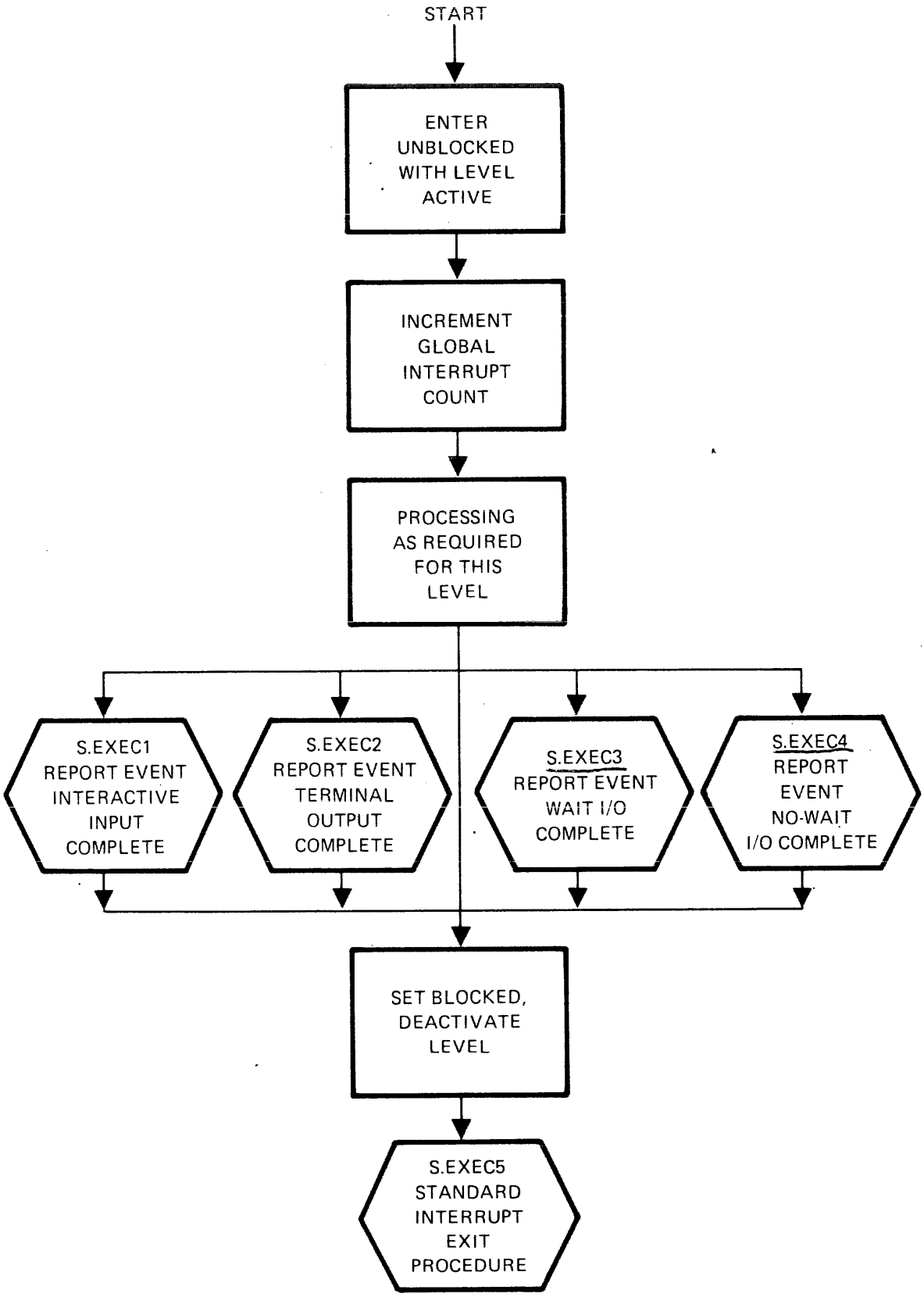
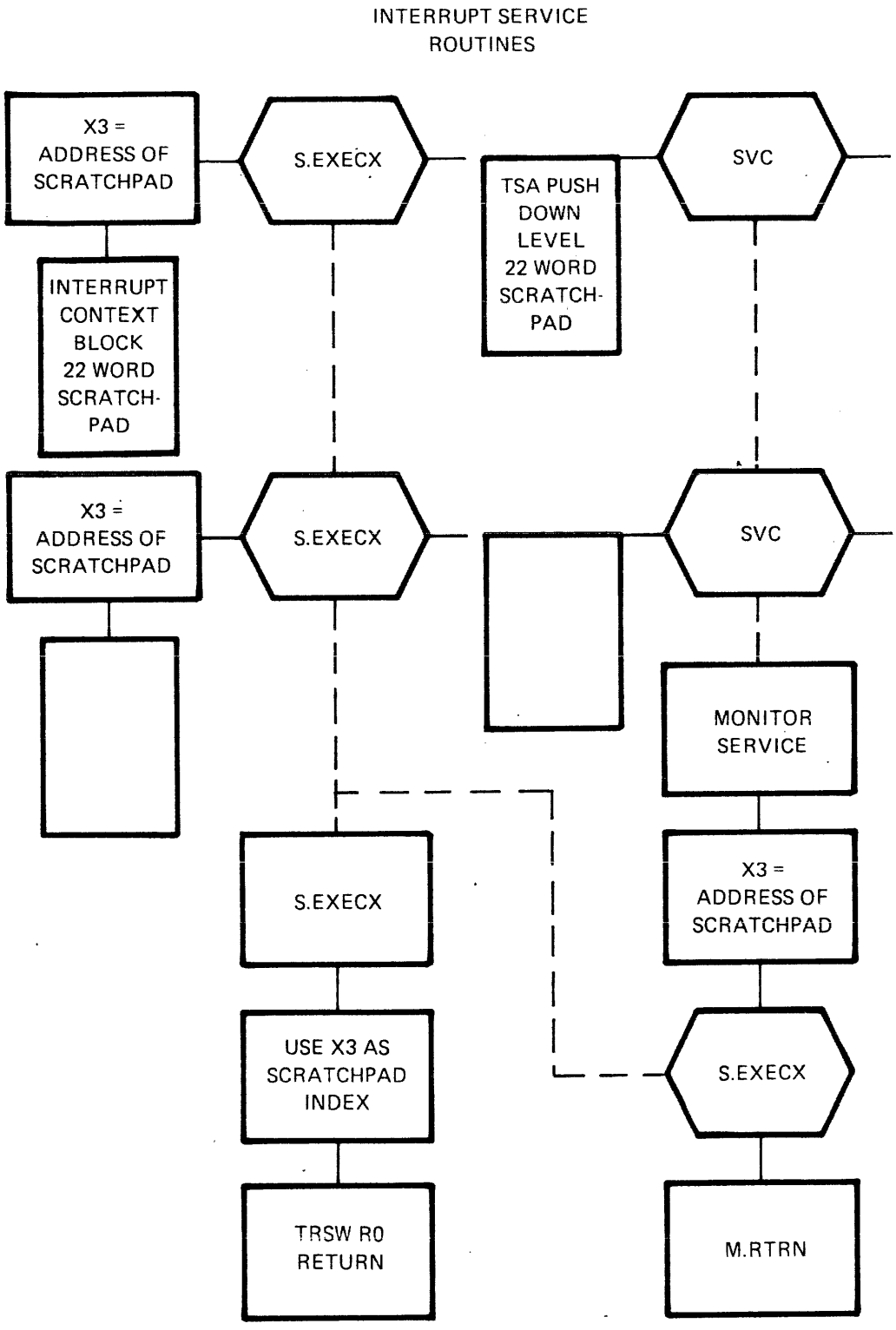
Scheduler - I/O Interrupt - Interface, Procedures



840816A


INTERRUPT SERVICE ROUTINES
X3 = ADDRESS OF SCRATCHPAD
S.EXECX
TSA PUSH DOWN LEVEL 22 WORD SCRATCH-PAD
SVC
INTERRUPT CONTEXT BLOCK 22 WORD SCRATCH-PAD
X3 = ADDRESS OF SCRATCHPAD
S.EXECX
SVC
MONITOR SERVICE
S.EXECX
X3 = ADDRESS OF SCRATCHPAD
USE X3 AS SCRATCHPAD INDEX
S.EXECX
TRSW R0 RETURN
M.RTRN

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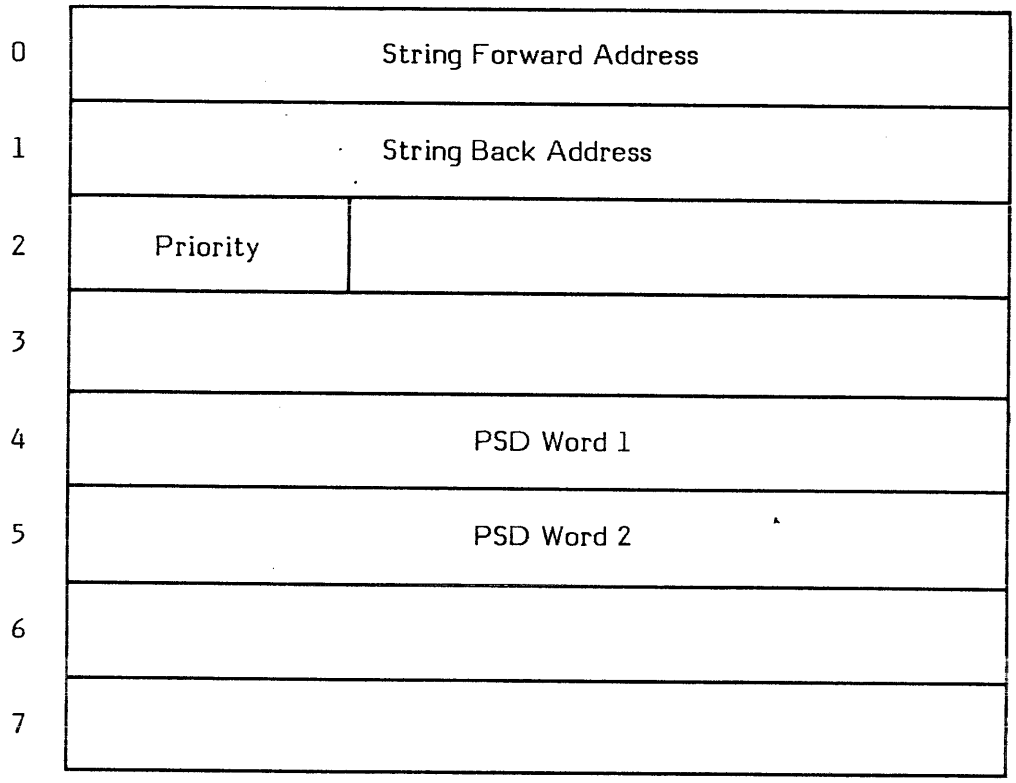
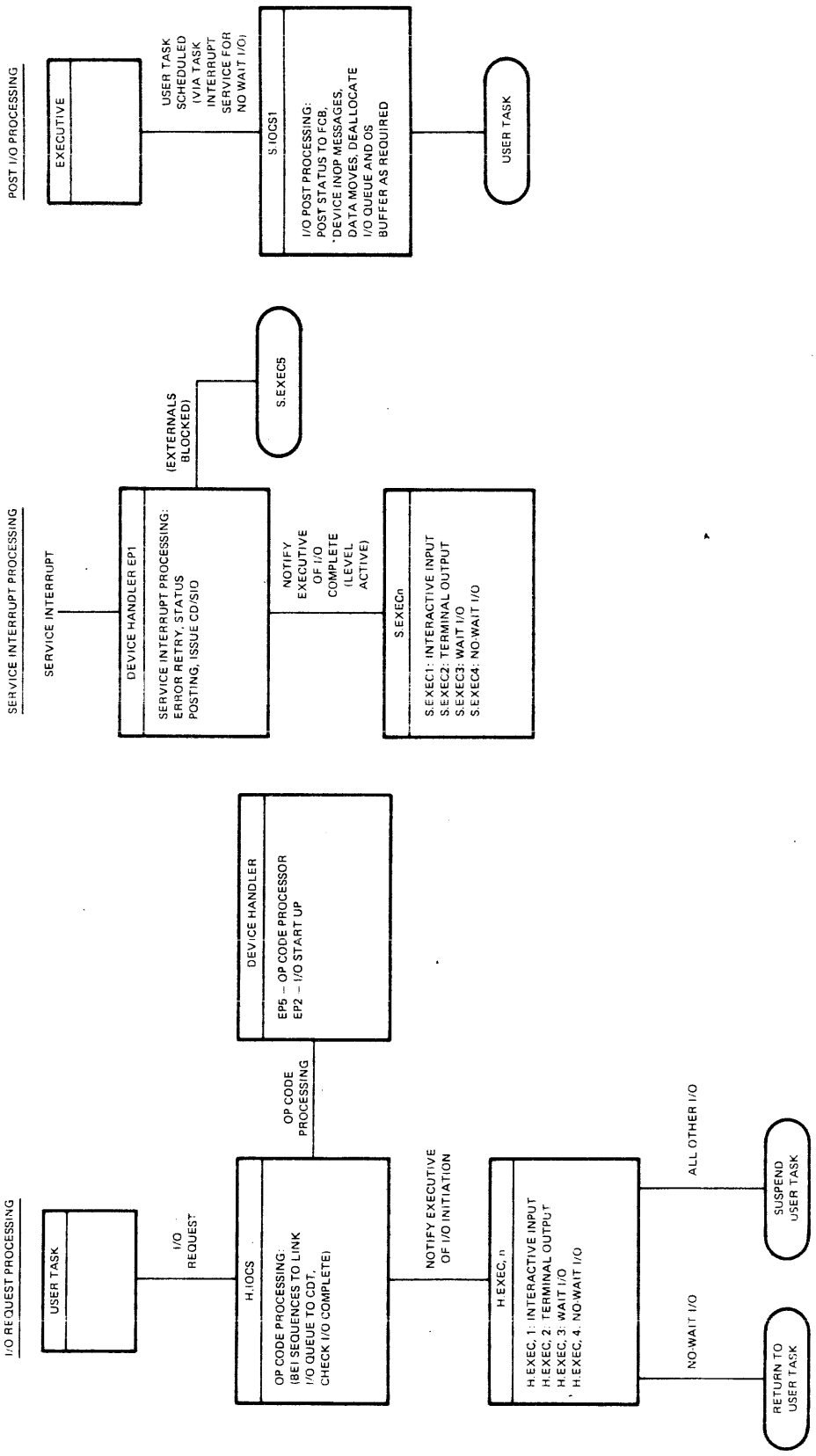
Preemptive System Service List Entry Header Format



1.3 I/O Overview From User Request to I/O Complete



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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], [DFI],

          [NST], [RAN],[ASC] ,[LDR],[INT] ,[EVN] ,[556]
                       [BIN]  [NLD] [PCK]  [ODD]  [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 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

EVN 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.DFCDE

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 / NLD], [INT / PCK] , [EVN / 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 M.FCBEXP

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

Calling Sequence:

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

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

1.12.8 M.FWRD

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

Calling Sequence:

```
M.FWRD  addr, [R] [,num]
```

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.

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

*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 IOQs 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)

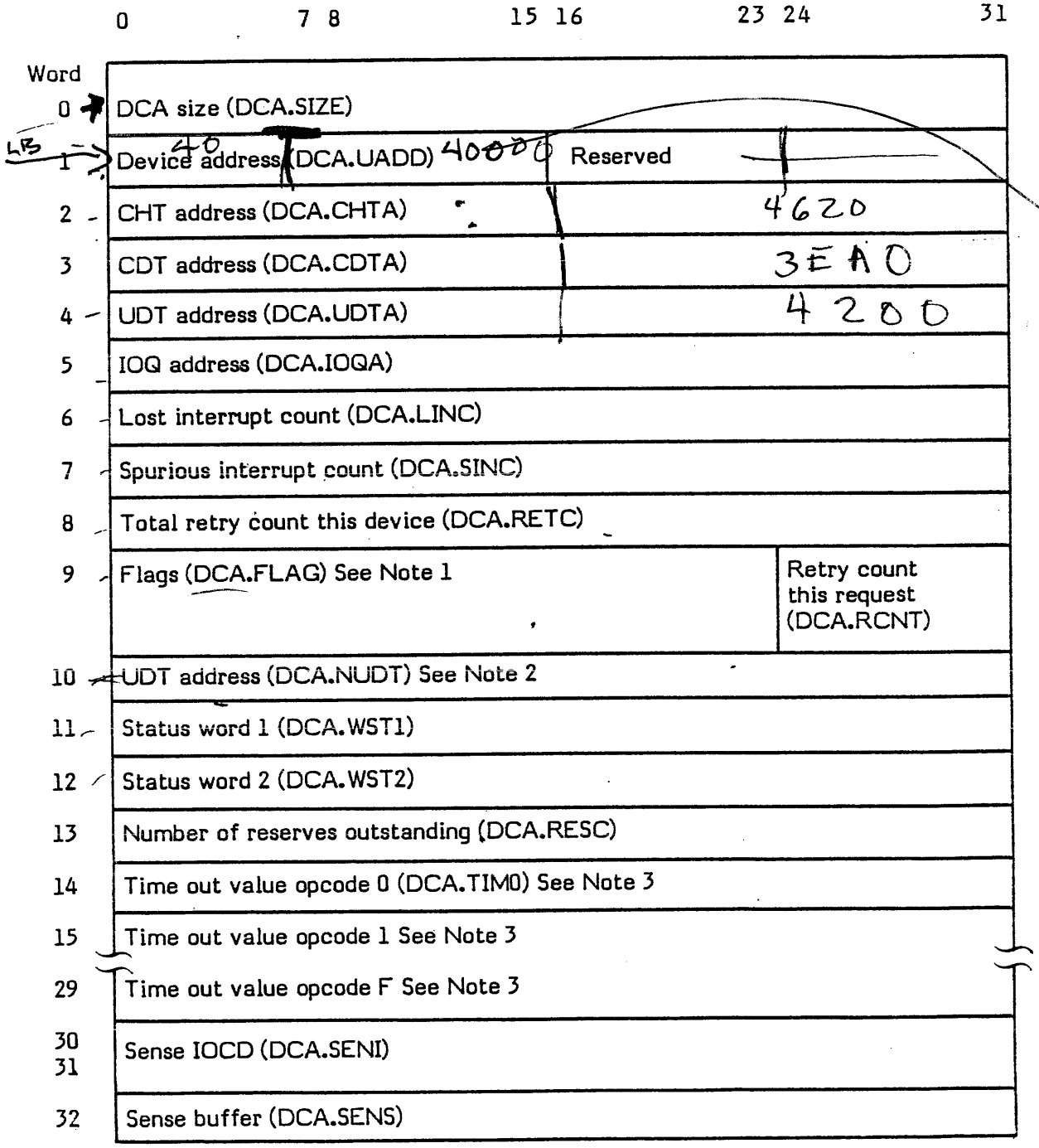
5. Bits in CDT.IOST are assigned as follows.

   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.XGPS)
   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.



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).

Dispatch Queue Entry (DQE) Table

Word # (Decimal)	Byte (Hex)	0 7	8 15	16 23	24 31
0	0	DQE.SF			
1	4	DQE.SB			
2	8	DQE.CUP	DQE.BUP	DQE.IOP	DQE.US
3	C	DQE.NUM/DQE.TAN			
4-5	10	DQE.ON			
6-7	18	DQE.LMN			
8-9	20	DQE.PSN			
10	28	DQE.USW			
11	2C	DQE.USHF			
12	30	DQE.MSD			
13	34	Reserved			
14	38	DQE.MMSG	DQE.MRUN	DQE.MNWI	DQE.GQFN
15	3C	DQE.UF2	DQE.IPUF	DQE.NWIO	DQE.SOPO
16	40	DQE.CQC			
17	44	Reserved		DQE.TIFC	DQE.RILT
18	48	DQE.UTS1			
19	4C	DQE.UTS2			
20	50	DQE.DSW			
21	54	DQE.PRS			
22	58	DQE.PRM			
23	5C	Reserved			DQE.MST
24	60	DQE.PSSF			
25	64	DQE.PSSB			
26	68	DQE.PSPR	DQE.PSCT	DQE.ILN	DQE.RESU
27	6C	DQE.TISF			
28	70	DQE.TISB			
29	74	DQE.TIPR	DQE.TICT	DQE.SWIF	DQE.UBIO
30	78	DQE.RRSF			
31	7C	DQE.RRSB			
32	80	DQE.RRPR	DQE.RRCT	DQE.NSCT	
33	84	DQE.MRSF			
34	88	DQE.MRSB			
35	8C	DQE.MRPR	DQE.MRCT	DQE.NMRR	DQE.NMMR
36	90	DQE.RTI	Reserved	DQE.ATI	Reserved
37	94	DQE.SAIR/DQE.TAD			
38-40	98	DQE.ABC			
41	A4	DQE.MPP			
42-43	A8	DQE.SRID			
44-51	B0	DQE.CDI[illegible]QE.CVOL			
52	D0	DQE.ACX1			
53	D4	DQE.ACX2			
54	D8	DQE.MRQ	DQE.MEM	DQE.MEMR	
55	DC	DQE.MRT	Reserved	DQE.RMMR	
56	E0	DQE.MAPN		DQE.CME	
57	E4	DQE.CMH		DQE.CMS	

Byte (Hex)	Symbol	Item Description
0	DQE.SF	String forward linkage address; Standard linked list format; Contains address of next (top-to-bottom) entry in chain.
4	DQE.SB	String backward linkage address; Standard linked list format; Contains address of next (bottom-to-top) entry in chain.
8	DQE.CUP	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 (DQE.BUP) of the task.
	DQE.BUP	Base priority of user task; Field length = 1B; Used by scheduler to generate DQE.CUP (current priority) based on any situational priority increments.
	DQE.IOP	I/O priority; Field length = 1B; Initially set from base priority; Used for I/O queue priority.
	DQE.US	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..

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

SWIO	0F	Task is waiting for I/O
SWSM	10	Task is waiting for message complete
SWSR	11	Task is waiting for run req complete
SWLO	12	Task is waiting for low speed output
SUSP	13	Task is waiting for: 1) timer expiration, or 2) resume request, or 3) message interrupt
RUNW	14	Task is waiting for: 1) timer expiration, or 2) run request
HOLD	15	Task is waiting for a continue req.
ANYW	16	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
SWDC	17	Task is waiting for disc space
SWDV	18	Task is waiting for dev allocation
SWFI	19	Task is waiting for file system
MRQ	1A	Task is waiting for memory
SWMP	1B	Task is waiting for memory pool
SWGQ	1C	Task is waiting in general wait queue
CIPU	1D	Current IPU task in execution
RIPU	1E	IPU requesting state

C 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.

10 DQE.ON Owner name;
Field length = 1D

18 DQE.LMN Load module name;
Field length = 1D

20 DQE.PSN Pseudonym associated with task;
Field length = 1D;
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.

28 DQE.USW User status word;
Field length = 1W

2C DQE.USHF Scheduling flags;
Field length = 1W;
Used by the scheduler to indicate special status conditions.

Bit	Label	Description
00	DQE.LPI	Load protection image requested
01	DQE.SING	Single copy load module
02	DQE.INDC	Task is indirectly connected
03	DQE.PRIV	Task is privileged
04	DQE.MSGR	Task has message receiver
05	DQE.BRKR	Task has break receiver
06	DQE.QS1X	Task quantum stage 1 expired
07	DQE.QS2X	Task quantum stage 2 expired
08	DQE.INER	Inswap I/O error
09	DQE.WIOA	Wait I/O request outstanding
10	DQE.WIOC	Wait I/O complete before in-progress notification
11	DQE.INMI	Inhibit message pseudo interrupt
12	DQE.BAOR	Batch origin task
13	DQE.TMOR	Running in TSM environment
14	DQE.ABRT	Task abort in progress
15	DQE.PRXT	Task is in preexit state
16	DQE.RRMD	Run receiver mode
17	DQE.WMSA	Wait-send msg outstanding
18	DQE.WMSC	Wait msg complete before link to wait queue
19	DQE.WRRA	Wait mode send run request outstanding
20	DQE.WRRC	Wait mode send run request complete before link to wait queue
21	DQE.DBAT	Debug associated with task
22	DQE.RT	Real time task
23	DQE.TDID	Time distribution task initial dispatch. Set by: 1. H.ALOC1 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	DQE.DELP Task delete in progress
		25	DQE.ABRA Task abort (with abort receiver) in progress
		26	DQE.ABRC Abort receiver established
		27	DQE.ADIN Asynchronous abort/delete inhibited
		28	DQE.ADDF Asynchronous delete deferred
		29	DQE.INAC Task is inactive
		30	DQE.AADF Asynchronous abort deferred
		31	DQE.ACTT Activation timer in effect

30 DQE.MSD Physical address of MIDL in TSA;
Field length = 1W

34 Reserved Field length = 1W

38 DQE.MMSG Maximum number of no wait messages allowed to be sent by this task;
Field length = 1B

DQE.MRUN Maximum number of no-wait run requests allowed to be sent by this task;
Field length = 1B

DQE.MNWI Maximum number of no-wait I/O requests allowed to be concurrently outstanding for this task;
Field length = 1B

DQE.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 (QRSM)
05 = Reserved for eventmark (QEVM)
06 = Queued for read wait for writer (QGEN)
07 = Queued for Shared Memory Table (QSMT)
08 = Queued for synchronous resource lock (QSRL)
09 = Queued for Mounted Volume Table (QMVT)
0A = Queued for dual port lock (QDPLK)

3C DQE.UF2 Scheduling flags;
Field length = 1B

Bit	Label	Description
0	DQE.EDB	Enable debug mode break
1	DQE.GQTO	Generalized wait queue time-out
2	DQE.SYNC	Task interrupts are synchronized
3	DQE.JOB	Task is part of a job
4	DQE.ACX	ACX-32 task flag
5-7		Reserved

DQE.IPUF IPU flag byte
Field length = 1B

Bit	Label	Description
0	DQE.IPUH	IPU inhibit flag
1	DQE.IPUB	IPU bias flag
2	DQE.IPUR	CPU only
3	DQE.OSD	OS execution direction flag (set when PSD is in user area)
4	DQE.BASE	Base register task
5	DQE.ADA	Ada task
6-7		Reserved

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

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

Bit	Label	Description
0	DQE.GQPO	SWGQ state priority based swapping
1	DQE.BMAP	Swap inhibit due to bit map access
2-7		Reserved

40 DQE.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

DQE.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 (SWGQ) queue
06 = Resume program from peripheral device (SWDV) queue
07 = Resume program from disc space (SWDC) queue

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

48 DQE.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;

Bit	Description
0-7	Reserved
8-15	Device type code
16-23	Channel address
24-31	Subchannel address or contains first word of SWGQ id

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 sed 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.

68 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

6C 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.

70 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.

74 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;

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

		6	DQE.FCRS	Task forced unswappable because swap file has not been allocated for it
		7	DQE.INOS	Task is imbedded in the operating system
	DQE.UBIO	Number of unbuffered I/O requests currently outstanding; Field length = 1B.		
78	DQE.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	DQE.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	DQE.RRPR	Run receiver head cell Dummy priority (always = 0); Standard head cell format; Field length = 1B.		
	DQE.RRCT	Run receiver head cell Number of entries in list; Standard head cell format; Field length = 1B;		
	DQE.NSCT	Number of map blocks out swapped; Field length = 1H.		
84	DQE.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	DQE.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.		

8C 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.

90 DQE.RTI Requested task interrupt flags;
Field length = 1B;

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

Reserved Field length = 1B

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

Bit	Label	Description
0		Reserved
1	DQE.AEA1	Active end action priority 1
2	DQE.ADM	Active debug break
3	DQE.AUB	Active user break
4	DQE.AEA	Active end action priority 2
5	DQE.AMI	Active message interrupt
6-7		Reserved

Reserved Field length = 1B

94 DQE.SAIR System action task interrupt request;

Bit	Label	Description
0	DQE.DELR	Request for delete of this task
1		Reserved
2	DQE.HLDR	Hold task request
3	DQE.ABTR	Abort task request
4	DQE.EXTR	Exit task request
5	DQE.SUSR	Suspend task request
6	DQE.RRRQ	Run receiver mode request
7		Reserved

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

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

A4 DQE.MPP Memory pool pointer;
Field length = 1W

A8 DQE.SRID Used swapspace linked list;
Field length = 2W

B0 DQE.CDIR Load module RID at activation;
Field length = 8W

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

D0 DQE.ACX1 Outswap time;
Field length = 1W

D4 DQE.ACX2 Advance communication word 2;
Field length = 1W

D8 DQE.MRQ 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.

Word	0 7	8 15	16 23	24 31
0	Status bits (DFT.STB) See Note 1	Access flags or system file code (DFT.ACF) See Note 2	CDT index (DFT.CDTX)	
1	Flags (DFT.FLGS) See Note 3	Number of FPTs assigned (DFT.NAS)	UDT index (DFT.UDTX)	
2	Segment definition area address (DFT.SEGA) or Volume name for dismount message (DFT.VNAM)			
3	Relative file block position (DFT.POS)			
4	Relative EOM block position (DFT.EOM) See Note 4			
5	Relative EOF block number (DFT.EOF)			
6	Current segment position in file (DFT.CSEG) or Device specification mask (DFT.MASK)		Number of segments (DFT.NSEG)	
7	Relative end block number of current segment (DFT.SEGE) or Unformatted medium identifier (MTF.REEL)		Append record pointer (DFT.AREC)	
8	File attributes field (DFT.ATTR) See Note 5			
9	Append block number (DFT.ABLK) or Volume number for multivolume media (MTF.VOL)			
10	Blocking buffer head cell address (DFT.BBA)			
11	Associated VAT index (DFT.VATX)	Number of opens on this FAT (DFT.OPCT)	Current access mode (DFT.CACM)	Resource type code (DFT.TYPE)
12	Address of parent directory resource descriptor (DFT.PDIR)			
13	Relative offset of parent directory entry (DFT.DOFF)			
14	Allocated Resource Table entry pointer (DFT.ARTA)			
15	Assigned access restrictions (DFT.ACCS) See Note 6			

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.AOTHR) 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 3	4 7	8 11	12 15	16 23	24 31
0	Reserved	Opcode (FCB.OPCD)	Logical file code (FCB.LFC)			
1	Quantity (FCB.TCW)			Data Address		
2	General control flags (FCB.GCFG)		Special flags (FCB.SCFG)	Random access address (FCB.CBRA)		Console teletype flag (FCB.CONF)
3	Status flags (FCB.SFLG)		Test status	DCC status	Device status	
4	Record length (bytes) (FCB.RECL)					
5	Reserved		I/O queue address (FCB.IOQA)			
6	Special status (FCB.SPST)	Reserved	Wait I/O error return address (FCB.ERRT)			
7	Index to FPT		FAT address (FCB.FATA)			
8	Reserved		Expanded data address (FCB.ERWA)			
9	Expanded transfer quantity (bytes) (FCB.EQTY)					
10	Expanded random access address (FCB.ERAA)					
11	Extended I/O status word 1 (FCB.IST1)					
12	Extended I/O status word 2 (FCB.IST2)					
13	Reserved		No-wait I/O normal end action service address (FCB.NWOK)			
14	Reserved		No-wait I/O error end action service address (FCB.NWER)			
15	User-supplied blocking buffer address and number of 192 W buffers (FCB.BBA)					

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:

Type of Transfer	F (12)	C (30,31)
Byte 0	1	00
Byte 1	1	01
Byte 2	1	10
Byte 3	1	11
Left Halfword	0	01
Right Halfword	0	11
Word	0	00

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:

Bit	Meaning
0	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.
1	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 "INOP" 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.
2	If set, data formatting is inhibited. Otherwise, data formatting is performed by the appropriate device handler. See Bit 8 for further explanation.
3	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.
4	If set, file accessing will occur in the random mode. Otherwise, sequential accessing will be performed.
5	If set, a blocked file is specified (disc or tape assignments only).
6	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.
7	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.

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 IOCL 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.

2.15.1 Special Control Specifications

Device	Default (Bit 2=0)	Override (Bit 2=1)	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12
Card Reader (CR)	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.	See Bit 8.	0=ASCII read 1=Binary read				
Line Printer (LP)	Interpret first character as carriage control.	No carriage control interpretation					
High Speed Data (HSD) Interface (Generic Handler)			See Word 2 definition	See Word 2 definition	See Word 2 definition	See Word 2 definition	See Word 2 definition
Paper Tape Reader (PT)	Read in formatted mode, skipping leader.	Read unformatted	0=Do not skip leader 1=Skip leader				
(MT 9-track only)	N/A						
Discs (DM,DF,FL)	Report EOF if X'0FE0FE0F' encountered in word 0 of 1st block during read of unblocked record.	No EOF reporting on unblocked reads.					

Device	(Bit 2=0)	(Bit 2=1)	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12
ALIM (Asynchronous Line Interface Module) Terminals (TY)	Read: receive data (bytes) defined for transfer count. Write: formatted	Read: Bit 2=0, Bit 8=1, Bit 9=0 =Blind mode reset Read: Bit 2=0, Bit 8=0, Bit 9=1 =Echo on read Read: Bit 2=1, Bit 8=N/A, Bit 9=N/A =Receive data Read: Bit 2=0, Bit 8=0, Bit 9=0 =Receive data Write: Bit 2=0, Bit 8=N/A, Bit 9=0 =Formatted write Write: Bit 2=0, Bit 8=N/A, Bit 9=1 =Initialize device Write: Bit 2=1, Bit 8=N/A, Bit 9=N/A =Unformatted write			On Read: 1= Inhibit conversion of lower case characters to upper case 0= Convert		
8-Line Asynchronous Communications Multiplexer (TY)	Read: perform special character formatting. Write: first character is for form control.	Read: read n bytes with no formatting. Write n form control.	Transmit break (erase, punch trailer): 0=Stop transmitting break 1=Start transmitting break. Read: 1=ASCII control character detect	Read: 0=Echo by controller 1=No echo by controller Write: 0=Normal write 1=Initialize device (load UART parameters)	Read (if Bit 2=0): 0=convert lower case character to upper case 1=Inhibit conversion of lower case characters to upper case.	Read: 0=no special character detect 1=special character detect Write 0=normal write 1=write with input subchannel monitoring plus software flow control	Read: 0=do not purge type ahead buffer 1=purge type ahead buffer

WORD 3

Bits 0-31 — 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:

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

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.

FCB Word 3 Bits	16	17	18	19	20	21	22	23	24
All F-Class Devices	ECHO	PPCI	INCORRECT LENGTH	PROGRAM CHECK	DATA CHECK	CONTROL CHECK	INTERFACE CHECK	CHANNEL CHAINING CHECK	BUSY
High Speed Data Interface (Generic Handler) D-Class	CD TERMI-NATION	ERROR STATUS FORMAT (See Word 3 description)							
GPMC	DEVICE DEPENDENT								

FCB Word 3 Bits	25	26	27	28	29	30	31
ALL F-Class Device	STATUS MODIFIER	CONTROLLER END	ATTENTION	CHANNEL END	DEVICE END	UNIT CHECK	UNIT EXCEPTION
High Speed Data Interface (Generic Handler) D-Class	EXTERNAL TERMINATION	IOCB ADDR ERROR	ERROR ON TI ADDR FETCH	DEVICE EOB	EP5 ERROR PRE-CLUDED REQUEST QUEUEING	NONEXECUTIVE CHANNEL PROGRAM IOCB TYPE IN ERROR 00-DATA TRANSFER 01-DEV STATUS 10-COMMAND TRANSFER	
GPMC	DEVICE DEPENDENT	TRANS-MISSION ERROR	INCORRECT LENGTH	UNUSUAL END	ILLEGAL ORDER	INTERRUPT PENDING	CHANNEL END

For Extended I/O Devices Only

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

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

	Bit	Description
CHANNEL STATUS	16	Echo
	17	Post program controlled interrupt
	18	Incorrect length
	19	Channel program check
	20	Channel data check
	21	Channel control check
	22	Interface check
	23	Chaining check
CONTROLLER/ DEVICE STATUS	24	Busy
	25	Status modified
	26	Controller end
	27	Attention
	28	Channel end
	29	Device end
	30	Unit check
	31	Unit exception

WORD 4

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 5

Bits 0-7	Reserved.
Bits 8-31	I/O Queue Address - This field is set by IOCS to point to the I/O queue for an I/O request initiated from this FCB.

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 commmand 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.IOCS,10), 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.IOCS,34 (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.IOCS,34 (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 aliows 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'FFFEE'

Each FPT entry has the following format:

Word	0 7	8 31
0	Reserved	Logical file code (FPT.LFC)
1	Flags (FPT.FLGS) See Note 1	FCB address (FPT.FCBA)
2	Reserved	FAT address (FPT.FATA)

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 lfc TO LFC=lfc 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).

Word	0 7	8 15	16 23	24 31
0	String forward address (IOQ.SFA)			
1	String backward address (IOQ.SBA)			
2	Queue priority (IOQ.PRI)	I/O type (IOQ.TYPE)	Channel number (IOQ.CHNO)	Subaddress (IOQ.SUBA)
3	Reserved (IOQ.RTN)			
4	PSD1 of task interrupt routine (IOQ.PSD) See Note 1			
5	PSD2 of task interrupt routine			
6	Status (IOQ.STAT) See Note 2	FCB or TCPB address (IOQ.FCBA)		
7	Program number (IOQ.PRGN)	CDT address (IOQ.CDTA)		
8	Handler function word 1 (IOQ.FCT1)			
9	Handler function word 2 (IOQ.FCT2) See Note 3			
10	Handler function word 3 (IOQ.FCT3) See Note 4			
11	Handler function word 4 (IOQ.FCT4)			
12	32-Bit flag word (IOQ.FLGS) See Note 5			
13	FAT address (IOQ.FATA)			
14	Number of bytes transferred (IOQ.UTRN) See Note 6		Number of words in OS buffer (IOQ.WOSB) See Note 6	
15	OS buffer address (IOQ.FBUF)			
16	User's buffer address (IOQ.TBUF)			
17	I/O returned status word 1 (IOQ.IOST)			
18	I/O returned status word 2 (IOQ.IST1) See Note 7			
19	I/O returned status word 3 (IOQ.IST2) See Note 8			
20	UDT address (IOQ.UDTA)			
21	Control information from word 2 of FCB (IOQ.CONT)			
22	Address of context block (IOQ.CBLK) or Device context area address (IOQ.DCAA)			
23	Mode bits (extended I/O) (IOQ.MODE) See Note 9 or Word address of set mode bits (IOQ.MOWD)	Queue priority temporary storage (IOQ.PSAV)	Number of extra words in this queue entry (IOQ.XTRA)	
24	Device inop buffer address (for I/O error processing) (IOQ.INOP)			
25	Address of first word of dynamic IOCD list (extended I/O)(IOQ.IOCD) See Note 10			

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.CT00 has been called with an FCB, not with a TCPB (i.e., not via H.IOCS,14)
   - 14 Reserved
   - 15 If set, terminal input
   - 16 If set, terminal output
   - 17 If set, task swappable 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 (GPMC) 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

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.

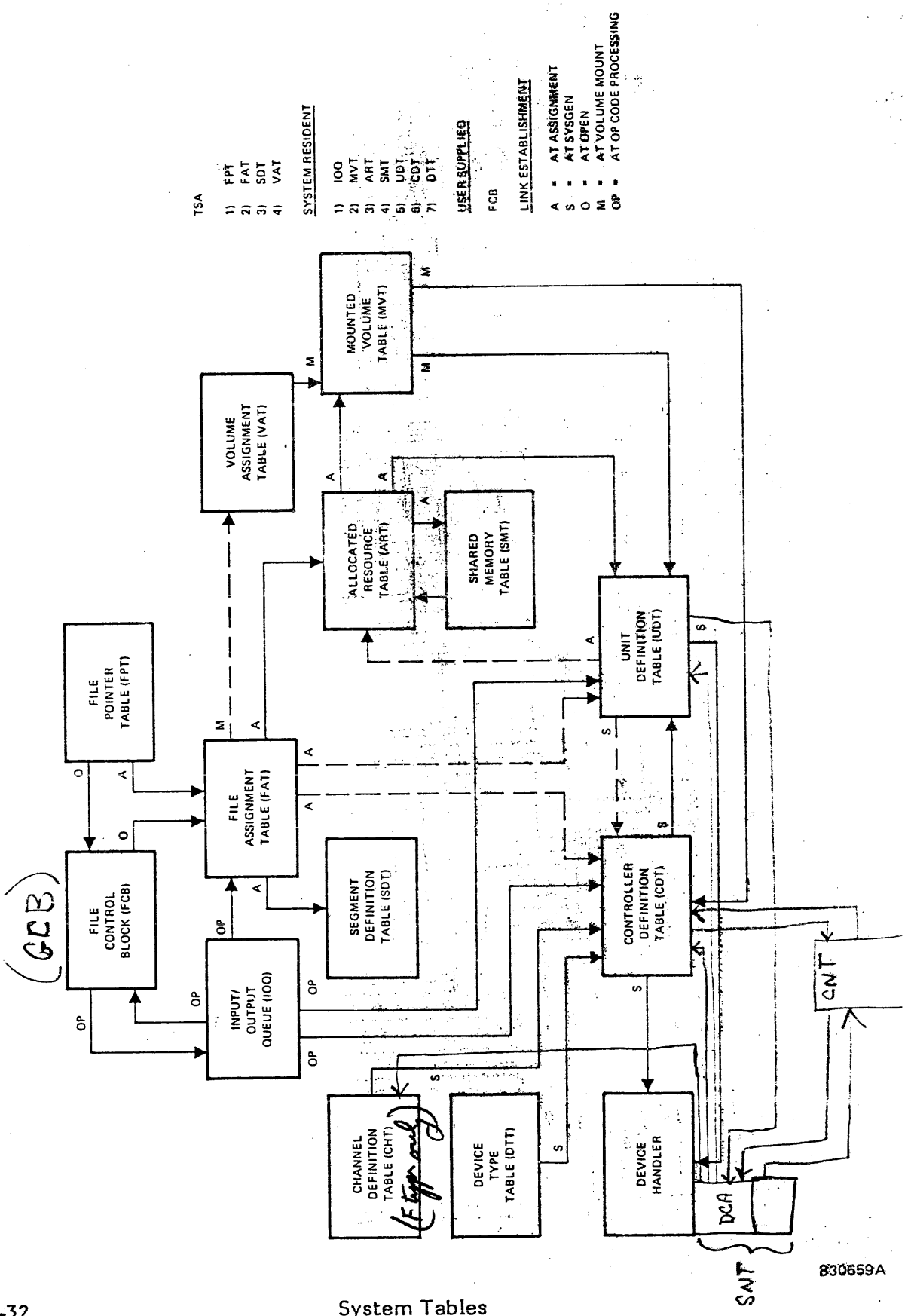
7. For extended I/O devices, IOQ.IST1 is initialized to the start address within the I/O queue for any dynamic IOCD's.

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.

2.18 I/O Table Linkages



2.39 Unit Definition Table (UDT)

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.

Word	0 – 7	8 – 15	16 – 23	24 – 31
0	UDT index (UDT.UDTI)		CDT index (UDT.CDTI)	
1	Unit status (UDT.STAT) See Note 1	Device type code (UDT.DTC) See Note 2	Logical channel number (UDT.CHAN)	Logical sub-address (UDT.SUBA)
2	Reserved	Address of Dispatch Queue entry of task which has device allocated if device is not shared (UDT.DQEA)		
3	Physical channel number (UDT.PCHN)	Physical sub-address (UDT.PSUB)	Sectors per block (UDT.SPB) or Number characters per line (UDT.CHAR) See Note 3	Sectors per allocation unit (UDT.SPAU) or Number lines per screen (UDT.LINE) See Note 4
4	Flags (UDT.FLGS) See Note 5	Number of sectors per track on disc or global line counter if a terminal (UDT.SPT)	Maximum byte transfer (UDT.MBX)	
5	Number of sectors on disc or tab setting if a terminal (UDT.SECS)			
6	Sector size, on disc or a tab setting if a terminal (UDT.SSIZ)		Number of heads on disc or a tab setting if a terminal (UDT.NHDS)	
7	Serial number if tape or removable disc (UDT.SERN)			
8	Peripheral time out value (UDT.PTOV)			
9	Reserved	Address of device context area (UDT.DCAA) or Handler name at initialization (UDT.HNAM)		
10	Bit flags See Note 6 (UDT.BIT2)		Associated Allocated Resource Table index if assigned (UDT.ARTI)	
11	Service interrupt handler address (UDT.SIHA)			
12	Device historical data address (UDT.HIST)			
13	Address of first IOQ linked to this device (UDT.FIOQ)			
14	Address of last IOQ linked to this device (UDT.BIOQ)			
15	Link Priority (UDT.LPRI)	Link Count (UDT.IOCT)	Unit Status byte 2 (UDT.STA2) See Note 7	

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.IOUT)
   - 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

TSM TERMINAL DEFINITION

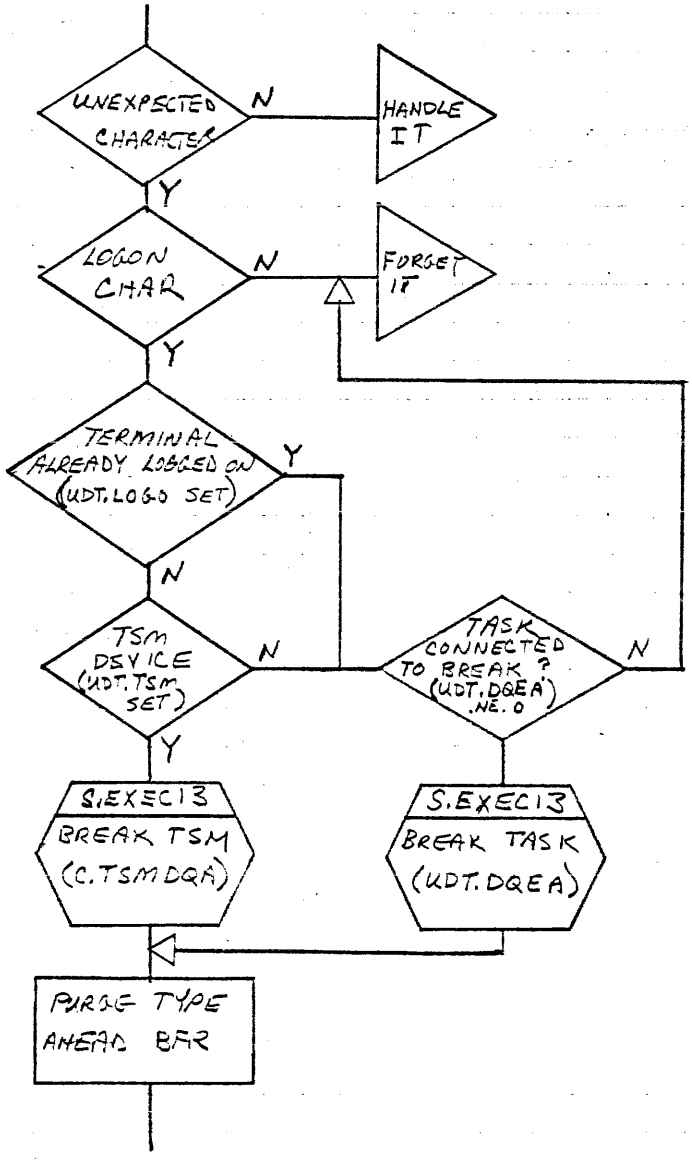
HANDLER - SYSGEN INITIALIZATION E.P.

- INCREMENT C.TSMTOT (BYTE) BY 1 FOR EACH TERM.
- SET UDT.TSM BIT IN UDT.STAT IN UDT FOR EACH TERM.

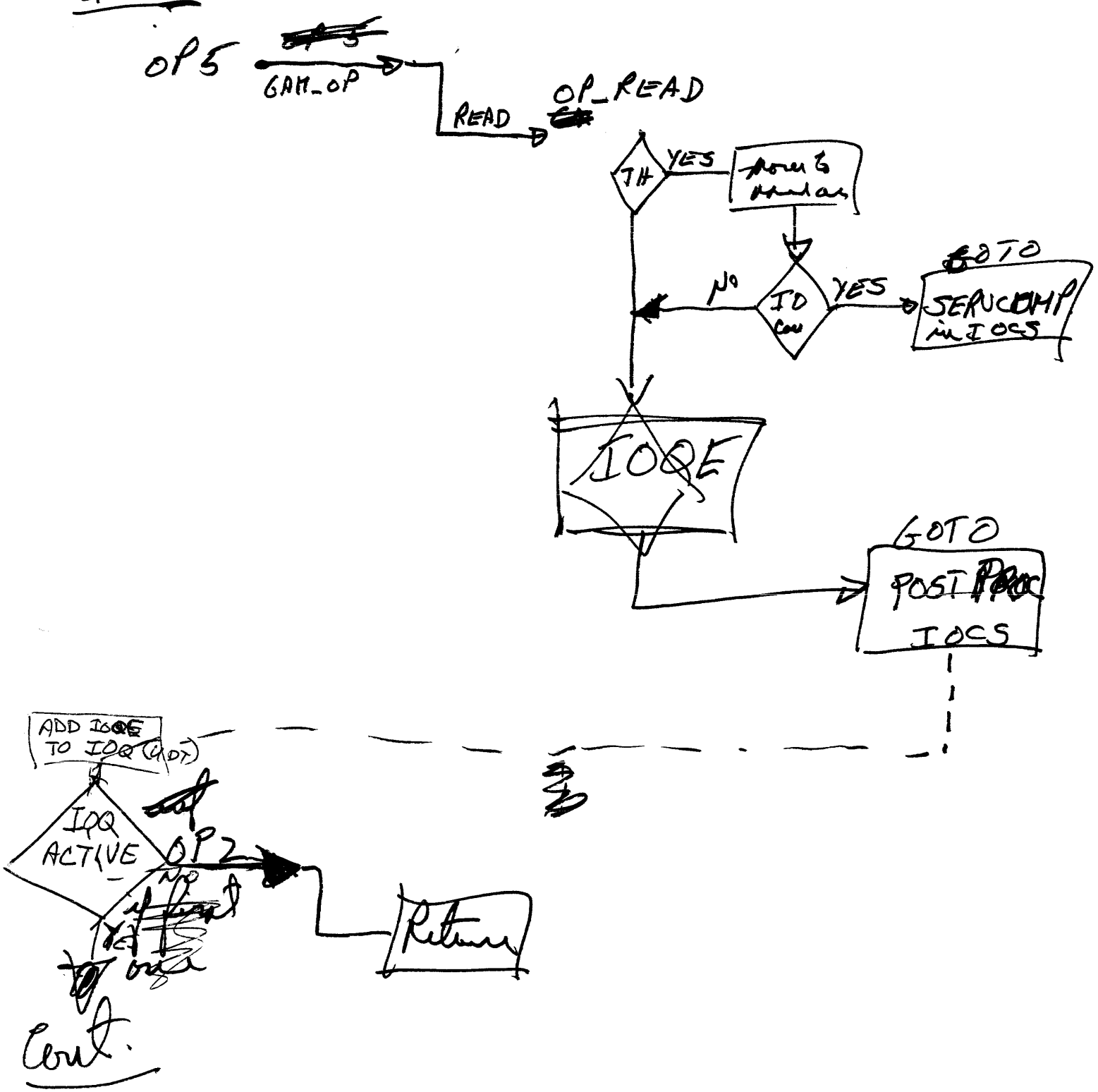
HANDLER - OP CODE ENTRY PT

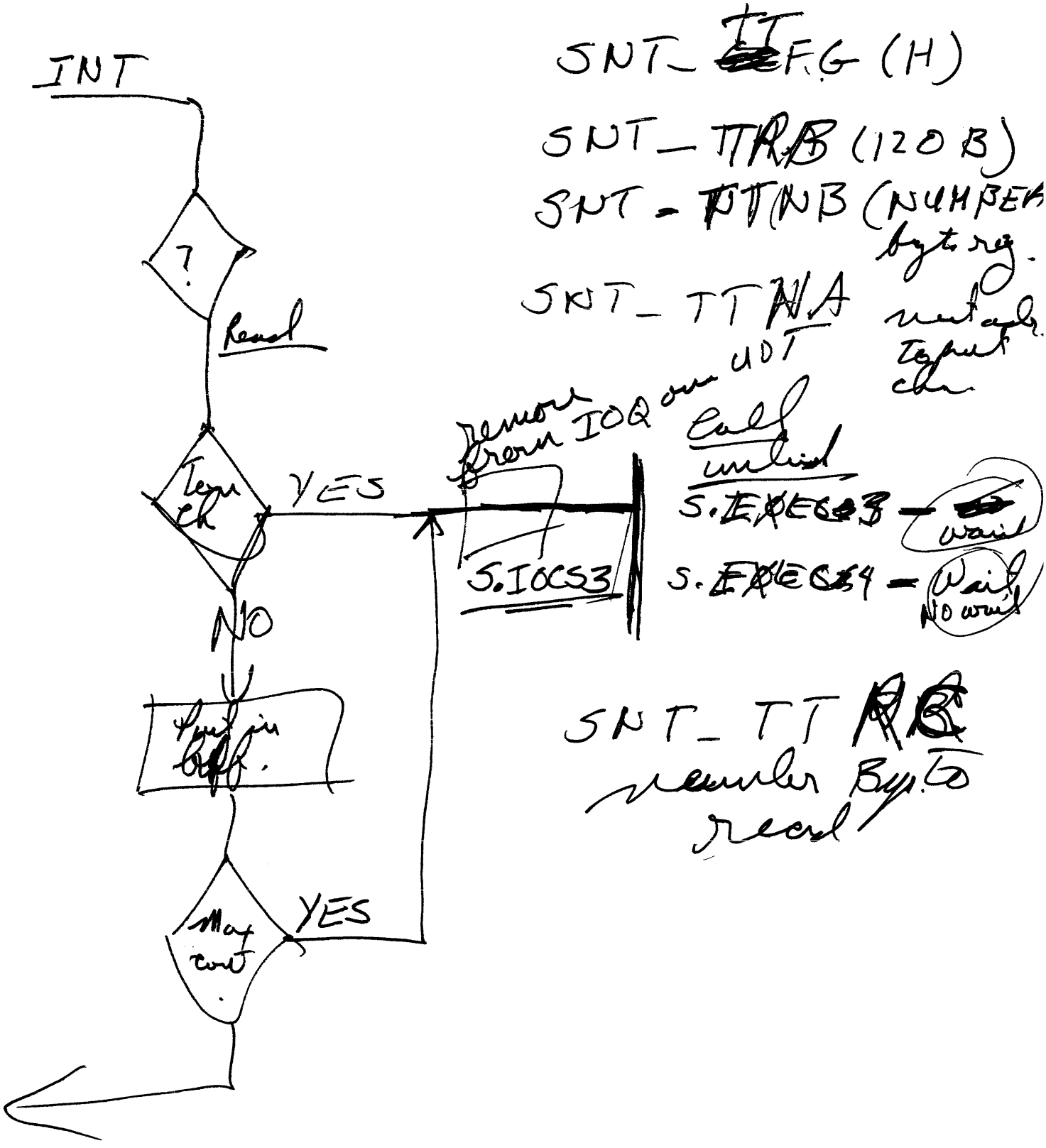
- SINCE THE HSD IS NOT AN IDP OR A QPMC, J.TINIT ASSUMES IT IS AN ADS AND WILL ISSUE A WRITE WITH A FCB WHICH HAS WORD 2, BITS 2 AND 9 SET, IGNORE THIS WRITE OF UART SETUP PARAMETERS.

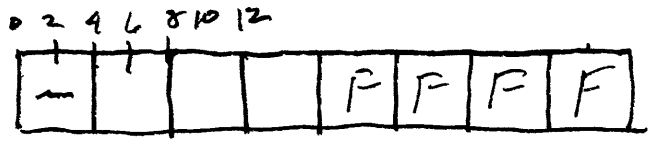
HANDLER - LOGGING ON



NOTE: BL S.EXEC13 WITH X3 = ADDRESS OF DW BOUNDED SCRATCH AREA. THE 8-LINE ASYNC HANDLER CLAIMS 3 WORDS ARE USED BUT THE S.EXEC13 CODE ONLY USES 2 WORDS (ONE DW).


IOCS
OPS
GAM_OP
READ
OP_READ
TH
YES
NO
IO
YES
GOTO
SERVCOMP
IN IOCS
IOQE
GOTO
POST
IOCS
ADD IOQE
TO IOQ (QDT)
IOQ
ACTIVE
OP2
NO
Return
Cont.


INT
?
Read
Term ch
YES
NO
Put in buff.
Max cnt
YES
Remove from IOQ
S.IOCS3
SNT_TT FG (H)
SNT_TTRB (120 B)
SNT - TTNB (NUMBER
SNT_TT NA
call unlid
S. EXECS3 — wait
S. EXECS4 — Wait NO wait
SNT_TT RC
receive Byte to read


0 2 4 6 8 10 12
F F F F

477
490

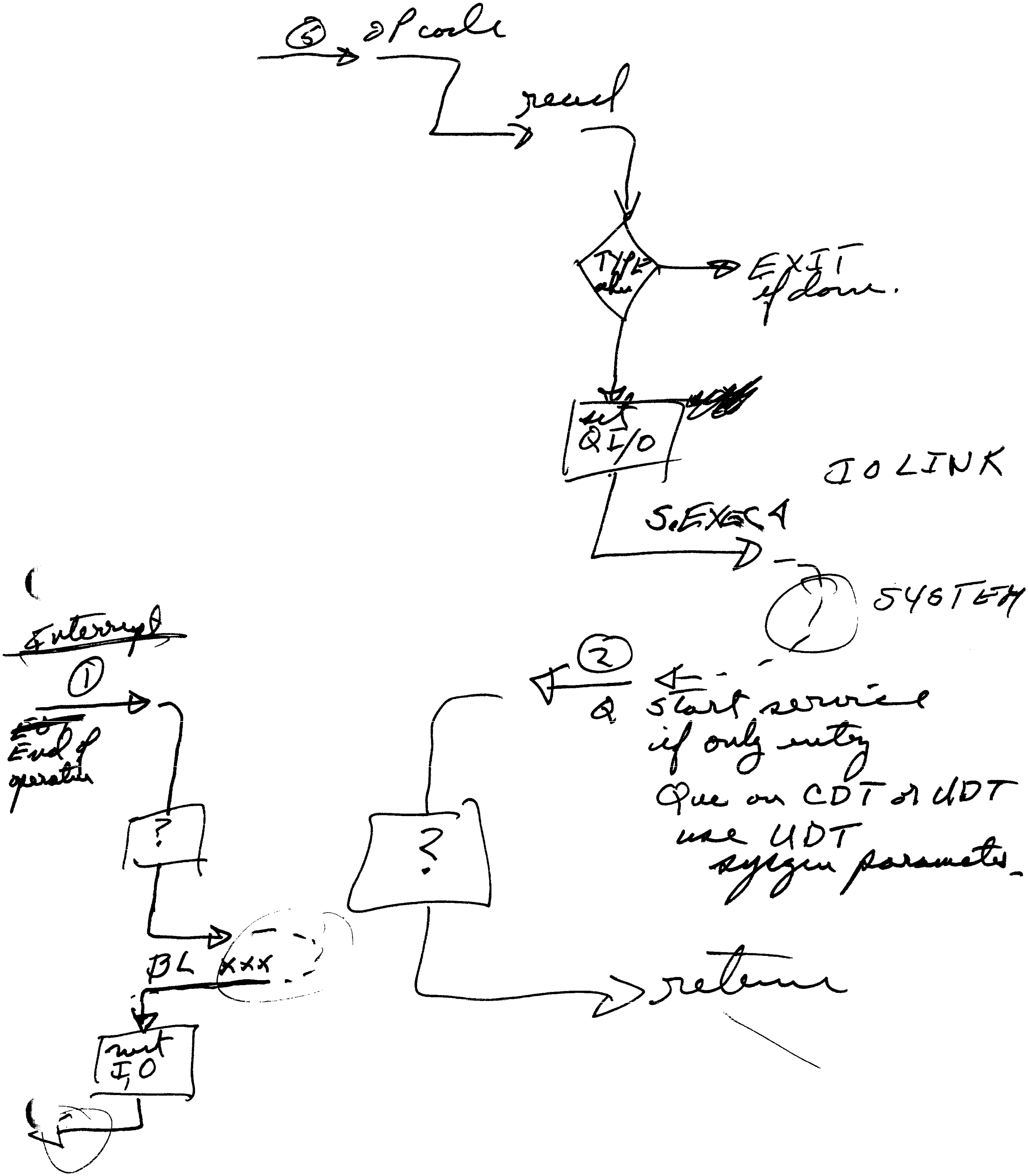

5 op code
read
TYPE
EXIT if done.
set QI/O
IOLINK
SYSTEM
Interrupt
1
End of operation
?
2
Q
start service if only entry
Que on CDT or UDT
use UDT
system parameter
?
BL xxx
return
wait I,O

Table 5-6
Device Functions (Terminals, Handler Action Only)

Operation	IOCS Op Code	Handler = H.ASMP (ALIM)	Handler = F8XIO (8-Line)
Open M.FILE	0	NOP	Initialize IOP Channel if Necessary
Rewind M.RWND	1	NOP	SENSE Operation
Read Rec. M.READ	2	Read to Data Buffer	Read to Data Buffer
Write Rec. M.WRIT	3	Write Record to Terminal	Write Record to Terminal
Write EOF M.WEOF	4	NOP	NOP
Execute Channel	5	Execute Channel	Execute Channel
Advance Record M.FWRD	6	Connect Communi-cations Channel	Set Data Terminal Ready
Advance File M.FWRD	7	Disconnect Com-munications Channel	Reset Data Terminal Ready
Backspace Record M.BACK	8	Initialize Dev-ice and Set Timeout Value	Used by J.TINIT to Initialize Terminals
Backspace File M.BACK	9	Clear Break Status Flag Word	Reset Request to Send
Upspace M.UPSP	A	Spec Error	Set Request to Send
Erase/Punch Trailer	B	Transmit Break	Set/Reset Break (depends on flags in FCB)
Eject/Punch Leader M.EJECT	C	Spec Error	Define Special Character
Close M.CLSE	D	NOP	NOP
Reserve FHD Port	E	Spec Error	Set Single Channel Operation (Default)
Release FHD Port	F	Spec Error	Set Dual Channel Operation

NOP = No operation performed

Spec Error = Illegal operation code

Table 5-8
Default and Special Device Formatting (Page 2 of 2)

Device	(Bit 2=0)	(Bit 2=1)	Bit 8	Bit 9	Bit 10	Bit 11	Bit 12
Mag Tape (MT, 7-track only)	Binary, ODD parity, 800 bpi	See Bits 8-10	0=Interchange (binary coded decimal) 1=Packed (binary)	If Bit 8=0: 0=EVEN parity 1=ODD parity	0=800 bpi 1=556 bpi		
(MT 9-track only)	N/A						
Discs (DM,DF,FL)	Report EOF if X'0FE0FE0F' encountered in word 0 of 1st block during read of unblocked record	No EOF reporting on unblocked reads					
ALIM (Asynchronous Line Interface Module) Terminals (TY)	Read: receive data (bytes) defined for transfer count Write: formatted	Read: Bit 2: 0 / Bit 8: 1 / Bit 9: 0 =Blind mode reset; 0 / 0 / 1 =Echo on read; 1 / N/A / N/A =Receive data; 0 / 0 / 0 =Receive data Write: 0 / N/A / 0 =Formatted write; 0 / N/A / 1 =Initialize device; 1 / N/A / N/A =Unformatted write			On Read: 1= Inhibit conversion of lower case characters to upper case 0= Convert		
8-Line Asynchronous Communications Multiplexer (TY)	Read: perform special character formatting. Write: first character is for form control.	Read: if formatmatting is inhibited, reads n bytes. Write n bytes with form control.	Transmit break (erase, punch) (trailer): 0=Stop transmitting break 1=Start transmitting break. Read: 1=ASCII control character detect	Read: 0=Echo by controller 1=No echo by controller Write: 0=Normal write 1=Initialize device (load UART parameters)	Read (if Bit 2=0): 0=convert lower case character to upper case 1=Inhibit conversion	Read: 0=no special character detect 1=special character detect Write 0=normal write 1=write with input subchannel monitoring plus software flow control	Read: 0=do not purge type ahead buffer 1=purge type ahead buffer

850255-2

Table 5-9 Standard Terminal and Line Printer Carriage Control Characters and Interpretation

Result

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

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 + purging
  - Clamp transfer count to linesize (printable chars)
- READ
  - Character control
    - Formatted - bit 2 clear
      - BS
      - DEL, RUB-OUT
      - TAB - insert blanks (Tap setting in UDT, 5⁰)
      - CR
      - ETX, EOF, CONTROL-C - set EOF
    - Formatted - bit 2 + 10 clear
      - convert LC to UC
    - Unformatted - bit 2 set
      - nothing
  - allocate read buffer in system, if not there already, so task swappable
  - Echo control FCB.SCFG bit 1 (set echo)

SET2C

BLE R1.2.03)

```
C.3227   SETF
C.TRACE  SETF
C.MEMD   SETF
C.SALONE SETF
C.SYSGDN SETF
*** DDDDD.CNTRL_JOB.                                              0003.
         PROGRAM   HSDINT                                         0004
         M.EQUS                                                   0005
         ENDM
         M.TBLS                                                   0006
         ENDM
GLOBALDD COMMON    IOCBAREA (5)                                  0007
HSD_BEG  EQU       $                                             0008
         LB        R1,C.PRNO       GET DQE FOR THIS TASK         0009
         SLL       R1,3            ADJUST FOR PSD                0010
         SBR       R1,0            SET MAPPING BIT               0011
         STW       R1,NEW_PSD+1W   STORE INTO WORD 2 OF NEW_PSD  0012
         LW        R1,X'128'       GET CONTENTS OF LOC X'128'    0013
         STW       R1,LOC_128      SAVE IT                       0014
         LEAR      R1,IOCB         GET PHYSICAL ADDRESS OF IOCB  0015
         STW       R1,X'128'       STORE IT INTO IVL             0016
         STW       X'780'          CLEAR IOCD ADDRESS LOCATION   0017
         LW        R1,X'734'       GET CONTENTS OF LOC X'734'    0018
         STW       R1,LOC_734      SAVE IT                       0019
         LEAR      R1,IOCB_TAW     GET PHYSICAL ADDRESS OF TAW   0020
         STW       R1,X'734'       STORE IT INTO TAW LOCATION    0021
         LEAR      R1,IOCBAREA     GET PHYSICAL ADDRESS OF IOCB  0022
         STW       R1,IOCB_TAW     STORE IT INTO TAW LOCATION    0023
         LW        R1,-5W          MOVE IOCB TO GLOBAL AREA      0024
         EQU       $               SO WE DON'T HAVE TO WORRY     0025
MOVELOOP LW        R2,IOCB+5W,X1   ABOUT CROSSING MAP BLOCK      0026
         STW       R2,IOCBAREA+5W,X1 BOUNDRIES.                  0027
         AIW       R1,MOVELOOP                                   0028
         EI        X'0A'           ENABLE HSD INTERRUPT          0029
         BEI                       BLOCK EXTERNAL INTERRUPTS     0030
                                                                 0031
         CD        X'40',X'3000'   START I/O                     0032
WAITLOOP EQU       $               WAIT FOR INTERRUPT            0033
         M.SJSP    TASK,TIME                                     0034
         LW        5,TIME                                        0035
         LD        5,TASK                                        0036
         SVC       1,X'54'                                       0037
         ENDM                                                    0038
         ZBM       1,SI_CNT                                      0039
         BNS       WAITLOOP                                      0040
         UEI                       UNBLOCK EXTERNAL INTERRUPTS   0041
                                                                 0042
         LW        R1,MSG2TCW                                    0043
         STW       R1,UTTCW                                      0044
         M.WRIT    UTFCB                                         0045
         IFP       UTFCB,!0002                                   0046
         LA        1,UTFCB                                       0047
!0002    ANOP                                                   0048
```

C. SBUF — memory Pool Pool
1wd address of memory
2wd # words in pool

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.

8.2.130 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 base mode equivalent service is M_READ.

Entry Conditions

Calling Sequence:

```
M.READ    fcb

(or)

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

where:

fcb	is the FCB address. Appropriate transfer control parameters are defined in the TCW (see Section 7.9.1.2).

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

8.2.131 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:

M_READ [FCBADDR]addr

(or)

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

where:

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:

IO06	Invalid blocking buffer control cell for a system or a blocked file.
IO09	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

07000005 TEMP GOULD C.S.D. MPX-32 3.20 MPXSYSDD PAGE

```
SSEMBLE R1.2.03)
32

                M.EXIT
                SVC         1,X'55'
                ENDM
        *
        TASK    DATAD       0                   LOCAL VARIABLES

        TIME    DATAW       -5
        LOC_128 DATAW       0
        LOC_784 DATAW       0
        *
        MSG2    DATAB       C' EXITING FROM MAIN PROGRAM ...'



        MSG2CNT EQU         $-MSG2
                BOUND       1W
        MSG2TCW GEN         12/MSG2CNT,20/B(MSG2)
        *
        *** 10000.SI_INT.
        SI_INT  EQU         $
00F0            STF         R0,SAVEREGS         SAVE REGISTERS
                DAI         X'0A'               DEACTIVATE MSD INTERRUPT
0120            LW          R1,MSG1TCW          DISPLAY MESSAGE TO USER TO LET
0164            STW         R1,UTTCW            THEM KNOW THAT THIS HANDLER IS
                M.WRIT      UTFCB               BEING EXECUTED.
                IFP         UTFCB,!0004
0160            LA          1,UTFCB
        !0004       ANOP
                SVC         1,X'32'
                ENDM
00E0            SBM         1,SI_CNT.           BUMP COUNTER
00D0            LW          R1,LOC_128          GET CONTENTS OF VARIABLE LOC_128
0128            STW         R1,X'128'           STORE IT
00D0            LW          R1,LOC_784          GET CONTENTS OF VARIABLE LOC_784
0784            STW         R1,X'784'           STORE IT
00F0            LF          R0,SAVEREGS         RESTORE REGISTERS
0148            LPSDCM      OLD_PSD             RETURN TO POINT OF INTERRUPTION
        SI_CNT  DATAW       0
        SAVEREGS REZ        8W

        *
        MSG1    DATAB       C' IN INTERRUPT HANDLER ...'
```

LE R1.2.03)

```
MSG1CNT  EQU     $-MSG1                                                  0070.
         BOUND   1W                                                      0071.
MSG1TCW  GEN     12/MSG1CNT,2D/3(MSG1)                                   0072.
*                                                                        0073.
         BOUND   1D                                                      0074.
IOCB     EQU     $               INPUT/OUTPUT CONTROL BLOCK              0075.
         DATAW   X'08000001'     OUTPUT 1 WORD OF DATA                   0076.
         DATAW   X'0007E010'     STARTING AT LOCATON X'7ED10'            0077.
         DATAW   X'00000000'                                             0078.
         DATAW   X'00000000'                                             0079.
         DATAW   C'TEST'         OUTPUT DATA                             0080.
IOCB_TAW DATAW   0               ;                                       0081.
*                                                                        0082.
         BOUND   1D                                                      0083.
ICB      EQU     $               INTERRUPT CONTEXT BLOCK                 0084.
OLD_PSD  GEN     32/0,32/0                                               0085.

NEW_PSD  GEN     1/1,31/W(SI_INT)                                        0086.
         GEN     32/0                                                    0087.
         GEN     32/0                                                    0088.
         GEN     32/0                                                    0089.
*                                                                        0090.
UFCB     DATA.   C'UT '          FILE CONTROL BLOCK                      0091.
UFCB+4   RES     1W                                                      0092.
         RES     5W                                                      0093.


         END     MSD_BEG                                                 0094.
```