Dump Analysis under VSE/ESA

VSE Runs on Hardware

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VSE Runs on Hardware

Machines eat hexadecimal for lunch:

- It's all "ones" and "zeros":

```
0000 = 0     1000 = 8
0001 = 1     1001 = 9
0010 = 2     1010 = 10 (A)
0011 = 3     1011 = 11 (B)
0100 = 4     1100 = 12 (C)
0101 = 5     1101 = 13 (D)
0110 = 6     1110 = 14 (E)
0111 = 7     1111 = 15 (F)
```

- Of course, nothing is quite that simple. Hex is always shown as a byte (8 bits):

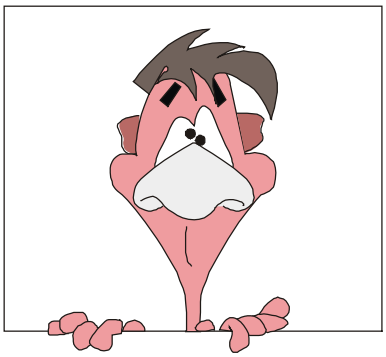
Hex	Dec
00	00
40	64
80	128
C0	196
FF	256

- Extended Binary Coded Decimal Interchange Code (EBCDIC)

4A	$	81	a	C1	A	F0	0
4B	.	82	b	C2	B	F1	1
4C	<	83	c	C3	C	F2	2
4D	(	84	d	C4	D	F3	3
4E	+	85	e	C5	E	F4	4
4F	|	86	f	C6	F	F5	5
50	&	87	g	C7	G	F6	6
5A	!	88	h	C8	H	F7	7
5B	$	89	i	C9	I	F8	8
5C	*	91	j	D1	J	F9	9
5D	)	92	k	D2	K		
5E	;	93	l	D3	L		
5F	(	94	m	D4	M		
60	-	95	n	D5	N		
61	/	96	o	D6	O		
6B	,	97	p	D7	P		
6C	%	98	q	D8	Q		
6D	_	99	r	D9	R		
6E	>	A2	s	E2	S		
6F	?	A3	t	E3	T		
7A	:	A4	u	E4	U		
7B	#	A5	v	E5	V		
7C	@	A6	w	E6	W		
7D	'	A7	x	E7	X		
7E	=	A8	y	E8	Y		
7F	"	A9	z	E9	Z		

Exercise One: Program Check

Exercise 1:



1. Recognize VSE/ESA Dump Format.
2. Locate a hexadecimal address in a dump.
3. Identify the module containing a given address, using:
   - Base Registers
   - Branch and Link registers
   - Scanning for an eyecatcher.

Caution: Here comes the boring stuff.

Understanding the following machine instructions will be helpful in this exercise:

`47c0rddd` Conditional branch to location derived from adding `ddd` to the contents of base register `r`. This instruction uses the condition code set by a previous instruction (compare or test).

e.g. `4770415C` = Branch to Register 4 + x'15C', if previous check was "not equal".

`4780415C` = Branch to above address, if field is zero.

`47F0rddd` Unconditional branch

e.g. `47F0415C` = Branch to Register 4 + x'15C'

`45b0rddd` Branch and Link to `ddd` plus base register `r`. Stores next instruction address in register `b`.

e.g. `45E0415C` = Used for sub-routine calls.
Branch to Register 4 + x'15C'.
In addition, place the return address in register 14.

`05br` Branch and link to address in register `r`. Store return address in register `b`.

e.g. `05E5` = Branch to where register 5 is pointing, and, in addition, place the return address in register 14.

`05C0` = Store the contents of the next sequential instruction in register 12, but do not branch.
This sets register 12 up as a base register.

You can recognize "branch and link" registers by examining the high-order byte in the register. If the program is executing in 31-bit mode, the bal register will have the x'80' bit turned on in the high-order byte. If executing in 24-bit mode, the high-order two bits contain the instruction length. (b'10000000' or x'80' for 4 byte instruction; b'01000000' or x'40' for a two byte instruction).

Exercise One: Program Check

Problem Description:

Getting program check interruption in some COBOL programs. Message 0S03I with interruption code 05 using ISAM interface (IIP).

Console log excerpt:

```
0S03I PROGRAM CHECK INTERRUPTION - HEX LOCATION 001C3E7A -INTERRUPTION CODE 05-ADDRESSING EXCEPTION
0S00I JOB CSFLDUPD CANCELED
0S07I PROBLEM PROGRAM  PSW = 071D0000 801C3E7C
0S30I DUMP STARTED. MEMBER=DBG00018.DUMP IN SUBLIB=SYSDUMP.BG
1I49I DUMP LIBRARY FULL
```

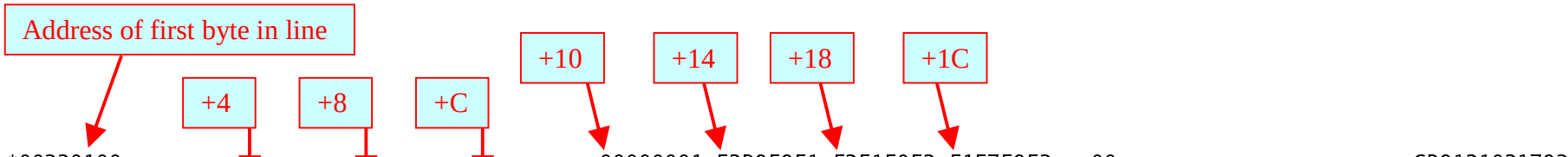
Analysis:

1. When VSE detects a program check in program mode (bit in PSW), it will take a dump depending on:
   - // OPTION NODUMP — No dump will be taken
   - // OPTION PARTDUMP — Failing partition and selected supervisor control blocks will be dumped
   - // OPTION DUMP — Failing partition and entire supervisor will be dumped
   - // OPTION SYSDUMP — Dump will be taken to VSE System Dump Library (SYSDUMP)
2. If the abend occurs in an SVA phase, the failing phase is included in the dump
3. Locate point of foul, and establish module where the error occurred:
   - Check for bal registers.
   - Check for base registers.
   - Check for eyecatcher.

Exercise One: Program Check

Listing:

```
*// JOB CSFLDUPD  --EDIT/OVERLAY FIELDS IN C.S.FILE--              DATE 10/07/1997, CLOCK 20/02/45
*// OPTION DUMP
*// ASSGN SYS005,897  'I/P KEYFAST TAPE 80/80'
*// TLBL SYS005
*// ASSGN SYS007,X'FEE'    O/P PRINT
*// LIBDEF PHASE,SEARCH=IJSYSRS.SYSLIB
*// EXEC CSFLDUPD,SIZE=AUTO
*         RUN DATE 10/07/97              C. S. FILE EDIT              -CSFLDUPD-                  PAGE  1
*         SOC. SEC. #   JILT   R-CODE   DISH   TELEPHONE#   RATE OF PAY   BIRTH DATE   COPE    -*-   M E S S A G E S
*         -----------   ----   ------   ----   ----------   -----------   ----------   ----    -----------------------
*
*JOBNAME=CSFLDUPD           DATE=10/07/1997  TIME=20:03:08  CPUID=A0021793 91210180  COMP=56860660615C  PAGE       1
*
*0S03I PROGRAM CHECK INTERRUPTION  - HEX LOCATION 001C3E7A - INTERRUPTION CODE 05 - ADDRESSING EXCEPTION
*0S00I JOB CSFLDUPD CANCELED
*0S07I PROBLEM PROGRAM  PSW = 071D0000 801C3E7C
*0S30I DUMP STARTED. MEMBER=DBG00018.DUMP IN SUBLIB=SYSDUMP.BG
*1I49I DUMP LIBRARY FULL
*
*SYMPTOM RECORD
```




```
*00330100                                 00000001 E2D9F9F1 F2F1F0F2 F1F7F9F3   00                    ....SR9121021793
*00330120 F2F07AF0 F37AF0F8 7AF0F0F9 F761F1F0 61F0F7F0 F07AF0F3 7AF0F87A F0F0F5F6       20:03:08:0097/10/0700:03:08:0056
*00330140 F8F6F0F6 F6F0F6F1 F5C30000 E2C3D7D9 C5D84040 00000000 00000000 00400074       860660615C..SCPREQ  ......... ..
*00330160 000000B4 002B00B4 000000DF 00000000 00000000 00000000 00000000 00000000       ................................
*00330180 00000000 00000000 C1C261E2 F2F0F0F0 40D9C5C7 E261C6C6 C6C6C640 D4E261F0       ........AB/S2000 REGS/FFFFF MS/0
*003301A0 E2F0F3C9 40D9C9C4 E261C9D2 D8E5D9D4 40D6C6C6 E261F0F0 F0F0F1C5 F5C340C1       S03I RIDS/IKQVRM 0FFS/00001E5C A
*003301C0 C261E2F0 F0F0F540 D1D6C26D D5C1D4C5 7EC3E2C6 D3C4E4D7 C440C4E4 D4D7C5C4       B/S0005 JOB_NAME=CSFLDUPD DUMPED
*003301E0 6DC4C1E3 C17EC2C7 60D7C1D9 E3C9E3C9 D6D540                                   _DATA=BG-PARTITION
```

Exercise One: Program Check

```
*PSW AND REGISTERS OF ENDING TASK

*PSW      071D0000 801C3E7C
*
*GR 0-7   40401238 00000068 00413F38 00000068 00000068 00000004 801C2582 001C3DB8
*   8-F   001C3EE0 801C20F2 00410228 00410068 0040AE00 00413B18 801C4392 00000000
*
*AR 0-7   00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
*   8-F   00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
*
*FP 0-3   40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040
*
*CR 0-7   04B1EE40 01000002 00000000 40000000 00000000 01077040 10000000 01000002
*   8-F   00000000 00000000 00000000 00000000 00000000 01000002 DF001076 000414E8

*IKQVRM   SVA       ADDRESS IS 001C2020  LENGTH IS 000158EB
*001C2020 47F0F07E C9D2D8E5 E2D44040 F1F5C340 C4E8F4F3 F6F5F240 F1F161F2 F061F9F6   00   .00=IKQVSM  15C DY43652 11/20/96
*001C2040 40F5F6F8 F660F0F6 F640C3D6 D7E8D9C9 C7C8E340 C9C2D440 C3D6D9D7 4B40F1F9        5686-066 COPYRIGHT IBM CORP. 19
*001C2060 F7F940F1 F9F9F540 C1D3D340 D9C9C7C8 E3E240D9 C5E2C5D9 E5C5C440 D3C9C3C5       79 1995 ALL RIGHTS RESERVED LICE
*001C2080 D5E2C5C4 40D4C1E3 C5D9C9C1 D3E260D7 D9D6D7C5 D9E3E840 D6C640C9 C2D490EC       NSED MATERIALS-PROPERTY OF IBM..
*001C20A0 D00C18C1 5810FDB0 41110000 89100001 12114780 F09E9680 D00C47F0 F0D089E0       ...A.......i.......0.o....00.i.
*001C20C0 000888E0 000889D0 000888D0 000889C0 000888C0 000850E0 D00C58E0 00809140       ..h...i...h...i...h...&.....j
*001C20E0 E02F47E0 F0D041E0 F0D056E0 FDB40B0E 05905850 C0181B66 58F09CE6 058F58B0       ....0...0.........&.....0.W....
*001C2100 500458A0 B004BD01 9D2A4780 97DC41F0 00019300 C0224770 97789300 C0239200       &..........p..0..l.....p.l...k.
*001C2120 C0224770 97784200 C01DD702 C025C025 9518C01D 4780                           ....p.....P.....n.....p.........
*001C2140 90809300 30224770 97789300 30239200 30224770 9778                           ..l.....p.l...k.....p.N.......p.
```

Points past failing instruction

Base register (Reg 7)

Locate the failing instruction, and backup looking for an eyecatcher.

PSW points here

```
001C3DA0 00000000 00000000 00000000 00000000 00000000 00000000 47F07010 C9D2D8D9                           ........................0..IKQR
001C3DC0 E3E54040 F1F5C3F0 1BFF5820 D1745800 C00C9102 C0204780 702A5810 A01447F0                         TV  15C0....J.....j...........0
001C3DE0 70364810 D1824811 20044A20 D1809108 C02147E0 70829110 A0284780 70529108                         ....Jb......J.j......bj.......j.
001C3E00 B0784710 70524540 70CC4110 00045510 C0144720 70C69102 A0284780 707A9102                         ....... .............Fj......:j.
001C3E20 C0204770 707A9108 B0784770 707A4122 00041810 50201000 07FE9110 A02847E0                         .....:j.....:.....&.....j.....
001C3E40 70969108 B0784710 70964540 70CC5840 C0149102 A0284780 70BA9102 C0204770                         .oj.....o. ... ..j.....j.....
001C3E60 70BA9108 B0784770 70BA4122 00044B10 71201514 472070C6 18310E02 07FE41F0                         ..j.....................F.....0
001C3E80 002307FE 50E0D0C0 18315810 D20C184D 18D141F0 00481A1F 58F0B090 05EE18D4                         ...&.....K..(.J.0.....0.....M
001C3EA0 58E0D0C0 07FE0000 00000000 00000000 00000000 00000000 00000000 00000000                         ................................
001C3EC0 00000000 00000000 00000000 00000000 00000000 00000000 00040000 00000000                         ................................
001C3EE0 47F08010 C9D2D8C7 D7E34040 F1F5C340 186E5870 87684100 00014000 D1EE1B00                         .0..IKQGPT  15C .>..g.....  .J...
001C3F00 9500C01D 4770804A BF2FC008 47708038 9101D1F6 4780872E 9104C021 47E08068                         n.............j.J6..g.j.......
```

Reg 7 is base register

Exercise One: Program Check

Search in RETAIN for "progck ikqrtv":

** SOFTWARE SUPPORT FACILITY TITLE PAGE 1 **

LIB/FILE(S) CURRENTLY SELECTED DS/AC
PROGCK IKQRTV

THE ABOVE SEARCH ARGUMENT RESULTED IN 3 MATCHES
USER PTF#,APAR#,ABS.L1 (APAR DEFAULTS)

1 UD47798 DY41632 PROGCK IN VSAM USING IIP (ISAM INTERFACE)
2 DY41110 PROGCK IN IKQRTV DURING GET PROCESSING WIT
3 II08262 USING THE ISAM INTERFACE PROGRAM (IIP) RES

APAR: II08262

-
-
-

ERROR DESCRIPTION:
Using the ISAM Interface Program (IIP) from old (backlevel) COBOL programs, may result in progck in VSAM due to invalid 31bit addresses passed to VSAM in the RPL. COBOL is using the high order byte of those fields in the DTFIS (IOASAD2, KARGAD2) that are used by IIP to modify the according RPL fields (RPLAREA and RPLARG).

Since most of the customers have no source of those programs and the COBOL release can no longer be maintained, VSAM provides FULL PAGE= ON the following patch to phase IIPOPEN to clear the high order byte, when the addresses are moved from the second to the first part of the DTFIS:

```
// JOB PATCH                                        APAR= II08262
// EXEC MSHP,SIZE=900K
 PATCH S=IJSYSRS.SYSLIB
 AFFECTS PHASE=IIPOPEN
 ALT 00EE D20380747008 : D20280757009   /* move ioarea   addr */
 ALT 00F4 D20380707014 : D20280717015   /* move workarea addr */
 ALT 00FA D20380607010 : D20280617011   /* move key arg  addr */
 ALT 0218 D20380747008 : D20280757009   /* move ioarea   addr */
 ALT 021E D20380707014 : D20280717015   /* move workarea addr */
 ALT 0224 D20380607010 : D20280617011   /* move key arg  addr */
/*
/&
```

The symptoms of the ABEND in VSAM code are most commonly a PROGCK in phase IKQVRM, modules IKQIXS or IKQRTV or similar.

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Determine System Status:

Tell difference between Lions and Tigers and Bears … Oh My:

- System disabled wait state (hard wait)
- System disabled loop
- System enabled wait state (soft wait)
- Partition wait
- Partition loop

Determine VSE System Status

1. Is Attention Routine responding?

   - Immediate command:

```
replid
AR 0015 1I88I NO REPLIES OUTSTANDING
```

   Response? No… go to page **15** to check for hard wait or disabled loop.

   - Reply to all outstanding messages, then attempt a more complex command:

```
sir
AR 0015 CPUID  VM = 5A96817596720000      VSE = FFFF100096720000
AR 0015 VM-SYSTEM = VM/ESA          VER.2 REL.3.0  SERV.LVL. = 9807
AR 0015 PROCESSOR = 9672-5A         USERID    = CTSCEO
AR 0015 PROC-MODE = ESA             IPL(120)    03/09/1999 13:28:47
AR 0015 AF-SYSTEM = VSE/AF          VER. 6 REL. 3.0
AR 0015 SERV.LVL. = DY44600         SERV.DATE = 01/14/1998
AR 0015 IPL-PROC  = $IPLESA         JCL-PROC  = $$JCLESA
AR 0015 SUPVR     = $$A$SUPX        STANDARD DISPATCHER ACTIVE
AR 0015                             HARDWARE COMPRESSION ENABLED
AR 0015                             VSE/POWER   SERV.LVL. = DY-BASE
        •
        •
        •
AR 0015 1I40I  READY
```

   Response? No…Enter “rc” and retry command. Still no response? Look for console management or vendor product problems

2. Are higher priority partitions running?

```
prty
AR 0015 PRTY Z,Y,P,C,BG,FB,FA,F9,F8,F7,F6,F5,F4,F2,F3,F1
```

POWER:

```
d t
AR 0015 1C39I COMMAND PASSED TO VSE/POWER
F1 0001 1R46I  TIME IS 17:28:44, DATE IS 04/17/1997
F1 0001 1R46I  013 PAGES FIXED, 014 CURRENT TASKS
```

CICS:

```
msg f2
AR 0015 1I40 READY
F2-0002
```

Determine VSE System Status

VTAM:

```
d net,majnodes
AR 0015 1C39I COMMAND PASSED TO ACF/VTAM
F3 0003 IST097I DISPLAY ACCEPTED
F3 0003 IST350I DISPLAY TYPE = MAJOR NODES
F3 0003 IST089I VTAMSEG TYPE = APPL SEGMENT     , ACTIV
      •
      •
      •
F3 0003 IST089I VTMSW1   TYPE = SW SNA MAJ NODE  , ACTIV
F3 0003 IST314I END
```

Respond? No … Transfer analysis to higher priority partition.

3. Check status of failing partition:

```
status f2
AR 0015   T23 F2       WAITING FOR I/O, ECB OR TECB
AR 0015   SCB-0004010C PCB=00040BC0 TCB=004A300 TIB=00042F00
                              -or-
                       READY TO RUN
                              -or-
                       WAITING FOR I/O ON DEVICE=<cuu>
                              -or-
                       WAITING FOR PROGRAM FETCH
                              -or-
                       WAITING FOR PAGE I/O COMPLETION
                              -or-
                       WAITING FOR LOCKED RESOURCE OWNED BY
                              -or-
                       VSE/POWER WAITING FOR WORK
```

- If "waiting on device=<cuu>"
  i. Check using the IUI System Status screen if partition is performing I/O.
  ii. Check status of device using "status <cuu>".
  iii. Save partition, SVA, and supervisor to tape using "dump" command
  iv. Try "cancel <cuu>". If this doesn't work, try "cancel <cuu>,force".
  Caution: A partition may be doing productive work (i.e. copying large amounts of data) and still show waiting on I/O each time it is checked.
- If "waiting on locked resource", check status of partition owning resource.
- If "ready to run", partition may be in a loop.
- If any indication that the partition may be waiting on POWER spooled device, also enter "d a" and "d tasks".
- If "waiting for work", previously running application has canceled. Check for error messages.

Determine VSE System Status

4. Is partition in a wait or loop? Check System Utilization using IUI:

```
IESADMSL.IESEADM       VSE/ESA FUNCTION SELECTION       APPLID: DBDCICS
Enter the number of your selection and press the ENTER key:

         1  Installation
         2  Resource Definition
   ==>   3  Operations
         4  Problem Handling
         5  Program Development
         6  Command Mode
         7  CICS-Supplied Transactions

 PF1=HELP                    3=SIGN OFF                    6=ESCAPE(U)
                             9=Escape(m)
==>
```

Select "Operations", "System Status":

```
IESADMSL.IESEOPS          OPERATIONS                  APPLID: DBDCCICS
Enter the number of your selection and press the ENTER key:

        1  Console
        2  Manage Batch Queues
        3  Display Active Users/Send Message
        4  Enter News
        5  Retrieve Message
   ==>  6  System Status
        7  Backup/Restore
        8  Personal Computer Move Utilities
        9  Transfer Files and Jobs to Another System

PF1=HELP                    3=END       4=RETURN          6=ESCAPE(U)
                            9=Escape(m)
==>                                              Path: 3
```

Select "Display System Activity":

```
IESADMSL.IESESTAT         SYSTEM STATUS               APPLID: DBDCCICS
Enter the number of your selection and press the ENTER key:

   ==>  1  Display System Activity
        2  Display Channel and Device Activity
        3  Display Storage Layout

PF1=HELP                    3=END       4=RETURN          6=ESCAPE(U)
                            9=Escape(m)
==>                                             Path: 36
```

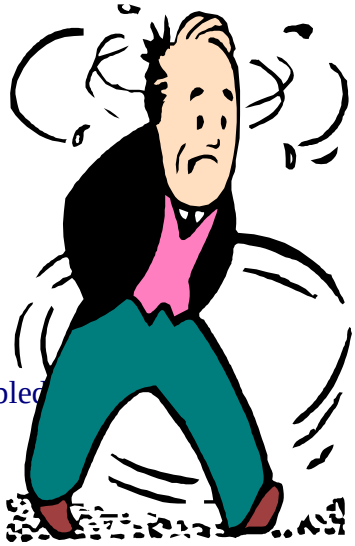
Determine VSE System Status

```
IESADMDA             DISPLAY SYSTEM ACTIVITY             15 Seconds  23:14:11
*--- SYSTEM (CPUs active:  1 ) ---* *---------- CICS : DBDCCICS ------------*
|CPU      :    *   I/O/Sec:    3  | |No. Tasks:   580   Per Sec    :     *  |
|Pages In :    0   Per Sec:    *  | |Active Tasks:  4   Suspended  :     0  |
|Pages Out:    0   Per Sec:    *  | |Most Active :  5   Pages Avail:   708  |
*--------------------------------* *---------------------------------------*
Priority: Z,Y,P,C,BG,FB,FA,F9,F8,F7,F6,F5,F4,F2,F3,F1

 ID S JOB NAME  PHASE NAME  ELAPSED     CPU TIME   OVERHEAD   %CPU       I/O
 F1 1 POWSTART    IPWPOWER   02:36:31       1.11        .33              2,268
 F3 3 VTAMSTRT    ISTINCVT   02:36:24       2.52        .93              4,352
 F2 2 CICSICCF    DFHSIP     02:36:20       9.86       2.24              2,752
 F4 4 <=WAITING FOR WORK=>                  .11        .03                 76
 F5 5 <=====STOPPED======>                  .00        .00
 F6 6 <=====STOPPED======>                  .00        .00
 F8 8 <=====STOPPED======>                  .00        .00
 F9 9 <=====STOPPED======>                  .00        .00
 FA A <=====STOPPED======>                  .00        .00
 FB B <=WAITING FOR WORK=>                  .11        .03                 77
 BG 0 TESTJOB     SHOWCAT    00:00:01       1.59        .00                 34
PF1=HELP                   3=END        4=RETURN     5=DYN.PART   6=CPU
```

```
IESADMDA             DISPLAY SYSTEM ACTIVITY             16 Seconds  23:15:27
*--- SYSTEM (CPUs active:  1 ) ---* *---------- CICS : DBDCCICS ------------*
|CPU      :  98%   I/O/Sec:    1  | |No. Tasks:   585   Per Sec    :     *  |
|Pages In :    0   Per Sec:    *  | |Active Tasks:  4   Suspended  :     0  |
|Pages Out:    0   Per Sec:    *  | |Most Active :  5   Pages Avail:   708  |
*--------------------------------* *---------------------------------------*
Priority: Z,Y,P,C,BG,FB,FA,F9,F8,F7,F6,F5,F4,F2,F3,F1

 ID S JOB NAME  PHASE NAME  ELAPSED     CPU TIME   OVERHEAD   %CPU       I/O
 F1 1 POWSTART    IPWPOWER   02:37:47       1.11        .33              2,268
 F3 3 VTAMSTRT    ISTINCVT   02:37:40       2.53        .93              4,357
 F2 2 CICSICCF    DFHSIP     02:37:36       9.92       2.24              2,752
 F4 4 <=WAITING FOR WORK=>                  .11        .03                 76
 F5 5 <=====STOPPED======>                  .00        .00
 F6 6 <=====STOPPED======>                  .00        .00
 F8 8 <=====STOPPED======>                  .00        .00
 F9 9 <=====STOPPED======>                  .00        .00
 FA A <=====STOPPED======>                  .00        .00
 FB B <=WAITING FOR WORK=>                  .11        .03                 77
 BG 0 TESTJOB     SHOWCAT    00:01:17      76.45        .02    98%          34
PF1=HELP                   3=END        4=RETURN     5=DYN.PART   6=CPU
```

If partition is in a loop (logging CPU time), record a few PSWs from the current TCBSAVE area prior to canceling partition with option dump: cancel bg,dump.
If this does not cancel the job, try: cancel bg,dump,,force .

Determine VSE System Status



5. Is system in hard (disabled) wait or disabled loop?

PSW: (Program Status Word, controls instruction execution)
070D2000 82ABB0B2

Displacement	Description
+x'00'	Flag Byte x'80' Unused x'40' Program Event Recording (PER) enabled x'20' – x'08' Unused x'04' Translation (virtual) mode x'02' Input/Output interrupts enabled x'01' External interrupts enabled
+x'01	Multi-purpose Byte x'---- . . . .' Program Protection Key (first four bits) x'08' Extended Control (EC) Mode x'04' Machine Check interrupts enabled x'02' Wait state x'01' Problem State
+x'02'	Flag Byte x'80'-x'40' Address Space Control x'80' = Primary mode x'40' = Access Register (AR) mode x'20'-x'10' Condition Code x'20' = Zero Both operands equal x'30' = Not zero Less than zero First operand low x'10' = Zero Greater than zero First operand high x'00' = Not Zero Overflow x' . . . . ----' Program masks: x'08' Fixed-point overflow mask x'04' Decimal overflow mask x'02' Exponent underflow mask x'01' Significance mask
+x'03'	Unused
+x'04'	Instruction Address

If instruction address begins with x'80', machine is operating in AMODE(31)
(31-bit addressing mode)

Determine VSE System Status

Hard Wait:

From the hardware console, place the system in stop mode.

If unable to stop the machine, you may be in a disabled PSW load loop
(e.g. if low core is overlaid and Progck New PSW is invalid).

Check the current PSW. Is wait bit on? No, it is probably a disabled loop (see next page).

Hardwait = PSW wait bit (14) is on, and interrupt masks (bits 6&7) are off

x'03' = zero = interrupts disabled
x'02' = on = wait bit

000A0000 00001000	Disaster error detected by VSE/AF supervisor
000A0000 00001122	Abend while processing program check (Normally indicates overlay of supervisor)
000A0000 00CExxxx	Stand-alone dump program. xxxx is rc.
010E0000 0000EEEE	SDAID address stop or DEBUG stop (can be restarted by pressing external interrupt)
010E0000 00EEEEEE	SDAID intervention required (can be restarted by making device ready)
040E0000 00002000	Stand-alone supervisor, normal completion

1. Check low core. Screen print it. If there is no hardwait code in low core, but the system still does not respond to attention routine commands, we may be in a disabled loop.

   See *VSE/ESA Messages and Codes, Volume 2* under "VSE/Advanced Functions Codes and SVC Errors" for a complete list of hardwait codes.

x'0FFF'	Progck in supervisor mode
x'0FED'	Inconsistency (logic error) detected in supervisor
x'0FF9'	Error during Page I/O
x'0FFB'	Page Fault during non-pageable supervisor activity
x'0FFE'	I/O Error during fetch from IJSYSRS.SYSLIB

   Special codes are placed in low core if errors are detected during IPL, including:

x'C1 E2'	Machine check on clear storage
x'07 E6 cc uu'	IPL input/output error (ccuu is device where error occurred). I/O error sense information will also be stored in low core.
x'07 E6 C3 E2'	Console router error ('CS')
x'07 E6 C9 C3'	Integrated Console error ('IC')
x'cc 00 0F D0'	Error during IPL (cc is supervisor cancel code)
x'F0 C9 F0 F0 C1'	'0I00A' … Low Core may contain message documented in *VSE/ESA Messages and Codes, Volume 1*

2. Perform Store Status (saves PSW and registers in low core)
3. Mount stand-alone tape and ipl the tape.
4. When you receive message “Standalone dump complete”, re-ipl VSE.
5. Load stand-alone tape using IUI.
6. Perform analysis of stand-alone dump.
7. Locate failing application, if not identified in previous step.
8. Contact owner of failing application (IBM, Vendor, local support group)

Disabled Loop:

1. Screen print the first x’100’ bytes of low core.
2. Write down current PSW.
3. Continue with step 3 under “Hard Wait”.
4. If low core is overlaid, this can cause a disabled PSW load loop. Depending on the processor, it may not be possible to stop the CPU to take a standalone dump. In this case, write down (or print) as much of low core as possible.

Exercise 2: Partition in I/O Wait

Exercise 2:

1. Identify the last instruction executed by a partition in a wait state

2. Identify the module where the last instruction occurred using:
   - Base Registers
   - Branch and Link registers
   - Scanning for an eyecatcher.

Documentation:

- If a loop, record a few instructions from TCBSAVE.
- Console log containing analysis.
- AR DUMP of failing partition
- AR DUMP of supervisor and SVA
- If waiting on locked resource, AR DUMP of partition which owns the resource.
- CANCEL <partition>,DUMP

Analysis:

1. Using status command, determine status of partition, and locate main task Task Control Block (TCB).
2. Locate current task save area in TCBSAVE
3. Locate failing PSW.
   - '0A07' (Waiting on I/O or ECB)
   - Note: PSW is backed up 10 bytes on SVC 07
   - '0A6E' (Waiting on locked resource)
   - '0A01', '0A02', '0A04', or '0A41' (Waiting on program fetch)
   - Otherwise, partition may be in a loop, or waiting on page I/O.
4. Use base register, or backup from point of impact, looking for a module eyecatcher.

Exercise 2: Partition in I/O Wait

If partition is in a wait state, PSW usually points to a Supervisor Call (SVC = x'0Ann'):

'0A00'	=	Start I/O (Register 1 points at CCB)
'0A01'	=	Fetch a phase (Register 1 points at phase name)
'0A02'	=	Fetch a $B transient (Register 1 points at phase name. If "$$BOPEN" or "$$BCLOSE", Register 0 points a list of files to be processed)
'0A04'	=	Load a phase and return entry address (See SVC 01)
'0A06'	=	Cancel
'0A07'	=	Wait for I/O (See SVC 00)
'0A0E'	=	End of Job
'0A29'	=	Dequeue (Register 1 points at Resource Control Block = RCB. RCB+x'04 points at ECB to be freed)
'0A2A'	=	Enqueue (See SVC x'29')
'0A3D'	=	Request getvis storage (Register 0 contains length of area to be acquired)
'0A3E'	=	Free storage (Register 1 contains pointer to area to be freed. Register 0 contains length of area to be freed.)
'0A41'	=	CDLOAD (load phase into GETVIS and return address) (See SVC 01)
'0A6E'	=	Lock / Unlock a resource (Register15 = x'……03' → Lock request, Register 15 = x'……01' → Unlock request Register 1 points at DTL = Define The Lock) DTL+ 4 (length = 12) contains name of lock
'0A71'	=	Cross Partition Communication Control (XPCC) (Register 1 points to CRCB +x'08' = Path id, connection token)

Standard wait coding:

```
91801002    TM    CCBFLAG,POSTED
4710rddd    BO    *+6
0A07        SVC   07
```

(If I/O is not yet complete, VSE backs up PSW by 10 bytes, back to Test-Under-Mask)

Exercise 2: Partition in I/O Wait

Problem Description:

VSE/ESA 2.2: Customer installed maintenance for Power in PMR 48228 B550 and now he has jobs that look to stall out. They do not get any I/O or CPU time. They can purge the jobs then restart them and they will run. His Cobol programs calling OEM SoftwareAG look to be the jobs that have problem. Customer request call back today.

Analysis:

```
status
AR 0015    T1F S1F       WAITING FOR I/O, ECB OR TECB
AR 0015    T20 AR        READY TO RUN
AR 0015    T21 BG        VSE/POWER WAITING FOR WORK
AR 0015    T4D     -F1   WAITING FOR I/O, ECB OR TECB
AR 0015    T4E     -F1   WAITING FOR I/O, ECB OR TECB
AR 0015    T55     -F1   WAITING FOR I/O, ECB OR TECB
AR 0015    T22 F1        WAITING FOR I/O, ECB OR TECB POWER MAIN TASK
AR 0015    T72     -F2   WAITING FOR I/O, ECB OR TECB
AR 0015    T73     -F2   WAITING FOR I/O, ECB OR TECB
AR 0015    T23 F2        WAITING FOR I/O, ECB OR TECB
AR 0015    T4F     -F3   WAITING FOR I/O, ECB OR TECB
AR 0015    T50     -F3   WAITING FOR I/O, ECB OR TECB
AR 0015    T51     -F3   WAITING FOR I/O, ECB OR TECB
AR 0015    T52     -F3   WAITING FOR I/O, ECB OR TECB
AR 0015    T53     -F3   WAITING FOR I/O, ECB OR TECB
AR 0015    T54     -F3   WAITING FOR I/O, ECB OR TECB
AR 0015    T24 F3        WAITING FOR I/O, ECB OR TECB
AR 0015    T7C     -F4   WAITING FOR I/O, ECB OR TECB
AR 0015    T7D     -F4   WAITING FOR I/O, ECB OR TECB
AR 0015    T25 F4        WAITING FOR I/O, ECB OR TECB
AR 0015    T26 F5        WAITING FOR I/O, ECB OR TECB
AR 0015    T27 F6        VSE/POWER WAITING FOR WORK
AR 0015    T28 F7        VSE/POWER WAITING FOR WORK
      • • •
AR 0015 1I40I  READY
```

```
d tasks
AR 0015 1C39I COMMAND PASSED TO VSE/POWER
F1 0001 1R48I  ***   BEGIN OF DISPLAYING VSE/POWER TCB'S       ***
F1 0001 1R48I  TID ,CUU,TCBADR,T,PHASE(ADDR),REG12 ,STATE(DETAIL)
F1 0001 1R48I  LSNA,   ,509A40, ,SN (5A0D00),5A0D5E,M(R01=3D509C38)
F1 0001 1R48I  LLDR,   ,50B000, ,LD (5AD000),5AD304,C(R01=3D50B034)
F1 0001 1R48I  YTES,   ,502B40, ,TV (59C700),59C7E0,C(R01=3D502B74)
F1 0001 1R48I  XMAS,   ,505A20, ,XM (58FC00),58FF26,M(R01=3D505BB8)
F1 0001 1R48I  JSPM,   ,506820, ,SM (59CB00),59CD08,Q(R01=3D2EF0B8)
F1 0001 1R48I  0 CP,   ,5012A0, ,CD (531400),534376,R(----------)   (D TASKS)
F1 0001 1R48I  NTFY,   ,50C560, ,NS (598700),598C24,M(R01=3D50C5F4)
```

Exercise 2: Partition in I/O Wait

```
F1 0001 1R48I  NRV ,SNA,50AB40, ,BS (5BF200),5BF2E6,B(NCB=3D509CC0) (PWR01,CON)
F1 0001 1R48I  DPST,   ,503D80, ,DP (575600),5756EE,M(R01=3D503BE0)
F1 0001 1R48I  E BG,FEC,507000, ,XRE(54EA00),54FC36,Q(R01=3D507020)
F1 0001 1R48I  E F2,FEC,507280, ,XRE(54EA00),54F844,C(R01=3D5072B4)
      • • •
F1 0001 1R48I  ***      END OF DISPLAYING VSE/POWER TCB'S      ***
```

```
d a
AR 0015 1C39I COMMAND PASSED TO VSE/POWER
F1 0001 1R48I   C-RV ,SNA,  AWAITING     NODE=3DPWR01
F1 0001 1R48I   F2,FEC,2A,  ADA5SRC ,30667,A
F1 0001 1R48I   F3,FEC,3V,  VTAMSTRT,22872,3
F1 0001 1R48I   F4,FEC,4A,  ADA5AUT ,30670,A
F1 0001 1R48I   F5,FEC,5A,  ADA5MDL ,30673,A
F1 0001 1R48I   F6,FEC,6A,  INACTIVE,
      • • •
```

```
status p1
AR 0015    T34 P1        WAITING FOR I/O, ECB OR TECB
AR 0015    SCB=00372000 PCB=00372088 TCB=003722E8 TIB=00372268
AR 0015 1I40I  READY
```

TCB:

```
show 3722e8.70
3722E8         0   02380008 00000800 00372268 00540000 | ................ |
3722F8        10   00020007 00000000 00000000 00372328 | ................ |
372308        20   003730E8 00373864 00500000 00000000 | ...Y............ |
372318        30   00000000 00373780 00000000 00000000 | ................ |
372328        40   00000000 00000000 040C0000 0000FF40 | ...............  |
372338        50   6000FEA4 003722E8 0000DE88 0000F4A0 | -..u...Y...h..4. |
372348        60   0000DF04 00042A80 8000FF26 00000034 | ................ |
```

Save area: (TCBSAVE points at partition save area)
(With VSE/ESA 2.4, the save area address is included in the STATUS display)

```
show P1,540000.70
540000         0   C4D9D7F4 F0F04040 07DD0000 0011C9BC | DRP400  ......I. |
540010        10   005DB700[9] 00583F80[A] 0011CB07[B] 0011BB08[C] | .)............. |
540020        20   00584748[D] 9011C3C2[E] 0011BB08[F] 00585432[0] | ......CB........ |
540030        30   005845F8[1] 00584630[2] 00000085[3] 005845F8[4] | ...8.......e...8 |
540040        40   50585588[5] 00000420[6] 00584080[7] 00584630[8] | ...h.....  ..... |
540050        50   0000AF75 6AE55569 40404040 40404040 | .....V..        |
540060        60   40404040 40404040 40404040 40404040 |                 |
```

Exercise 2: Partition in I/O Wait

PSW, however, is not pointing in the partition, it is pointing into the SVA:

```
11BB00        0   001AF1F9 F2F0F5F0 47F0F0BA 47F0F0BE | ..192050.00..00. |
11BB10       10   47F0F0B6 47F0F0C2 47F0F0B6 47F0F0B6 | .00..00B.00..00. |
11BB20       20   47F0F0B6 47F0F098 47F0F0A6 5BC9D1C4 | .00..00q.00w$IJD |
11BB30       30   D7D9E340 C3F4F4F0 C4C1F4F1 F6F8F440 | PRT C440DA41684  |
11BB40       40   F5F6F8F6 60F0F0F7 404DC35D 40C3D6D7 | 5686-007 (C) COP |
11BB50       50   E8D9C9C7 C8E340C9 C2D440C3 D6D9D740 | YRIGHT IBM CORP  |
11BB60       60   F1F9F8F3 6BF1F9F8 F940C1D3 D340D9C9 | 1983,1989 ALL RI |
11BB70       70   C7C8E3E2 40D9C5E2 C5D9E5C5 C440D3C9 | GHTS RESERVED LI |
11BB80       80   C3C5D5E2 C5C440D4 C1E3C5D9 C9C1D3E2 | CENSED MATERIALS |
11BB90       90   60D7D9D6 D7C5D9E3 E840D6C6 40C9C2D4 | -PROPERTY OF IBM |
11BBA0       A0   90ECD000 18CF41FF 001047F0 C0E090EC | ..........0.... |
11BBB0       B0   D00018CF 181241FF 001447F0 C0C241FF | ..........0.B.. |
11BBC0       C0   000441FF 000441FF 00045811 00085811 | ................ |
      .
      .
      .
11C990       90   07FE50E0 91E45860 90D8D501 605A908C | ....jU.-.QN.-!.. |
11C9A0       A0   4780CEB0 41109060 0A009180 10024710 | .......-..j..... |
11C9B0       B0   CEAC0A07 47F0CEBE 581090E0 91801002 | ....O.....j...   |
11C9C0       C0   4710CEBE 0A079508 98B84770 CEF29180 | ......n......2j. |
11C9D0       D0   909047E0 CEF29101 909247E0 CEDE5860 | .....2j..k.....- |
```

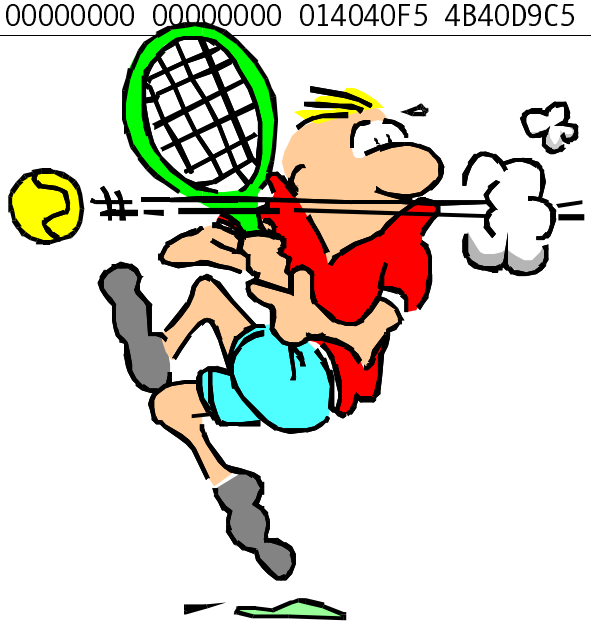
PSW points here

Reg 12 points here

Branch shows Reg12 to be base reg

CCB (Reg1): **It is not posted, but is complete (x'0C').**

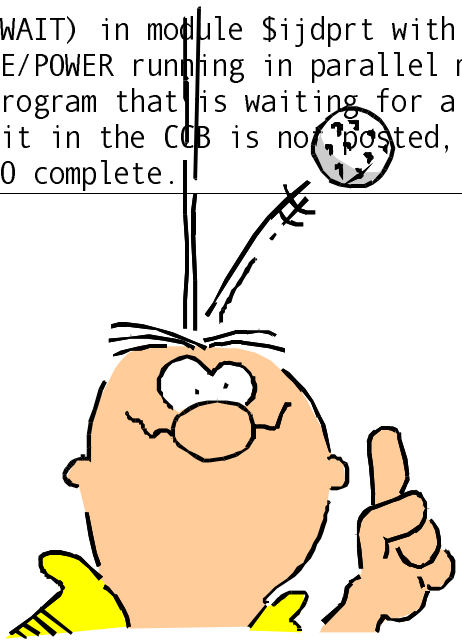
```
5845F8        0   00000001 0C000114 005DB710 005DB718 | .........)...)-. |
584608       10   0011BB08 08B40909 00584631 00000000 | ..............   |
584618       20   07004120 E0000000 095846C1 20000084 | ..........A...d  |
584628       30   00000000 00000000 014040F5 4B40D9C5 | .........  5. RE |
```



Exercise 2: Partition in I/O Wait

Search in RETAIN for "$ijdprt wait":

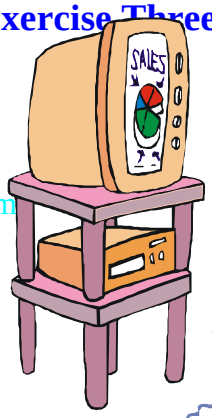
```
** SOFTWARE SUPPORT FACILITY    TITLE PAGE       1     **
LIB/FILE(S) CURRENTLY SELECTED DS/AC
$IJDPRT WAIT

THE ABOVE SEARCH ARGUMENT RESULTED IN     2 MATCHES
USER PTF#,APAR#,ABS.L1                                          (APAR DEFAULTS)

    1         DY41428 VSERAS
    2 UD50251 DY44442 SERVICE RELEASE 04/1997 FOR VSE/ESA VERSIO


APAR DY44442:

PROBLEM SUMMARY:                                                    ACTIVE
************************************************************** OPTIONS ARE:
* USERS AFFECTED: All.                                        *
************************************************************
* PROBLEM DESCRIPTION: 1. SVC07 Softwait with parallel POWER  *
*                      2. ILLEGAL SVC with SVC03 fct code 06  *
*                      3. IJBAR Enhancements:                 *
*                         A. GETVIS SVA,DETAIL                *
*                         B. SIR SMF,cuu                      *
*                      4. Debug Area wrapped after Debug Stop *
*                         and > 1 CPU active.                 *
*                      5. Wrong EREP records for the OSA card * FULL PAGE= ON
*                      6. Provide OBR code for OSA device.    *   RESPONDER
*                      7. No Action after CANCEL cuu,FORCE    * PG  1, 2 OF  6
************************************************************** HIT       2
* RECOMMENDATION:                                             *  OF        2
************************************************************** APAR= DY44442
1. Softwait with an SVC07 (WAIT) in module $ijdprt with Turbo   OWNED BY: RS3
   Dispatcher active and VSE/POWER running in parallel mode.
   The dump shows a COBOL program that is waiting for a spooled
   print I/O. The traffic bit in the CCB is not posted, although
   the status looks like I/O complete.
```

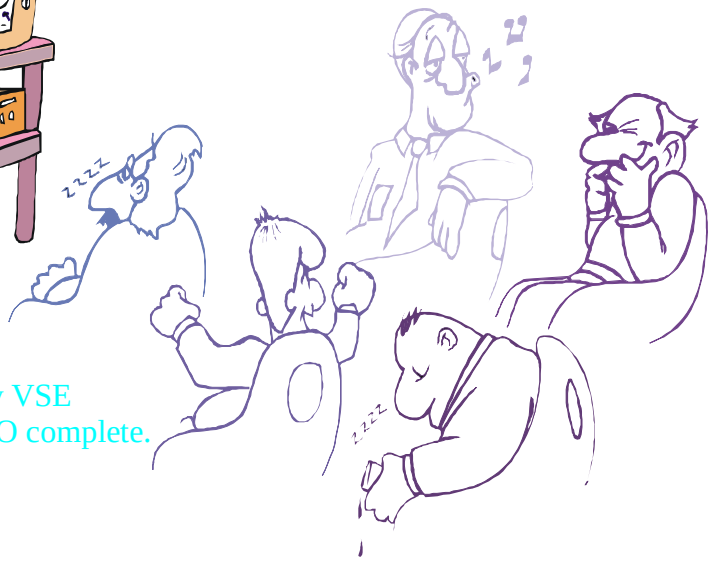


Exercise Three: I/O Error

Exercise 3:

1. Interpret hardware error indicators in VSE/ESA console messages.
2. Locate CCB in I/O Error partition dump
3. Locate failing CCW.
4. Identify dasd address





Is anyone asleep yet?

CSW: (Channel Status Word) passed to hardware by VSE via SSCH command. Returned by hardware when I/O complete.

```
0000E258 0C000000
```

+x'00' Multi-use byte
- x'---- . . . .' Protection Key
- x'08' Unused
- x'04' Logout pending
- x' . . . . . --' Condition code from Start I/O command

+x'01' CCW Address (three byes, real address of last CCW executed)

+x'04' Unit Status
- x'80' Attention interrupt

x'40' Status Modifier
- x'20' Control Unit End
- x'10' Busy
- x'08' Channel End
- x'04' Device End
- x'02' Unit Check
- x'01' Unit Exception

+x'05' Channel Status
- x'80' Program Controlled Interrupt
- x'40' Incorrect Length
- x'20' Program Check
- x'10' Protection Check
- x'08' Channel Data Check
- x'04' Channel Control Check
- x'02' Interface Control Check
- x'01' Chaining Check

+x'06' Residual Bye count (Difference between bytes requested and number read)

Exercise Three: I/O Error

CCB: (Command Control Block, used by application to request Input or Output from VSE)

```
00009800 0C000124 00631280 00631298
```

+x'00' Residual Count (two bytes)

+x'02' Communications Byte 1
- x'80' Traffic Bit (Set at Channel End or Device End) (Set by VSE)
- x'40' End of File (Set by VSE)
- x'20' Unrecoverable I/O Error (Set by VSE)
- x'10' Accept Unrecoverable Errors (Set by application)
- x'08' Return Data Checks (Set by application)
- x'04' Post at Device End (Set by application)
- x'02' Return Data Check / Read Check (Set by application)
- x'01' User Error Routine (Set by application)

+x'03' Communications Byte 2
- x'80' Data Check in count area (Set by VSE)
- x'40' Track Overrun (Set by VSE)
- x'20' End of Cylinder (Set by VSE)
- x'10' Data Check (Set by VSE)
- x'08' No Record Found (Set by VSE)
- x'04' Retry No-record-found (Set by application)
- x'02' Verify Error (Set by VSE)
- x'01' Command Chain (retry) (Set by VSE)

+x'04' CSW Status Bytes (Two bytes, see CSW) (Set by VSE)

+x'06' Symbolic Unit (SYSUNIT) (Set by application)

If x'01xx': Programmer unit (e.g. x'0124' = SYS036)

If x'00xx':
- 00 = SYSRDR
- 01 = SYSIPT
- 02 = SYSPCH
- 03 = SYSLST
- 04 = SYSLOG
- 05 = SYSLNK
- 06 = SYSRES
- (and so forth)

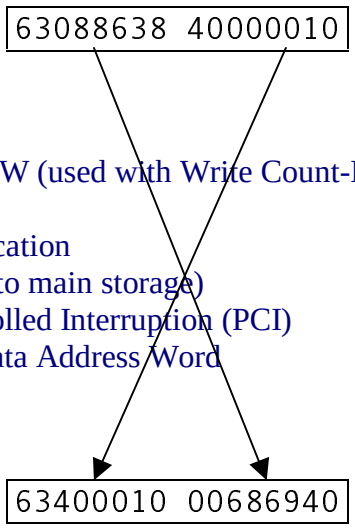
+x'08' Pointer to first CCW (Set by application)

+x'0C' Pointer to last CCW executed (Set by VSE)

Exercise Three: I/O Error

CCW: (Channel Command Word, specific I/O commands)

Format0 (original) CCW:



+x'00' CCW Command Code
+x'01' Data Address (three bytes)
+x'04' Flags
- x'80' Use address portion of next CCW (used with Write Count-Key-Data)
- x'40' Chain to next sequential CCW
- x'20' Suppress Incorrect Length Indication
- x'10' Skip (suppress transfer of data to main storage)
- x'08' Cause Channel Program Controlled Interruption (PCI)
- x'04' Address refers to an Indirect Data Address Word

+x'05' Unused
+x'06' Byte Count (two bytes)

Format1 CCW:

+x'00' CCW Command Code
+x'01' Flags (see above)
+x'02' Byte Count (two bytes)
+x'04' Data Address (four bytes)

CCW Op-codes commonly-used for DASD:

Count-Key-Data (CKD):

```
   07   Seek
   1B   Seek Head
   23   Set Sector
   31   Search ID Equal
   08   TIC
   06   Read Data
   05   Write Data
.  86   Multi-track read
```

Extended-Count-Key-Data (ECKD):

```
   63   Define Extent
   47   Locate Record
   12   Read Count
   06   Read Data
   05   Write Data
.  86   Multi-track read
```

CCW Op-codes commonly used for printers:

```
09   Space one line after printing
0B   Space one line immediately
63   Load FCB
89   Skip to channel one after printing
8B   Skip to channel one immediately
```

CCW Op-codes commonly used for tape:

```
01   Write                  2F   Backspace file
02   Read forward           3F   Forward space file
07   Rewind                 9F   Lead display
0F   Rewind and Unload      DB   Modeset
```

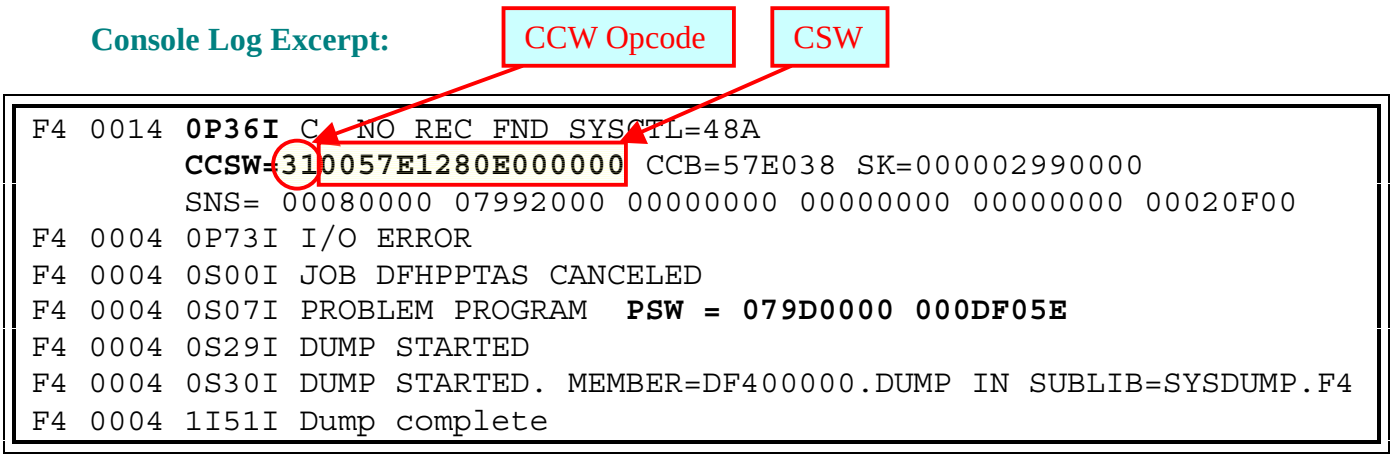
Sense CCW: 04

Exercise Three: I/O Error

Problem Description:

Message 0P36I during compilation of DFHPPT after migration to VSE/ESA 2.1.3.

Console Log Excerpt:



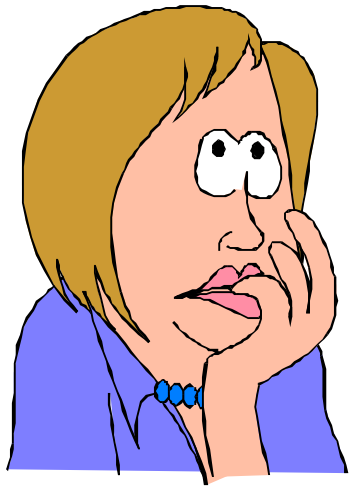
Input/Output errors are documented via a message to the console, 0P01 – 0P68 or 0Exx, and the application is cancelled, unless the application has requested that I/O errors be returned. (CCB+x'02' = x'10', x'08', x'02')

1. Check message in *VSE/ESA Messages and Codes, Volume 1*. If the message indicates a critical I/O error, contact hardware support. Very few of these kinds of problems are caused by software.
2. The 0Pxx message will identify the failing hardware unit. However, not all hardware errors are logged via EREP. If VSE is running on VM, it passes most error information to VM for logging. "No Record Found" (msg0P36I), "Phase not found" (msg0P62I) or "Wrong Length Record" errors are not logged.
3. Even if a dump is not created ("// OPTION NODUMP"), message 0S07I will include the failing PSW. Ascertain which phase was involved. If the phase was in the SVA, use the "show" command to locate an eyecatcher.
4. Errors associated with file management products (LIBR, VSAM, DL/I) are often caused by file corruption. Run the following utilities:
   - LIBR: ($IJBLBR, modules start with INL*)
     Run LIBR TEST against the failing library.
   - VSAM: (modules start with IKQ*)
     Run IDCAMS REPRO against the failing file.

     (modules start with IGG*)
     Run IKQVCHK against the failing catalog.
   - DL/I: (modules start with DLZ*)
     Run DLZURGPO to unload the database,
     IKQVCHK, to check the catalog

Exercise Three: I/O Error

```
// JOB DMPANA33  PRINT COMPLETE FORMATTED DUMP                    DATE 10/21/97,CLOCK 14/55/52
// EXEC PROC=DTRINFOA
// ASSGN SYS016,DISK,VOL=SYSWK1,SHR       INFO ANAL MANAGEMENT FILE
1T20I  SYS016 HAS BEEN ASSIGNED TO X'141' (TEMP)
// ASSGN SYS017,DISK,VOL=SYSWK1,SHR       INFO ANAL ROUTINES FILE
1T20I  SYS017 HAS BEEN ASSIGNED TO X'141' (TEMP)
EOP DTRINFOA
// EXEC INFOANA,SIZE=300K

BLN1008I INFO/ANALYSIS READY
   SELECT DUMP MANAGEMENT
     DUMP NAME SYSDUMP.F4.DF400000
BLN9018I DUMP SYSDUMP.F4.DF400000 SELECTED
          RETURN
   SELECT DUMP VIEWING
          PRINT FORMAT
       •
       •
       •
NAME = CANCLMSG COMPONENT ID = F4       TYPE = TEXT DATA

0P73I I/O ERROR
0S00I JOB DFHPPTAS CANCELED
       •
       •
       •
NAME = GREGS    COMPONENT ID = F4       TYPE = HEXADECIMAL DATA

    GP REGS    0-3    00000054 0057E038 0057E000 0057E038
               4-7    FFFFFFFF 000DF0CC 0058F380 00262028
               8-B    0040A190 0040A044 000DBE78 000E002F
               C-F    000DF030 0058F9B0 000DAA90 000DF030

       •
       •
       •
NAME = PSW      COMPONENT ID = F4       TYPE = HEXADECIMAL DATA

       PSW     079D0000 000DF05E
       •
       •
       •
NAME=$IJBLBR  COMPONENT ID=SVA      BASE=000BC198
 000BC180                                                47F0F046 5BC9D1C2 00 *                        .00.$IJB*
 000BC1A0  D3C2D940 C4C2F6F0 C9C9F0F0 C4F6F1D5 C4E4E3F5 F6F8F660 F0F6F640 4DC35D40 00 *LBR DB60II00D61NDUT5686-066 (C) *
 000BC1C0  C3D6D7E8 D9C9C7C8 E340C9C2 D440C3D6 D9D74B40 F1F9F8F4 6B40F1F9 F9F541F0 00 *COPYRIGHT IBM CORP. 1984, 1995.0*
 000BC1E0  F1601EF0 58F0F000 07FF0000 00000008 000BC630 000BE1A8 000BCC00 000D6FF6 00 *1-.0.00...........F.........?6*
 000BC200  000BE848 000BEB60 000C3100 000C4D90 000C5390 000BF110 000C04C0 000C9CA8 00 *..Y....-......(.......1.........*
```



Reg1 ⇒ CCB

Failing instruction

Exercise Three: I/O Error

```
 000BC220  000CA460 000CAD98 000CE890 000CF068 000CF478 000D6FD8 000CF9A0 000D6220 00 *...-.....Y...0...4...?Q..9.....*
 000BC240  000DF030 000DF0D0 000DFB18 000E0E48 000E1C00 000E2008 000E6238 000E7690 00 *..0...0.....................*
 000BC260  000E5DC8 000E80D8 000F2188 000F87E8 000FB3F0 00000000 C9D5D3C3 D7E3C3C8 00 *..)H...Q.......Y...0....INLCPTCH*
 000BC280  40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 00 *                                 *
 000BC2A0  TO NEXT LINE ADDRESS SAME AS ABOVE
      •
      •
      •
 000DF000  00600000 01630000 00600000 10470000 00600000 101D0000 00200000 089D0000 00 *.-.......-.......-.............*
 000DF020  00200000 08FFFFFF FF000000 00000000 47F0F01C 17C9D5D3 D7C4D6C9 D6F5F6F8 00 *................00..INLPDOIO568*
 000DF040  F6F6F1C9 C9F0F8F3 F1F8F4F5 90ECD00C 18CF41B0 CFFF4150 C09C1813 0A009180 00 *661II0831845..........&........*
 000DF060  10014710 C0380A07 1F001FEE 41F00047 0A6B1FFF 58E0D00C 980CD014 07FE07C1 00 *.............0...,.............PA*
 000DF080  E3C3C840 C1D9C5C1 406040C9 D5D3D7C4 D6C9D640 F9F54BF0 F8F3C06A C06CC06E 00 *TCH AREA - INLPDOIO 95.083...%.>*
      •
      •
      •
BLN5014I DATA FROM 00268D78 TO 0026FD77 NOT AVAILABLE OR ALL ZEROS
BLN9012I PRINT FUNCTION COMPLETED
         PRINT 0 END
      •
      •
      •
 00400000  D3D5D2C5 C4E34040 079D0000 000DF05E 0040A044 000DBE78 000E002F 000DF030 90 *LNKEDT  ......0;. .............0.*
 00400020  0058F9B0 000DAA90 000DF030 00000054 0057E038 0057E000 0057E038 FFFFFFFF 90 *..9.......0.....................*
 00400040  000DF0CC 0058F380 00262028 0040A190 0000AF67 5EA86815 40404040 40404040 90 *..0...3...... ......;...        *
 00400060  40404040 40404040 40404040 40404040 40404040 40404040 C9D1C2D3 C5F14040 90 *                          IJBLE1  *
 00400080  F1F5C3F0 40F2F140 C4F6F1E9 C4C8E240 F5F6F8F6 60F0F6F6 404DC35D 40C3D6D7 90 *15C0 21 D61ZDHS 5686-066 (C) COP*
 004000A0  E8D9C9C7 C8E340C9 C2D440C3 D6D9D74B 40F1F9F7 F96B40F1 F9F9F600 00000000 90 *YRIGHT IBM CORP. 1979, 1996.....*
 004000C0  D540C1E4 E3D64040 00000004 00423304 00423304 C4C6C8D7 D7E3C1E2 07000000 90 *N AUTO  .............DFHPPTAS....*
 004000E0  00000000 00000000 00000000 00400078 00428090 00000000 00000000 00004000 90 *.............. ................ .*
 00400100  00000000 C4C6C8D7 D7E3C2C1 01000040 00000003 00000000 00000000 00000000 90 *....DFHPPTBA... ................*
      •
      •
      •
 0057E000  C2E4C3C2 0057E110 00000017 00000006 00000400 00000000 00000000 0057E250 90 *BUCB.....................S&*
 0057E020  0057E250 0057E250 0057E290 0057E250 0057E1D0 00000000 0000A00C 0E000831 90 *..S&..S&..S...S&.............*
 0057E040  0057E110 0057E128 00000000 005F0057 E0B00000 00000000 00000000 00000000 90 *.............................*
 0057E060  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 90 *.............................*
 0057E080  TO NEXT LINE ADDRESS SAME AS ABOVE
 0057E100  00000000 00000000 00000000 00000000 0757E25E 60000006 2358FB48 60000001 90 *................S;-.......-...*
 0057E120  3157E260 60000005 0857E120 60000001 8657E020 20000400 00000000 00000000 90 *..S--.......-.....0.............*
 0057E140  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 90 *.............................*
 0057E160  TO NEXT LINE ADDRESS SAME AS ABOVE
 0057E240  FFFFFFFF FFFFFFFF FFFFFFFF 0057F420 C2C8C4D9 00000003 0C600000 00310000 90 *.............4.BHDR.....-......*
 0057E260  02990000 01000000 00007F26 FFFFFFFF 00265DD8 FFFFFFFF FFFFFFFF FFFFFFFF 90 *..........".......)Q.............*
 0057E280  FFFFFFFF FFFFFFFF FFFFFFFF 0057F020 C2C8C4D9 00000004 00000000 00000000 90 *..............0.BHDR.............*
```

Reg12 points here (begin of module)

Branch instructions shows Reg12 to be base reg

PSW pointed here

Reg1 pointed here (CCB)

Exercise Three: I/O Error

Summary:

1. PSW points at DF05E. (INLPDOIO + X'2E'). Last instruction executed was I/O wait (SVC 07).
   PSW has been backed up 10 bytes:

```
9180 1002          TM    CCBFLAG,POSTED
4710 C038          BO    *+6
0A07               SVC   07
```

2. Register 1 points at the CCB (0057E038) = **0000A00C 0E000831 0057E110 0057E128**

   - CSW Status Bytes (x'0E00') indicate Channel End + Device End + Unit Check
   - CCB communications bytes (x'A00C') indicate Posted + Unrecoverable I/O error + No Record Found.
   - I/O was performed to system device x'31' (SYSCTL). Msg0P36I identified SYSCTL as being assigned to device x'48A'.
   - CCW chain starts at 57E110, and last CCW executed was at 57E120 (57E128 – 8)

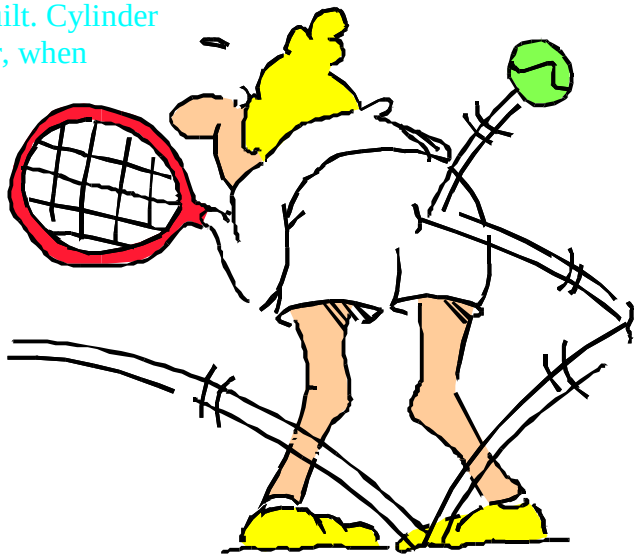
3. CCW chain at 57E110:

0757E25E 60000006	Seek to cylinder x'299' (665) {bbcc = 00000299}
2358FB48 60000001	Set Sector to 04 (not in handout)
3157E260 60000005	Search to cylinder x'299', head 0, record 1 {cchhr = 0299000001}
0857E120 60000001	TIC back to previous search (keeps channel program active until head is positioned properly)
8657F020 20000400	Multi-track read. 1024 (x'400') byte record into buffer at storage location x'57F020'.

CCW chain was terminated prematurely at search with "no record found".

Problem Resolution:

To get around the immediate problem, the library was re-built. Cylinder 665 of device x'48A' was part of the VSE library. However, when VSE/DITTO was used to display this area, it showed all records (including record 1) missing from this track (and subsequent tracks for several cylinders). Turning on SYS DASDFP=YES during IPL, identified a product initializing space outside of its defined extents.



VSE Supervisor Control Blocks

Uh oh, now we're really getting in deep!

Hardware

Interrupt
- External Interrupt
- Supervisor Call
- Program Check
- Machine Check
- Input / Output

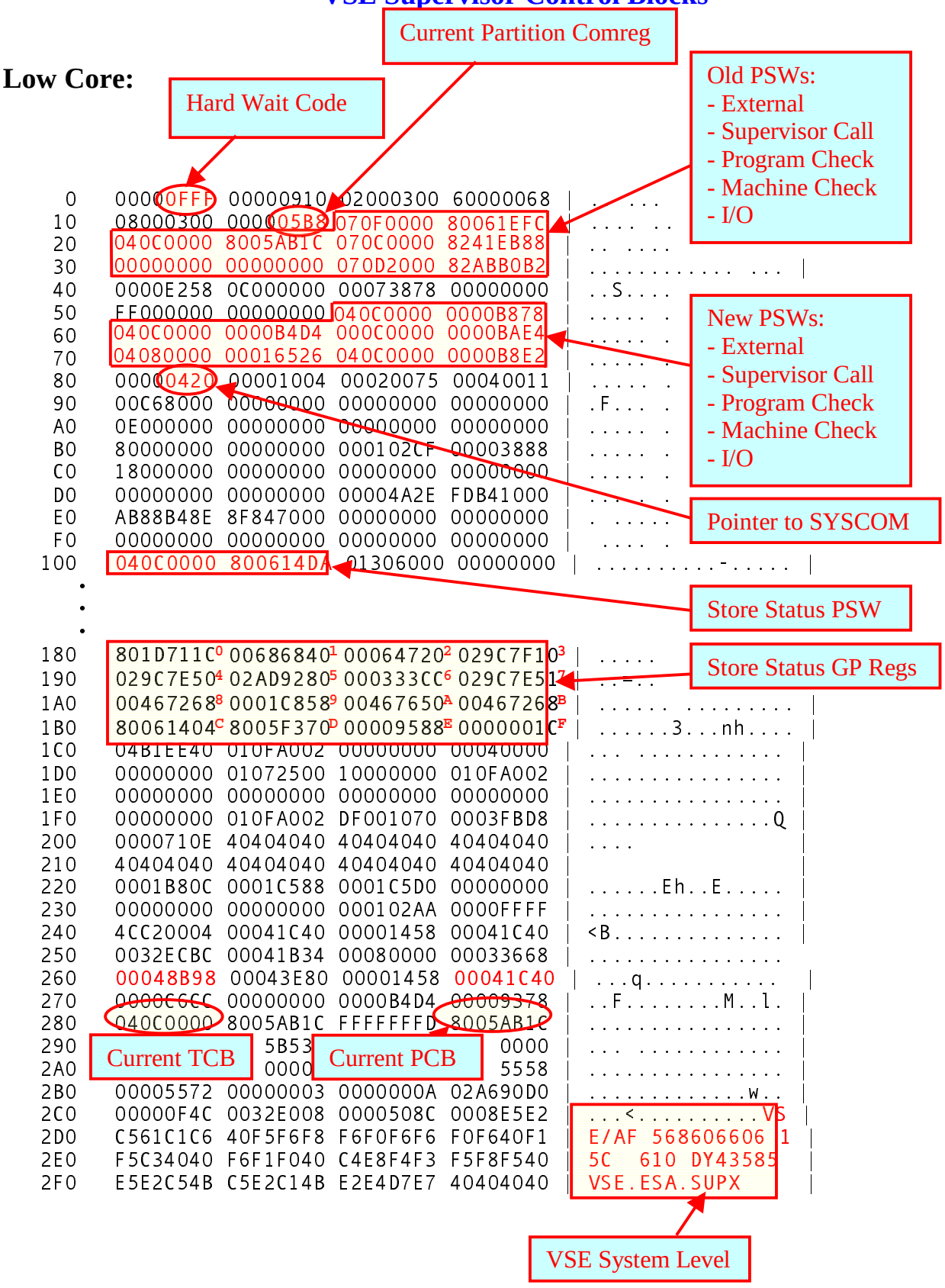
Low Core

+x'38'	I/O Old PSW
+x'78'	I/O New PSW
+x'160'	Floating Point Regs
+x'180'	General Purpose Regs
+x'1C0'	Control Regs
+x'258'	PSS

- Save current PSW
- Load new PSW
- Call First Level Interrupt routine
- Save Registers
- Move PSW and Registers to Task Save Area
- Process Interrupt
- Make necessary modifications to PSS / TSS or dispatch chain (turbo)
- Call dispatcher

VSE Supervisor Control Blocks

Low Core:



VSE Supervisor Control Blocks

Low Core:

+x'00' Hard Wait code (4 bytes) (Also in SYSCOM +x'04')
+x'14' Partition Comreg pointer for active partition

Old PSWs:

+x'18' External Old PSW
+x'20' Supervisor Call Old PSW
+x'28' Program Check Old PSW
+x'30' Machine Check Old PSW
+x'38' I/O Old PSW

+x'40' Channel Status Word (CSW)
+x'48' Channel Address Word (CAW)

New PSWs:

+x'58' External New PSW
+x'60' Supervisor Call New PSW
+x'68' Program Check New PSW
+x'70' Machine Check New PSW
+x'78' I/O New PSW

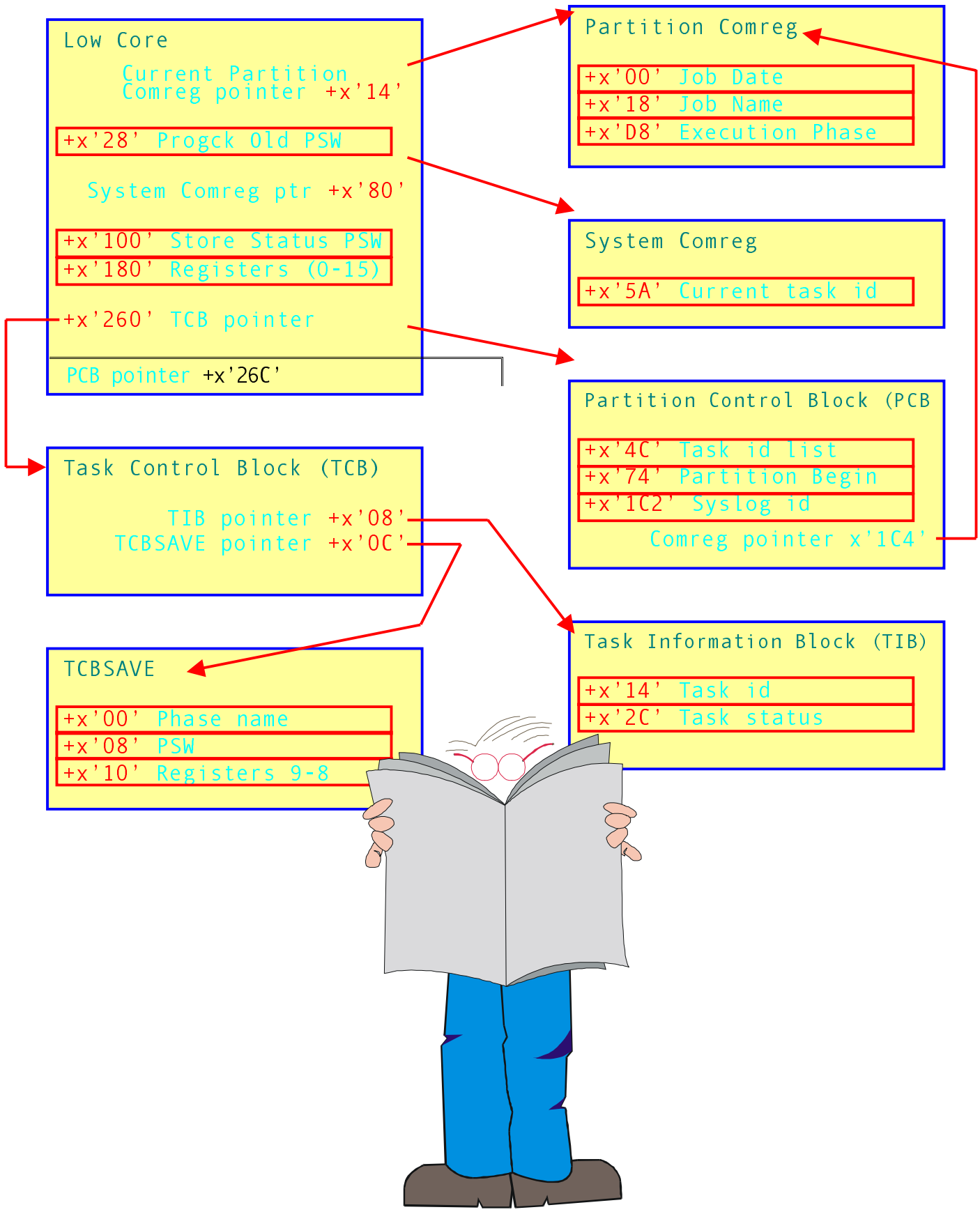
+x'80' Pointer to SYSCOM (always 00000420 for VSE/ESA version 2)

+x'8A' Last SVC interrupt code
+x'8C' Last Program Check interrupt info (ILC + interrupt code)
+x'BA' Last I/O Interrupt address (moved to x'23E' when hard wait set)
+x'100' Store Status PSW (If no Store Status was performed, search for "SNS-TASK" and back up x'48' bytes)
+x'180' Store Status General Purpose Registers
+x'1C0' Store Status Control Registers
+x'23E' Last I/O Interrupt address prior to hard wait (moved from x'BA')

+x'241' x'10' indicates that the turbo dispatcher controls more than 1 CPU.
+x'258' Partition Selection String (PSS)
+x'25C' Address of related CPU control block (turbo dispatcher)
+x'260' Address of currently active Task Control Block (TCB)
+x'264' Address of currently active Task Information Block (TIB)
+x'268' Address of currently active Partition Information Block Extension (PIB2)
+x'26C' Address of currently active Partition Control Block (PCB)
+x'270' Address of DEBUG control header
+x'280' Save area for General Purpose Registers (9-8)
+x'2C0' Address of TIB table (TIBATAB)
+x'2C4' Address of PCB Table (PCBATAB)

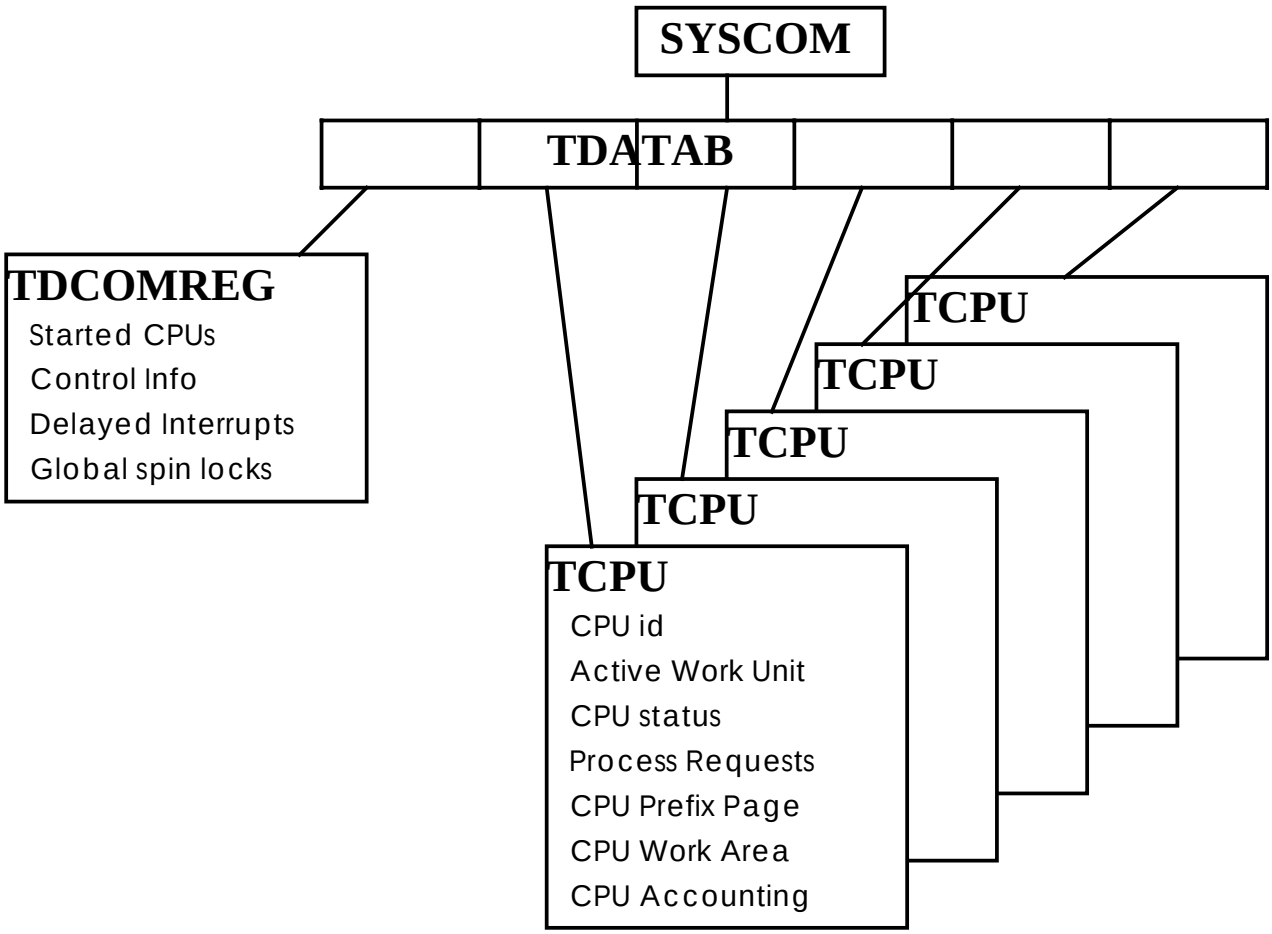
+x'2CE' Supervisor Level Identification information

VSE Supervisor Control Blocks



Turbo Dispatcher:

When running in multi-processor mode, there is one more step. Each processor has its own low core, and system errors are only documented in the low core page (page zero) which was active at the time when the error was detected.



Low core is used to communicate between hardware and software. VSE control blocks which may be changed by all active processors are also saved in page zero. Each active processor is allocated a unique 4k page (page zero). All software changes to one page zero must be synchronized in all other copies. Therefore, these changes may only be made by one CPU at a time (non-parallel work unit). Control blocks and area which can be changed independent on the status of the system have been moved from page 0 (prefix page). This allows these control blocks to be updated as a parallel work unit. Since they are the anchor on which many other control blocks are hung, SYSCOM and BG Comreg have been left in page 0. Turbo Dispatcher uses a locking (test-and-set) mechanism to ensure that only one CPU at a time can update control blocks in page 0.

VSE Supervisor Control Blocks

Locate all copies of page zero:

Follow pointer in lowcore + x'25C' to current TCPU. Approximately x'68' prior to TCPU(1), you will find the TDCOMREG, which is the main Turbo Dispatcher control block. Just prior to that you will find TDATAB (a list of TCPUs for all active processors). The list starts with a pointer to the TDCOMREG, and ends with x'80000000'.

```
V0000250   00   00335B38 00040604 00000007 000322F8 | ..$............8 |
```

```
V0032250  -A8   00000000 000008A8 0000508C 00000000 | .......y........ |
V0032260  -98   00032290 000322F8 00334000 00334068 | .......8.. ... . |
V0032270  -88   80000000 00000000 00000000 00000000 | ................ |
V0032280  -78   00000000 00000000 00000000 FFFFFFFF | ................ |
V0032290  -68   E3C4C3D6 D4D9C5C7 00640300 00000080 | TDCOMREG........ |
V00322A0  -58   000000C0 C4000300 039B5000 00000080 | ....D........... |
V00322B0  -48   00000000 13DE20D3 AE8D1F19 499C6E01 | .......L........ |
V00322C0  -38   AE8EF46E 5E939A02 00334000 00000000 | ..4.;l.... ..... |
V00322D0  -28   00000000 00000000 00000000 00030001 | ................ |
V00322E0  -18   00020003 00000000 00000000 00000000 | ................ |
V00322F0  -08   00000000 00000000 E3C3D7E4 40140001 | ........TCPU ... |
V0032300   08   006800E0 00000005 039B6000 0109C000 | ..........-..... |
V0032310   18   00032360 00000000 00000000 3976492C | ...-...........  |
V0032320   28   00000000 124CF28B 00000000 00D3277F | .....<2......L." |
V0032330   38   00000000 0C73B2A2 000026FE E8385600 | .......s....Y... |
```

There is a TCPU control block for each active processor. TCPU+x'07' contains the CPU number. TCPU+x'10' contains a pointer to the prefix page (low storage page 0) for this processor. Prefix pages for all active processors are contiguous in 31-bit storage, so once you have found one, you can find them all.

```
V.39B6000    0   0000 0FFF 0000008C 070F0000 00009388 | ..............lh |
V.39B6010   10   00007488 00003CA0 070F0000 00009388 | ...h.........lh |
V.39B6020   20   070D1000 839A1416 00000000 0000008C | ....c........... |
V.39B6030   30   00000000 00000000 070F0000 00009388 | ..............lh |
V.39B6040   40   00000000 04000000 B0095D10 00000000 | .........)..... |
V.39B6050   50   FF000000 00000000 040C0000 0000B8B8 | ................ |
V.39B6060   60   040C0000 0000B504 000C0000 0000BB24 | ................ |
V.39B6070   70   04080000 00016D5A 040C0000 0000B922 | ......_!........ |
V.39B6080   80   00000420 00031202 00020021 00000006 | ................ |
       •
       •
       •
V.39B6160  160   40404040 40404040 40404040 40404040 |                  |
V.39B6170  170   40404040 40404040 40404040 40404040 |                  |
V.39B6180  180   00000001⁰00000100¹00002200²00557E2B³| ..............=. |
V.39B6190  190   00C00000⁴00660000⁵0062B000⁶006200E0⁷| ................ |
V.39B61A0  1A0   00629000⁸0062A000⁹0056F520ᴬ80620000ᴮ| .........5..... |
V.39B61B0  1B0   B0629BDCᶜ9062939Eᴰ B0629C0Aᴱ00000000ᶠ| ......l......... |
V.39B61C0  1C0   04B1EC40 0113F003 186A7880 00040000 | ... ..0......... |
```

Exercise 4: System Disabled Wait

Exercise 4:

From a non-formatted Stand-alone dump:

1. Identify partition (task) currently in control at time of system hang.
2. Identify hard wait code (either low core or SYSCOM +x'04')
3. Locate PSW / Registers saved with "store status" command.
4. Identify module in control at point of failure.

Problem Description:

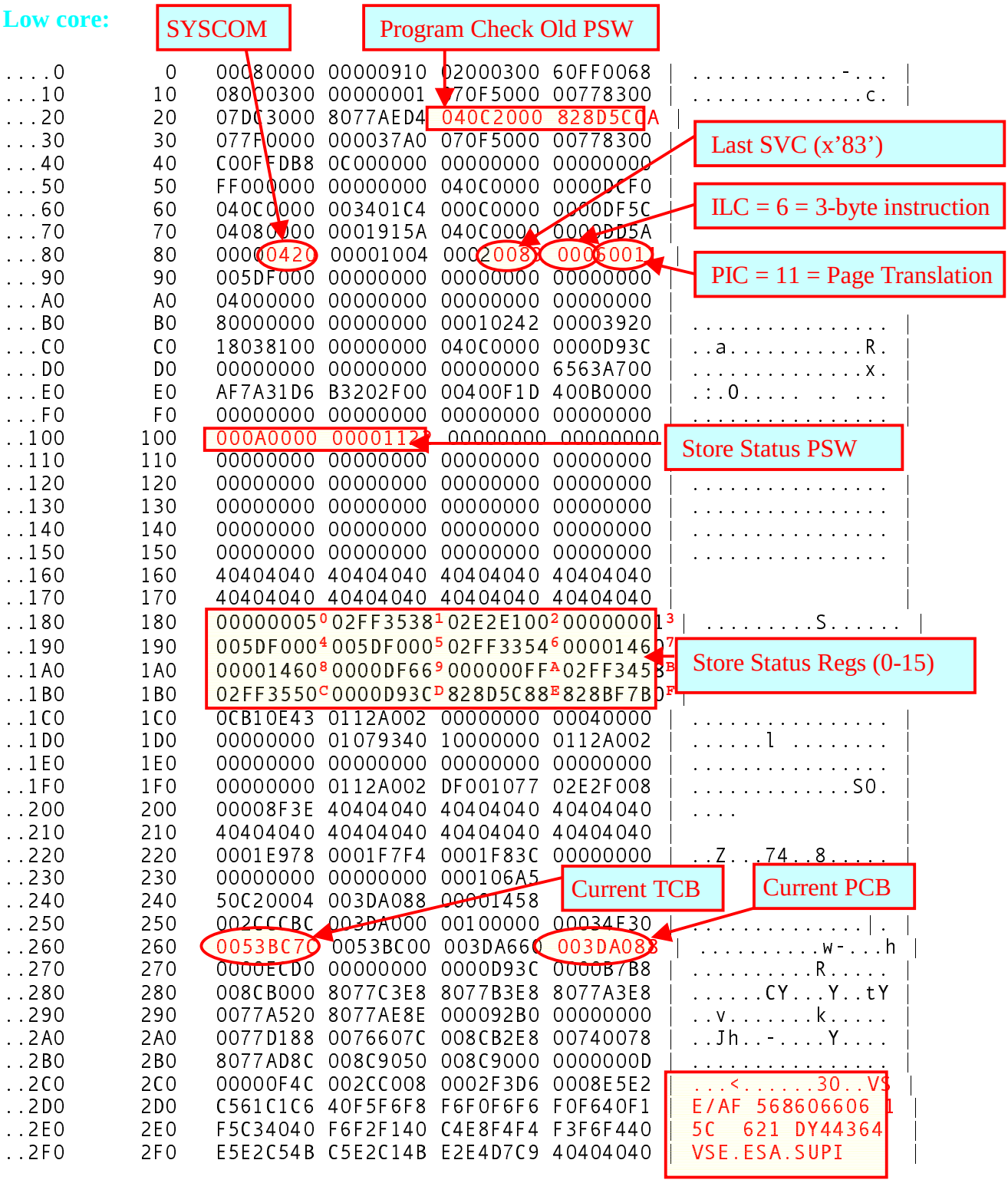
VSE/ESA 2.2.0
Pat was working with Level2 VSE. They had him issue a getvis sva,all command and it hung up his system. Pat is taking a SADUMP and will send it in.

Unable to format stand-alone dump using Interactive Interface "*Analyze SA Dump*" function.

Exercise 4: System Disabled Wait

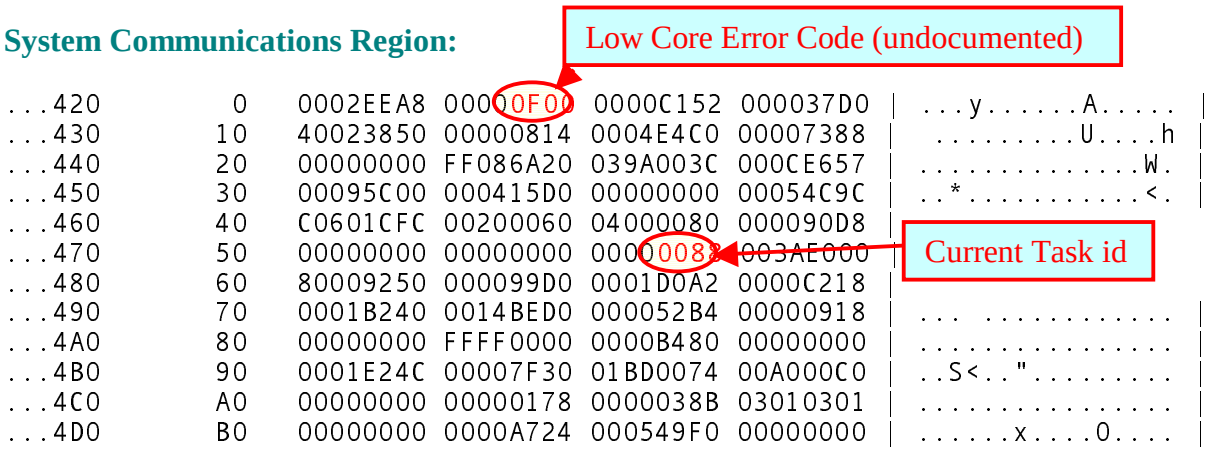
Stand-alone dump analysis failed. So we are left to our own devices

Low core:


SYSCOM
Program Check Old PSW
Last SVC (x'83')
ILC = 6 = 3-byte instruction
PIC = 11 = Page Translation
Store Status PSW
Store Status Regs (0-15)
Current TCB
Current PCB
....0 0 00080000 00000910 02000300 60FF0068 | ....-... |
...10 10 08000300 00000001 070F5000 00778300 | ....c. |
...20 20 07DC3000 8077AED4 040C2000 828D5C0A |
...30 30 077F0000 000037A0 070F5000 00778300 |
...40 40 C00FFDB8 0C000000 00000000 00000000 |
...50 50 FF000000 00000000 040C0000 0000DCF0 |
...60 60 040C0000 003401C4 000C0000 0000DF5C |
...70 70 04080000 0001915A 040C0000 0000DD5A |
...80 80 00000420 00001004 00020088 00060011 |
...90 90 005DF000 00000000 00000000 00000000 |
...A0 A0 04000000 00000000 00000000 00000000 |
...B0 B0 80000000 00000000 00010242 00003920 | .... |
...C0 C0 18038100 00000000 040C0000 0000D93C | ..a...........R. |
...D0 D0 00000000 00000000 00000000 6563A700 | ....x. |
...E0 E0 AF7A31D6 B3202F00 00400F1D 400B0000 | .:.O..... .. ... |
...F0 F0 00000000 00000000 00000000 00000000 | .... |
..100 100 000A0000 00001122 00000000 00000000
..110 110 00000000 00000000 00000000 00000000
..120 120 00000000 00000000 00000000 00000000 | .... |
..130 130 00000000 00000000 00000000 00000000 | .... |
..140 140 00000000 00000000 00000000 00000000 | .... |
..150 150 00000000 00000000 00000000 00000000 | .... |
..160 160 40404040 40404040 40404040 40404040 | |
..170 170 40404040 40404040 40404040 40404040 | |
..180 180 00000005[0] 02FF3538[1] 02E2E100[2] 00000001[3] | ....S..... |
..190 190 005DF000[4] 005DF000[5] 02FF3354[6] 00001460[7]
..1A0 1A0 00001460[8] 0000DF66[9] 000000FF[A] 02FF3458[B]
..1B0 1B0 02FF3550[C] 0000D93C[D] 828D5C88[E] 828BF7B0[F] |
..1C0 1C0 0CB10E43 0112A002 00000000 00040000 | .... |
..1D0 1D0 00000000 01079340 10000000 0112A002 | ......l .... |
..1E0 1E0 00000000 00000000 00000000 00000000 | .... |
..1F0 1F0 00000000 0112A002 DF001077 02E2F008 | ....SO. |
..200 200 00008F3E 40404040 40404040 40404040 | .... |
..210 210 40404040 40404040 40404040 40404040 | |
..220 220 0001E978 0001F7F4 0001F83C 00000000 | ..Z...74..8.....
..230 230 00000000 00000000 000106A5
..240 240 50C20004 003DA088 00001458
..250 250 002CCCBC 003DA000 00100000 00034F30 | ....|. |
..260 260 0053BC7C 0053BC00 003DA660 003DA088 | ....w-...h |
..270 270 0000ECD0 00000000 0000D93C 0000B7B8 | ....R..... |
..280 280 008CB000 8077C3E8 8077B3E8 8077A3E8 | ......CY...Y..tY |
..290 290 0077A520 8077AE8E 000092B0 00000000 | ..v.......k..... |
..2A0 2A0 0077D188 0076607C 008CB2E8 00740078 | ..Jh..-....Y.... |
..2B0 2B0 8077AD8C 008C9050 008C9000 0000000D | .... |
..2C0 2C0 00000F4C 002CC008 0002F3D6 0008E5E2 | ...<.....30..VS |
..2D0 2D0 C561C1C6 40F5F6F8 F6F0F6F6 F0F640F1 | E/AF 568606606 1 |
..2E0 2E0 F5C34040 F6F2F140 C4E8F4F4 F3F6F440 | 5C 621 DY44364 |
..2F0 2F0 E5E2C54B C5E2C14B E2E4D7C9 40404040 | VSE.ESA.SUPI |

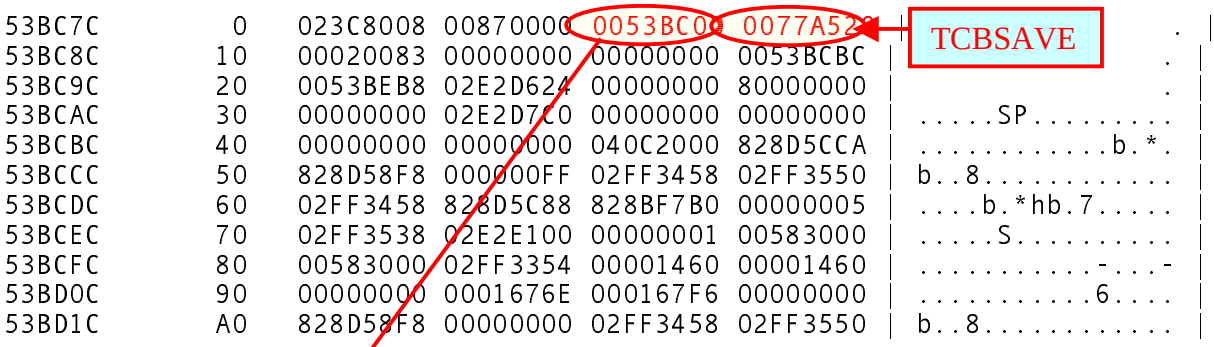
Exercise 4: System Disabled Wait

System Communications Region:



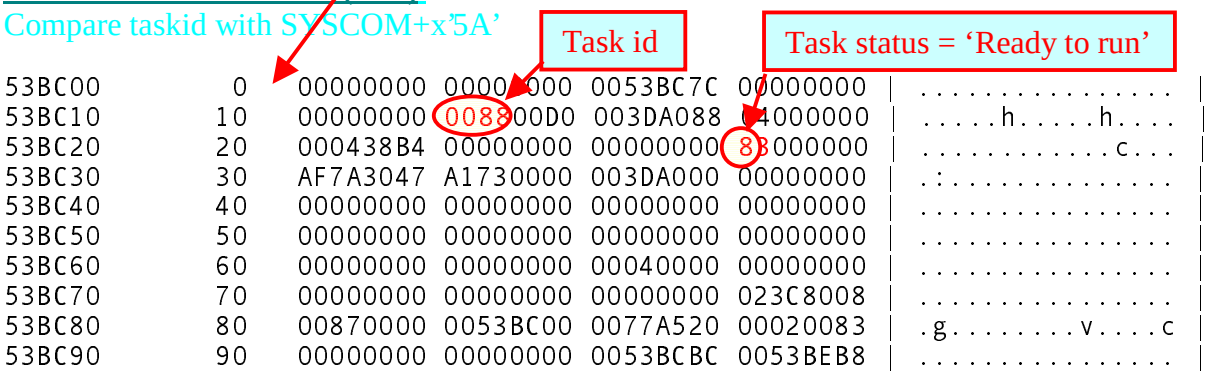

```
...420         0   0002EEA8 00000F00 0000C152 000037D0 | ...y......A..... |
...430        10   40023850 00000814 0004E4C0 00007388 |  .........U....h |
...440        20   00000000 FF086A20 039A003C 000CE657 | ..............W. |
...450        30   00095C00 000415D0 00000000 00054C9C | ..*...........<. |
...460        40   C0601CFC 00200060 04000080 000090D8 |
...470        50   00000000 00000000 00000088 003AE000 |
...480        60   80009250 000099D0 0001D0A2 0000C218 |
...490        70   0001B240 0014BED0 000052B4 00000918 | ... ............ |
...4A0        80   00000000 FFFF0000 0000B480 00000000 | ................ |
...4B0        90   0001E24C 00007F30 01BD0074 00A000C0 | ..S<.."......... |
...4C0        A0   00000000 00000178 0000038B 03010301 | ................ |
...4D0        B0   00000000 0000A724 000549F0 00000000 | ......x....0.... |
```

Low core + x'260' points at the current **Task Control Block (TCB)**:




```
53BC7C         0   023C8008 00870000 0053BC00 0077A520 | .          . |
53BC8C        10   00020083 00000000 00000000 0053BCBC | .          . |
53BC9C        20   0053BEB8 02E2D624 00000000 80000000 | .          . |
53BCAC        30   00000000 02E2D7C0 00000000 00000000 | .....SP......... |
53BCBC        40   00000000 00000000 040C2000 828D5CCA | ............b.*. |
53BCCC        50   828D58F8 000000FF 02FF3458 02FF3550 | b..8..........  |
53BCDC        60   02FF3458 828D5C88 828BF7B0 00000005 | ....b.*hb.7..... |
53BCEC        70   02FF3538 02E2E100 00000001 00583000 | .....S.........  |
53BCFC        80   00583000 02FF3354 00001460 00001460 | ..........-...-  |
53BD0C        90   00000000 0001676E 000167F6 00000000 | ..........6....  |
53BD1C        A0   828D58F8 00000000 02FF3458 02FF3550 | b..8..........  |
```

Task Information Block (TIB) contains the task id and status.
Compare taskid with SYSCOM+x'5A'




```
53BC00         0   00000000 00000000 0053BC7C 00000000 | ..............  |
53BC10        10   00000000 00880000 003DA088 04000000 | .....h.....h.... |
53BC20        20   000438B4 00000000 00000000 83000000 | ............c... |
53BC30        30   AF7A3047 A1730000 003DA000 00000000 | .:............  |
53BC40        40   00000000 00000000 00000000 00000000 | ..............  |
53BC50        50   00000000 00000000 00000000 00000000 | ..............  |
53BC60        60   00000000 00000000 00040000 00000000 | ..............  |
53BC70        70   00000000 00000000 00000000 023C8008 | ..............  |
53BC80        80   00870000 0053BC00 0077A520 00020083 | .g.......v....c |
53BC90        90   00000000 00000000 0053BCBC 0053BEB8 | ..............  |
```

Exercise 4: System Disabled Wait

The PCB: tells you what partition is active (which file on stand-alone dump tape)

```
3DA088     0   01E08000 10000000 00000000 000D0000 | ................ |
3DA098    10   00000000 000031D8 FFFFCF9A 003DA088 | .......Q.......h |
3DA0A8    20   00D00009 04C00000 00000000 68696A86 |               .f |
3DA0B8    30   8788896F 952D0000 00000000 00000000 |               .. |
3DA0C8    40   00000000 00000000 00000000 02E3B680 | .............T.. |
3DA0D8    50   00090000 003DA000 003DA000 00000080 | ................ |
3DA0E8    60   00000014 00000000 00000000 00740000 |
3DA0F8    70   00CC0000 00740000 00D00000 00000000 |
3DA108    80   00000000 00CF7000 00000000 00000000 |
3DA118    90   00000000 00741036 0075C0B0 DD000008 | ................ |
3DA128    A0   00000000 00000000 00000000 00000000 | ................ |
3DA138    B0   00000000 016439A6 00000000 00223CA4 | .......w.......u |
3DA148    C0   00000000 01AE0C17 8004EC20 9040802D | .............  .. |
3DA158    D0   8004EC28 91408087 8004EC30 92408000 | ....j .g....k .. |
3DA168    E0   8004EC38 93418000 8004EC40 94408008 | ....l......  m .. |
3DA178    F0   8004EC48 95408000 003DB2D8 003DB6F0 | ....n .....Q...0 |
3DA188   100   00000000 003C2900 00000000 00000001 | ................ |
3DA198   110   00000000 00700000 40404040 404007D6 | ........       .O |
3DA1A8   120   02FD9340 01079340 002CC110 003EE088 | ..l  ..l  ..A....h |
3DA1B8   130   80000000 05000000 00011B4A 000BC860 | ...........¢..H- |
3DA1C8   140   000BE630 00043232 0000015E 003CF000 | ..W........;..0. |
3DA1D8   150   000F0000 00FFFFFF 00                  ................ |
3DA1E8   160   0075F834 00040001 00                  .8.............. |
3DA1F8   170   003CF178 00000000 00000000 00000000 | ..1............. |
3DA208   180   00000000 00000001 00000000 00000000 | ................ |
3DA218   190   00000000 00000000 00000200 00000000 | ................ |
3DA228   1A0   003DBAC8 00000000 00000000 00000000 | ...H............ |
3DA238   1B0   00000000 00000000 00284002 D0000000 | ................ |
3DA248   1C0   00D0C3F1 003DA520 003DA6E8 003DB680 | .C1. |
3DA258   1D0   003DA650 003DA660 003DA670 003DB698 | ..w.. |
3DA268   1E0   8004EC28 00000000 003DA2E8 00000000 | ..........sY.... |
3DA278   1F0   00000000 002D00D0 003DA088 00400000 | ...........h. .. |
```

Task id list

Partition Begin

Partition Comreg

SYSLOG id

SYSLOG id in VSE/ESA 1.3 is at PCB+x'18E'

Partition Comreg:

```
3DA520     0   F1F061F2 F861F9F7 61F1F900 00000000 | 10/28/97/19.... |
3DA530    10   00000000 00000000 E2C7E2E2 D6D5D3D5 | ........SGSSONLN |
3DA540    20   00744FFF 007446BE 007446BE 000000D0 | ..|............. |
3DA550    30   02FFFFFF FF7F54D3 200054D0 19000000 | .....".L........ |
3DA560    40   32B0AF79 DC6E6373 012C0139 014638F1 | ...............1 |
3DA570    50   F0F2F8F9 F7F3F0F1 000007FE 00000000 | 02897301........ |
3DA580    60   08CE0000 F1F90000 000000D0 C3F100D0 | ....19......C1.. |
3DA590    70   003DB6E0 003CF2F8 0000092C 072E0946 | ......28........ |
3DA5A0    80   00000000 05B811E1 00702000 68680F40 | ...............  |
3DA5B0    90   40404040 40404000 40404040 40404000 |        .       . |
3DA5C0    A0   003DB718 C6000000 003DA950 02040202 | ....F.....z..... |
3DA5D0    B0   00000000 00000000 003CF000 0103B900 | ..........0..... |
3DA5E0    C0   0B01000B 00000000 00CF7000 00000000 | ................ |
3DA5F0    D0   C9D1C2C6 C3F10066 C4C3D4D6 E3C4D9E5 | IJBFC1..DCMOTDRV |
3DA600    E0   00706A50 00000000 00000000 007400E0 | ................ |
```

Job Date

Job Name

SYSLOG id

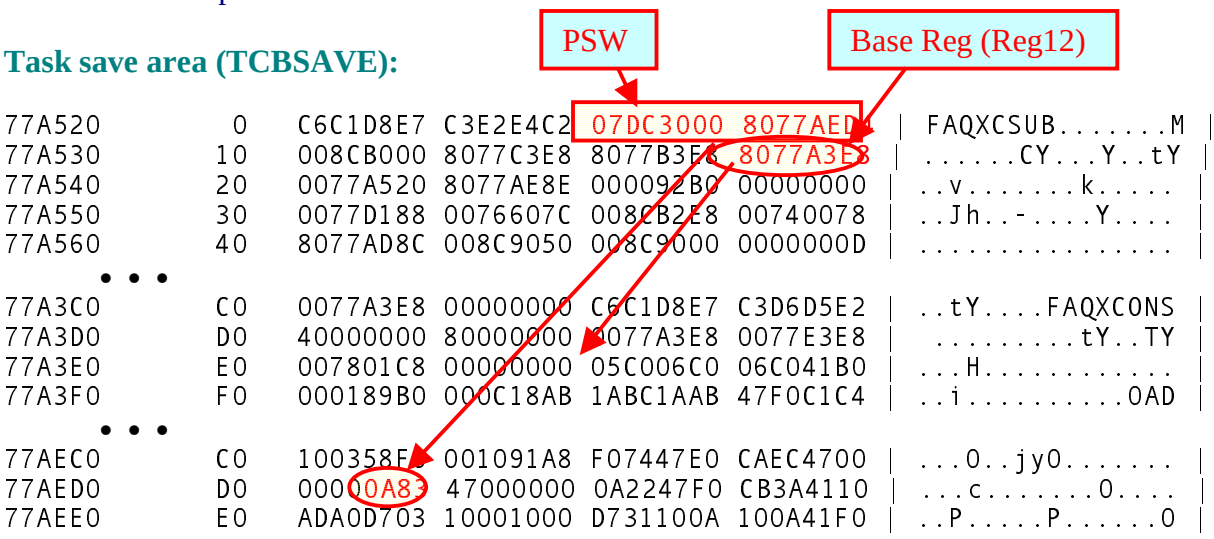
Execution Phase Name

Exercise 4: System Disabled Wait

Ok, let's summarize what we have so far:

Current Task id: x'0088'
Current Task Save Area: 77A520
Current Partition: C1
Current Job: SGSSONLN
// EXEC phase: DCMOTDRV

Task save area (TCBSAVE):




```
77A520        0   C6C1D8E7 C3E2E4C2 07DC3000 8077AED4 | FAQXCSUB.......M |
77A530       10   008CB000 8077C3E8 8077B3E4 8077A3E8 | ......CY...Y..tY |
77A540       20   0077A520 8077AE8E 000092B0 00000000 | ..v.......k..... |
77A550       30   0077D188 0076607C 008CB2E8 00740078 | ..Jh..-....Y.... |
77A560       40   8077AD8C 008C9050 008C9000 0000000D | ................ |
      • • •
77A3C0       C0   0077A3E8 00000000 C6C1D8E7 C3D6D5E2 | ..tY....FAQXCONS |
77A3D0       D0   40000000 80000000 8077A3E8 0077E3E8 |  .........tY..TY |
77A3E0       E0   007801C8 00000000 05C006C0 06C041B0 | ...H..........0. |
77A3F0       F0   000189B0 000C18AB 1ABC1AAB 47F0C1C4 | ..i..........0AD |
      • • •
77AEC0       C0   100358F8 001091A8 F07447E0 CAEC4700 | ...0..jy0.......  |
77AED0       D0   00000A83 47000000 0A2247F0 CB3A4110 | ...c.......0....  |
77AEE0       E0   ADA0D703 10001000 D731100A 100A41F0 | ..P.....P......0  |
```

Partition (main task) save area:


```
740000        0   C4C3D4D6 E3C4D9E5 07DD1000 807406B0 | DCMOTDRV........ |
740010       10   007435A8 00740078 00744FFF 0076E900 | ...y......|...Z. |
740020       20   0075C000 0075C208 0075C298 0075C410 | ......B...Bq..D. |
740030       30   0075C27C 0075C204 0074AD80 00CBFFFF | ..B...B......... |
740040       40   00000000 00000000 00702618 00741078 | ................ |
740050       50   0000AF79 DC6E6373 40404040 40404040 | ........         |
740060       60   40404040 40404040 40404040 40404040 |                  |
740070       70   40404040 40404040 47F0F12C C4C3D4D6 |          .01.DCMO |
740080       80   E3C4D9E5 F44BF24B F0404040 F0F461F2 | TDRV4.2.0   04/2 |
740090       90   F261F9F5 E2E4D740 40404040 C7E2E5E2 | 2/95SUP     GSVS |
7400A0       A0   C5404040 4040C396 97A89989 8788A340 | E     Copyright  |
7400B0       B0   4D835D40 F1F9F9F4 40D38587 8595A340 | (c) 1994 Legent  |
7400C0       C0   E29686A3 A6819985 6B40C995 834B6B40 | Software, Inc.,  |
7400D0       D0   F1F9F8F7 6B40F1F9 F9F46B40 81A24081 | 1987, 1994, as a |
7400E0       E0   9540A495 97A48293 89A28885 8440A696 | n unpublished wo |
7400F0       F0   99920000 00000000 D7C1E3C3 C8404040 | rk......PATCH    |
      • • •
740690       90   41EE0004 47F0A5D8 4100D410 500F0000 | .....0vQ..M..... |
7406A0       A0   9680F000 D203F004 AE504110 D27C0A10 | o.0.K.0.....K... |
7406B0       B0   9180801A 4710A40C 58E0D074 07FE50E0 | j.....u......... |
7406C0       C0   D0745820 D4144122 00045920 D4144780 | ....M.......M... |
```

Exercise 4: System Disabled Wait

Progck old psw: (Store Status registers) document the actual failure:

```
28D58F0        70   00000120 00000120 47F0F018 13C3D6C9 | .........00..COI |
28D5900        80   D5D7C8C3 6BF1F5C3 60C4E8F4 F3F7F5F9 | NPHC,15C-DY43759 |
28D5910        90   90ECD00C 189F41F0 00005800 96A458FD | .......0....ou.. |
28D5920        A0   0000581F 00041A01 590F0008 4740903C | ............ .. |
28D5930        B0   500F0008 590F000C 47409046 0000500F | ......... ..... |
28D5940        C0   000450F1 000018B1 50D0B004 50B0D008 | ...1........... |
28D5950        D0   98F1D010 18DBD207 B0901000 D203B0FC | q1....K.....K... |
28D5960        E0   967C5880 96345850 B0945820 50044120 | o...o....m..... |
28D5970        F0   20D45830 96345030 B0E05020 B0E44140 | .M..o........U.  |
      •
      •
      •
28D5C00         0   96401FAA 186A5840 200095F2 40064770 | o ..... ..n2 ... |
28D5C10        10   936C5850 00805860 501458C0 60805830 | l......-....-... |
28D5C20        20   C02C5850 30245450 960C4780 933E4160 | ........o...l..- |
28D5C30        30   000147F0 936C5860 404041C0 00011826 | ...Ol..-  ...... |
28D5C40        40   1E2C5830 96041846 185C9200 40000E24 | ....o....*k. ... |
28D5C50        50   58C00080 58C0C014 58C0C080 58C0C02C |                  |
28D5C60        60   50A0C024 18261256 47709394 5860963C |                  |
28D5C70        70   5060B0E0 5070B0E4 41C0B0F8 50C0B0E8 |                  |
28D5C80        80   4110B0E0 45E0958C 5850B0F8 41A000FF |                  |
28D5C90        90   155A47D0 93B05860 B0905820 60001845 | .!..l..-....-... |
28D5CA0        A0   50402090 47F093D2 5820B094 D20BB0E0 | . ...OlK...mK... |
28D5CB0        B0   95F05020 B0E458F0 96244110 B0E005EF |
28D5CC0        C0   D203B0FC 969847F0 951AB203 40009674 |
28D5CD0        D0   50804004 58702034 50704008 5850B094 |
28D5CE0        E0   58705004 D207400C 705C47F0 94225880 |
28D5CF0        F0   5004D507 400C805C 47809422 D20BB0E0 |
```

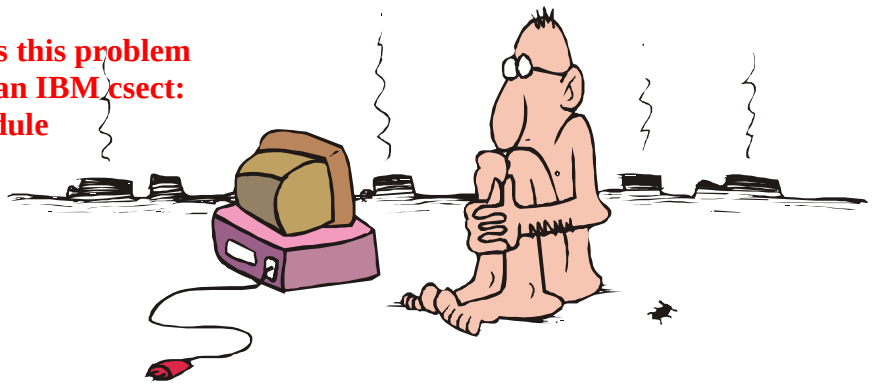
Reg14 from Store Status

Progck Old PSW
Reg9 (from Store Status) points to an invalid page

Problem Summary:

1. Last call from “main-line” code is found in partition save area, and was at address 7406B0. This was in Legend module DCMOTDRV (Base Reg12), and was an SVC 29 (x’1D’ = Wait multiple). This is documented in the partition save area.
2. This call resulted in a call to FAQS, which then issued an SVC 131 (x’83’ = MVS SVC simulation) at 77AED4 from module FAXSCONS (Base Reg10). This is documented in TCBSAVE.
3. The actual abend, however, was documented via the program check old psw, and was in IBM code. Failing registers are in low core +x’180’ (Store Status).

So, much as we would like to pass this problem to FAQS, the abend occurred in an IBM csect: ’COINPHC’ which is part of module IJBCSEC2 and phase $IJBCSIO (IBM Component: Librarian)



Process Stand-alone Dump Tape using IUI

Load Stand-alone Dump Tape to VSE Dump Library:
(assumes tape mounted on 181)

1. Select “Storage Dump Management” panel (options 4.6).
2. Press pf6 to load a new dump.
3. Fill in options on “Onload External Dump” panel and press enter.
4. Leave file number blank on “Onload Dump from Tape” panel, and press enter. This will return you to the “Storage Dump Management” panel.
5. Press pf5 to process the job you just defined in steps 2-4.
6. On panel “Job Disposition”, ensure “hold list in queue” is set to “1”. Press enter.
   Note: The job is submitted with a “// PAUSE” statement, reminding you to mount the appropriate tape. You must switch to an operator panel to respond to this pause (options 3.1 from “Main Selection” panel).
7. After the job finishes running, if it completed with other than return code 0, return to the “Problem Handling” panel and check the output via option 4.
8. Ensure the dump was loaded with return code 0. If not, correct the problem and retry. If the dump library is full, delete some dumps from “Storage Dump Management” panel, and repeat the process. Don’t forget to press pf5 to process (submit) the job after defining options.

Print a stand-alone dump:

1. From “Storage Dump Management” panel, select option 2 to print the symptoms. This will identify which partition was active at the point of the hard wait, but not the current phase.
2. From same panel, select option 4 to analyze the dump. In our case, this generated an error (low core had been overlaid), so we had to analyze the dump outselves after printing it using option 3.
3. Don’t forget to press pf5 to process (submit) the job(s) defined in steps 1 and 2.
4. Output from printing the dump can be viewed from “Problem Handling” panel, option 4.

Process Stand-alone Dump Tape using IUI

Main Panel:

```
IESADMSL.IESEADM        VSE/ESA FUNCTION SELECTION     APPLID: DBDCCICS

Enter the number of your selection and press the ENTER key:

         1  Installation
         2  Resource Definition
         3  Operations
   ==>   4  Problem Handling
         5  Program Development
         6  Command Mode
         7  CICS-Supplied Transactions

 PF1=HELP                    3=SIGN OFF                    6=ESCAPE(U)
                             9=Escape(m)

 ==>
```

```
IESADMSL.IESEPROB         PROBLEM HANDLING             APPLID: DBDCCICS

Enter the number of your selection and press the ENTER key:

         1  Online Problem Determination
         2  Inspect Message Log
         3  Storage Dump Management
         4  Inspect Dump Management Output
         5  Retrace History File
    ==>  6  Dump Program Utilities


 PF1=HELP                    3=END        4=RETURN          6=ESCAPE(U)
                             9=Escape(m)

 ==>                                                  Path: 4
```

```
PRB$IDH1                    STORAGE DUMP MANAGEMENT

LIST OF SYSTEM MANAGED DUMPS

OPTIONS: 2 = PRINT SYMPTOMS 3 = PRINT DUMP      4 = ANALYZE SA DUMP
         5 = DELETE DUMP    8 = ON/OFFLOAD DUMP 9 = ANALYZE CICS DUMP

                                 RELATED  ON-                TAPE   DATA
OPT    -------DUMP NAME-------   DUMP   LINE  DATE   TIME    LABEL  SPACE

 _      SYSDUMP.F4.DF400002        NONE   X   10/14/97 17:10:43
 _      SYSDUMP.F4.DF400001        NONE   X   10/14/97 10:39:56
 _      SYSDUMP.F4.DF400000        NONE   X   10/13/97 12:59:56
 _
PF1=HELP       2=REDISPLAY  3=END               5=PROCESS    6=ADD DUMP
```

Process Stand-alone Dump Tape using IUI

4.3+pf6 Add Dump

```
PRB$IDH4                    ONLOAD EXTERNAL DUMP

 Enter the required data and press ENTER.

TARGET LIBRARY NAME           SYSDUMP

SUBLIBRARY NAME...... BG          Name of the sublibrary into which the
                                  dump has to be loaded. For valid sub-
                                  libraries enter a "?".

DUMP NAME............ SADUMP01    Unique name used to reference the
                                  dump in the library. The name must
                                  start with an alphabetic character,
                                  but not with H, L, M, N, or X.

DEVICE............... 1           Definition of the input device.
                                  Enter 1 for tape or 2 for disk.


 PF1=HELP       2=REDISPLAY  3=END
```

Press Enter:

```
PRB$IDH3                    ONLOAD DUMP FROM TAPE

 Enter the required data and press ENTER.



TAPE ADDRESS............. 181       Address (cuu) of the onload tape.
                                   For valid addresses enter a "?".

VOLUME SERIAL NUMBER.... DG4097    Volume serial number of the onload
                                   tape.

FILE NUMBER.............. ____      File sequence number of the dump you
                                   want to onload from tape (optional).


 PF1=HELP       2=REDISPLAY  3=END
```

Press Enter. This will return you to the “Storage Dump Management” panel.

Process Stand-alone Dump Tape using IUI

Return to "Storage Dump Management" panel and press pf5 "Process":

```
SUB$PRO5                        JOB DISPOSITION


 Enter the required data and press ENTER.


JOB DESTINATION...... 1           Enter 1 to submit the job to batch.
                                  Enter 2 to file in library.
                                  Enter 3 to do both.
JOB NAME............. DMPINF37    The name under which the job will be
                                  saved in VSE/ICCF.
PRIORITY............. 8           Priority 0-9 for this job.
CLASS................ 0           Changing * has no effect.
DISPOSITION.......... D           D,H,K or L. Changing * has no effect.
JOB ACCOUNTING....... ________        ________
HOLD LIST IN QUEUE... 1           Enter 1 to hold output in list queue.
                                  Enter 2 to print output immediately
TIME EVENT SCHEDULING 2           Enter 1 if TIME EVENT SCHEDULING
                                  required, otherwise enter 2.
OTHER PARAMETERS..... 2           Enter 1 to change any other POWER JOB
                                  parameters, otherwise enter 2.
 PF1=HELP       2=REDISPLAY  3=END

 JOBNAME-PREFIX OF THE GENERATED JOB(S) is "DMP" (E.G. DMPANA01).
```

After pressing enter, you are returned to "Problem Handling" panel with a message "Job has been submitted as DMP...."

```
IESADMSL.IESEPROB          PROBLEM HANDLING              APPLID: DBDCCICS

Enter the number of your selection and press the ENTER key:

         1  Online Problem Determination
         2  Inspect Message Log
         3  Storage Dump Management
         4  Inspect Dump Management Output
         5  Retrace History File
         6  Dump Program Utilities

PF1=HELP                      3=END        4=RETURN          6=ESCAPE(U)
                               9=Escape(m)
 JOB HAS BEEN SUBMITTED AS DMPINF41.
 ==>                                                  Path: 4
```

Process Stand-alone Dump Tape using IUI

On the operator console, you will see the following:

```
BG 0001 1Q47I   BG DMPONL41 00995 FROM (SYSA) , TIME= 2:23:32
BG 0000 // JOB DMPONL41  ONLOAD DUMP FROM TAPE
BG 0000 * PLEASE MOUNT TAPE DG4097 ON UNIT 181 TO ONLOAD
BG 0000 * DUMP SYSDUMP.BG.SADUMP01
BG 0000 // PAUSE
BG 0000 EOJ DMPONL41  MAX.RETURN CODE=0004
```

If the return code is other than zero, check out the output by:

```
IESADMSL.IESEPROB          PROBLEM HANDLING              APPLID:DBDCCICS

Enter the number of your selection and press the ENTER key:

         1  Online Problem Determination
         2  Inspect Message Log
         3  Storage Dump Management
   ==>   4  Inspect Dump Management Output
         5  Retrace History File
         6  Dump Program Utilities

 There is at least one message waiting for you to retrieve it.

 PF1=HELP                    3=END        4=RETURN          6=ESCAPE(U)
                             9=Escape(m)

==> 4                                                 Path: 4
```

Select the list queue entry corresponding to the job which just ran

```
IESBQUL                          LIST QUEUE                Page  1 of  1
                                                        Prefix: DMP
OPTIONS:   1 = DISPLAY      2 = CHANGE       3 = PRINT       5 = DELETE

OPT JOBNAME NUMBER SFX S PR DIS CL   PAGES  CC FORM TO       FROM

 _  DMPONL37 00988        8  H  A        2   1      SYSA     .SYSA
 _  DMPONL38 00989        8  H  A        3   1      SYSA     .SYSA
 _  DMPONL39 00990        8  H  A        2   1      SYSA     .SYSA
 _  DMPDEL40 00994        8  H  A        2   1      SYSA     .SYSA
 _  DMPONL41 00995        8  H  A        2   1      SYSA     .SYSA
 _  DMPONL42 00997        8  H  A        4   1      SYSA     .SYSA

PF1=HELP       2=REFRESH    3=END        4=RETURN

LOCATE JOBNAME ==> _________
```

Process Stand-alone Dump Tape using IUI

The list queue entry should identify the reason for the non-zero return code. In this case, the dump library is full.

```
// JOB DMPONL41  ONLOAD DUMP FROM TAPE                          DATE 10/

* PLEASE MOUNT TAPE DG4097 ON UNIT 181 TO ONLOAD

* DUMP SYSDUMP.BG.SADUMP01
// PAUSE
// ASSGN SYS018,181
// EXEC PROC=DTRINFOA
// ASSGN SYS016,DISK,VOL=SYSWK1,SHR       INFO ANAL MANAGEMENT FILE
1T20I  SYS016 HAS BEEN ASSIGNED TO X'141' (TEMP)
// ASSGN SYS017,DISK,VOL=SYSWK1,SHR       INFO ANAL ROUTINES FILE
1T20I  SYS017 HAS BEEN ASSIGNED TO X'141' (TEMP)
EOP DTRINFOA
// EXEC INFOANA,SIZE=300K

BLN1008I INFO/ANALYSIS READY
   SELECT DUMP MANAGEMENT
     DUMP NAME SYSDUMP.BG.SADUMP01
BLN9018I DUMP SYSDUMP.BG.SADUMP01 ADDED
          RETURN
   SELECT DUMP ONLOAD
          VOLID DG4097 SYS018
          RETURN
BLN9051I DUMP LIBRARY IS FULL
BLN3002I ONLOAD FAILED, REASON CODE = 3012
   SELECT END
BLN1004I CONTROL STATEMENT FLUSHED
1S55I  LAST RETURN CODE WAS 0004
// MTC REW,SYS018
EOJ DMPONL41  MAX.RETURN CODE=0004                           DATE 10/
```

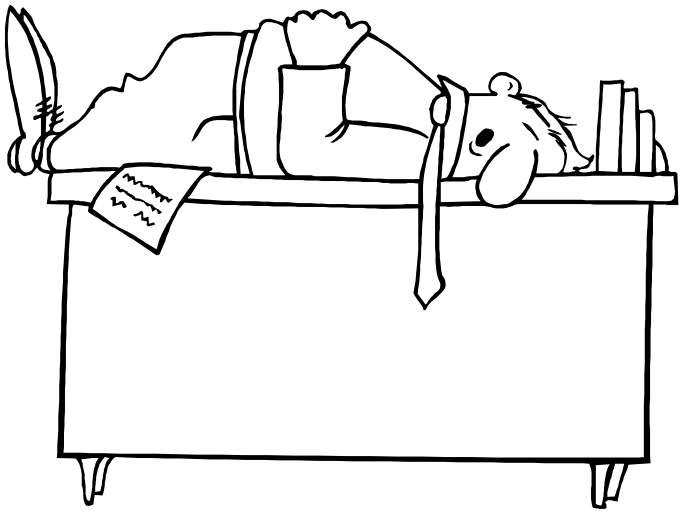
Return to the "List of Storage Managed Dumps", and delete a dump or two, then select option '8' to onload the failing sa-dump from tape. When the load is successful, the date and time and tape label will be filled in:

```
PRB$IDH1                   STORAGE DUMP MANAGEMENT

LIST OF SYSTEM MANAGED DUMPS

OPTIONS: 2 = PRINT SYMPTOMS 3 = PRINT DUMP      4 = ANALYZE SA DUMP
         5 = DELETE DUMP    8 = ON/OFFLOAD DUMP 9 = ANALYZE CICS DUMP

                                RELATED  ON-                    TAPE
OPT    -------DUMP NAME-------  DUMP    LINE  DATE    TIME      LABEL

 _     SYSDUMP.BG.SADUMP01        NONE   X   10/28/97 12:25:58  DG4097
 _     SYSDUMP.F4.DF400002        NONE   X   10/14/97 17:10:43
 _
 _

PF1=HELP       2=REDISPLAY  3=END               5=PROCESS    6=ADD DUMP
```

Process Stand-alone Dump Tape using IUI

Print the symptoms of the sadump (Option 2 on Storage Dump Management panel)**:**

```
// JOB DMPSTA50  PRINT STANDALONE DUMP ANALYSIS                DATE 10/
 // EXEC PROC=DTRINFOA
// ASSGN SYS016,DISK,VOL=SYSWK1,SHR       INFO ANAL MANAGEMENT FILE
1T20I  SYS016 HAS BEEN ASSIGNED TO X'141' (TEMP)
// ASSGN SYS017,DISK,VOL=SYSWK1,SHR       INFO ANAL ROUTINES FILE
1T20I  SYS017 HAS BEEN ASSIGNED TO X'141' (TEMP)
EOP DTRINFOA
// EXEC INFOANA,SIZE=300K

BLN1008I INFO/ANALYSIS READY
   SELECT DUMP MANAGEMENT
     DUMP NAME SYSDUMP.BG.SADUMP01
BLN9018I DUMP SYSDUMP.BG.SADUMP01 SELECTED
          RETURN
   SELECT DUMP VIEWING
          CALL IJBXCSMG
SYSDUMP.BG.SADUMP01

   LAST ENTRIES IN CONSOLE ROUTER QUEUE:
   REPLIES OUTSTANDING  :
BLN9003I 4G82I DUMP ANALYSIS ROUTINE COMPLETED SUCESSFULLY.
          CALL IJBXDBUG

               VSE/AF 568606606 15C  621 DY44364

DATE DUMP WAS TAKEN:  10/28/97              DUMP TYPE:  SADUMP
SUPERVISOR ID:  VSE.ESA.SUP                 SUPERVISOR NAME:  $$A$SUPI
SYSTEM STATUS:  HARD WAIT                   HARD WAIT CODE:  F00
CURRENT TASK:  T88 C1 SUB                   BASE PHASE:  DCMOTDRV
```



Process Stand-alone Dump Tape using IUI

Now that we know that C1 partition was the culprit, let's see if it is on the tape:

```
IESADMSL.IESEDUMP       DUMP PROGRAM UTILITIES         APPLID: DBDCCICS
Enter the number of your selection and press the ENTER key:

        1  Create Standalone Dump Program on Tape
        2  Create Standalone Dump Program on Disk
        3  Remove Standalone Dump Program from Disk
   ==>  4  Scan Dump Files on Tape
        5  Scan Dump Files on Disk
        6  Print IPL Diagnostics
        7  Format ICCF Dump Data
        8  Print SDAID Tape


PF1=HELP                    3=END        4=RETURN           6=ESCAPE(U)
                            9=Escape(m)
==> 4                                                 Path: 46
```

The SYSLST output:

```
// JOB SCANDMPT  SCAN DUMP FILE ON TAPE                          DATE 10/

* ***************************************************************
* * Request for the tape to run the VSE/DOSVSDMP utility
* ***************************************************************
// PAUSE MOUNT TAPE ON 181
// MTC REW,181
// ASSGN SYS006,181
// EXEC DOSVSDMP,PARM='SCAN DEVICE=181'
10/29/97
PRINTOUT OF VSE DUMP TAPE
DIRECTORY OF VSE DUMP TAPE
DUMP FILE  DUMP TYPE  NAME      DATE      DATA DUMPED
---------  ---------  --------  --------  --------------------------
   001                                    DOES NOT CONTAIN DUMP DATA
   002                                    DOES NOT CONTAIN DUMP DATA
   003     SADUMP               97/../28  SUPERVISOR+SVA
   004     SADUMP               97/10/28  PMRAS-R
   005     SADUMP               97/10/28  PMRAS-00
   006     SADUMP     NO-NAME   97/10/28  BG-PARTITION
   007     SADUMP     NO-NAME   97/10/28  FA-PARTITION
         .
         .
         .
   023     SADUMP     SGSSONLN  97/10/28  C1-PARTITION
```

Yes, partition C1 is on file 23 on the tape. Now we can return to the "Onload Dump From Tape" panel (4.3 + pf6), and request that file 23 be loaded.