E47 / E48

Problem Determination for CICS TS

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Problem Determination for CICS TS
Sessions E47 / E48

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Problem Determination for CICS TS
Sessions E47 / E48

<u>Speaker Notes:</u>

The material in this presentation has been assembled from externally available sources, including:

"*<u>CICS TS Data Areas</u>*" (LY33-6086-00)

"*<u>CICS TS Diagnostic Reference</u>*" (LY33-6085-00)

"*<u>CICS TS Problem Determination Guide</u>*" (GC33-1663-00)

"*<u>CICS TS Trace Entries</u>*" (SX33-6108-00)

CICS TS Formatted Dump

Nothing in this presentation should be interpreted as an official programming interface.

CICS TS Dump Processing

```
DFHAC2206 19:12:05 DBDCCICS Transaction PGCK has failed with abend ASRA.

                              -or-

F2 0103 DFHAP0001 DBDCCICS An abend (code 0C9/AKEA) has occurred at offset
        X'0000072E' in module CICSPGCK.
```

ALL abends should be investigated

abcode axxy
           'a'   is either **'A'** (CICS) or **'D'** (DL/I)
           xx   is domain code
           y   is alphanumeric code

AKEA (ASRA)   Termination due to program interrupt (progck)

AKEB (ASRB)   Termination due to VSE system abend (invalid SVC, etc)

AKEC   Termination due to run-away task

'**KE**' is "Kernel domain".
'**SR**' is "System Reliability Domain (DFHSRP)".

CICS TS Dump Processing

Transaction Dump:

? DFHDMPA, DFHDMPB

? Not VSE SYSDUMP datasets

? CICS detects an abend while a user transaction is in control

? Explicit request from application (exec cics dump transaction)

System Dump:

? System Dumps (SDUMP) taken to VSE SYSDUMP dataset.

? If CICS (including DL/I) abnormally terminates.

? If systems operator requests cemt perform shutdown ... dump

? If systems operator requests cemt perform [snap | dump] title('. . . . . .')

? Not the same as an AR DUMP

? If an application makes a specific dump request

? System dumps can be requested for specified transaction abend codes

CICS TS Dump Processing

Speaker Notes:

CICS Dump Datasets:

CICS maintains one or two dump datasets: DFHDMPA, DFHDMPB. Defining CICS dump datasets is described in "*CICS TS System Definition*" (SC33-1651). These dump datasets should not be confused with VSE SYSDUMP datasets. They are sequential files, and so may be managed by VSE/VSAM Space Management.

Transaction Dumps

If a transaction terminates, CICS may write a transaction dump to the dump dataset (DFHDMPA or DFHDMPB), which is currently open. Depending on the abend code and dump settings, a system dump may also be taken (see below). Transaction dumps contain only CICS control blocks and transaction storage, and are printed/formatted using DFHDU410, see "*CICS TS Operations and Utilities Guide*" (SC33-1654-02). Since these dumps contain only application-specific control areas, they are generally of limited usefulness for system problems.

System Dumps (SDUMP)

are either IDUMPS or PDUMPS. IDUMPs are written to VSE SYSDUMP dataset, and are processed using INFOANAL. They can be formatted to show CICS control blocks using DFHPD410. PDUMPS are taken (re-directed) to SYSLST if an IDUMP request fails, unless VSE/ESA option SYSDUMPC is set, see "*CICS TS Operations and Utilities Guide*" (SC33-1654-02).

These dumps can be VERY LARGE (1.5 million lines, 25,000 pages, 200Meg)

Application dump request: exec cics perform dump
(See "CICS Application Programming Reference", SC33-1658.

CICS TS allows system dumps to be requested for specified transaction abend codes.
See "CICS TS Problem Determination" under 3.2 Using dumps in problem determination
The CICS support group can also provide assistance with user exits.

CICS TS Dump Processing

<u>Speaker Notes:</u>

A **CEMT SNAP** dump is <u>not</u> the same as an **AR DUMP**. The **CEMT SDUMP** "freezes" the CICS partition, whereas the **AR DUMP** allows CICS to continue to run during the dump. This may cause incompatibilities in the dumped data. The **CEMT** snap dump is also written to VSE SYSDUMP where it can be formatted using DFHPD410, instead of tape. In addition, under CICS TS, the sdump also includes relevant sections of the VSE Supervisor and System GETVIS.

If the CICS TS partition is locked out, and does not respond to a CEMT command, an attention routine dump (AR DUMP) may be taken. However, the partition should first be taken out of the dispatch chain (suspended) to prevent the partition from continuing to run and producing a corrupted dump. Mount a scratch tape on 181, and use the following series of commands:

SUSPEND F2

DUMP F2,181

DUMP SVA,181

DUMP SUP,181

RESUME F2

File one of this dump tape (F2 partition) may be loaded into a VSE/ESA SYSDUMP library and formatted using DFHPD410.

CICS TS Dump Processing

System Dump Control:

1. Suppress or enable:
   - ? **DUMP=YES | NO** (system initialization parameter)
   - ? **CEMT SET SYSTEM DUMPING | NOSYSDUMP**
   - ? Dump domain **XDUREQ** global user exit module.

2. **CEMT SET SYSTEM DUMPING (NOSYSDUMP)**
   CEMT INQUIRE SYSTEM DUMPING

3. System Dump Code Table - Allows suppression of system dumps for specific dump codes.

   SYSdump | NoSYsdump   SHUtdown | NoSHutdown

   ```
   CEMT I SYDUMPCODE
      STATUS:    RESULTS - OVERTYPE TO MODIFY
       Syd(AP0001  )   Sys  ...    Max( 001 ) Cur(0001)
   ```

4. Dump code:

   ```
   F2 0103  DFHAP0001 DBDCCICS An abend (code 0C9/AKEA) has occurred at
            offset x'0000072E' in module CICSPGCK.
   ```

   CEMT SET SYD(AP0001) MAX(1) SY ADD

CICS TS Dump Processing

Speaker Notes:

Most of the following functions described for **CEMT** are also available via the CICS system programming interface (SPI) using "**EXEC CICS**". See "*CICS TS: System Programming Reference*" (SC33-1659-01)
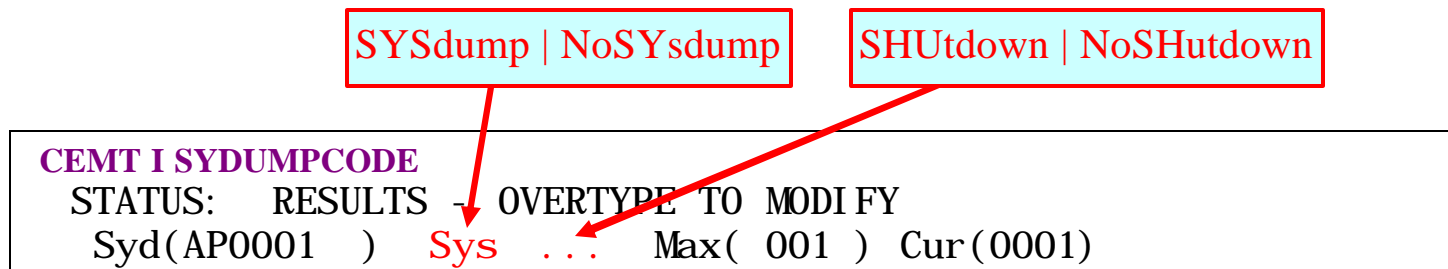
1. **System dumps** (apart from CICS kernel domain dumps) can be suppressed or enabled:
   - ? **DUMP=YES|NO** (system initialization parameter)
   - ? **CEMT SET SYSTEM DUMPING|NOSYSDUMP**
   - ? Dump domain **XDUREQ** global user exit module.

2. **Global Suppression** - Inquire whether system dumping has been suppressed globally by using
   CEMT INQUIRE SYSTEM DUMPING. Suspend system dumping using **CEMT SET SYSTEM DUMPING (NOSYSDUMP)**.

3. **System Dump Code Table** - Allows suppression of system dumps for specific dump codes.

   "**NSY**" and "**NSH**" are not displayed on the dump code line, only the actions, "**SYS**" and "**SHU**".

   A dump code is the CICS message number with the '**DFH**' prefix removed.
   For instance, '**AP0001**' is the dump code for message **DFHAP0001**:

4. **Dump code:**
   CEMT SET SYD(AP0001) MAX(1) SY ADD would add a new Dump Code to the table, and take a single system
   dump the next time message **DFHAP0001I** occurs.,,

CICS TS Dump Processing

Transaction Dump Control:

1. Suppress or enable:

   DUMP attribute of the **RDO TRANSACTION** resource definition.

2. Transaction Dump Code Table

TRAndump	NOTrandump	SYSdump	NoSYsdump	SHUtdown	NoSHutdown

```
CEMT I TRDUMPCODE
  STATUS:   RESULTS - OVERTYPE TO MODIFY
   Trd(AKCS) ...  ...  ...    Max( 001 ) Cur(0000)
   Trd(ASRA) Tra  ...  ...    Max( 001 ) Cur(0003)
   Trd(AZCT) ...  ...  ...    Max( 001 ) Cur(0000)
```
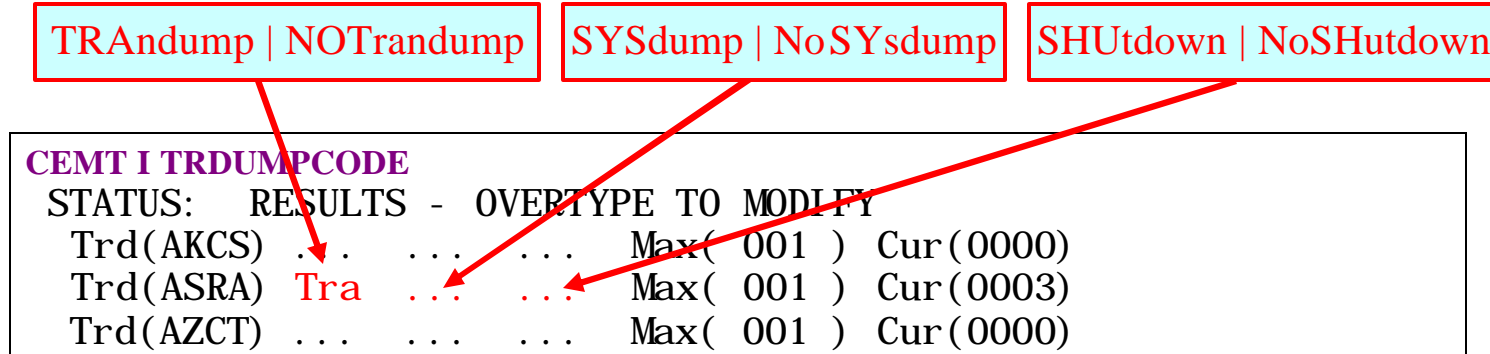
"**NOT**", "**NSY**" and "**NSH**" are not displayed on the dump code line, only "**TRA**", "**SYS**" and "**SHU**".

CICS TS Transaction Abends (ASRA / AKEA)

To Analyze a Transaction Dump:

1. Switch (or close) current dump dataset and print the transaction dump using DFHDU410.

2. **Abend details**: Printed at the front of the dump. There are two sets of PSW / Registers. The first set is that of the abend itself. The second is for the last EXEC CICS call from the transaction.

3. **Task Control Area (TCA):** This will also show failing transaction and program (phase).

4. **"*EXC*" entry in trace table**: Note what the transaction was doing just prior to abend.

5. **Compare TACB:** Follows the trace table. Compare with the PSW and registers printed at front of dump. If there are two TACBs, always use the second one.

6. **Locate failing code:** The PSW shows the location of the failure, and, the message **DFHAP0001** or **DFHSR0001** lists the displacement into the failing program (phase) or module. Scan for program name and "**PROGRAM STORAGE**".

7. **Identify failing load module and displacement:** Use a Linkedit listing for the failing program.

8. **Identify the failing source code:** Use a current compile listing.

CICS TS Transaction Abends (ASRA / AKEA)

The following sequence of events takes place when a transaction abend occurs:

1. Program Checks or VSE abends are detected by STXIT exits set by the CICS TS main task (Kernel Domain). The AP (Application) Domain is set ready-to-run.

2. AP Domain issues initial Program Check Recovery call to LE/VSE (if applicable)

3. AP Domain calls ME (Message) domain to issue message to SYSLOG

4. AP Domain calls DU (Dump) domain to save **System Dump** (if applicable)

5. AP Domain issues Rununit End Invocation call to LE/VSE (if applicable). **LE/VSE trace** output is written to DCT destination CESE (normally SYSLST).

6. AP Domain issues LINK-TO-USER-EXIT-PROGRAM IESOPIA. Saves **OLPD** data

7. AP Domain calls DU domain to save **Transaction Dump** (if applicable)

8. AP Domain releases transaction data areas and return to Kernel Domain.

CICS TS Transaction Abends (ASRA / AKEA)

<u>Speaker Notes</u>:

Four different methods are used to capture transaction abend data:

1. **<u>System (full partition) dump</u>** is taken first. Can be formatted using DFHPD410. Dump is large and slow, but offers the advantage that all data present in CICS TS and VSE system areas at time of abend is saved. DFHPD410 can be run multiple times, extracting different kinds of data, or the entire dump can be printed using INFOANA. Transaction Abend info can be found in KEERH.

2. **<u>LE/VSE Trace</u>** is written to destination CESE (defaults to SYSLST). Only contains LE/VSE control blocks. Traceback trace is useful to see sequence of LE/VSE calls leading up to the abend.

3. **<u>On-line Problem Determination (OLPD)</u>** is a very small snap shot of critical transaction abend information. It requires the Interactive Interface. The advantage is virtually no system overhead, and error data is presented in a very user-friendly, informative fashion. It is meant as a supplement, not a replacement for other error capture methods (transaction or system dump).

4. **<u>Transaction dumps</u>** are a small snapshot of AP, SM (Storage Management) and TR (Trace) control blocks. As such, the data is more oriented towards transaction rather than system diagnostics. The disadvantage is that it is a one-time shot; information not available in printout cannot be recovered. Trace data can be printed in "Full" or "Abbreviated" format.

CICS TS Transaction Abends (ASRA / AKEA)

Console Log:

```
F2 0103 DFHAP0001 DBDCCICS An abend (code 0C9/AKEA) has occurred at
offset x'0000072E' in module CICSPGCK.
F2 0103 DFHME0116 DBDCCICS
        (Module:DFHMEME) CICS symptom string for message DFHAP0001 is
        PIDS/564805400 LVLS/411 MS/DFHAP0001 RIDS/DFHSRP PTFS/VSE411
AB/S00C9 AB/UAKEA RIDS/CICSPGCK ADRS/0000072E.
F2 0103 DFHDU0201 DBDCCICS ABOUT TO TAKE SDUMP.  DUMPCODE: AP0001  ,
        DUMPID: 30/0001
F2 0103 0S24I AN SDUMP OR SDUMPX MACRO WAS ISSUED
F2 0103 0S29I DUMP STARTED
F2 0103 0S30I DUMP STARTED.  MEMBER=DF200010. DUMP IN
F2 0103 1I51I DUMP COMPLETE
F2 0103 DFHDU0202 DBDCCICS SDUMPX COMPLETE.  SDUMPX
```

AKEA is KE Domain transaction error code.

0C9 indicates a Fixed Point Divide Except.

ASRA is the AP Domain error code.

CICS TS Transaction Abends (ASRA / AKEA)

1. Print the transaction dump using DFHDU410:

```
CEMT SET DUMPDS SWITCH
STATUS:   RESULTS - OVERTYPE TO MODIFY
 Dum Cur(A) Ope Aut
```

> At time of abend, dump dataset B was open. It is now closed, and A is open.

```
// JOB PRINT DUMP DATASET B
// LIBDEF *,SEARCH=(PRD1.BASE)
// DLBL DFHDUMP,'CICS.DUMPB',0,VSAM,CAT=VSESPUC,DISP=(OLD,KEEP
// ASSGN  SYS009,SYSLST      (INDEX OUTPUT DESTINATION)
// EXEC DFHDU410,SIZE=2M,PARM='TRANSLATE=LC,SINGLE,NOFULL'
   SELECT TYPE=SCAN
   END
/*
/&
```

```
INDEX OF DUMPS ON DATASET CICS.DUMPA

   DUMPID      APPLID       DATE      TIME     TRANID    DUMP CODE
   30/0006     DBDCCICS     03182001  20:27    PGCK      ASRA
```

> **AKEA** is KE Domain transaction error code.
>
> **0C9** indicates a Fixed Point Divide Except.
>
> **ASRA** is the AP Domain error code.

CICS TS Transaction Abends (ASRA / AKEA)

The preceding job produced a list of all dumps in the selected dump dataset. They can then be selected based on Dump Code (**ASRA**), Transaction Id (**PGCK**), Dump Id (**30/0006**), or Time (**20:27**). Dump Id and Time may be specified as a range. We selected our dump based on Dump Code. Trace formatting is controlled via the execution parm ("**NOABBREV**" or "**NOFULL**")

```
// JOB PRINT DUMP DATASET B
// LIBDEF *,SEARCH=(PRD1.BASE)
// DLBL DFHDUMP,'CICS.DUMPB',0,VSAM,CAT=VSESPUC,DISP=(OLD,KEEP
// ASSGN  SYS009,SYSLST        (INDEX OUTPUT DESTINATION)
// EXEC DFHDU410,SIZE=2M,PARM='TRANSLATE=LC,SINGLE,NOFULL'
    SELECT TYPE=OR
    DUMPCODE=(ASRA)
    END
/*
/&
```

See "*CICS TS Operations and Utilities Guide*" (SC33-1654-02)

CICS TS Transaction Abends (ASRA / AKEA)

2. Abend details:

```
SYMPTOMS= AB/UASRA PIDS/564805400 FLDS/DFHABAB RIDS/CICSPGCK

CICS LEVEL = 0411
```

PSW & REGISTERS AT TIME OF INTERRUPT

```
PSW           07BD2000  8241DEFE  00040009  00000000

REGS 0- 7     0220A6BC  0220A730  00000000  000001F4        00000001  00000000  00614BBC  00000000

REGS 8- 15    006C10D0  0220A7C8  0241D91C  0241DBE0        0241D8E4  0220A578  8241DEEA  00000000
```

REGISTERS AT LAST EXEC COMMAND

```
REGS 0- 7     00000000  0000006F  02209258  02374C7C        0220A578  00000000  02209A3C  0220D808

REGS 8- 15    0220CBA8  00000004  02209DD4  005F2750        022078B0  02209B98  00000001  02366EF0
```

```
Transaction environment for  transaction_number(0000149)
 transaction_id(PGCK)          orig_transaction_id(PGCK)
 initial_program(CICSPGCK)  current_program(CICSPGCK)
 facility_type(TERMINAL)     facility_name(A001)              Start_code(T0)
 netname(D0830001)           profile_name(DFHCICST)
 userid(SYSA      )          cmdsec(NO)                       ressec(NO)
```

What kind of failure?

Which transaction failed?

Which transaction program?

CICS/TS Transaction Abends (ASRA / AKEA)

3. Task Control Area (TCA):

TASK CONTROL AREA (at 005BB080)

```
00000000 005BB180 00140001 021EA420 00589648 021623B0 005A25FC 00000000 00000060 *. $........u...o........-*
00000020 00000000 0000149C 00000000 00000000 00000000 81C61614 021F2000 0000012C *....................aF.........*
         ?
         ?
         ?
00000140 02209B98 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *...q............................*
00000160 00000000 00000000 00C00000 00000000 00000000 00000000 80000000 C1E2D9C1 *...........................ASRA*
00000180 00000000 005BB4E4 00000000 00000000 005BB388 022078B0 006C1128 006C13E8 *.....$.U........$.h.........Y*
000001A0 00000000 80589080 00000000 00000000 D7C7C3D2 021EA420 00000000 00000000 *...................PGCK..u.......*
000001C0 00000000 D7C7C3D2 00000000 00000000 00000000 C1E2D9C1 00000000 021F9008 *....PGCK............ASRA......*
000001E0 00000000 00000000 00000000 00000000 B58DE2EE 70CEB042 00000000 00000000 *.................S..........*
00000200 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *................................*
00000220 00000000 00000000 00000000 00000000 80589400 00000000 00000000 005BB56C *..............m.........$..*
00000240 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *................................*
00000260 00000000 00000000 170EE5E3 C1D4F14B C4C2C4C3 C3C9C3E2 8DE2EE70 CEB00001 *..........VTAM1.DBDCCICS.S.....*
00000280 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *................................*
000002A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *................................*
000002C0 00000000 00000000 018A0023 006C1008 00000000 00000000 00000000 00000000 *................................*
000002E0 00000000 00000000 C3C9C3E2 D7C7C3D2 F0C3F961 C1D2C5C1 0000072E 00030781 *......CICSPGCK0C9/AKEA....a*
```

Which transaction failed?

What kind of failure?

Which transaction program?

CICS TS Transaction Abends (ASRA / AKEA)

4. Locate "*EXC*" entry in trace table:

```
== TRACE ENTRIES FOR DUMPING TRANSACTION ==

00149 1 US 0402 USXM  EXIT  INIT_TRANSACTION_USER/OK 01C4319F ,  01C45050, 0                                      =000001=
00149 1 DS 0002 DSAT  ENTRY SET_PRIORITY            1                                                             =000002=
00149 1 DS 0003 DSAT  EXIT  SET_PRIORITY/OK                                                                       =000003=
00149 1 AP 05A0 APRM  ENTRY TRANSACTION_INITIALIZATION                                                            =000004=
00149 1 AP 05A1 APRM  EXIT  TRANSACTION_INITIALIZATION/OK                                                         =000005=
     ?
     ?
     ?
00149 1 LD 0002 LDLD  EXIT  ACQUIRE_PROGRAM/OK      8241D7F0, 0241D7D0, 1C3A, 0, REUSABLE, ESDSA, OLD_COPY        =000020=
     ?
     ?
     ?
00149 1 AP 00E1 EIP   ENTRY REWRITE                                   0004, 0220A578 .. v., 0B000606 ....         =000093=
00149 1 AP 04E0 FCFR  ENTRY REWRITE              0218FA80 ,   0000000C, 00000000, 0220A940, C8, NO, NO            =000094=
00149 1 DS 0004 DSSR  ENTRY WAIT_OLDW             KSDS, FCIOWAIT, 0057E841, NO, IO                                =000095=
     ?
     ?
     ?
00149 1 AP 00E1 EIP   EXIT  REWRITE              OK                   00F4, 00000000 ...., 00000606 ....          =000100=
00149 1 AP 1942 APLI  *EXC* Program Check        START_PROGRAM,CICSPGCK, CEDF, FULLAPI, EXEC, NO, 021F6030, 0000000 =000101=
00149 1 AP 1948 APLI  EVENT CALL-TO-LE/VSE        Program_Check_Recovery CICSPGCK                                 =000102=
00149 1 AP 1949 APLI  EVENT RETURN-FROM-LE/VSE    Program_Check_Recovery 00000004 CICSPGCK                        =000103=
00149 1 AP 0790 SRP   *EXC* PROGRAM_CHECK                                                                         =000104=
```

CICS TS Transaction Abends (ASRA / AKEA)

5. Compare the TACB:

Compare this PSW and registers with those listed at front of dump

```
== TRACE TABLE END ==

STORAGE MANAGER TRANSACTION AREA (at 02161E18)
00000000  01BF718C 035DD880 836416D0 02161860 005BB34C 036403B8 005BB390 036403B0  *.....)Q.c.......-.$.<.....$......*
00000020  00000000 835FB080 0000050C 02161EC0 02161F08                             *....c...............             *


TRANSACTION STORAGE-CICS31          ADDRESS 021F9000 TO 021F912F     LENGTH 00000130
00000000  C3F0F0F0 F0F1F4F9 01206EE3 C1C3C240 00000000 00001846 C4C6C8E3 C1C3C240  *C0000149..>TACB ........DFHTACB *
00000020  00000000 C1E2D9C1 C3C9C3E2 D7C7C3D2 00000000 00000000 00000000 00000000  *...ASRACICSPGCK..............*
00000040  00000000 00000000 00000000 0000B000 00000000 0000072E D9C5C7E2 50D7E2E6  *..........................REGS.PSW*
00000060  0220A6BC 0220A730 00000000 000001F4 00000001 00000000 00614BBC 00000000  *..w..x.......4........./.....*
00000080  006C10D0 0220A7C8 0241D91C 0241DEE0 0241D8E4 0220A578 8241DEEA 00000000  *.....xH..R.......QU..v.b......*
000000A0  07BD2000 8241DEFE 00040009 00000000 4931308E 88000000 4E000000 045D8AB5  *.....b...............h...+....)..*
000000C0  4E000000 000254FB 40404040 40404040 00000000 00000000 00000000 00000000  *+.......             ............*
000000E0  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  *..............................*
```

Failing PSW

Registers (0-15)

Abend Code

Transaction Program

CICS TS Transaction Abends (ASRA / AKEA)

6. Locate failing code:

CICSPGCK

PROGRAM STORAGE   ADDRESS 0241D7D0 TO 0241F409   LENGTH 00001C3A

```
0241D7D0 -20 C4C6C8E8 C9F4F1F1 58F00014 58F0F0B4 58F0F00C 58FF000C 07FF0000 00000000 *DFHYI411.0...00...00.........
0241D7F0   0 47F0F028 00C3C5C5 00000000 00000014 47F0F001 4ACEAC00 0241D89C 00000000 *.00...CEE............
0241D810  20 00000000 00000000 90ECD00C 4110F038 98EFF04C 07FF0000 0241D7F0 0241D8E4 *.............PO
0241D830  40 0241E2A8 0241D850 0241D7F0 0241DC6A 0241E930 0241D8B0 00000000 00000007 *..Sy..Q...PO
0241D850  60 C3D6C2E3 C5E2E340 F2F0F0F1 F0F3F1F7 F1F8F5F8 F0F6F0F1 F0F1F0F1 00000000 *COBTEST 20010317185806010101.
0241D870  80 0000076C 60A87C4C 00000000 50800209 00000000 09000000 00800000 00000067 *....-y.<.......
0241D930 140 00000000 0050000A 00                               84 409596A3 40998583 8589A585 *.............HShould not rece
0241D950 160 40A38889 A2408599 999                               983 40C59999 96995D40 7E7E6ED5 *  this error (Illogic Error)
0241D970 180 81948540 9596A340 899                               340 E3818293 85404040 40404040 *ame not in Internet Table
0241DB60 370 96A49584 8199A840 A5899693 81A38584 E2404040 40404040 40404040 40E2E3E2 *oundary violated S
0241DB70 380 D6E4E340 40C3D6C2 E3C5E2E3 00000000 00000134 00000001 00000138 00000003 *OUT COBTEST...........
0241DB90 3A0 00000000 00000000 00000000 80000000 0409FF34 001C003C 0000005F 054A8132 *.......................<....
0241DBD0 3E0 00300259 02C00007 08000030 02594040 5820D130 D2032000 A014D203 2008A014 *...        .K..
0241DBF0 400 D2032010 A014D207 2018A251 D2032020 A014920E 2028920F 2030D203 90C8C008 *K...        ..K.
0241DEE0 6F0 4780B696 9180D0C4 4720B696 4110D12C 4100D144 58C0D080 05EF58C0 D0E850F0 *...        ....
0241DEF0 700 D0785820 91188E20 002 5D20 91205 030 911058B0 C03447F0 B696D215 9128A1A4 *...        oK.j
```

CICS TS Stub:
Calls DFHEIP to initialize application control blks

LE/VSE Initialization Code

COBOL program name (Shows start of program)

Which machine instruction failed?
PSW points past failing instruction

CICS TS Transaction Abends (ASRA / AKEA)

Why did it fail?

```
TRANSACTION STORAGE-USER31       ADDRESS 02203AB0 TO 0220C75F     LENGTH 00008CB0

00000000 E4F0F0F0 F0F1F4F9 4C4CD9E4 E6D76E6E 00008C78 00000000 00008C78 00008C78 *U0000149<<RUWP>>........* 02203AB0
00000020 00008C78 02203AE0 00010000 00000000 005A45671 125C005C 0000000C 00000000 *........................* 02203AD0
         ?
         ?
         ?
00006E00 99844B40 404040D7 9985A2A2 408595A3 859940A3 96408396 95A38695 A4854B40 *rd.    Press enter to co* 0220A8B0
00006E20 60F44040 40000000 00000000 00000000 000001F4 00000000 00000000 00000000 *-4    .........*...4....* 0220A8D0
00006E40 D2C5E8F0 F0F0F0F0 F1F0F1F1 F1F1F1F1 40404040 40404040 40404040 40404040 *KEY0000010111111        * 0220A8F0
```

Failing instruction is '**5D209120**' (Divide Reg2 by Reg9 +x'120'). From TACB, Reg9 = '**0220A7C8**' .
Reg9 + x'120' = '**220A8E8**'. The Transaction Dump printed this as transaction storage. The failing
instruction was a Divide, for which the Divisor is at '**022A8E8**', and contains zeros.

CICS TS Transaction Abends (ASRA / AKEA)

Sometimes we need to locate another phase involved in the abend, but which may not have been included in the Transaction Dump printout.

- - - - - **MODULE INDEX** - - - - -

LOAD PT.	NAME	ENTRY PT	LENGTH		LOAD PT.	NAME	ENTRY PT	LENGTH
02056E60	DFHAPATT	02056E80	000002D2		02673750	DFHEDAD	02673770	0001D9B2
02057140	DFHZCSTP	02057160	0000027A		02692000	CEEMUEN3	02692000	00007C82
020573C0	DFHZCGRP	020573E0	00000412		02699C90	IGZCMGUE	02699C90	00004620
02058000	DFHPGRP	02058000	000032BA		035FB000	DFHSIP31	035FD090	000C36E0
?								
?								
?								
02402000	IESCONSL	02402000	0001B7C8					
0241D7D0	**CICSPGCK**	**0241D7F0**	**00001C3A**					
02500000	CEEEV003	025A3370	000EA7C8					
025EB000	DFHWBTC	025EB020	00013D30					

CICSPGCK is loaded at '**0241D7D0**'.   The failing PSW was '**07BD2000 8241DEFE**'. Address portion is second word of PSW (x'80' indicates AMODE(31), so can be ignored).
'**241DEFE**' – '**241D7D0**' = '**72E**' displacement into the phase, which was the same value as was listed in console message DFHAP0001.

CICS TS Transaction Abends (ASRA / AKEA)

7. Identify the failing load module and displacement:

```
--------------------------------------------------------------
   PHASE CICSPGCK, *
--------------------------------------------------------------

   INCLUDE DFHELII
              ** MODULE DFHELII  2000-10-23 14.09      INCLUDED FROM PRD1    . BASE
              ** MODULE CEEBETBL 2000-10-23 14.01      AUTOLNKD FROM PRD2    . SCEEBASE
              ** MODULE CEEBINT  2000-10-23 14.01      AUTOLNKD FROM PRD2    . SCEEBASE
        ?
        ?
        ?
```

03/19/2001	PHASE	XFR-AD	LOCORE	HICORE	CSECT/ ENTRY	LOADED AT	RELOC. FACTOR	PARTIT. OFFSET	PHASE OFFSET
	CICSPGCK	500098	500078	501CB1					
					DFHELII	500078	500078	000000	000000
					*DFHEPIN	500078			
					*DFHEXEC	500080			
					+DFHEI1	500080			
					*DLZEI04	500080			
					COBTEST	**500098**	**500098**	**000020**	**000020**
					CEEBETBL	500D70	500D70	000CF8	000CF8
					CEEBINT	500D90	500D90	000D18	000D18

> What load module failed?
>
> Displacement x'72E' is x'70E' into COBTEST.

CICS TS Transaction Abends (ASRA / AKEA)

8. Identify the failing source code:

For this, you will need a COBOL compile listing with CBL options "LIST,XREF" specified.

```
// EXEC IGYCRCTL, SIZE=IGYCRCTL

PROCESS(CBL) STATEMENTS:    CBL LIB, APOST, NOADV, NODYNAM, RENT, BUF(4096), LIST, XREF

     000177                    *EXEC CICS REWRITE FILE('KSDS') FROM(Console-Inarea)
     000178                    *            END-EXEC.
     000179                        MOVE 'ÊÊ\____ _00074    ' TO DFHEIVO
     000180                        MOVE 'KSDS' TO DFHC0080
     000181                        MOVE LENGTH OF Console-Inarea TO DFHB0020
     000182                      CALL 'DFHEI1' USING DFHEIVO  DFHC0080 Console-Inarea
     000183                                           DFHB0020.

     000186                        COMPUTE Result = Dividend / Divisor.

     000188                        GO TO EOJ.


     000000                    COBTEST   DS    0H
                                         USING *, 15
     000000   47F0 F028                  B     40(, 15)           BYPASS CONSTANTS.
     000004   00                         DC    AL1(0)             ZERO NAME LENGTH FOR
     000005   C3C5C5    [LE/VSE Stub]    DC    CL3' CEE'          CEE EYE CATCHER
     000008   00000000                   DC    F'0'               STACK FRAME SIZE
     00000C   00000014                   DC    A(@PPA1-COBTEST)   OFFSET TO PPA1 FROM Y
     000010   47F0 F001                  B     1(, 15)            RESERVED
     000014              @PPA1   DS    0H                         PPA1 STARTS HERE
```

CICS TS Transaction Abends (ASRA / AKEA)

```
000060                          @EPNAM   DS    OH                    ENTRY POINT NAME
000060   C3D6C2E3C5E2E340        DC    C' COBTEST '          PROGRAM NAME
000068   F2F0F0F1                DC    CL4'2001'     @TIMEVRS: YEAR OF COMPILATIO
000066   F0F3F1F9                DC    CL4'0319'             MONTH/DAY OF COMPILATI
0000                             DC    CL4'1612'             HOURS/MINUTES OF COMPI
000074   F4F5                    DC    CL2'45'               SECONDS FOR COMPILATIO
000076   F0F1F0F1F0F1            DC    CL6'010101'           VERSION/RELEASE/MOD LE

0003F0                    GN=2   EQU   *
0003F0   5820  D130              L     2,304(0,13)           BL=1
0003F4   D203 2000 A014          MVC   0(4,2),20(10)         SORT-CORE-SIZE
0003FA   D203 2008 A014          MVC   8(4,2),20(10)         SORT-FILE-SIZE

0006F8   05EF                    BALR  14,15
0006FA   58C0  D0E8              L     12,232(0,13)          TGTFIXD+232
0006FE   50F0  D078              ST    1                     TFIXD+120
000186   COMPUTE
000702   5820  9118              L     2,280(0,9)            DIVIDEND
000706   8E20  0020              SRDA  2,32(0)
00070A   5D20  9120              D     2,288(0,9)            DIVISOR
00070E   5030  9110              ST    3,272(0,9)            RESULT
000188   GO
000712   58B0  C034              L     11,52(0,12)           PBL=1
000716   47F0  B696              BC    15,1686(0,11)         EOJ
```

COBOL program name

Begin executable code

What source statement failed?

Displacement x'70E' points just past divide instruction. COBOL source statement is #0186.

CICS TS Transaction Abends (ASRA / AKEA)

<u>Summary:</u>

1. Message DFHAP0001 identified an ASRA (program check) abend in CICSPGCK +x'072E'.

2. Transaction dump identified the current transaction as PGCK and transaction number as 0149.

3. From the trace table, prior to the failure, the program had just returned from File I/O, writing a record to VSAM file KSDS.

4. TACB matched the data in the front of the dump. Abend occurred at location x'**00D7E2E6**'. Reg9 is later found to be a pointer to program static storage at location x'**0241D91C**'.

5. From program storage, the failing instruction is identified as '**5D209120**' (Divide).

6. The program static storage addressed by register 9 is located in 31-bit transaction storage, and the divisor is determined to be zero, thus causing the program check.

7. Using a linkedit listing, and cobol compile listing, the failing source statement is identified.

CICS TS On-line Problem Determination (OLPD)

Immediately upon experiencing a program check the operator is presented with following screen:

```
IESPRBDC1      ONLINE PROBLEM DETERMINATION DATA COLLECTION

               The transaction you were executing ended abnormally.

               Information about this incident has been
               stored for later problem determination.

               Specifics about this incident are:

               Transaction ID: PGCK              Abend Code: ASRA
               Task ID:           149            Abend Date: 3/18
               Program ID:        CICSPGCK        Abend Time: 20:27:19

               Press ENTER to return to your application.

   ===> PRESS ENTER TO CONTINUE.
```

What kind of failure?

Which program (phase) failed?   Which transaction failed?

Pressing enter returns to CICS screen:

```
DFHAC2206 20:28:01 DBDCCICS Transaction PGCK has failed with
abend ASRA.   Resource backout was successful.
```

CICS TS On-line Problem Determination (OLPD)

Return to to IUI, and select '4.1 Online Problem Determination':

```
IESPRBID1           ONLINE PROBLEM DETERMINATION INCIDENT REPORT

P. NO.      ENTER PARAGRAPH NUMBER TO GET ADDITIONAL INFORMATION

  1         Transaction 'PGCK' encountered a 'ASRA' abend executing
            at 'A001'.  This occurred at offset X'00070E' in program
            'CICSPGCK'.    Program 'CICSPGCK' starts at X'8241D7F0'.
            This incident occurred for task ID '00149'
            at 20:27:19 on  3/18.

  2         The source language of the abending program is not
            defined correctly in the Processing Program Table,
            DFHPPT.  Or the program has been link-edited
            incorrectly.

  3         This is a Fixed-Point Divide Exception program interrupt.

PF1=HELP                    3=END          4=RETURN                6=PRINT
            8=FORWARD                       10=USER SCREEN
```

What kind of failure?

Which transaction failed?

Which program (phase) failed?

Why did it fail?

CICS TS On-line Problem Determination (OLPD)

OLPD shows failing PSW and registers, excerpts from the dump around the abend location (but not the entire phase), and other problem related data (for instance, with a decimal divide exception, it shows the content of the divisor).

```
1          Program Check PSW ==> 07BD2000 8241DEFE

    Registers in effect when the program check occurred:

    REGS    0 -   3   0220A6BC 0220A730   00000000 000001F4
    REGS    4 -   7   00000001 00000000   00614BBC 00000000
    REGS    8 -  11   006C10D0 0220A7C8   0241D91C 0241DBE0
    REGS   12 -  15   0241D8E4 0220A578   8241DEEA 00000000
```

```
1      The area of storage in the vicinity of the interrupt is
       shown below.  This is at or near offset X'0000070A'
       within the application program.  If the offset number
       shows question marks (?), the storage is not within the
       application program.

       The failing instruction is at or near X'0241DEFA'.

    Address    |<-------- S T O R A G E -------->|    Graphics
       0241DED0   5030D1C4 9680D1C4 4110D1B8 58F0A000   &. JDo. JD.. J.. O..
       0241DEE0   4100D144 58C0D080 05EF58C0 D0E850F0   .. J.......... Y&0
       0241DEF0   D0785820 91188E20 0020 5D20 9120 5030   ....j.....).j.&.
       0241DF00   911058B0 C03447F0 B696D215 9128A1A4   j......0.oK.j..u
```

Which machine instruction failed?

Problem Determination under CICS TS   **Page 31**

CICS TS On-line Problem Determination (OLPD)

OLPD shows failing PSW and registers, excerpts from the dump around the abend location (but not the entire phase), and other problem related data (for instance, with a decimal divide exception, it shows the content of the divisor).

```
1          Program Check PSW ==> 07BD2000 8241DEFE

    Registers in effect when the program check occurred:

    REGS    0 -   3   0220A6BC 0220A730   00000000 000001F4
    REGS    4 -   7   00000001 00000000   00614BBC 00000000
    REGS    8 -  11   006C10D0 0220A7C8   0241D91C 0241DBE0
    REGS   12 -  15   0241D8E4 0220A578   8241DEEA 00000000
```

```
1      The area of storage in the vicinity of the interrupt is
       shown below.  This is at or near offset X'0000070A'
       within the application program.  If the offset number
       shows question marks (?), the storage is not within the
       application program.

       The failing instruction is at or near X'0241DEFA'.

    Address    |<-------- S T O R A G E -------->|    Graphics
       0241DED0   5030D1C4 9680D1C4 4110D1B8 58F0A000   &. JDo. JD.. J.. O..
       0241DEE0   4100D144 58C0D080 05EF58C0 D0E850F0   .. J.......... Y&0
       0241DEF0   D0785820 91188E20 0020 5D20 9120 5030   ....j.....).j.&.
       0241DF00   911058B0 C03447F0 B696D215 9128A1A4   j......0.oK.j..u
```

Which machine instruction failed?

CICS TS On-line Problem Determination (OLPD)

```
1       A Fixed-Point Divide Exception can occur during
        fixed-point division for either of two reasons.

        First check whether the divisor (the second operand)
        is zero.   This is an invalid condition.

        The other reason for a Fixed-Point Divide Exception
        is that the quotient cannot be expressed as a 32-bit
        signed binary integer.
```

```
1       The storage area around the second operand of the failing
        instruction is shown below.

        The second operand address is X'0220A8E8'.

        Address    |<--------- S T O R A G E --------->|     Graphics
        0220A8D0    60F44040 40000000 00000000 00000000    -4    ............
        0220A8E0    000001F4 00000000 00000000 00000000    ...4............
        0220A8F0    D2C5E8F0 F0F0F0F0 F1F0F1F1 F1F1F1F1    KEY0000010111111
        0220A900    E2C3C8D9 D6E3E340 404040D9 C5C3D6D9    SCHROTT    RECOR
```

Why did it fail?

CICS TS System Dump Processing (DFHPD410)

Diagnose AKEA / ASRA Transaction Abends from System Dump:

1. Format dump: using **CALL DFHPD410 DATA DEF=0,KE=3,AP=3,TR=1**

2. Locate failing transaction: flagged with "**ERROR = *YES***"in KE Domain Task Summary and note the **KE NUM** (Kernel Number) and TCA Address. Then use **TRAN#** to find corresponding entry in AP Domain Transaction Summary and note the Terminal id (**FACILITY TYPE** = "**TC**", **FACILITY ID** = terminal id.). **EIB** is also interesting, as it contains information on the last function requested by this transaction.

3. KE Domain Error Table Summary: locate entry matching task Kernel Number located in step 2.

4. Kernel Error Data (KERRD): Match sequence number of entry located in step 3.

5. Locate failing instruction: from PSW in KERRD and program dump in PSWDATA. Continue to isolate error to source statement, following step 6 on page 22.

6. Register Data: Depending on type of error, may either be found directly following the KERRD under REGDATA, or in USER31 / USER24 storage.

7. "***EXC***" entry in trace table: Note what the transaction was doing just prior to abend. If trace data table is long and complicated, you may print only the trace entries pertaining to this task (task id from the AP Domain Transaction summary) using:
   CALL DFHPD410 DATA DEF=0,TR=1,TRS=<TASKID=(0269)>.

CICS TS System Dump Processing (DFHPD410)

1. Format Dump:

```
// JOB PRINT DUMP FROM SYSDUMP LIBRARY
// LIBDEF *,SEARCH=(PRD1.BASE)
// EXEC INFOANA,SIZE=300K
   DUMP NAME SYSDUMP.F2.DF200010
   SELECT DUMP SYMPTOMS
     PRINT DATA
     RETURN
   SELECT DUMP VIEWING
     CALL DFHPD410 DATA DEF=0, KE=3, AP=3, TR=1
     RETURN
   SELECT END
/*
/&
```

CICS TS System Dump Processing (DFHPD410)

DFHPD410 formats all control blocks required for problem determination, so the output can be quite large and complex. The control blocks are divided into **DOMAINS**, or discrete CICS functions. It is important to limit the amount of output by carefully selecting the domains (and level) to be formatted.

DEF=0   Skip all domains not explicitly included

AP={0|1|2|3} Application Domain

DS={0|1|2|3} Dispatcher Domain

FCP={0|2}   File Control Domain

KE={0|1|2|3} Kernel Domain

LD={0|1|2|3} (program) Loader Domain

PCT={0|2}   Program Control Table

PG={0|1|2|3} Program Manager Domain

IND={0|1|2|3} Index of formatted control blocks

SM={0|1|2|3}   Storage Manager Domain

TCP={0|1|2|3} Terminal Control Domain

TR={0|1|2|3}   Trace Domain

TRS={<PARMS>}   Select trace entries to be formatted

TRS=<ENTRY_NUM=(NN)> Select one trace entry

XM={0|1|2|3}   Transaction manager

US={0|1}   User domain

CICS TS System Dump Processing (DFHPD410)

Interactive Interface to CICS TS Dump Analysis:

Select 4.3:

```
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.BG.DBG00002       NONE    X    03/14/01 18:13:13
   _9_     SYSDUMP.F2.DF200004       NONE    X    03/13/01 15:14:14
   _

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

CICS TS System Dump Processing (DFHPD410)

In coexistence mode (if CICS/VSE is also installed), a second panel is presented to allow the specification of which CICS Dump Formatting Tool to be used: DFHPD410 (1) or DFHDAP (2):

```
PRB$IDHA                        SPECIFY CICS VERSION

 Enter the required data and press ENTER.

        Dump-Name:  SYSDUMP. F3. DF300008

You have a coexistence system with CICS 2.3 and CICS/TS installed.

Please specify the CICS version with which the selected dump was produced.

CICS VERSION.................  1       Enter 1 if the dump was produced by
                                      CICS/TS, Enter  2 if the dump was
                                      produced by CICS/VSE.




            PF2=REDISPLAY   3=END
```

CICS TS System Dump Processing (DFHPD410)

```
 PRB$IDH9                ANALYZE CICS DUMP: SPECIFY DUMP LEVEL

  Enter the required data and press ENTER.

        Dump-Name:  SYSDUMP. F2. DF200004

 Enter the dump level for the following CICS component identifiers.

 Enter 0, 1, 2 or 3

 DS...........................  3          Dispatcher domain

 KE...........................  3          CICS kernel

 LD...........................  3          Loader domain

 TR...........................  3          Trace domain

 OTHER DUMP OPTIONS...........  2          Enter 1 to activate any other dump
                                           option, otherwise enter 2.
  PF1=HELP        2=REDISPLAY   3=END
```

CICS TS System Dump Processing (DFHPD410)

2. Locate failing transaction:

CALL DFHPD410 DATA DEF=0, KE=3, AP=3, TR=1

```
===KE: Kernel Domain KE_TASK Summary

KE NUM KE TASK   STATUS        TCA ADDR  TRAN # TRANSID DS TASK   KE KTCB    ERROR

0001    035F3880 KTCB Step     00000000                 00000000 035D70B0
0002    035F3500 KTCB QR       00000000                 03505000 035D9020
0003    035F3180 KTCB RO       00000000                 03503000 035D8068
        ?
        ?
        ?
001E    02152B00 Unused
001F    0215F080 ***Running*** 005BB080 00149  PGCK      01BE8580 035D9020 *YES*
0020    0215F400 Unused
```

Use KE_NUM to locate entry in Domain Error table

TCA Address

```
===AP: AP DOMAIN TRANSACTION SUMMARY
```

Tran No	Tran Id	Orig Tran	TCA Addr	TWA Addr	EIB Addr	SEIB Addr	EIS Addr	EIUS Addr	Facility Type	Facility Id...
TCP	CSTP	CSTP	01C74680	0210A438	0210A0D0	01C74A8C	01C74988	0210A008		
00006	CSSY	CSSY	00596080	0053A000	0058E0D0	0059648C	00596388	0058E008		
00007	CSSY	CSSY	00596680	0053A000	0059E0D0	00596A8C	00596988	0059E008		
00020	CSSY	CSSY	005BB680	0053A000	005A80D0	005BBA8C	005BB988	005A8008		
00021	CSSY	CSSY	00597680	0053A000	005A60D0	00597A8C	00597988	005A6008		
00022	CSNE	CSNE	01C75080	0053A000	021190D0	01C7548C	01C75388	02119008		
00023	CXPB	CXPB	01C76680	0053A000	021830D0	01C76A8C	01C76988	02183008		
00025	LFSO	LFSO	00595080	006C0438	006C00D0	0059548C	00595388	006C0008		
00149	PGCK	PGCK	005BB080	0053A000	006C10D0	005BB48C	005BB388	006C1008	TC	A001

CICS TS System Dump Processing (DFHPD410)

3. KE Domain Error Table Summary

```
==KE: KE Domain Error Table Summary

ERR NUM     ERR TIME    KE NUM   ERROR TYPE              ERR CODE    MODULE      OFFSET

00000001    20:11:24    0022     PROGRAM_CHECK           0C9/AKEA    DFHYI411    0000072E
00000002    20:11:45    0022     TRAN_ABEND_PERCOLATE    ---/ASRA    DFHSR1      00000380
00000003    20:20:39    0022     PROGRAM_CHECK           0C9/AKEA    DFHYI411    0000072E
00000004    20:20:39    0022     TRAN_ABEND_PERCOLATE    ---/ASRA    DFHSR1      00000380
00000005    20:27:19    001F     PROGRAM_CHECK           0C9/AKEA    DFHYI411    0000072E
```

4. Locate Kernel Error Data (KERRD):

=KE: Error Number: 00000005

TCA   ILC, Interrupt Code   PSW

```
KERRD 02210F48 KERNEL ERROR DATA

000   F0C3F961 C1D2C5C1 01040009 0000FFFF  C4C6C8C1 D7D3C9F1 01DA6D90 01BE8580 *0C9/AKEA...I....DFHAPLI1.._...e. *
020   005BB080 0215F080 00000005 00000009  07BD0009 A0000000 07BD2000 8241DEFE *. $....0.....................b... *
040   0004 0009 0000000 8241DEFE B0000000   0220A6BC 0220A730 00000000 000001F4 *.........b..........w...x.......4*
060   00000001 00000000 00614BBC 00000007   006C10D0 0220A7C8 0241D91C 0241DBE0 *.........../......%....xH..R..... *
080   0241D8E4 0220A578 8241DEEA 00000000   00000000 00000000 00000000 00000000 *..QU..v.b....................... *
0A0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000 *................................ *
0C0   00000000 00000000 00000000 00000000   07BD0009 A0000000 07BD2000 8241DEFE *...........................b... *
0E0   00040009 00000000 8241DEFE B0000000   0220A6BC 0220A730 00000000 000001F4 *.........b..........w...x.......4*
100   00000001 00000000 00614BBC 00000000   006C10D0 0220A7C8 0241D91C 0241DBE0 *.........../......%....xH..R..... *
120   0241D8E4 0220A578 8241DEEA 00000000   00000000 00000000 00000000 00000000 *..QU..v.b....................... *
140   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000 *................................ *
160   00000000 00000000 00000000 00000000   B58DE2F0 F9479E07 4931308E 88000000 *................S09.......h... *
180   4E000000 045D8AB5 4E000000 000254FB   40404040 40404040 00000000 00000000 *+....)..+.......     ....... *
1A0   00000000 00000000                                                          *........ *
```

5. Locate Failing Instruction:

```
PSWDATA 0241D7D0
   0000 C4C6C8E8 C9F4F1F1 58F00014 58F0F0B4 58F0F00C 58FF000C 07FF0000 00000000 *DFHYI411.0...00...00.......* 0241D7D0
   0020 47F0F028 00C3C5C5 00000000 00000014 47F0F001 4ACEAC00 0241D89C 00000000 *.00..CEE........00.>.....* 0241D7F0
   0040 00000000 00000000 90ECD00C 4110F038 98EFF04C 07FF0000 0241D7F0 0241D8E4 *...............0.q.0<......* 0241D810
   0060 0241E2A8 0241D850 0241D7F0 0241DC6A 0241E930 0241D8B0 00000000 00000007 *..Sy..Q&..P0......Z...Q...* 0241D830
   0080 C3D6C2E3 C5E2E340 F2F0F0F1 F0F3F1F7 F1F8F5F8 F0F6F0F1 F0F1F0F1 00000000 *COBTEST 2001031718580601 01* 0241D850
   00A0 0000076C 60A87C4C 00000000 50800209 00000000 09000000 00800000 00000067 *...%-y@<....&............* 0241D870
            ?
            ?
            ?
   06E0 92E8A020 412095C8 41309340 5020D1B8 5030D1BC 41209178 413092E8 5020D1C0 *kY....nH..l &.J.&.J...j...* 0241DEB0
   0700 5030D1C4 9680D1C4 4110D1B8 58F0A0C0 4100D144 58C0D080 05EF58C0 D0E850F0 *&.JDo.JD..J..0....J.......* 0241DED0
   0720 D0785820 91188E20 0020 5D20 9120 5030 9110B0 C03447F0 B696D215 9128A1A4 *....j.....).j.&.j......0.o* 0241DEF0
   0740 9240913E D238913F 913ED203 D16CD160 4120B34C 5020D160 47F0B592 D203D160 *k j.K.j.j.K.J%J-...<&.J-.0* 0241DF10
```

6. Locate Register Data:

```
   REG 9   0220A7C8
 31-bit data follows:
REGDATA 0220A7C8
-0080 0220A578 0220A790 0220A7C8 8220AAC0 C8C1D5C3 02205900 02205900 00000000 *..v...x...xHb...HANC.......* 0220A7C8
-0060 8220A758 0220ADE8 00001000 00000970 0220A758 00000670 00000668 00000000 *b.x....Y..........x.......* 0220A7E8
-0040 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *..........................* 0220A808
-0020 E2E8E2D6 E4E34040 00000000 00000000 0E000000 00000000 0F000000 00000000 *SYSOUT    .................* 0220A828
 0000 D2C5E8F0 F0F0F0F0 F1F0F1F1 F1F1F1F1 E2C3C8D9 D6E3E340 404040D9 C5C3D6D9 *KEY0000010111111SCHROTT   * 0220A848
 0020 C440F0F0 F0F04040 40404040 40404040 40404040 40404040 40404040 40404040 *D 0000                    * 0220A868
 0040 40404040 40404040 40404040 40404040 00000000 00000000 00000000 00000000 *              ............* 0220A888
 0060 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *..........................* 0220A8A8
 0080     00BF LINES SAME AS ABOVE                                              0220A8C8
 00C0 00000000 00000000 00000001 00000000 D9858184 A840A396 40998581 84408689 *...............Ready to re* 0220A8E8
 00E0 99A2A340 99858396 99844B40 404040D7 9985A2A2 408595A3 859940A3 96408396 *rst record.    Press enter * 0220A908
```

CICS TS System Dump Processing (DFHPD410)

USER31. 00149 02203AB0 USER storage above 16MB

```
0000 E4F0F0F0 F0F1F4F9 4C4CD9E4 E6D76E6E 00008C78 00000000 00008C78 00008C78 *U0000149<<RUWP>>............* 02203AB0
0020 00008C78 02203AE0 00010000 00000000 4C4CD9E4 E6C26E6E E4F0F0F0 F0F1F1F1 *...........<<RUWB>>U0000111* 02203AD0
0040 E4F0F0F0 F0F1F1F1 00000000 00000000 00000000 00000000 00000000 00000000 *U0000111.................* 02203AF0
     ?
     ?
     ?
6D00 00000000 00000000 0E000000 00000000 0F000000 00000000 D2C5E8F0 F0F0F0F0 *.................KEY00000* 0220A7B0
6D20 F1F0F1F1 F1F1F1F1 E2C3C8D9 D6E3E340 404040D9 C5C3D6D9 C440F0F0 F0F04040 *10111111SCHROTT   RECORD 0* 0220A7D0
6D40 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *                          * 0220A7F0
6D60 40404040 40404040 00000000 00000000 00000000 00000000 00000000 00000000 *           ...............* 0220A810
6D80 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.........................* 0220A830
6DA0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.........................* 0220A850
6DC0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.........................* 0220A870
6DE0 00000001 00000000 D9858184 A840A396 40998581 84408689 99A2A340 99858396 *........Ready to read first* 0220A890
6E00 99844B40 404040D7 9985A2A2 408595A3 859940A3 96408396 95A38995 A4854B40 *rd.    Press enter to conti* 0220A8B0
6E20 60F44040 40000000 00000000 00000000 000001F4 00000000 00000000 00000000 *-4     .............4......* 0220A8D0
6E40 D2C5E8F0 F0F0F0F0 F1F0F1F1 F1F1F1F1 E2C3C8D9 D6E3E340 404040D9 C5C3D6D9 *KEY0000010111111SCHROTT    * 0220A8F0
6E60 C440F0F0 F0F04040 40404040 40404040 40404040 40404040 40404040 40404040 *D 0000                     * 0220A910
```

Divisor (Reg9 +x'120')

DFHPD410 dumps x'180' bytes for each registers (x'80 prior and x'100' after address in register)
Unfortunately, in this case, we need Reg9 + x'120'. For this we look for this address in User31 storage. Search for the address in the far-right column.

CICS TS System Dump Processing (DFHPD410)

```
===AP:  AP DOMAIN TRANSACTION CONTROL BLOCKS

TCA.00149 005BB080 Task Control Area (User Area)

0000   005BB180  00140001 021EA420 00589648   02161010 005A25FC 00000000 00000008  *..S.......u...o......!..........*
0020   00000000  00001490 00000000 00000000   00000000 81F84278 021F2000 0000012C  *..................a8...........*
0040   00000000  00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0060   00000081  01004000 00000040 021EA420   00000000 00000000 00000000 00000000  *...a. ...  ..u..................*
0080   00000019  021EA420 00000000 00000000   00000000 00000000 00000000 00000000  *......u.........................*
00A0   00000000  00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00C0   00000000  00000000 00000000 00000000   00000000 00000000 00000000 80589DC0  *................................*
00E0   00000000  00000000 00000000 0053A000   00000000 00000000 00000000 02203AB8  *................................*


SYS_TCA.00149 005BB180 Task Control Area (System Area)

0000   00000000 00000000 00000000 00000000   0000149C 01BF050C 0000004A 00000000  *.........................>.....*
0020   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0040   0220A578 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *...v............................*
0060   00000000 00000000 00C00000 00000000   00000000 00000000 80000000 00000000  *................................*
0080   00000000 005BB4E4 00000000 00000000   005BB388 022078B0 006C1128 006C13E8  *.....$.U.......$.h....%..%.Y*
00A0   00000000 80589080 00000000 00000000   D7C7C3D2 021EA420 00000000 00000000  *.............PGCK..u...........*
00C0   00000000 D7C7C3D2 00000000 00000000   00000000 00000000 00000000 00000000  *....PGCK........................*
00E0   00000000 00000000 00000000 00000000   B58DE2EE 70CEB042 00000000 00000000  *..............S.................*
0100   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0120   00000000 00000000 00000000 00000000   80589400 00000000 00000000 005BB56C  *...................m.......$.%*
0140   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0160   00000000 00000000 170EE5E3 C1D4F14B   C4C2C4C3 C3C9C3E2 8DE2EE70 CEB00001  *.........VTAM1.DBDCCICS.S......*
0180   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *...............................*
01A0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *...............................*
01C0   00000000 00000000 018A0023 006C1008   00000000 00000000 00000000 00000000  *.................%.............*
01E0   00000000 00000000 C3C9C3E2 D7C7C3D2   F0C3F961 C1D2C5C1 0000072E 08030781  *.......CICSPGCK0C9/AKEA....a*
0200   00000000 00000000                                                          *........                       *
```

CICS TS System Dump Processing (DFHPD410)

Speaker Notes:

In a Formatted Transaction Dump, the User and System TCA were presented as a single block, followed by a repeat of the System Area. Actually, the User Area, TCA(U), is only x'100' bytes long, and is followed in a dump by the system area, TCA(S). The first full word in TCA(U) points at TCA(S), but since, under CICS TS, TCA(U) is always x'100' long, the TCA(S) isn't hard to find.

In the Formatted Transaction Dump we saw earlier, TCA(S) +x'D4' contained the transaction abend code ('ASRA'). Here we see evidence that the System dump is taken prior to the Transaction dump, since this field is not yet filled in. However, TCA(S) +x'1F0' contains the Kernel Domain trans abend code ('0C9/AKEA').

7. Locate Exception (*EXC*) Trace Entry:

```
CALL DFHPD410 DATA DEF=0, TR=1, TRS=<TASKID=(0149)>
```

```
00149 1 AP 00E1 EIP     ENTRY REWRITE                                    0004, 0220A578 . . v. , 0B000606        =000645=

00149 1 AP 04E0 FCFR    ENTRY REWRITE           0218FA80 ,   0000000C, 00000000, 0220A940, C8, NO, NO          =000646=
00149 1 DS 0004 DSSR    ENTRY WAIT_OLDW         KSDS, FCIOWAIT, 0057E841, NO, IO                               =000647=
00149 1 DS 0005 DSSR    EXIT  WAIT_OLDW/OK                                                                     =000648=
00149 1 AP F00A XCPC    ENTRY DEQ                                                                              =000649=
00149 1 AP F00B XCPC    EXIT  DEQ                                                                              =000650=
00149 1 AP 04E1 FCFR    EXIT  REWRITE/OK         00000000, LENGTH_OK                                           =000651=

00149 1 AP 00E1 EIP     EXIT  REWRITE           OK                        00F4, 00000000 . . . . , 00000606  =000652=

00149 1 AP 1942 APLI    *EXC* Program Check      START_PROGRAM, CICSPGCK, CEDF, FULLAPI, EXEC, NO, 021F6030, 0000, =000653=

00149 1 AP 1948 APLI    EVENT CALL-TO-LE/VSE     Program_Check_Recovery  CICSPGCK                              =000654=
00149 1 AP 1949 APLI    EVENT RETURN-FROM-LE/VSE Program_Check_Recovery  00000004 CICSPGCK                     =000655=
00149 1 AP 0790 SRP     *EXC* PROGRAM_CHECK                                                                    =000656=
```

CICS TS System Dump Processing (DFHPD410)

Now, let's say we wanted more detail on the **EIP ENTRY REWRITE** and the Exception Entry
(Trace entries 645 and 653):

```
CALL DFHPD410 DATA DEF=0, TR=3, TRS=<ENTRY_NUM=(645, 653)
```

```
AP 00E1 EIP ENTRY REWRITE                              REQ(0004) FIELD-A(0220A578..v.) FIELD-B(0B000606....)
           TASK-00149 KE_NUM-001F TCB-00342000 RET-8241DEEA TIME-20:27:19.3500194704 INTERVAL-00.0000021093 =000645=

AP 1942 APLI  *EXC* - Program-Check   FUNCTION(START_PROGRAM) PROGRAM(CICSPGCK) CEDF_STATUS(CEDF) EXECUTION_SET(FULL
           ENVIRONMENT_TYPE(EXEC) SYNCONRETURN(NO) LANGUAGE_BLOCK(021F6030) COMMAREA(00000000 , 00000000)
           LINK_LEVEL(1) SYSEIB_REQUEST(NO)
           TASK-00149 KE_NUM-001F TCB-00342000 RET-81D3FC8C TIME-20:27:19.3514947204 INTERVAL-00.0001222187 =000653=
```

Program Block

```
1-0000   00580000 000000DA 00000000 00000000   B81B5D40 00000000 02680100 C3C9C3E2   *.................)..CICS*
  0020   D7C7C3D2 01CB3AB0 B5000000 01CB3AB0   01000001 01410202 0241D7D0 021F6030   *PGCK.......  .......P...-.*
  0040   00001C3A 00000000 00000000 00000000   00010002 02020000                     *................         *
```

KERRD

```
2-0000   F0C3F961 C1D2C5C1 010400C9 0000FFFF   C4C6C8C1 D7D3C9F1  01DA6D90 01BE8580   *0C9/AKEA...I....DFHAPLI1..*
  0020   005BB080 0215F080 00000005 00000009   07BD0009 A0000000 07BD2000 8241DEFE   *.$...0..............b...*
  0040   0004 0009 0000000 8241DEFE B0000000    0220A6BC⁰0220A730¹00000000²000001F4³ *........b.....w...x..4*
  0060   00000001⁴00000000⁵00614BBC⁶00000000⁷   006C10D0⁸0220A7C8⁹0241D91CᴬA0241DBE0ᴮ *........./......*
  0080   0241D8E4ᶜ0220A578ᴰ8241DEEAᴱ00000000ᶠ   00000000 00000000 00000000 00000000 *..QU..v.b..............*
  00A0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000 *........................*
  00C0   00000000 00000000 00000000 00000000   07BD0009 A0000000 07BD2000 8241DEFE *.....................b...*
```

PSW

Extract Abend Info from Raw Dump

It is possible to extract the information for AKEA and AKEB abends directly from the raw dump, or from the console, without invoking a dump formatter (for instance, if a dumpwas not taken, or cannot be formatted):

1. Locate the Kernel Task Control Block (DFHKEKCB)

   KEKCB+x'78' points at the Kernel Error Header (DFHKEERH):

2. Starting with the first Kernel Error Data block (KEERH+x'28'),
   Locate the specific Kernel Error Data block matching this error.

```
F2 0103 DFHAP0001 DBDCCICS An abend (code 0C9/AKEA) has occurred at offset
        X'0000072E' in module CICSPGCK.
```

3. Extract failing PSW and registers from KERRD.

4. Locate failing program and displacement.

Extract Abend Info from Raw Dump

1. Locate the Kernel Task Control Block (DFHKEKCB)

locate f2,'kekcb

```
AR+0015     MATCH FOUND AT 00509006
V00509000 ........ ....D2C5 D2C3C240 40404040 BE *......KEKCB    * R01DAF000
V00509010 82214080 82215B10 82214480 822264F8 BE *b. .b.$.b...b..8* R01DAF010
V00509020 822158C8 82215438 82214880 82214C80 BE *b..Hb...b...b.<.* R01DAF020
```

15 e

```
AR 0015 1I 40I   READY
```

DFHKEKCB

show f2,509000.80

```
AR 0015    DATA  FOUND AT 00509000
V00509000 02106EC4 C6C8D2C5 D2C3C240 40404040 BE *..>DFHKEKCB    * R01DAF000
V00509010 82214080 82215B10 82214480 822264F8 BE *b. .b.$.b...b..8* R01DAF010
V00509020 822158C8 82215438 82214880 82214C80 BE *b..Hb...b...b.<.* R01DAF020
V00509030 822A54B0 02213080 82214700 82214F00 BE *b......b...b.|.* R01DAF030
V00509040 00000000 00000000 00004E20 0210AE28 BE *..........+..
V00509050 00000005 04452000 0220C880 00000000 BE *.........H..
V00509060 00000000 005E0000 01734000 13C40006 BE *.....;.... ..D..* R01DAF060
V00509070 00509210 00000000 0220CD00 021F0080 BE *. &k.............* R01DAF070
```

Pointer to KEERH

Extract Abend Info from Raw Dump

2. Locate the specific Kernel Error Data block

show f2,0220CD00.50

DFHKEERH

```
AR 0015   DATA  FOUND AT 0220CD00
V0220CD00 00286EC4 C6C8D2C5 C5D9C840 40404040 BE *..>DFHKEERH     * R01DB4D00
V0220CD10 0220CD28 02211FF8 01A80000 00000000 BE *.......8.y......* R01DB4D10
V0220CD20 0000002A 00000029 60606061 C1C5C9F9 BE *........---/AEI9* R01DB4D20
V0220CD30 09000000 000004EC C4C6C8D7 C3D74040 BE *........DFHPCP  * R01DB4D30
```

locate f2,'0c9/akea (from=0220CD00,to=02211FF8

```
AR 0015    MATCH FOUND AT 0220DBF0
0220DBF0 F0C3F961 C1D2C5C1 010400C9 0000FFFF BE *0C9/AKEA...I....*
0220DC00 C4C6C8C1 D7D3C9F1 01DA6D90 01BE8580 BE *DFHAPLI1.._...e.*
0220DC10 005BB080 0215F080 00000005 00000009 BE *.$....0.........*
```

15

```
AR+0015    MATCH FOUND AT 02210F68
02210F60 ........ ........ F0C3F961 C1D2C5C1 BE *........0C9/AKEA*
02210F70 010400C9 0000FFFF C4C6C8C1 D7D3C9F1 BE *...I....DFHAPLI1*
02210F80 01DA6D90 01BE8580 005BB080 0215F080 BE *.._...e..$....0.*
```

15

```
AR 0015 NO MORE MATCH FOUND
AR 0015 AREA WAS CHECKED FROM 0220CD00 TO 02211FF8
```
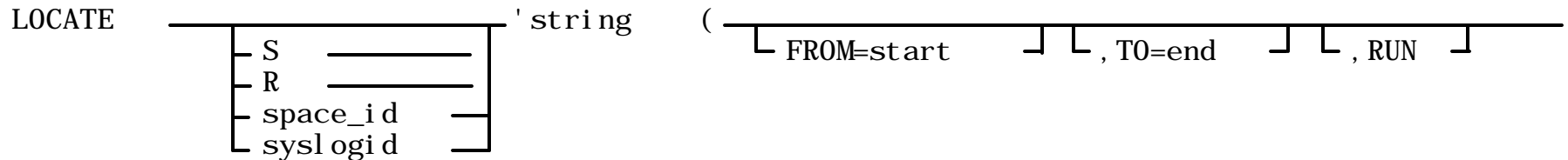
15 e

Extract Abend Info from Raw Dump

<u>Speaker Notes</u>:

1. Search for the eyecatcher "DFHKEKCB" starting from the beginning of the CICS TS partition. This is the beginning of the Kernel Domain Task Control Block. It is normally located within the first 64K (x'10000') of the partition.

2. The eyecatcher actually starts at +3 into the control block. +x'78' points to the Kernel Error control block header.

3. Repetitively search for the Kernel error code within the limits defined by the KEERH +x'10' and x'14'.

4. If KEERH+x'20' is only one higher than +x'24', this indicates the table has not wrapped, and the last hit will be the latest. Otherwise, the "hit" just prior to the entry identified by KEERH +x'24' will be the latest one.
x'28' times x'1A8'= x'43E8' plus x'0220CD28' = x'02211110'. This is probably a percolated abend ('---/ASRA').
The KERRD just prior to that would be x'02211110' minus x'1A8' = x'02210F68'

LOCATE

See "*VSE/ESA Supervisor Diagnosis Reference*" (LY33-9164)

```
LOCATE  ─────────────────────'string   (─────────────────────────────────────
           ├─ S ──────────┤                └─ FROM=start ─┘  └─ ,TO=end ─┘  └─ ,RUN ─┘
           ├─ R ──────────┤
           ├─ space_id ───┤
           └─ syslogid ───┘
```

'   is a single, special character that indicates that the following string is a character string.
If the ' is missing, the string is assumed to be hexadecimal digits.

string   is the series which the user wants to be located; limited to either 16 characters or, to 32 hexadecimal digits representing 16 bytes of storage. Any character or hexadecimal digit to be excluded from the scan, must be replaced by a "." (period).

'**15**'   continue search from current point

'**15 e**'   terminate search.

Extract Abend Info from Raw Dump

3. Extract failing PSW and registers from KERRD.

DFHKERRD

show f2,02210F48.80

```
AR 0015    DATA   FOUND AT 02210F48

02210F60 ........ ........ F0C3F961 C1D2C5C1 BE *.......0C9/AKEA*
02210F70 010400C9 0000FFFF C4C6C8C1 D7D3C9F1 BE *...I....DFHAPLI1*
02210F80 01DA6D90 01BE8580 005BB080 0215F080 BE *.._...e..$....0.*
02210F90 00000027 00000009 07BD0009 A0000000 BE *................*
02210FA0 07BD2000 8241DEFE 0004 0009 0000000 BE *....b...........*
02210FB0 8241DEFE B0000000 0220A6BC 0220A730 BE *b.........w...x.*
02210FC0 00000000 000001F4 00000001 00000005 BE *.......4........*
02210FD0 00614BBC 00000000 006C10D0 0220A7C8 BE *./.......%....xH*
02210FE0 0241D91C 0241DBE0 0241D8E4 0220A578 BE *..R.......QU..v.*
02210FF0 8241DEEA 00000000 00000000 00000000 BE *b..............*
02211000 00000000 00000000 00000000 00000000 BE *................*
02211010 00000000 00000000 00000000 00000000 BE *................*
```

TCA

PSW

ILC, Interrupt Code

Extract Abend Info from Raw Dump

Speaker Notes:

DFHKEERH Dsect:

Loc	Len	Description
0	10	Header
10	4	First KERRD
14	4	End of Table (end of last KERRD)
18	2	Length of each KERRD
1A	6	Unused
20	4	Next available slot
24	4	Last used slot (Current abend KERRD)
28	1A8	First Kernel Error Data Block (KERRD)

DFHKERRD Dsect:

Loc	Len	Description
0	8	Kernel Error Code (rrr/cccc).
		'rrr' is VSE Abend Code.. if '0Cx', this is a program check, and 'x' is the Program Interrupt Code.
		'cccc' is the CICS TS Abend code
20	4	Address of Task Control Area (TCA)
2C	4	Reason Code (Particularly interesting for AKEA Abends)
38	8	Failing PSW (EC-mode)
40	2	Instruction Length Code (ILC)
42	2	Program Interrupt Code (x'09' = Fixed Point Divide Exception)
50	40	General Registers at point of failure (Reg0 – Reg15)

CICS TS Transaction Abends (AKEB)

To diagnose AKEB Transaction Abends:

```
L1 0107 DFHSR0606 A01CICS5 Abend (code 2C5/AKEB) has been detected.
L1 0107 DFHME0116 A01CICS5
        (Module:DFHMEME) CICS symptom string for message DFHSR0606 is
        PIDS/564805400 LVLS/410 MS/DFHSR0606 RIDS/DFHSRP PTFS/VSE410
        AB/S02C5 AB/UAKEB.
L1 0107 DFHDU0201 A01CICS5 ABOUT TO TAKE SDUMP. DUMPCODE: SR0606  ,
         DUMPID: 1/0002
L1 0107 OS24I AN SDUMP OR SDUMPX MACRO WAS ISSUED
L1 0107 OS29I DUMP STARTED
L1 0107 OS30I DUMP STARTED. MEMBER=DL100008.DUMP IN SUBLIB=SYSDUMP.L1
L1 0107 1I51I DUMP COMPLETE
L1 0107 DFHDU0202 A01CICS5 SDUMPX COMPLETE. SDUMPX RETURN CODE X'00'
```

1. Format dump: Use "CALL DFHPD410 DATA DEF=0,KE=3,AP=3,TR=1".

2. KE Domain Error Table Summary :

3. Kernel Error Data (KERRD):

4. PSW:

5. Register Data:

6. "*EXC*" entry in trace table:

7. Exec Interface Block (EIB):

8. EXEC CICS Save Area from TCA(S):

CICS TS Transaction Abends (AKEB)

Speaker Notes:

1. **Format dump:** Use "CALL DFHPD410 DATA DEF=0,KE=3,AP=3,TR=1". Add "FCP=3", if an error in file access. Check Cancel Code in error message on console. '2C5' is a special return code for OS/390 simulation mode, and give us a reason code, which is saved in the KERRD+x'2C'. We'll check this later when we get to the KERRD. Locate failing transaction in KE Domain Task Summary.

2. **KE Domain Error Table Summary:** Locate entry matching task located in step 1.

3. **Kernel Error Data (KERRD):** Locate entry matching sequence number of entry from step 2.

4. **PSW:** Locate failing instruction from PSW in KERRD and program dump in PSWDATA. Usually with AKEB abends, the PSW is not pointing at a user program. To identify the failing module, use INFOANA to print off the segment of the dump surrounding the PSW and look for an eyecatcher (see page 85). In this case, the failing module was in the SVA, so is not included in the CICS TS System Dump.

5. **Register Data:** x'100' bytes of register data may be found directly following the KERRD under REGDATA. If we need to see more than this, register data is also usually found in USER31 / USER24 storage.

6. **"*EXC*" entry in trace table:** Helps us understand what the transaction was doing just prior to abend. Unfortunately, in this case, the user did not have INTTR turned on, so all we have is the *EXC* entry. Requesting a full trace entry didn't show us much more. Trace data is the KERRD.

Unfortunately, in this case, internal tracing was turned off, so we don't have trace entries indicating what the transaction was doing which precipitated the AKEB abend. The System EIB will tell us what CICS TS command was requested, and the User Savearea will help us locate the failing source statement.

7. **Exec Interface Block (EIB):** Displacement x'1B' contains the two-digit Function Code (EIBFN) which tells us what function the failing application requested. For a failed request, displacement x'1D' contains a six-digit response code (EIBRCODE). See "*CICS TS User's Guide*" (SX33-6101-00). In this case, x'0602' indicates "Read File". For File Access Request, displacement x'23' contains the dataset name (EIBDS).

8. **User Savearea:** x'40' into System TCA is a pointer to the User Savearea. This points to the last CICS TS Command Level Language call. This is probably the call which resulted in the AKEB. This will not be formatted, but, since the address is <16Meg, it can be located in a UDSA storage area. Search for "USER24.NNNNN", where "nnnnn" is the transaction id, then locate the address in the right-hand column. Continue to isolate error to source statement, following step 6 on page 22.

CICS TS Transaction Abends (AKEB)

1. Locate failing transaction in KE Domain Task Summary.

```
CALL DFHPD410 DATA DEF=0, KE=3, AP=3, FCP=3, TR=1
```

===KE: Kernel Domain KE_TASK Summary

```
KE_NUM KE_TASK  STATUS        TCA_ADDR TRAN_# TRANSID DS_TASK  KE_KTCB   ERROR

0001   036F6880 KTCB Step     00000000              00000000 036DA0B0
       ?
       ?
       ?
003C   0265A080 Unused
003D   0265A400 ***Running**  00722080 00035  PRNT    03629180 036DC020 *YES*
003E   0265A780 Unused
0040   022AF080 Not Running   00721080 00006  CSSY    0363E680 036DC020
0041   022AF400 Not Running   00721680 00007  CSSY    0363EB80 036DC020
0042   022AF780 Not Running   007D7080 00022  CSSY    0363ED80 036DC020
```

===AP: AP DOMAIN TRANSACTION SUMMARY

```
Tran      Tran    Orig    TCA       TWA       EIB       SEIB      Facility  Facility
 No        Id     Tran    Addr      Addr      Addr      Addr      Type      Id  .

TCP       CSTP    CSTP    02268680  022AE438  022AE0D0  02268A8C
00006     CSSY    CSSY    00721080  006BA000  0072C0D0  0072148C
00007     CSSY    CSSY    00721680  006BA000  0072D0D0  00721A8C
JBS       CSSY    CSSY    007D7680  006BA000  007D60D0  007D7A8C
 ?
 ?
 ?
00035     PRNT    PRNT    00722080  006BA000  008010D0  0072248C  C         T01A
```

CICS TS Transaction Abends (AKEB)

2. Locate KE Domain Error Table Summary:

```
==KE: KE Domain Error Table Summary

ERR_NUM     ERR_TIME    KE_NUM   ERROR TYPE                  ERR_CODE    MODULE      OFFSET

00000001    17:43:23    0004     TRAN_ABEND_PERCOLATE        ---/AEI1    DFHPCP      000004EC
00000002    17:43:23    0004     TRAN_ABEND_PERCOLATE        ---/AEI1    DFHEIP      000015D6
00000003    17:44:22    003D     ABEND                       2C5/AKEB    UNKNOWN     UNKNOWN
```

3. Locate KE Error Data (KERRD):

```
=KE: Error Number:    00000003
```

| ILC, Interrupt Code | Reason Code | PSW | VSE Cancel Code ('2C5' |

```
KERRD 0265A5D8 KERNEL ERROR DATA

0000   F2C3F561 C1D2C5C2 020402C5 0000FFFF   C4C6C8C6 C3C2C440 00767420 03629180   *2C5/AKEB..E....DFHFCBD......j.*
0020   00722080 0265A400 00000003 42000000   07DD0000 4017367E 07DD0000 0017367E   *......u.............=.......=*
0040   0002 0000 0000000 0017367E D0000000    00000005⁰0E7DA000¹006F0608²00000003³   *........
0060   006F0728⁴077DA108⁵007DA078⁶006F0610⁷  A0173656⁸FFFFFFF1⁹0000000B^A00000001^B  *.?...
0080   0000000F^C006F06B8^D006F0600^E00173500^F  00000000 00000000 00000000 00000000  *......
00A0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *............................*
00C0   00000000 00000000 00000000 00000000   07DD0000 4017367E 07DD0000 0017367E   *.............=.......=*
00E0   00020000 00000000 0017367E D0000000    00000005 0E7DA000 006F0608 00000000   *
0100   006F0728 077DA108 007DA078 006F0610   A0173656 FFFFFFF1 0000000B 00000001   *
0120   0000000F 006F06B8 006F0600 00173500   00000000 00000000 00000000 00000000   *
0140   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *
0160   00000000 00000000 00000000 00000000   B592C5FA DC5D7600 40404040 40404040   *
0180   40404040 40404040 40404040 40404040   40404040 40404040 00000000 00000000   *
01A0   00000000 00000000                                                            *........*
```

PSW is pointing outside CICS TS partition.

ILC = 2. Usually indicates an SVC (0Axx)
Interrupt Code = '0000' would indicate SVC 00 (EXCP)

CICS TS Transaction Abends (AKEB)

Error Code: 2C5/AKEB   Error Type: ABEND   Timestamp: B592C5FADC5D7600

Date (GMT)   :   22/03/01   Time (GMT)   :   17:44:22.474199
Date (LOCAL) :   22/03/01   Time (LOCAL) :   17:44:22.474199

KE_NUM: 003D   KE_TASK: 0265A400   TCA_ADDR: 00722080   DS_TASK: 03629180

Program DFHFCBD was in control, but the PSW was elsewhere.

Registers and PSW.

PSW: 07DD0000 0017367E   Instruction Length: 2   Interrupt Code: 00   Exception Address: 00000000

Execution key at Program Check/Abend: D

CICS TS Transaction Abends (AKEB)

17.3 OS/390 API Abend Codes

Abend Code	Reason Code	Subreason Code	Explanation
? ? ?			
2C5			This ABEND code is reserved for VSE specific error situations. VSE cancel codes are reflected by reason codes in the range from X'01000000' to X'FFFFFFFF'.
? ? ?			
	cc00000		cc is the VSE cancel code as described inVSE/ESA Messages and Codes Volume 1.

17.2 VSE/Advanced Functions Cancel Codes

Cancel Code	Associated Message	Reason for Cancelation
? ? ?		
42	0P86	DASD file-protection exception: the failing program attempted to access a location beyond extent limits.

CICS TS Transaction Abends (AKEB)

4. Locate Failing instruction:

Data at PSW 0017367E   Module: UNKNOWN   Offset: UNKNOWN

PSWDATA 0017367E

```
-0080   4710F106 41440001 96021026 4580F298   1B441B33 4330102D 4343E174 4A40F7A4   *..1.....o.....2q...........> 7u*
-0060   1A4E9500 102D4780 F1309502 102D4770   F1529140 102047E0 F152BF0C 1076BF02   *.+n.....1. n.....1.j ....1.......*
-0040   106F587E 0000BF01 7006BF18 101D0A4B   BE01E102 4580F298 9104102D 4710F336   *.?.=................2qj.....3. *
-0020   91101010 4780F17C 9102102D 4710F17C   9104102D 4710F17C 0A2347F0 F17E0A00   *j.....1@j.....1@j.....1@...01=..*
 0000   91101010 4780F190 9505102D 4770F190   0A249101 102C4710 F40C981E D00007FE   *j.....1. n.....1...j.....4. q.....*
 0020   1B33D201 108EF6EC 47F0F0DA 95001028   4780F27C 1B664360 10288960 00011A61   *..K...6..00. n.....2@...-..i-../*
 0040   58206010 91021015 4780F1E6 F2776018   20004FA0 6018F271 60182008 4FC06018   *..-.j.....1W2.-...|.-.2.-...|.-.*
 0060   42C0600F 47F0F1F6 D2026019 2000D200   600F2003 58A06018 1BCC4120 602018BA   *..-..016K.-...K.-.....-.....-...*
```

CICS TS Transaction Abends (AKEB)

The amount of storage printed as "PSW DATA" does not include an eyecatcher to identify the failing module. Attempt to print a range of addresses around the PSW address from the dump the CICS TS System Dump.

```
//  EXEC INFOANA,SIZE=300K
    DUMP NAME SYSDUMP.F2.CICSTSAB
    SELECT DUMP VIEWING
        PRINT 173500 174000
        RETURN
    SELECT END
```

```
00173500   47F0F6FC  47F0F3E8  9701102D  9707102D  9701102D  9703102D  9701102D  47000000  *.06..03Yp...p...p...p...p......*
00173520   47F0F080  C9D1C7E7  C4C1C640  47F0F6F4  F1F5C340  F5F6F8F6  60F0F6F6  404DC35D  *.00.IJGXDAF .06415C 5686-066 (C)*
00173540   40C3D6D7  E8D9C9C7  C8E340C9  C2D440C3  D6D9D740  F1F9F8F0  6BF1F9F9  F540D3C9  * COPYRIGHT IBM CORP 1980,1995 LI*
00173560   C3C5D5E2  C5C440D4  C1E3C5D9  C9C1D3E2  60D7D9D6  D7C5D9E3  E840D6C6  40C9C2D4  *CENSED MATERIALS-PROPERTY OF IBM*
00173580   58110008  50D100E8  41D100B8  58110184  50ED0034  58E10008  901CD000  4870102E  *....&J.Y.J.....d&..............*
001735A0   4A70F7A6  1A715877  0000507              C9400  10589504  102D4780  *..7w......&=...'..m..m..n.....*
001735C0   F0EA9101  10154710  F19E483            F4030  108E4133  00089110  *0.j.....1....<......>.......j.*
001735E0   10154780  F0EA4030  10AE458            E4140  F79F9140  10204710  *....0. .....1.j.....1..7.j....*
00173600   F1064144  00019602  102C458   2981D44  1B554330  102D4343  E1744A40  F7A41A4E  *1.....o.....2q......... 7u.+*
00173620   9500102D  4780F130  9502102D  4770F152  91401020  47E0F152  BF0C1076  BF02106F  *n.....1.n.....1.j ....1........?*
00173640   587E0000  BF017006  BF18101D  0A4BBE01  E1024580  F2989104  102D4710  E3369110  *.=.............2qj.....3.j.*
00173660   10104780  F17C9102  102D4710  F17C9104  102D4710  F17C0A23  47F0F17E  0A009110  *....1@j.....1@j.....1@...01=..j.*
00173680   10104780  F1909505  102D4770  F1900A24  9101102C  4710F40C  981ED000  07FE1B33  *....1.n.....1...j.....4.q......*
001736A0   D201108E  F6EC47F0  F0DA9500  10284780  F27C1B66  43601028  89600001  1A615820  *K...6..00.n.....2@...-..i-.../..*
```

Failing Instruction
IJGXDAF+x'15C'

CICS TS Transaction Abends (AKEB)

5. Examine Register Data:

```
 REG 1    0E7DA000

31-bit data cannot be accessed **

24-bit data follows:

REGDATA 007DA000
```

For SVC 00 errors, check out register 1.
In this case, it is pointing to a DTF: **DRPRTD**

```
-0080   03628D7C 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *...@........................*
-0060   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *............................*
-0040   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *............................*
 0000   00000800 00000134 006F0600 00000000   00173500 220AC4D9 D7D9E3C4 400E0134   *.........?..........DRPRTD ...*
 0020   41000000 00000000 70707032 00000078   00008800 00000000 007DA040 00000000   *................h.............*
 0040   077DA109 00000006 97602024 0FB28F00   93000000 0000003D 00000000 00000000   *.'.....p-......l..............*
 0060   317DA0EB 40000005 00000000 00000000   06707080 40000FB2 127DA103 40000005   *.'.. ............. .....'.. ...*
 0080   397DA0EB 40000004 0E707080 40000FB2   8718979E 8718919E 077DA109 40000006   *.'.. ......... ...g.p.g.j..'.. ...*
 00A0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *............................*
 00C0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *............................*
 00E0   00000000 00000000 00000000 01000B07   00707028 00707028 00000000 0000007F   *............................."*
```

The CCB (first 16 bytes of DTF) does not show a two-byte I/O (CSW) completion code (displacement x'**04**'). This implies that the error was recognized by the supervisor, not the I/O device. If "**DASDFP=YES**" is specified, this is probably a DASD File Protect error, which prohibits programs from accessing or changing data outside the defined extents for the file.

CICS TS Transaction Abends (AKEB)

6. Locate *EXC* entry in trace table:

INTERNAL TRACE TABLE

> Unfortunately, INTTR=OFF Detail for SRP *EXC* is the KERRD (see page 40)

```
DSTCB 1 KE 0201 KEDD   ENTRY SET_GLOBAL_TRACE      OFF                                                          =000001=
DSTCB 1 KE 0202 KEDD   EXIT  SET_GLOBAL_TRACE/OK                                                                 =000002=
00001 2 TR 0230 TRSR   EVENT TIME-BASE-RESET                                                                    =000003=
00014 2 ST 0059 STST   *EXC* DMF                  ERROR.                                                        =000004=
III   2 ST 0059 STST   *EXC* DMF                  ERROR.                                                        =000005=
                 ?
                 ?
                 ?
00033 2 AP EA01 TMP    EXIT  LOCATE               DSN.PRY2.VERSION2.YEARLY.PRINT.CAPTURE, 0280A490, NORMAL       =000116=
00033 2 AP EA01 TMP    EXIT  UNLOCK               DSN.PRY2.VERSION2.YEARLY.PRINT.CAPTURE. NORMAL                 =000117=
00035 2 AP 0791 SRP    *EXC* VSE_ABEND                                                                          =000118=
```

7. Locate EIB and extract EIBFN:

> EIBFN = '0602': File Read from DRPRTD

```
SYSEIB.00035 0072248C System EXEC Interface Block

 -0008                                                        5CE2E8E2 C5C9C240  *                              *SYSEIB *

  0000   0174422F 0101081F D7D9D5E3 0000035C  E3F0F1C1 000000C9 00C87D06 02000000  *........PRNT...*T01A...I.H'.....*

  0020   000000C4 D9D7D9E3 C4404000 00000000  000000C4 D9D7D9E3 C4404000 00000000  *...DRPRTD.......DRPRTD .....*

  0040   00000000 00000000 00000000 00000000  00000000 00                          *....................       *
```

8. Locate last EXEC CICS call from Application Program:

```
SYS_TCA.00035 00722180 Task Control Area (System Area)
0000   00000000 00000000 00000000 00000000   0000035C 03636020 00000        .......*
0020   00000000 00000000 00000000 00000000   00000000 00000000 00000        .......*
0040   00805088 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *..&h............................*
0060   00000000 00000000 00000000 00000000   00000000 00000000 80000000 00000000   *................................*
0080   00000000 007224E4 00000000 00000000   00722388 00000000 00801128 008013E8   *.......U...........h...........Y*
```

TCA(S) +x'40' ==> User Savearea

User Savearea: (From TCA(S) + x'40')

```
USER24.00035 00801520 USER storage below 16MB
0000   C2F0F0F0 F0F0F3F5 D7D9D5E3 F0F0F5C1   00000000 00000000 00000000 00000000   *B0000035PRNT005A.........00801520
0020   00000000 00000000 00000000 00000000   00000000 00000000 E900C800 00000000   *.......................Z.00801540
0040   116C0000 119C0000 00000000 116C0000   0000010C 010C0000 1C000CC4 D9D7D9E3   *.%............%.....DRPRT 00801560
0060   C44040D7 D9D5E300 00000000 00000000   00000000 00000000 00000000 00000000   *D  PRNT................ 00801580
       ?
       ?
       ?
3B60   40404040 40000000 00000000 0080105C   00000000 5078841A E0000000 FFFFFFED   *         .........*....&.d...00805080
3B80   00805390 00788354 007871C8 00801BEE   40788B64 00801528 00802528 00803528   *......c....H... 008050A0
3BA0   00804528 00783240 00783240 007871C0   2012004B 00000000 00000000 80768AD0   *....... ....... 008050C0
3BC0   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................ 008050E0
```

R14 points at last application program call.

```
000917          005700     MOVE FILENAME TO NAMEFILE.
000918                     *EXEC CICS READ DATASET(FILENAME) RIDFLD(DAM-KEY)
000919                     *     INTO(PRTD-RECORD) END-EXEC.
000920          005710     MOVE '..O......00769   ' TO DFHEIV0                    510
000921                     MOVE LENGTH OF PRTD-RECORD TO DFHB0020        IMP 430 476
000922                     CALL 'DFHEI1' USING DFHEIV0  FILENAME PRTD-RECORD DFHB0020 DAM-KEY
```

CICS TS Transaction Abends (AKEB)

To Summarize:

1. External symptom indicated a generic VSE cancel code in an unknown module.

2. Failing task was KE_Num 003D, AP Transaction Number 00035.

3. Failing transaction was PRNT from terminal T01A.

4. KERRD showed a VSE Abend at location x'0017367E' caused by a DASD File Protect violiation. Probably an illegal SVC 00. This address is in the 24-bit System GETVIS. Further analysis revealed that the failing instruction was indeed an SVC 00 at displacement x'15C' into IJGXDAF, Direct Access (DAM) Logic Mod.

5. Register 1 was pointing at a DTFDA, but it was not flagged as I/O Complete, nor were there any Channel or Device Errors posted. This indicated an error detected by the I/O Supervisor, consistent with DASD File Protect violation.

6. Internal Trace was not running, but the EIB revealed that the last transaction program **EXEC CICS** request was for a Read Record from a DAM file (DRPRTD)

7. This error was caused by IBM System code. It was a problem with the initial setup of the DTF by CICS TS File Control. The Seek Address is pointing at the wrong location in the DTF.

CICS TS Storage Violation

<u>What is a Storage Violation:</u>

    1. Data written outside transaction storage

    2. Storage Isolation:

<u>Storage Check Zones:</u>

    1. Replace SAAs:

    2. Storage chain protected:

<u>CICS TS detection of storage violations:</u>

<u>System Initialization (SIT) parameters:</u>

    CHKSTSK = NONE | CURRENT | ALL

    CHKSTRM = NONE | CURRENT:

    RENTPGM = PROTECT:

    STGPROT=YES:

    STGRCVY = YES:

CICS TS Storage Violation

Speaker Notes:

What is a Storage Violation:

1. **Data written outside transaction storage:** A storage violation occurs when data is written outside of the storage assigned to the current transaction. Since task storage is usually acquired contiguously, these overlays usually only damage storage for this transaction. However, sometimes, particularly if unitialized or bad pointers are involved, the overlay can occur anywhere in the CICS TS partition.

2. **Storage Isolation:** To reduce the impact of storage violations, CICS TS isolates user storage in different partition getvis locations. Thus, storage violations by a user transaction are more likely to impact itself or another user transaction than CICS system areas. In addition, the user can request subsystem storage protection, which isolates CICS storage in a different, inaccessible, storage protect key (STGPROT=YES in SIT).

Storage Check Zones:

1. **Replace SAAs:** In CICS TS, user storage areas are no longer chained together via Storage Accounting Areas (SAAs). In their place, task data in UDSA (24-bit) and EUDSA (31-bit) subpools are framed with Check Zones" (or "Crumple Zones") which are checked by CICS during FREEMAIN and end-of-task. CHKSTRM={CURRENT|NONE} and CHKSTSK={ALL|CURRENT|NONE}. TIOAs still use the old SAA storage format.

2. **Storage chain protected:** Task data is chained at a higher level, so overlaid data no longer destroys the storage chain. If authorized to do so, CICS will attempt to repair storage violations and continue with the task. Otherwise the task is abended but its storage is placed out-of-service (not FREEMAINed). STGRCVY={NO|YES}. In either case, CICS TS control system attempts to continue after a storage violation.

CICS TS detection of storage violations:

CICS detects storage violations involving TIOAs by checking the SAA chains when it receives a command to FREEMAIN an individual element of TIOA storage, at least as far as the target element. It also checks the chains when it FREEMAINs the storage belonging to a TCTTE after the last output has taken place. CICS detects storage violations involving user-task storage by checking the storage check zones of an element of user-task storage when it receives a command to FREEMAIN that element of storage. It also checks the chains when it FREEMAINs all the storage belonging to a task when the task ends.

The storage violation is detected not at the time it occurs, but only when the SAA chain or the storage check zones are checked.

CICS TS Storage Violation

System Initialization (SIT) parameters:

CHKSTSK = NONE | CURRENT | ALL   Set scope of CICS TS checks for Task Storage Check Zones. It will not change how often CICS TS will perform storage checks (see previous page):

> **NONE**   – Task storage‑violation checking is deactivated.
> **CURRENT**   – Only storage for the current task is checked.
> **ALL**   – Storage for all tasks is checked.

CHKSTRM = NONE | CURRENT: Set scope of CICS TS checks for Terminal I/O storage (TIOAs)

RENTPGM = PROTECT: Read-only DSAs, RDSA and ERDSA, will be allocated from read-only key‑0 protected storage.

STGPROT=YES: Sets Storage Protection in the CICS region. CICS will acquire user transaction storage in key 9 (normally reserved for partition F8), CICS subsystem storage (CICS Key) in the normal partition key. (key 3 for F2). When CICS switches back and forth between applications (transactions) and subsystem, the SPKA instruction sets the proper storage protect key. This prevents user applications from overlaying CICS storage. If "NO" is specified, all storage runs in partition key.

STGRCVY = YES: Corrupted SAAs or check zones are repaired and the transaction continues.

CICS TS storage protection: Attempting to write into the wrong storage area with CICS TS storage protection enabled will cause an application program check (ASRA) with Program Interruption Code = x'**04**' (Protection Exception). CICS TS also checks all application‑supplied addresses, and will cancel the application with an AEYD abend.

Storage Protection options implemented	Execution key of program	Writing to this type of storage will cause ASRA or AEYD abends
Read-only storage (RENTPGM=PROTECT)	CICS-key and user-key.	CICS key 0 read-only storage (RDSA and ERDSA)
Subsystem storage protection (STGPROT=YES)	User-key	All CICS-key storage (CDSA and ECDSA)
Base CICS (all storage is CICS key storage) (RENTPGM=NOPROTECT and **STGPROT=NO)**	CICS-key and user-key	VSE/ESA (operating system) storage only

CICS TS Storage Violation

To diagnose Storage Violation Problems:

```
F2 0103 DFHSM0102 DBDCCICS A storage violation (code x'0F0C') has been
          detected by module DFHSMAR .
F2 0103 DFHME0116 (Module:DFHMEME) CICS symptom string for message DFHSM0102
          is PIDS/564805400 LVLS/411 MS/DFHSM0102 RIDS/DFHSMAR PTFS/VSE411
          RCS/00000F0C.
F2 0103 DFHDU0201 DBDCCICS ABOUT TO TAKE SDUMP. DUMPCODE: SM0102  ,
          DUMPID: 37/0002
F2 0103 0S24I AN SDUMP OR SDUMPX MACRO WAS ISSUED
F2 0103 0S29I DUMP STARTED
F2 0103 0S30I DUMP STARTED.  MEMBER=DF200001.DUMP IN SUBLIB=SYSDUMP.F2
F2 0103 1I51I DUMP COMPLETE
F2 0103 DFHDU0202 DBDCCICS SDUMPX COMPLETE.  SDUMPX RETURN CODE X'00'
```

CICS TS Storage Violation

Random storage overlays are among the most difficult problems to resolve. The best than can be done with an non-recurring problem is to locate the storage which was overlaid, and attempt to identify the data which overlaid it.

1. Format System Dump: Use **CALL DFHPD410 DATA   DEF=0,KE=1,AP=1,SM=1,TR=1**. Locate the failing task in the Kernel Task Summary. It will no longer be visible in the AP Domain Transaction Summary.

2. Locate the exception trace entry ("***EXC***") in the trace table.

3. Print detail (level 2) for the exception trace entry:
   Use **CALL DFHPD410 DATA DEF=0,TR=3,TRS=<ENTRY_NUM=(648)>**.
   Look up violation code (x'**0F0C**') in "***CICS TS Trace Entries***" to see what information is included in the trace entry.

4. Often, you cannot locate the source of these problems from a single occurrence.
   See additional hints on page 76

CICS TS Storage Violation

Prior to Overlay:

'U' (EUDSA) plus task id

```
USER31.00050 02200040 USER storage above 16MB
0000   E4F0F0F0 F0F0F5F0 02203218 00000000   D3D3E340 061C0001 00000000 00000000   *U0000050.......LLT....* 02200040
0020   00000000 00000000 00000040 00000000   00000000 00000000 00000000 00000000   *.....................* 02200060
0040   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 02200080
       ?
       ?
       ?
3A60   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 02203AA0
3A80   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 02203AC0
3AA0   00000000 00000000 E4F0F0F0 F0F0F5F0                                         *......U0000050       * 02203AE0

USER31.00050 02203AF0 USER storage above 16MB
0000   E4F0F0F0 F0F0F5F0 00000000 00000000   00000000 00000000 00000000 00000000   *U0000050.............* 02203AF0
0020   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 02203B10
0040   00000000 00000000 00000000 00000000   022054F0 00000000 00000000 00000000   *..................0..* 02203B30
       ?
       ?
       ?
8C40   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 0220C730
8C60   00000000 00000000 00000000 00000000   00000000 00000000 E4F0F0F0 F0F0F5F0   *..............U0000050* 0220C750
```

After Overlay: (I did this myself, so I knew where it was. Now, let's see if we can find it using CICS TS tools)

```
3A80   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 02203AC0
3AA0   01020304 05060708 11121314 15161718                                         *................     * 02203AE0

USER31.00050 02203AF0 USER storage above 16MB
0000   21222324 25262728 31323334 35363738   00000000 00000000 00000000 00000000   *.....................* 02203AF0
0020   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.....................* 02203B10
```

CICS TS Storage Violation

1. Format System Dump:

```
CALL DFHPD410 DATA    DEF=0,KE=1,AP=1,SM=1,TR=1
```

=== DUMP SUMMARY

DUMPID: 37/0002

DUMPCODE: SM0102

DATE/TIME: 01/03/21 11:37:46 (LOCAL)

MESSAGE: **DFHSM0102 DBDCCICS A storage violation (code X'0F0C') has been detected by module DFHSMAR .**

SYMPTOMS: PIDS/564805400 LVLS/411 MS/DFHSM0102 RIDS/DFHSMAR PTFS/VSE411 PRCS/00000F0C

CICS TS Storage Violation

===AP: AP DOMAIN TRANSACTION SUMMARY

Tran No	Tran Id	Orig Tran	TCA Addr	TWA Addr	EIB Addr	SEIB Addr	EIS Addr	EIUS Addr	Facility Type
TCP	CSTP	CSTP	01C74680	0210A438	0210A0D0	01C74A8C	01C74988	0210A008	
00006	CSSY	CSSY	00596080	0053A000	0058E0D0	0059648C	00596388	0058E008	
00007	CSSY	CSSY	00596680	0053A000	0059E0				
00020	CSSY	CSSY	005BB680	0053A000	0059F0				
00021	CSSY	CSSY	005BB080	0053A000	005B40				
00022	CSNE	CSNE	01C75080	0053A000	021130				
00023	CXPB	CXPB	01C76080	0053A000	021810				
00025	IES0	IES0	00595080	006C0438	006C00				

> We have a problem here. The failing transaction is no longer visible in the AP Domain summary. It is still in the Kernel Task list, but with no transaction number or id.

===KE: Kernel Domain KE_TASK Summary

KE NUM	KE TASK	STATUS	TCA ADDR	TRAN #	TRANSID	DS TASK	KE KTCB	ERROR
?								
?								
?								
001E	02152B00	Unused						
001F	0215F080	***Running**	00000000				01BE8480	035D9020
0020	0215F400	Unused						
0021	0215F780	Not Running	00595080	00025	IES0		01BE8280	035D9020
0022	0215FB00	Unused						
0023	0216C080	Not Running	01C76080	00023	CXPB		01BE8080	035D9020
0027	02115780	Not Running	005BB680	00020	CSSY		03501480	035D9020

CICS TS Storage Violation

2. Locate "*EXC*" entry in trace table:

```
00050 1 AP 00E1 EIP    EXIT   REWRITE                  OK                              00F4,00000000 ....,00000606 ....    =000593=
00050 1 AP 1949 APLI   EVENT  RETURN-FROM-LE/VSE       Rununit_Initialization OK CICSREAD                                  =000594=
00050 1 AP 1948 APLI   EVENT  CALL-TO-LE/VSE           Rununit_End_Invocation CICSREAD                                     =000595=
00050 1 AP 1949 APLI   EVENT  RETURN-FROM-LE/VSE       Rununit_End_Invocation OK CICSREAD                                  =000596=
00050 1 AP 1948 APLI   EVENT  CALL-TO-LE/VSE           Rununit_Termination CICSREAD                                        =000597=
00050 1 AP 1949 APLI   EVENT  RETURN-FROM-LE/VSE       Rununit_Termination OK CICSREAD                                     =000598=
00050 1 AP 1948 APLI   EVENT  CALL-TO-LE/VSE           Thread_Termination                                                  =000599=
00050 1 AP 1949 APLI   EVENT  RETURN-FROM-LE/VSE       Thread_Termination OK                                               =000600=
00050 1 PG 0700 PGHM   ENTRY  FREE_HANDLE_TABLES                                                                           =000601=
00050 1 PG 0701 PGHM   EXIT   FREE_HANDLE_TABLES/OK
00050 1 AP 1941 APLI   EXIT   START_PROGRAM/OK         ....,NO,CICSREAD
      ?
      ?
      ?
XM    1 PG 0801 PGXM   ENTRY  TERMINATE_TRANSACTION
XM    1 PG 0802 PGXM   EXIT   TERMINATE_TRANSACTION/OK
XM    1 SM 0F01 SMAR   ENTRY  RELEASE_TRANSACTION_STG                                                                      =000642=
XM    1 SM 0F0D SMAR   EVENT  Storage_released         USER24 storage at 006C1008                                         =000643=
XM    1 XM 1001 XMIQ   ENTRY  SET_TRANSACTION          INCREMENT                                                          =000644=
XM    1 XM 1002 XMIQ   EXIT   SET_TRANSACTION/OK                                                                          =000645=
XM    1 AP 1700 TFIQ   ENTRY  SET_TERMINAL_FACILITY YES                                                                   =000646=
XM    1 AP 1701 TFIQ   EXIT   SET_TERMINAL_FACILITY/EXCEPTION NO_TERMINAL                                                 =000647=
XM    1 SM 0F0C SMAR   *EXC*  Storage_check_failed_at_address 02203AF0 RELEASE_TRANSACTION_STG                            =000648=
XM    1 ME 0301 MEME   ENTRY  SEND_MESSAGE             66,SMD102,036848FE , 00000002,036848E0 , 00000008,SM              =000649=
```

> Hopefully, the failing transaction is still in the trace table. Search on "*EXC*"
> Backing up from this "exception entry", we find the transaction termination for task 00050, program CICSREAD.

CICS TS Storage Violation

3. Print detail for the exception trace entry (number 000648):

```
CALL DFHPD410 DATA DEF=0, TR=3, TRS=<ENTRY_NUM=(648)>
```

```
SM 0F0C SMAR  *EXC* - Storage_check_failed_at_address - 02203AF0 FUNCTION(RELEASE_TRANSACTION_STG)
       TASK-XM    KE_NUM-001F TCB-00342000 RET-836A84A4 TIME-11:37:46.9870023767 INTERVAL-00.0000019531 =000648=
    1-0000  00280000 000000D1 00000000 00000000  B0000000 00000000 02000100 00000000   *...........................*
      0020  00000000 00000000

    2-0000  02203AF0

    3-0000  00008C80

    4-0000  21222324 25262728 31323334 35363738  00000000 00000000 00000000 00000000   *...........................*
      0020  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      0040  00000000 00000000 00000000 00000000  022054F0 00000000 00000000 00000000
      01C0  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      01E0  00000000 00000000 00000000 00000000  00000000 00000000 00000030 00000000   *...........................*

    5-0000  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      0020  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      0040  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000   *...........................*
      01C0  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      01E0  00000000 00000000 00000000 00000000  00000000 00000000 E4F0F0F0 F0F0..

    6-0000  00000000 00000000 00000650 0220A790  00000000 00000000 00000000 00000000
      0020  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      0040  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      03C0  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      03E0  00000000 00000000 00000000 00000000  01020304 05060708 11121314 15161718   *...........................*

    7-0000  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      0020  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
      0040  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
```

Parm 1: SMAR parameter list

Parm 2: Address of corrupted User Task Storage Area

Parm 3: Length of corrupted User Task Storage Area

Parm 4: Corrupted User Task Storage Area (first 512 bytes)

Parm 5: Corrupted User Task Storage Area (last 512 bytes)

Parm 6: 1024 bytes preceding corrupted storage area

Parm 7: 1024 bytes following corrupted storage area

CICS TS Storage Violation

4. Look up violation code (x'0F0C') in "*CICS TS Trace Entries*"

1.1.3.13 Storage manager domain trace points

Table 96. Storage manager domain trace points

Point ID	Module	Lvl	Type	Data included in level2 Trace entry
SM 0F0C	DFHSMAR	Exc	Storage check failure	1 SMAR parameter list 2 Storage address where the storage violation was detected. 3 Length of User Transaction Storage * 4 First x'200' bytes of User Transaction Storage * 5 Last x'200' bytes of User Transaction Storage * 6 x'400' bytes preceding violation. * 7 x'400' bytes following User Transaction Storage

* Entries invalid in manual.

CICS TS Storage Violation

So let's summarize what we know about this error:

1. Location overlaid: (32 bytes, centered around x'**02203AF0**')

2. Data which overlaid the storage: (**X'01020304 05060708 11121314 15161718 21222324 25262728 31323334 35363738**')

3. Transactions (programs) which were running at the time of failure.
   See **AP DOMAIN TRANSACTION SUMMARY**.

   Caution: The overlay may have occurred any time during the life of this transaction. So, for a comprehensive "suspects list", we would have to go back through the trace and identify all programs which were active at any point during the life of this transaction).

Most of the time, storage violations are caused by the failing transaction, usually by exceeding the size of the requested user storage block. If you do not recognize the data, or cannot find an obvious error in the failing program, it may be coming from another program. In any case, we often have to wait for it to fail again. But this time, we can be prepared:

1. Turn on Aux Trace: (if it is not already on): **AUXTR =ON** in DFHSIT. Be sure to define two Auxilliary trace datasets, and specify **AUXTRSW=YES** to automatically switch when one is full.

2. Enable Internal Tracing: **INTTR=YES** in DFHSIT. Consider increasing the size of the internal trace table beyond the 80K default with VSE/ESA (**TRTABSZ=NNN**, in K)

3. Start collecting incidents: Make a list of the type of overlay, location, and the programs active at any time during the failing transaction lifetime. Eventually, you will see trends allowing you to narrow down the problem scope.

4. Contact CICS Level2 for specialized trace assistance.

CICS TS Short on Storage

To diagnose Short on Storage Problems:

```
F2 0091  DFHSM0133 FJC2CICS CICS is under stress (short on storage above 16MB).
F2 0091  DFHDU0201 FJC2CICS ABOUT TO TAKE SDUMP. DUMPCODE: SM0133   ,
         DUMPID: 1/0001
F2 0091  0S24I AN SDUMP OR SDUMPX MACRO WAS ISSUED
F2 0091  0S29I DUMP STARTED
```

1. **Format System Dump:** Use **DFHPD410 DEF=0,KE=3,AP=3,SM=3,TR=1**

2. **Locate failing task:** Search for "**SUSPEND QUEUE**".

3. **Check Space Management Summary:**

4. **Locate Kernel Linkage Stack:**

5. **Check exception trace entry:**

6. **Request trace detail for the exception entry:**

7. **Locate the failing code:**

CICS TS Short on Storage

CICS TS manages eight separate storage areas (DSAs) as follows:

CDSA   The CICS Key DSA:

RDSA   The read-only DSA:

SDSA   The shared DSA:

UDSA   The user DSA:

ECDSA   The extended CICS-key DSA:

ERDSA   The extended read-only DSA:

ESDSA   The extended shared DSA:

EUDSA   The extended user DSA:

CICS TS Short on Storage

<u>Speaker Notes:</u>

3. **Check Space Management Summary:** for the failing DSA. How many tasks are waiting? How often have we come up short? Has the DSA been extended into multiple extents?

4. **Locate Kernel Linkage Stack:** for the failing transaction (task). Contains sequence of calls by CICS TS system routines which preceded the error. This will show us the CICS TS system functions performed just prior to detecting the error, and often helps us ascertain how we got into this fix in the first place.

5. **Check exception trace entry:** in the trace table and compare with results from step 4.

6. **Request trace detail for the exception entry:** and others, as required, by re-running DFHPD410, The detailed trace will often show an explanation for the parameters in a level 1 trace entry.

7. **Locate the failing code:** if you suspect that the GETMAIN request is invalid, (See page 22). Unfortunately, the program storage is not formatted for this kind of a problem, so we have to find the program load address from the trace table, and use INFOANA to print that section of the dump.

CICS TS manages eight separate storage areas (DSAs) as follows:

CDSA	**CICS Key DSA:** allocated below the 16MB boundary, always from CICS-key storage	
RDSA	**Read-only DSA:** allocated below the 16MB boundary from either read-only storage or CICS-key storage depending on the **RENTPGM** system initialization parameter	
SDSA	**Shared DSA:** allocated below the 16MB boundary from either user-key or CICS-key storage depending on the **STGPROT** system initialization parameter.	
UDSA	**User DSA:** allocated below the 16MB boundary from either user-key or CICS-key storage depending on the **STGPROT** system initialization parameter	
ECDSA	**Extended CICS-key DSA:** allocated above the 16MB boundary, always from CICS-key storage	
ERDSA	**Extended read-only DSA:** allocated above the 16MB boundary, either from read-only storage or CICS-key storage, depending on the **RENTPGM** system initialization parameter	
ESDSA	**Extended shared DSA:** allocated above the 16MB boundary from either user-key or CICS-key storage depending on the **STGPROT** system initialization parameter.	
EUDSA	**Extended user DSA:** allocated above the 16MB boundary, from either user-key or CICS-key storage depending on the **STGPROT** system initialization parameter	

CICS TS Short on Storage

1. Format System Dump

```
CALL DFHPD410 DATA    DEF=0, KE=3, AP=3, SM=3, TR=1
```

    DUMPID: 1/0001

    DUMPCODE: SM0133

    DATE/TIME: .....:00 15:17:09 (LOCAL)

    MESSAGE: **DFHSM0133 FJC2CICS CICS is under stress (short on storage above 16MB).**

> This task is asking for 96 million bytes. At first blush, that would appear to be the problem. Let's see who the culprit is.

2. Locate failing task

==SM Suspend queue summary

KE Task	Tran #	Susptok	Subpool	DSA	Request
01A4E080	0000038	0286000B	U0000038	EUDSA	96066416

> Task Address (Use this to locate task in Kernel Task Summary)

CICS TS Short on Storage

3. Check SM Summary for the failing DSA:

```
==SM EUDSA Summary
    Size:                               1024K
    Cushion size:                         0K
    Current free space:                 960K   (93%)
  * Lwm free space:                     960K   (93%)
  * Hwm free space:                    1024K  (100%)
    Largest free area:                  960K
  * Times nostg returned:                 0
  * Times request suspended:              1
    Current suspended:                    1
  * Hwm suspended:                        1
  * Times cushion released:               0
    Currently SOS:                      YES
  * Times went SOS:                       1
  * Time at SOS:              00:00:00.000
  * Storage violations:                   0
    Access:                            CICS
  * Extents added:                        1
  * Extents released:                     0
    Number of extents:                    1

    Extent list:      Start        End          Size        Free
                      01B00000    01BFFFFF     1024K        960K

    * NOTE: these values reset at 18:33:29 GMT (the last statistics collection interval)
```

Hmmm … Only one task,
only one occurrence.
I think we are getting closer.

CICS TS Short on Storage

4. Locate Kernel Linkage Stack

===KE: Kernel Domain KE_TASK Summary

Locate the failing task, by matching the Task Address from the previous page.

KE_NUM	KE_TASK	STATUS	TCA_ADDR	TRAN_#	TRANSID	DS_TASK	KE_KTCB	ERROR
0001	035F5880	KTCB Step	00000000			00000000	035D90B0	
0002	035F5500	KTCB QR	00000000			035F5000	035DB020	
0003	035F5180	KTCB R0	00000000			035D9000	035DA068	
?								
?								
?								
0040	01A41B00	Unused						
0041	01A4E080	Not Running	00594080	00038	QXXX	03507380	035DB020	
0042	01A4E400	Unused						
0043	01A4E780	Not Running	00592680	00024	IES0	03507180	035DB020	

Now, locate the Linkage Stack that matches this Kernel No.

CICS TS Short on Storage

KE_NUM	@STACK	LEN	TYPE	ADDRESS	LINK	REG OFFS	ERROR	NAME
0041	01A4F020	0120	Bot	83609BA0	83609E70	02D0		DFHKETA
0041	01A4F140	01F0	Dom	8362E480	8362E56E	00EE		DFHDSKE
0041	01A4F330	0370	Dom	836A8590	836A8D18	0788		DFHXMTA
0041	01A4F6A0	03A0	Dom	81820CF8	81821600	0908		DFHPGPG
			Int	+00D4	81820D86	008E		INITIAL_LINK
0041	**01A4FA40**	**04E0**	**Dom**	**818D9250**	**818DAF42**	**1CF2**		**DFHAPLI1**
			Int	**+2128**	**818D972E**	**04DE**		**LE370_INTERFACE**
			Int	**+1C94**	**818DB6CC**	**247C**		**GETMAIN**
0041	01A4FF20	0240	Dom	836778E8	83679CBE	23D6		DFHSMGF
			Int	+236C	836779F0	0108		SUSPEND_REQUEST
0041	01A50160	01C0	Sub	83685CF8	83685F80	0288		DFHSMSQ
			Int	+07EA	83685DBE	00C6		SUSPEND_REQUEST
			Int	+011E	836865F4	08FC		CHECK_NOTIFY_REQUIRED
0041	01A50320	0470	Dom	836245C0	83625CFE	173E		DFHDSAT
			Int	+0FD4	836246A6	00E6		CHANGE_PRIORITY
			Int	+1042	836			

Linkage Stack Address.

The culprit appears to be DFHAPLI1 (CICS TS – LE/VSE interface), well perhaps between it and LE/VSE.

KERNSTCK 01A4FA40 STACK ENTRY KERNEL LINKAGE STORAGE

```
0000   000004E0 01A4F6A0 0050AA08 818DAF42E 835FD080F 0000008A0 01A4FE381 005090002 *..........*  01A4FA40
0020   818D92503 01A4FA404 018DA24F5 018DB24E6 018DC24D7 018DD24C8 01A4FE389 01A4FE38A *..........*  01A4FA40
0040   0179FCD8B 00594080C 01A4FA40 00000000 01A4E080 00509000 0050A208 82FFFFC4 *.........*  01A4FA40
0060   01A4FF20 818D9250 01A4F6A0 017180D0 01716080 00000001 00000004 80000000 *.........*  01A4FA40
0080   01A4FDE1 018DC808 018DC                         64C25E 018DC79D 018DC808 *.........*  01A4FA40
00A0   018DC7A5 018DC8D8 01A4F                         A4FDE1 018DC808 018DC7A5 *.........*  01A4FA40
```

Registers (14-12) when DFHAPLI1 was called.

Problem Determination under CICS TS   **Page 83**   **Charles E. Olsen (Nov, 2003)**

CICS TS Short on Storage

5. Check entries in the trace table:

```
00038 1 LD 0002 LDLD   EXIT   ACQUIRE_PROGRAM/OK 82100020, 02100000, 2612, 190, REUSABLE, ESDSA, NEW_COPY   =000667=
00038 1 AP 1940 APLI   ENTRY ESTABLISH_LANGUAGE QXXX01, 02100000, 82100020, 00002612, USER, BELOW, COBOL,    =000668=
        ?
        ?
        ?
00038 1 AP 1940 APLI   ENTRY START_PROGRAM   QXXX01, CEDF, FULLAPI, EXEC, NO, 0179FCD8,                       =000676=
00038 1 SM 0301 SMGF   ENTRY GETMAIN                3A8C, YES, 00, LE_TWA, TASK31                             =000677=
00038 1 SM 0302 SMGF   EXIT  GETMAIN/OK             01B00008                                                  =000678=
```

```
00038 1 AP 1948 APLI   EVENT CALL-TO-LE/VSE              Thread_Initialization QXXX01                         =000679=
00038 1 AP 1949 APLI   EVENT RETURN-FROM LE/VSE          Thread_Initialization OK QXXX01                      =000680=
00038 1 SM 0301 SMGF   ENTRY GETMAIN                     5F220A58, YES, LE_RUWA, TASK31                       =000681=
00038 1 SM 1206 SMPQ   *EXC* Insufficient_storage_to_satisfy_request ALLOCATE_PAGEPOOL_STORAGE,
                                                                     0352E9F8, 5F220A70, YES                  =000682=
00038 1 SM 1001 SMSQ   ENTRY SUSPEND_REQUEST            5F220A70, 0352E9F8, NO                                =000683=
```

Invalid GETVIS length

6. Re-run DFHPD410, requesting trace detail:

```
CALL  DFHPD410  DATA      DEF=0, TR=3, TRS=<ENTRY_NUM=(681)

SM 0301 SMGF   ENTRY - FUNCTION(GETMAIN) GET_LENGTH(5F220A58) SUSPEND(YES) REMARK(LE_RUWA)
                                         STORAGE_CLASS(TASK31)

TASK-00038 KE_NUM-0041 TCB-003B3000 RET-818DAF42   TIME-13:36:04.6478565012
                                                   INTERVAL-00.0000036250=000681=
1-0000   00400000 0000000E 00000000 00000000   B6580000 00000000 015401B0 01A4FFC0
  0020   0354C064 19490008 5F220A58 00000004   006C2148 0100D3C5 6DD9E4E6 C1400708
```

CICS TS Short on Storage

7. Print Program Storage:

```
// JOB INFOANAL PRINT Portion of Dump
// EXEC PROC=DTRINFOA
// EXEC INFOANA,SIZE=300K
   DUMP NAME SYSDUMP.F2.PMR72960
   SELECT DUMP VIEWING
      PRINT 02100000 02002612
      RETURN
   SELECT END
/*
/&
```

```
PRINT  02100000 02002612
02100000   C4C6C8E8 C3F4F1F0 58F00014 58F0F0B4 58F0F00C 58FF000C 07FF0000 00000000  *DFHYC410.0...00..00............*
02100020   47F0F028 00C3C5C5 00000000 00000014 47F0F001 4ACEAC00 021000CC 00000000  *.00..CEE.........00............*
02100040   00000000 00000000 90ECD00C 4110F038 98EFF04C 07FF0000 02100020 02100114  *..............0...0<...........*
02100060   02100FE0 02100080 02100020 021004F8 02101B38 021000E0 00000000 00000006  *...................8...........*
02100080   C4C5D4D6 F0F14040 F2F0F0F1 F0F3F1F3 F1F2F5F7 F4F9F0F1 F0F1F0F0 00000000  *DEMO01   20010313125749010100....*
021000A0   00000000 E08A3C44 00000000 50800B09 00200000 00000000 00808000 0000025C  *............&..................**
021000C0   0000006A 00000800 40404040 05000001 02101AB8 00000000 FFFFFFBC 02100020  *........    ...................*
021000E0   02100058 00000008 00000006 02100058 02101AB8 021016D0 00000005 00000000  *...............................*

02100FC0   58C0D080 05EF58C0 D0E850F0 D0785820 D05C58F0 22244110 938E05EF 40404040  *.........Y&0.....*.0.........   *
02100FE0   00108001 00000000 00000000 00000000 00000000 00000000 00000000 00000000  *...............................*
02101000   00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  *...............................*
02101020   00000000 00000000 F3E3C7E3 00000000 03000000 00010020 00000000 00000000  *.......  3TGT..................*
02101040   00000000 00000000 000004F5 00000000 00000000 00000000 00000000 00000000  *...........5...................*
```

CICS TS Short on Storage

"IDBA" missing between end of code and TGT3 indicates program was compiled nonreentrant (without "RENT" option). This caused LE/VSE to request an invalid amount for 31-bit working storage. When the customer recompiled his program with "RENT", the problem went away.

Sample from another program:

```
0241E280   B6B05820  D05C58F0  21CC4110  A29405EF  947FD1A4  5820D05C  58F02224  4110A284  *.....*.0....sm.m"Ju.  *.0....sd*
0241E2A0   05EF4040  40404040  0241E2B4  0241E42C  0241E2D8  C9C4C2C1  00030000  F400012C  *..        ..S...U...SQIDBA....4...*
0241E2C0   0003F000  03F00000  00400000  01D00000  00003100  00000615  10002000  30000010  *..0..0...  ....................*
0241E2E0   80010000  00000000  00000000  00000000  00000000  00000000  00000000  00000000  *................................*
0241E300   00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000  *................................*
0241E320   00000000  0000F3E3  C7E30000  00000300  00000001  00200000  00000000  00000000  *.....3TGT.......................*
```

CICS TS Short on Storage

Summary:

1. Initial console message DFHSM0133 indicated a short on storage condition in EUDSA. This was confirmed by the preface in the DFHPD410-formatted dump.

2. The Storage Management Suspend Queue Summary pointed to a single task waiting for storage. This task is requesting 96Meg of transaction storage.

3. The EUDSA summary showed a single instance of short on storage, increasing the possibility that the condition was due to a single aberrant request, and not gradual storage consumption.

4. The transaction currently waiting for 96meg of storage was Kernel task number 0041, transaction id **QXXX**.

5. The Kernel Linkage stack shows the storage request immediately followed a call to LE/VSE by DFHAPLI1 (CICS TS – LE/VSE interface module).

6. The sequence from step 5 was confirmed in the trace table. A detailed (FULL) GETMAIN trace entry showed that the storage requested was actually x'**5F220A58**' bytes.

7. Program storage for transaction QXXX was not formatted by DFHPD410 for this type of dump. Printing the storage using INFOANA showed that the program was compiled without the RENT option. Changing the program options to include RENT and re-compiling, corrected the error.

CICS TS Short on Storage

DISPLAY CICS TS STORAGE (Fast Path 364) (IEDC Command)

```
IESADMDCST                    DISPLAY CICS TS STORAGE         Time:   09:40:19
 Applid: DBDCCICS    Sysid: CIC1   Jobname: CICSICCF    CICS TS Level:   110


Storage Protection ...... INACTIVE         Reentrant Programs ..... PROTECT
                                           CICS Trace Table size..      80
 Extended DSA:                      (All sizes in kbyte)    LIMIT   25600
                                    ECDSA     EUDSA     ESDSA     ERDSA   Totals
     Current DSA Size ............  2048      1024      1024      6144    10240
     Current DSA used ............  1876        64         8      5220     7168
    *Peak DSA used ...............  1884        64         8      5220
     Peak DSA Size ...............  2048      1024      1024      6144    10240
     Largest free area/Free Storage 0.95      1.00      1.00      0.94
     Times short-on-storage (SOS)..   0         0         0         0        0


 DSA:                                                        LIMIT    5120
                                    CDSA      UDSA      SDSA      RDSA    Totals
     Current DSA Size .............  512       256       512       512     1792
     Current DSA used .............  344         8       456       344     1152
    *Peak DSA used ................  352        28       456       344
     Peak DSA Size ................  512       256       512       512     1792
     Largest free area/Free Storage. 0.88      1.00      0.86      0.86
     Times short-on-storage (SOS)...   0         0         0         0        0

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

CICS TS Trace (DFHTU410)

CICS Tracing

1. "Normal" CICS tracing: is performed by the trace domain at predetermined trace points in CICS code during the regular flow of control:
   - ? **SYSTR={ON|OFF}**   Switches the system master trace flag on or off at CICS startup.
   - ? **STNTR={1|(1[,2][,3])|ALL|OFF}**   Specifies the level of CICS standard tracing.
   - ? **STNTRXX={(1,2|1[,2][,3])|ALL|OFF}**   Specifies level of standard tracing for "xx" component.

2. "User" tracing is initiated by application calls:
   - ? **EXEC CICS ENTER TRACENUM**
   - ? **USERTR={ON|OFF}**   Switches the user trace flag on or off at CICS startup.

3. "Special" tracing: Defined for specific CICS functions to assist with pre-defined types of problems:
   - ? **SPCTR={(1,2|1[,2][,3])|ALL|OFF}**   Specifies the level of special tracing.
   - ? **SPCTRXX={(1,2|1[,2][,3])|ALL|OFF}**   Specifies level of special tracing for "xx" component.

CICS TS Trace (DFHTU410)

4. Internal tracing:
   - ? **INTTR={ON|OFF}**   Switches internal trace on or off at CICS startup.
   - ? **TRTABSZ={16|NUMBER-OF-KILOBYTES}**   Defines the size of the CICS internal trace table.

5. External Tracing:
   - ? **AUXTR={OFF|ON}**   Switches auxiliary trace on or off at CICS startup.
   - ? **AUXTRSW={NO|ALL|NEXT}** Specifies automatic switching for auxiliary trace data sets when full.
   - ? One or two dasd files (DFHAUXT and DFHBUXT), may be VSE/VSAM Managed SAM) or tape.

```
// DLBL DFHAUXT,'CICS.AUXTRACE',0,VSAM,CAT=VSESPUC,                    X
              RECSIZE=4096,DISP=(NEW,KEEP),RECORDS=(400,0)
```

   - ? When running DFHTU410 to print trace dataset, change **DISP** to **(OLD,KEEP)**, to retain the aux trace dataset after print is complete, or **(OLD,DELETE)**, to delete it.

6. Three levels of trace points:
   - ? Exception Trace: Always included in internal trace whether trace is enabled or not.
   - ? Level-1 trace points: Designed to give you enough diagnostic information to fix "user" errors.
   - ? Level-2 and higher: Additional trace points for internal tracing. Only use on advice of IBM Support.

CICS TS Trace (DFHTU410)

7. Use on-line transaction CETR to control tracing for this CICS session:

```
CETR                    CICS Trace Control Facility              CIC1 DBDCCICS

Type in your choices.


Item                              Choice       Possible choices


Internal Trace Status      ===>   STARTED      STArted, STOpped
Internal Trace Table Size  ===>   80      K    16K - 1048576K

Auxiliary Trace Status     ===>   STOPPED      STArted, STOpped, Paused
Auxiliary Trace Dataset    ===>   A            A, B
Auxiliary Switch Status    ===>   NO           NO, NExt, All

Master System Trace Flag   ===>   ON           ON, OFf
Master User Trace Flag     ===>   ON           ON, OFf

When finished, press ENTER.


PF1=Help      3=Quit      4=Components      5=Ter/Trn      9=Error List
```

Change to "STA" to initiate external tracing

CICS TS Trace (DFHTU410)

Formatting and Printing the Trace

1. Internal trace can be formatted in one of two ways:
   - ? From a CICS system dump, using the CICS print dump formatter, DFHPD410.
     Level of trace formatting is controlled via "**TR={1|2|3}**" parameter.
   - ? From a transaction dump, using the CICS dump utility program, DFHDU410.
     Level of trace formatting is controlled via execution parm: "**NOABBREV**" or "**NOFULL**".

2. External trace can be formatted using DFHTU410:

```
// JOB PRINT TRACE DATASET
// LIBDEF *,SEARCH=(PRD1.BASE)
// DLBL DFHAUXT,'CICS.AUXTRACE',0,VSAM,CAT=VSESPUC,DISP=(OLD,KEEP)
// EXEC DFHTU410,SIZE=2M,PARM='ABBREV,TASKID=(00081,0072)'
/*
/&
```

   - ? Trace entries can be selected by trace entry number (**ENTRY_NUM**), kernel domain task number (**KE_NUM**), task id (**TASKID**), terminal id (**TERMID**), time period (**TIMERG**), transaction id (**TRANID**) or by domain / trace point (**TYPETR**).
   - ? Only exception trace entries may be printed, if requested (**EXCEPTION**).
   - ? Level of trace formatting (**ABBREV** or **FULL**)

3. "**ABBREV**"iated trace output prints a "one line per entry" trace table. Extended (or **FULL**) trace formatting prints a "many lines per entry" trace table.

4. There are two types of trace entries: Old Style and New Style:

CICS TS Trace (DFHTU410)

Old-Style Abbreviated Trace Entry:

```
00072 1 AP 00E1 EIP   ENTRY READ          0004, 0220A588 ..vh, 0B000602 ..          =007847=
```

| Task Number | | Program Name | Interpretation String | | Field A | Field B | | Trace Entry Number |

| | Domain Trace Point | | | Request Field | | | | |

| TCB (VSE Sub-task Index) | | | | Resource Name (where applicable) | **Field B (For EIP Entry):** | | | |

Field B (For EIP Entry):

Byte 1:   Execution Key ('0B')
Byte 2:   unused
Bytes 3&4: EIBFN ('0602')

Field B (For EIP Exit):

Byte 1:   EIBRESP2
Byte 2:   EIBRESP
Bytes 3&4: EIBFN

Old-Style Full Trace Entry:

```
AP 00E1 EIP ENTRY READ              REQ(0004) FIELD-A(0220A588 ..vh) FIELD-B(0B000602 ....)

TASK-00072 KE_NUM-0022 TCB-00342000 RET-8240268C TIME-14:47:42.7280805170
                                        INTERVAL-00.0000023593     =007847=
```

CICS TS Trace (DFHTU410)

New-Style Abbreviated Trace Entry:

00072 1 LD 0002 LDLD EXIT ACQUIRE_PROGRAM/OK 082402020, 02402000, 1C1A, 527, R =007761=

Domain Trace Point

Function

Trace Entry Number

Task Number

Program Name

Completion Code (if Exit)

TCB (VSE Sub-task Index)

ENTRY … EXIT, or *EXC*

Interpretation String
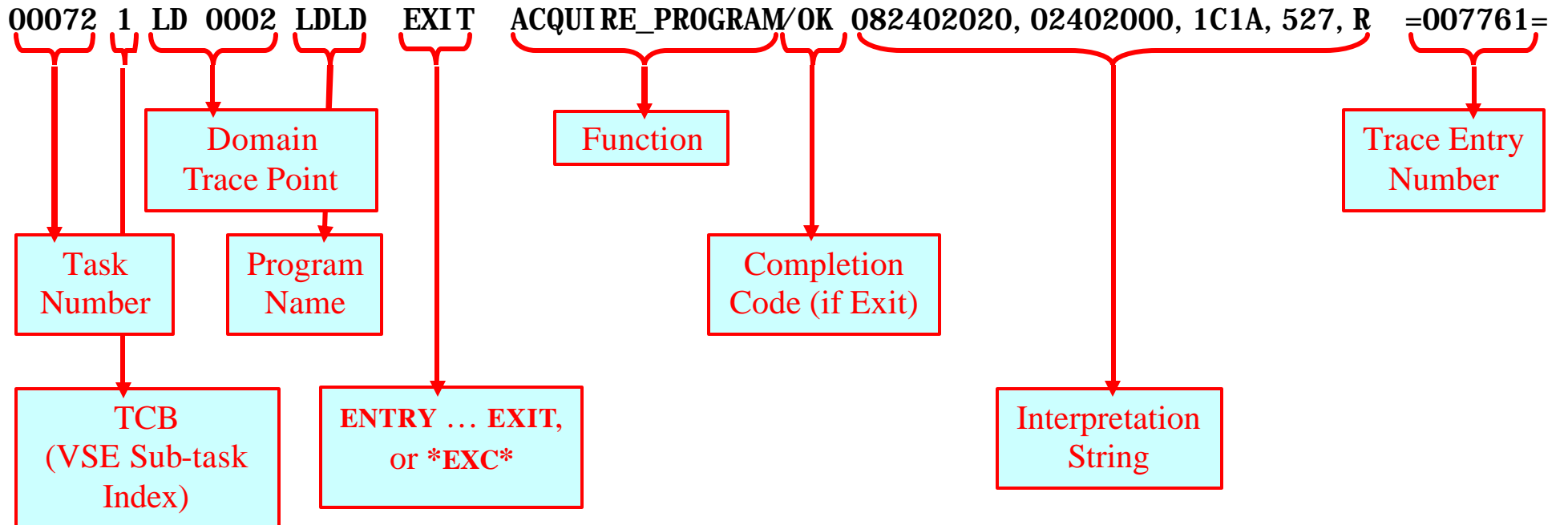
CICS TS Trace (DFHTU410)

New-Style Full Trace Entry:

The full trace entry defines the individual entries in the interpretation string. In addition, the full trace entry also includes other fields and control blocks pertaining to this trace point.
See "*CICS TS Trace Entries*" for a description of the additional data areas.

```
LD 0002 LDLD EXIT - FUNCTION(ACQUIRE_PROGRAM) RESPONSE(OK)  ENTRY_POINT(82402020) LOAD_POINT(02402000)
                                                                               PROGRAM_LENGTH(1C1A)

            FETCH_TIME(527) PROGRAM_ATTRIBUTE(REUSABLE) LOCATION(ESDSA) COPY_STATUS(NEW_COPY)


TASK-00072 KE_NUM-0022 TCB-00342000 RET-81D40D64 TIME- 14:47:39.4471504072 INTERVAL-00.0000037187      =007761=
  1-0000   00880000 0000001C 00000000 00000000   B4680A14 00000000 01680100 C3C9C3E2   *.h..............CICS*
    0020   D9C5C1C4 01CA5C70 02162858 01CA5C70   01020102 82402020 02402000 0A029420   *READ..*.......*.....*
    0040   00001C1A 00000048 00000000 00000000   00000000 00000000 00100000 00000000   *....................*
    0060   10000100 00000527 8102BDD8 021104D0   010001D1         LDLD Parameter List  *........a..Q...}...J.*
    0080   00680200 81FEBE30                                                           *....a...            *
```

1.1.3.7 Loader domain trace points

Table 90. Loader domain trace points

Point_ID	Module	Lvl	Type	Data
LD 0001	DFHLDLD	LD	Entry	1 LDLD parameter list
LD 0002	DFHLDLD	LD	Exit	1 LDLD parameter list

CICS TS Trace (DFHTU410)

```
// EXEC DFHTU410, SIZE=2M, PARM='ABBREV, TASKID=(00081,0072)'
    ?
    ?
    ?
00072 1 LD 0001 LDLD   ENTRY ACQUIRE_PROGRAM       01CA5C70                                                =007750=
00072 1 DS 0002 DSAT   ENTRY CHANGE_MODE           R0                                                      =007751=
00072 2 DS 0003 DSAT   EXIT  CHANGE_MODE/OK         QR                                                      =007752=

00072 2 DS 0002 DSAT   ENTRY CHANGE_MODE           QR                                                      =007759=
00072 1 DS 0003 DSAT   EXIT  CHANGE_MODE/OK         R0                                                      =007760=
00072 1 LD 0002 LDLD   EXIT  ACQUIRE_PROGRAM/OK     82402020, 02402000, 1C1A, 527,  REUSABLE, ESDSA, NEW_COPY  =007761=
00072 1 AP 1940 APLI   ENTRY ESTABLISH_LANGUAGE     CICSREAD, 02402000, 82402020, 000                       =007762=

00072 1 AP 1941 APLI   EXIT  ESTABLISH_LANGUAGE/OK COBOL_LE, 01CDFF6C, ....                                 =007769=
00072 1 AP 1940 APLI   ENTRY START_PROGRAM          CICSREAD, CEDF, FULLAPI, EXEC, NO,                      =007770=

00072 1 AP 00E1 EIP    ENTRY READ                   0004, 0220A588 .. vh, 0B000602 ...                       =007847=

00072 1 AP 04E0 FCFR   ENTRY READ_INTO_UPDATE       0218FA80 ,   0000000C, 0220A7D8,
                                                    C8, 00000000, 0220AA00, A, YES, GTEQ, NO, KEY, NO =007850=

00072 1 AP 04E1 FCFR   EXIT  READ_INTO_UPDATE/OK   C8, C8, 0, 00000000, , LENGTH_OK                         =008119=
00072 1 AP 00E1 EIP    EXIT  READ                   OK 00F4, 00000000 ...., 00000602                        =008120=

00072 1 AP 00E1 EIP    ENTRY SEND-TC                0004, 0220A588 .. vh, 0B000404 ...                       =008121=
00072 1 AP FD01 ZARQ   ENTRY APPL_REQ               021E9420, WAIT                                          =008122=
00072 1 AP FD18 ZSDS   ENTRY SEND_DFSYN             021E9420, A001, ZRVX                                     =008123=

00072 1 AP FD81 ZARQ   EXIT  APPL_REQ                                                                       =008155=
00072 1 AP 00E1 EIP    EXIT  SEND-TC                OK 00F4, 00000000 ...., 00000404                        =008156=
```

CICS TS Trace (DFHTU410)

```
00072  1 AP 00E1 EIP    ENTRY  RECEIVE-TC        0004, 0220A588 . . vh, 0B000402 . . .          =008157=

00072  1 AP FD01 ZARQ   ENTRY  APPL_REQ          021E9420, READ, WAIT                           =008158=

00072  1 DS 0004 DSSR   ENTRY  SUSPEND           01880017, DFHZARQ1, ZCIOWAIT, YES              =008161=



00081  1 LD 0001 LDLD   ENTRY  ACQUIRE_PROGRAM   01CA5C70                                       =012472=

00081  1 LD 0002 LDLD   EXIT   ACQUIRE_PROGRAM/OK    82402020, 02402000, 1C1A, 0,  REUSABLE, ESDSA, OLD_COPY    =012473=

00081  1 AP 1940 APLI   ENTRY  START_PROGRAM     CICSREAD, CEDF, FULLAPI, EXEC, NO,             =012474=

00081  1 AP 00E1 EIP    ENTRY  READ               0004, 0221A588 . . vh, 0B000602 .             =012543=

00081  1 AP 04E0 FCFR   ENTRY  READ_INTO_UPDATE   0218FA80 ,   0000000C, 0221A7D8, C8,
                                                  00000000, 0221AA00, A, YES, GTEQ, NO, KEY, NO  =012546=

00081  1 SM 0301 SMGF   ENTRY  GETMAIN           01BE9944 ,   0000007E, E4, YES, VSWA           =012547=
00081  1 SM 0302 SMGF   EXIT   GETMAIN/OK        005A2630                                       =012548=
00081  1 DS 0004 DSSR   ENTRY  WAIT_OLDW         KSDS, FCIOWAIT, 00ABC841, NO, IO               =012549=
00081  1 DS 0005 DSSR   EXIT   WAIT_OLDW/OK                                                     =012550=

00081  1 AP 04B7 FCVS   *EXC*  VSAM              EXCEPTION  VSAM RPL                            =012551=

00081  1 SM 0C01 SMMG   ENTRY  GETMAIN           80, YES, USER                                  =012552=
00081  1 SM 0C02 SMMG   EXIT   GETMAIN/OK        0221C778                                       =012553=
00081  1 AP 04B7 FCVS   *EXC*  VSAM              EXCEPTION  VSAM RPL                            =012554=

00081  1 AP 04BA FCVS   *EXC*  WAIT_FOR_EXCLUSIVE_CONTROL                                       =012555=

00081  1 DS 0004 DSSR   ENTRY  WAIT_OLDC         KSDS, FCXCWAIT, 005A26B4, YES, IO              =012556=
```