```
LOC  OBJECT CODE  ADDR1  ADDR2  STMT
                                    2 ************************************************************************
                                    3 *
                                    4 *            TRE instruction tests
                                    5 *
                                    6 *        NOTE: This test is based the CLCL-et-al Test
                                    7 *              modified to only test the Performance
                                    8 *              of the TRE instruction.
                                    9 *
                                   10 *        James Wekel August 2022
                                   11 ************************************************************************
                                   12 ************************************************************************
                                   13 *
                                   14 *            TRE Performance instruction tests
                                   15 *
                                   16 ************************************************************************
                                   17 *
                                   18 *  This program ONLY tests the performance of the TRE
                                   19 *  instructions.
                                   20 *        Tests:
                                   21 *              1. TRE of 512 bytes
                                   22 *              2. TRE of 512 bytes that crosses a page boundary,
                                   23 *                 which results in a CC=3, and a branch back
                                   24 *                 to complete the TRE instruction
                                   25 *              3. TRE of 2048 bytes
                                   26 *              4. TRE of 2048 bytes that crosses a page boundary,
                                   27 *                 which results in a CC=3, and a branch back
                                   28 *                 to complete the TRE instruction
                                   29 *
                                   30 ************************************************************************
                                   31 *  NOTE: When assembling using SATK, use the "-t S390" option.
                                   32 ************************************************************************
                                   33 *
                                   34 *  Example Hercules Testcase:
                                   35 *
                                   36 *
                                   37 *     *Testcase TRE-02-performance (Test TRE instructions)
                                   38 *
                                   39 *     archlvl     390
                                   40 *     mainsize    3
                                   41 *     numcpu      1
                                   42 *     sysclear
                                   43 *
                                   44 *     loadcore    "$(testpath)/TRE-02-performance"
                                   45 *
                                   46 *     r           21fd=ff   # (enable timing tests)
                                   47 *     runtest     20        # (depends on the host)
                                   48 *qui
                                   49 *     *Done
                                   50 *
                                   51 *
                                   52 ************************************************************************
```

```
 LOC         OBJECT CODE        ADDR1     ADDR2     STMT

                                                       54          PRINT OFF
                                                     3435          PRINT ON

                                                     3437 ********************************************************************************
                                                     3438 *        SATK prolog stuff...
                                                     3439 ********************************************************************************

                                                     3441          ARCHLVL  ZARCH=NO,MNOTE=NO
                                                     3443+$AL      OPSYN AL
                                                     3444+$ALR     OPSYN ALR
                                                     3445+$B       OPSYN B
                                                     3446+$BAS     OPSYN BAS
                                                     3447+$BASR    OPSYN BASR
                                                     3448+$BC      OPSYN BC
                                                     3449+$BCTR    OPSYN BCTR
                                                     3450+$BE      OPSYN BE
                                                     3451+$BH      OPSYN BH
                                                     3452+$BL      OPSYN BL
                                                     3453+$BM      OPSYN BM
                                                     3454+$BNE     OPSYN BNE
                                                     3455+$BNH     OPSYN BNH
                                                     3456+$BNL     OPSYN BNL
                                                     3457+$BNM     OPSYN BNM
                                                     3458+$BNO     OPSYN BNO
                                                     3459+$BNP     OPSYN BNP
                                                     3460+$BNZ     OPSYN BNZ
                                                     3461+$BO      OPSYN BO
                                                     3462+$BP      OPSYN BP
                                                     3463+$BXLE    OPSYN BXLE
                                                     3464+$BZ      OPSYN BZ
                                                     3465+$CH      OPSYN CH
                                                     3466+$L       OPSYN L
                                                     3467+$LH      OPSYN LH
                                                     3468+$LM      OPSYN LM
                                                     3469+$LPSW    OPSYN LPSW
                                                     3470+$LR      OPSYN LR
                                                     3471+$LTR     OPSYN LTR
                                                     3472+$NR      OPSYN NR
                                                     3473+$SL      OPSYN SL
                                                     3474+$SLR     OPSYN SLR
                                                     3475+$SR      OPSYN SR
                                                     3476+$ST      OPSYN ST
                                                     3477+$STM     OPSYN STM
                                                     3478+$X       OPSYN X
                                                     3479+$AHI     OPSYN AHI
                                                     3480+$B       OPSYN J
                                                     3481+$BC      OPSYN BRC
                                                     3482+$BE      OPSYN JE
                                                     3483+$BH      OPSYN JH
                                                     3484+$BL      OPSYN JL
                                                     3485+$BM      OPSYN JM
                                                     3486+$BNE     OPSYN JNE
```

```
 LOC         OBJECT CODE        ADDR1     ADDR2     STMT

                                                    3487+$BNH     OPSYN JNH
                                                    3488+$BNL     OPSYN JNL
                                                    3489+$BNM     OPSYN JNM
                                                    3490+$BNO     OPSYN JNO
                                                    3491+$BNP     OPSYN JNP
                                                    3492+$BNZ     OPSYN JNZ
                                                    3493+$BO      OPSYN JO
                                                    3494+$BP      OPSYN JP
                                                    3495+$BXLE    OPSYN JXLE
                                                    3496+$BZ      OPSYN JZ
                                                    3497+$CHI     OPSYN CHI
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   3499 ********************************************************************************
                                                   3500 *        Initiate the TRE02TST CSECT in the CODE region
                                                   3501 *        with the location counter at 0
                                                   3502 ********************************************************************************

                                                   3504 TRE02TST ASALOAD  REGION=CODE
                           00000000  00003000      3505+TRE02TST START 0,CODE
00000000  000A0000 00000008                        3507+         PSW   0,0,2,0,X'008'      64-bit Restart ISR Trap New PSW
00000008                   00000008  00000058      3508+         ORG   TRE02TST+X'058'
00000058  000A0000 00000018                        3510+         PSW   0,0,2,0,X'018'      64-bit External ISR Trap New PSW
00000060  000A0000 00000020                        3511+         PSW   0,0,2,0,X'020'      64-bit Supervisor Call ISR Trap New PSW
00000068  000A0000 00000028                        3512+         PSW   0,0,2,0,X'028'      64-bit Program ISR Trap New PSW
00000070  000A0000 00000030                        3513+         PSW   0,0,2,0,X'030'      64-bit Machine Check Trap New PSW
00000078  000A0000 00000038                        3514+         PSW   0,0,2,0,X'038'      64-bit Input/Output Trap New PSW
00000080                   00000080  00000200      3515+         ORG   TRE02TST+512



                                                   3517 ********************************************************************************
                                                   3518 *        Create IPL (restart) PSW
                                                   3519 ********************************************************************************

                                                   3521          ASAIPL   IA=BEGIN
                           00000000  00003000      3522+TRE02TST CSECT
00000200                   00000200  00000000      3523+         ORG   TRE02TST
00000000  00080000 00000200                        3524+         PSW   0,0,0,0,BEGIN,24
00000008                   00000008  00000200      3525+         ORG   TRE02TST+512     Reset CSECT to end of assigned storage area
                           00000000  00003000      3526+TRE02TST CSECT
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    3528 ************************************************************************
                                                    3529 *               The actual "TRE02TST" program itself...
                                                    3530 ************************************************************************
                                                    3531 *
                                                    3532 *  Architecture Mode: 390
                                                    3533 *  Addressing Mode:   31-bit
                                                    3534 *  Register Usage:
                                                    3535 *
                                                    3536 *   R0       (work)
                                                    3537 *   R1       I/O device used by ENADEV and RAWIO macros
                                                    3538 *   R2       First base register
                                                    3539 *   R3       IOCB pointer for ENADEV and RAWIO macros
                                                    3540 *   R4       IO work register used by ENADEV and RAWIO
                                                    3541 *   R5-R7    (work)
                                                    3542 *   R8       ORB pointer
                                                    3543 *   R9       Second base register
                                                    3544 *   R10-R13  (work)
                                                    3545 *   R14      Subroutine call
                                                    3546 *   R15      Secondary Subroutine call or work
                                                    3547 *
                                                    3548 ************************************************************************

00000200                    00000000                3550          USING  ASA,R0          Low core addressability
00000200                    00000200                3551          USING  BEGIN,R2        FIRST Base Register
00000200                    00001200                3552          USING  BEGIN+4096,R9   SECOND Base Register
00000200                    00000000                3553          USING  IOCB,R3         SATK Device I/O Control Block
00000200                    00000000                3554          USING  ORB,R8          ESA/390 Operation Request Block

00000200  0520                                      3556 BEGIN    BALR   R2,0            Initalize FIRST base register
00000202  0620                                      3557          BCTR   R2,0            Initalize FIRST base register
00000204  0620                                      3558          BCTR   R2,0            Initalize FIRST base register
00000206  5020 203C                      0000023C   3559          ST     R2,SAVER2

0000020A  4190 2800                      00000800   3561          LA     R9,2048(,R2)    Initalize SECOND base register
0000020E  4190 9800                      00000800   3562          LA     R9,2048(,R9)    Initalize SECOND base register

00000212  45E0 29A0                      00000BA0   3564          BAL    R14,INIT        Initalize Program
                                                    3565 *
                                                    3566 **       Run the tests...
                                                    3567 *
00000216  45E0 2050                      00000250   3568          BAL    R14,TEST91      Time TRE   instruction  (speed test)
                                                    3569 *
                                                    3570 ************************************************************************
                                                    3571 *         Test for normal or unexpected test completion...
                                                    3572 ************************************************************************

0000021A  95FF 9FFD                      000021FD   3574          CLI    TIMEOPT,X'FF'   Was this a timing run?
0000021E  4770 29B2                      00000BB2   3575          BNE    EOJ             No, timing run; just go end normally

00000222  9594 9FFE                      000021FE   3577          CLI    TESTNUM,X'94'   Did we end on expected test?
00000226  4770 29E0                      00000BE0   3578          BNE    FAILTEST        No?! Then FAIL the test!
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

0000022A  9500 9FFF                    000021FF  3580          CLI   SUBTEST,X'00'    Did we end on expected SUB-test?
0000022E  4770 29E0                    00000BE0  3581          BNE   FAILTEST         No?! Then FAIL the test!

00000232  47F0 29B2                    00000BB2  3583          B     EOJ              Yes, then normal completion!
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    3585
00000238  00000000                                  3586 SAVER1   DC    F'0'
0000023C  00000000                                  3587 SAVER2   DC    F'0'
00000240  00000000                                  3588 SAVER5   DC    F'0'
00000248  00000000 00000000                         3589 SAVETRT  DC    D'0'              (saved R1/R2 from TRT results)
                                                    3590
00000250                                            3591          DROP  R15
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    3593 ************************************************************************
                                                    3594 *        TEST91                  Time TRE instruction  (speed test)
                                                    3595 ************************************************************************

00000250  91FF 9FFD                      000021FD  3597 TEST91   TM    TIMEOPT,X'FF'    Is timing tests option enabled?
00000254  078E                                     3598          BZR   R14              No, skip timing tests

00000256  4150 2B80                      00000D80  3600          LA    R5,TREPERF         Point R5 --> testing control table
                                                    3601
0000025A                  00000000               3602          USING TRETEST,R5         What each table entry looks like
                                                    3603 *
                          0000025A  00000001      3604 TST91LOP EQU   *
0000025A  5050 2040                  00000240     3605          ST    R5,SAVER5          save current pref table base
                                                    3606 *
0000025E  4360 5000                  00000000     3607          IC    R6,TNUM            Set test number
00000262  4260 9FFE                  000021FE     3608          STC   R6,TESTNUM
                                                    3609 *
                                                    3610 **       Initialize operand data  (move data to testing address)
                                                    3611 *
00000266  58A0 500C                  0000000C     3612          L     R10,OP1WHERE       Where to move operand-1 data to
0000026A  58B0 5010                  00000010     3613          L     R11,OP1LEN           operand-1 length
0000026E  5860 5004                  00000004     3614          L     R6,OP1DATA         Where op1 data is right now
00000272  5870 5010                  00000010     3615          L     R7,OP1LEN          How much of it there is
00000276  0EA6                                     3616          MVCL  R10,R6
                                                    3617 *
00000278  58C0 5014                  00000014     3618          L     R12,OP2WHERE       Where to move operand-2 data to
0000027C  58D0 2ACC                  00000CCC     3619          L     R13,=A(OP2LEN)     How much of it there is
00000280  5860 5008                  00000008     3620          L     R6,OP2DATA         Where op2 data is right now
00000284  5870 2ACC                  00000CCC     3621          L     R7,=A(OP2LEN)          How much of it there is
00000288  0EC6                                     3622          MVCL  R12,R6
                                                    3623 *
0000028A  4300 5001                  00000001     3624          IC    R0,TBYTE           Set test byte


                                                    3626 *
                                                    3627 **       Next, time the overhead...
                                                    3628 *
0000028E  5870 2AEC                  00000CEC     3629          L     R7,NUMLOOPS
00000292  B205 2AF0                  00000CF0     3630          STCK  BEGCLOCK
00000296  0560                                     3631          BALR  R6,0
                                                    3632
00000298  98AC 500C                  0000000C     3633          LM    R10,R12,OPSWHERE     get TRE operands
0000029C  B2A5 00AC                                3634          TRE   R10,R12                do TRE
000002A0  4710 209C                  0000029C     3635          BC    B'0001',*-4            not finished
000002A4  98AC 500C                  0000000C     3636          LM    R10,R12,OPSWHERE
000002A8  4710 20AC                  000002AC     3637          BC    B'0001',*+4
                                                    3638 *        .........ETC.........
                                                    3639          PRINT OFF
                                                    3834          PRINT ON
000005AC  98AC 500C                  0000000C     3835          LM    R10,R12,OPSWHERE
000005B0  4710 23B4                  000005B4     3836          BC    B'0001',*+4
000005B4  98AC 500C                  0000000C     3837          LM    R10,R12,OPSWHERE
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
000005B8  4710 23BC                     000005BC  3838          BC    B'0001',*+4
                                                  3839
000005BC  0676                                    3840          BCTR  R7,R6
000005BE  B205 2AF8                     00000CF8  3841          STCK  ENDCLOCK
000005C2  45F0 2914                     00000B14  3842          BAL   R15,CALCDUR
000005C6  D207 2B08 2B00      00000D08  00000D00  3843          MVC   OVERHEAD,DURATION
                                                  3844 *
                                                  3845 **       Now do the actual timing run...
                                                  3846 *
000005CC  5870 2AEC                     00000CEC  3847          L     R7,NUMLOOPS
000005D0  B205 2AF0                     00000CF0  3848          STCK  BEGCLOCK
000005D4  0560                                    3849          BALR  R6,0
                                                  3850
000005D6  98AC 500C                     0000000C  3851          LM    R10,R12,OPSWHERE          Load TRE operands
000005DA  B2A5 00AC                               3852          TRE   R10,R12                     do TRE
000005DE  4710 23DA                     000005DA  3853          BC    B'0001',*-4                 not finished?
000005E2  98AC 500C                     0000000C  3854          LM    R10,R12,OPSWHERE          Load TRE operands
000005E6  B2A5 00AC                               3855          TRE   R10,R12                     do TRE
000005EA  4710 23E6                     000005E6  3856          BC    B'0001',*-4                 not finished?
                                                  3857 *        .........ETC.........
                                                  3858          PRINT OFF
                                                  4119          PRINT ON
000009F6  98AC 500C                     0000000C  4120          LM    R10,R12,OPSWHERE
000009FA  B2A5 00AC                               4121          TRE   R10,R12
000009FE  4710 27FA                     000009FA  4122          BC    B'0001',*-4
00000A02  98AC 500C                     0000000C  4123          LM    R10,R12,OPSWHERE
00000A06  B2A5 00AC                               4124          TRE   R10,R12
00000A0A  4710 2806                     00000A06  4125          BC    B'0001',*-4
                                                  4126
                                                  4127
00000A0E  0676                                    4128          BCTR  R7,R6
00000A10  B205 2AF8                     00000CF8  4129          STCK  ENDCLOCK
                                                  4130 *
00000A14  D204 2B51 2AD8      00000D51  00000CD8  4131          MVC   PRTLINE+33(5),=CL5'TRE'
00000A1A  45F0 283A                     00000A3A  4132          BAL   R15,RPTSPEED
                                                  4133 *
                                                  4134 *  more performance tests
                                                  4135 *
00000A1E  5850 2040                     00000240  4136          L     R5,SAVER5           restore perf table base
00000A22  4150 5024                     00000024  4137          LA    R5,TRENEXT          Go on to next table entry
00000A26  D503 2AD0 5000      00000CD0  00000000  4138          CLC   =F'0',0(R5)         End of table?
00000A2C  4770 205A                     0000025A  4139          BNE   TST91LOP            No, loop...
00000A30  5810 2038                     00000238  4140          L     R1,SAVER1           Restore register 1
00000A34  5820 203C                     0000023C  4141          L     R2,SAVER2           Restore first base register
00000A38  07FE                                    4142          BR    R14                 Return to caller or FAILTEST
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                          4144 ********************************************************************************
                                          4145 *        RPTSPEED                  Report instruction speed
                                          4146 ********************************************************************************

00000A3A  50F0 2910                 00000B10  4148 RPTSPEED ST    R15,RPTSAVE        Save return address
00000A3E  45F0 2914                 00000B14  4149          BAL   R15,CALCDUR        Calculate duration
                                          4150 *
00000A42  4150 2B08                 00000D08  4151          LA    R5,OVERHEAD        Subtract overhead
00000A46  4160 2B00                 00000D00  4152          LA    R6,DURATION        From raw timing
00000A4A  4170 2B00                 00000D00  4153          LA    R7,DURATION        Yielding true instruction timing
00000A4E  45F0 2968                 00000B68  4154          BAL   R15,SUBDWORD       Do it
                                          4155 *
00000A52  98CD 2B00                 00000D00  4156          LM    R12,R13,DURATION   Convert to...
00000A56  8CC0 000C                 0000000C  4157          SRDL  R12,12             ... microseconds
                                          4158 *
00000A5A  4EC0 2B10                 00000D10  4159          CVD   R12,TICKSAAA       convert HIGH part to decimal
00000A5E  4ED0 2B18                 00000D18  4160          CVD   R13,TICKSBBB       convert LOW  part to decimal
                                          4161 *
00000A62  F877 2B20 2B10      00000D20  00000D10  4162          ZAP   TICKSTOT,TICKSAAA            Calculate...
00000A68  FC75 2B20 2ADD      00000D20  00000CDD  4163          MP    TICKSTOT,=P'4294967296'      ...decimal...
00000A6E  FA77 2B20 2B18      00000D20  00000D18  4164          AP    TICKSTOT,TICKSBBB            ...microseconds
                                          4165 *
00000A74  D20B 2B5B 2B74      00000D5B  00000D74  4166          MVC   PRTLINE+43(L'EDIT),EDIT          (edit into...
00000A7A  DE0B 2B5B 2B23      00000D5B  00000D23  4167          ED    PRTLINE+43(L'EDIT),TICKSTOT+3     ...print line)
```

```
                                          4169          RAWIO 4,FAIL=FAILIO      Print elapsed time on console
00000A80  9200 300E                 0000000E  4170+         MVI   IOCBSC,X'00'          Clear SC information
00000A84  D201 300A 3006      0000000A  00000006  4171+         MVC   IOCBST,IOCBZERO       Clear accumulated status
00000A8A  5810 3000                 00000000  4172+         L     1,IOCBDID             Remember the device ID with which I am working
                                          4173+* Initiate Subchannel-based input/output operation
00000A8E  5840 3018                 00000018  4174+         $L    4,IOCBORB             Locate the ORB for the channel subsystem
00000A92  B233 4000                 00000000  4175+         SSCH  0(4)                  Initiate the I/O operation
00000A96  A774 009D                 00000BD0  4176+         $BC   B'0111',FAILIO        ..Start function failed, report/handle the error
00000A9A  5840 3020                 00000020  4177+         $L    4,IOCBIRB             Locate the IRB storage area
00000A9E                      00000000  4178+         USING IRB,4                 Make it addressable

                                          4180+* Wait for I/O operation to present status via an interruption
00000A9E                                  4181+IOWT0007 DS    0H  Wait for I/O to complete
00000A9E  D207 28C0 0078      00000AC0  00000078  4183+         MVC   IOS0008(8),120(0)               Save Input/Output new PSW
00000AA4  D207 0078 28B8      00000078  00000AB8  4184+         MVC   120(8,0),ION0008              Establish Input/Ouput new PSW
00000AAA  8200 28B0                 00000AB0  4185+         $LPSW WPSW0008                      Wait for event
00000AB0  020A0000 00000000               4186+WPSW0008 PSW   2,0,2,0,0                       Wait for event
00000AB8  00082000 00000AC8               4187+ION0008  PSW   0,0,0,32,IRST0008,24              I/O New PSW: cc==2
00000AC0  00000000 00000000               4188+IOS0008  DC    XL8'00'
                                          4189+* Handle input/output interruption
00000AC8                                  4190+IRST0008 DS    0H
00000AC8  D207 0078 28C0      00000078  00000AC0  4191+         MVC   120(8,0),IOS0008            Restore input/output new PSW
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                         4192+* Process the interruption...
                                         4193+* Validate interruption is for the expected subchannel
00000ACE  5510 00B8                 000000B8  4194+         CL    1,IOSSID              Is this the device for which I am waiting?
00000AD2  A774 FFE6                 00000A9E  4195+         $BNE  IOWT0007              ..No, continue waiting for it
                                         4196+* Accumulate interruption information from IRB
00000AD6  B235 4000                 00000000  4197+         TSCH  0(4)                  Retrive interrupt information
00000ADA  A744 FFE2                 00000A9E  4198+         $BC   B'0100',IOWT0007      CC1 (not status pending), wait for it to arriv
00000ADE  A714 0079                 00000BD0  4199+         $BC   B'0001',FAILIO        CC3 (not operational), an error then
                                         4200+*                                      CC0 (status was pending), accumulate the status
00000AE2  D600 300E 4003      0000000E  00000003  4201+         OC    IOCBSC,IRBSCSW+SCSW2  Accumulate status control
00000AE8  D601 300A 4008      0000000A  00000008  4202+         OC    IOCBST,IRBSCSW+SCSWUS Accumulate device and channel status
00000AEE  9104 300E                 0000000E  4203+         TM    IOCBSC,SCSWSPRI       Primary subchannel status?
00000AF2  A7E4 FFD6                 00000A9E  4204+         $BNO  IOWT0007              ..No, wait for primary status
00000AF6  D203 3010 4004      00000010  00000004  4205+         MVC   IOCBSCCW,IRBSCSW+SCSWCCW  CCW address
00000AFC  D201 3016 400A      00000016  0000000A  4206+         MVC   IOCBRCNT,IRBSCSW+SCSWCNT  Residual count
                                         4207+* Test for errors as specified in the IOCB
00000B02  910C 300A                 0000000A  4208+         TM    IOCBUS,CSWCE+CSWDE    Channel end and device end both accumulated?
00000B06  A7E4 0065                 00000BD0  4209+         $BNO  FAILIO                Hunh? No CE and DE but do have primary status!
                                         4210+* Input/Output operation successful


00000B0A  58F0 2910                 00000B10  4212          L     R15,RPTSAVE        Restore return address
00000B0E  07FF                               4213          BR    R15                Return to caller

00000B10  00000000                           4215 RPTSAVE  DC    F'0'               R15 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4217 ********************************************************************************
                                                   4218 *        CALCDUR                   Calculate DURATION
                                                   4219 ********************************************************************************

00000B14  50F0 2958                       00000B58  4221 CALCDUR  ST    R15,CALCRET        Save return address
00000B18  9057 295C                       00000B5C  4222          STM   R5,R7,CALCWORK     Save work registers
                                                   4223 *
00000B1C  9867 2AF0                       00000CF0  4224          LM    R6,R7,BEGCLOCK     Remove CPU number from clock value
00000B20  8C60 0006                       00000006  4225          SRDL  R6,6                       "
00000B24  8D60 0006                       00000006  4226          SLDL  R6,6                       "
00000B28  9067 2AF0                       00000CF0  4227          STM   R6,R7,BEGCLOCK             "
                                                   4228 *
00000B2C  9867 2AF8                       00000CF8  4229          LM    R6,R7,ENDCLOCK     Remove CPU number from clock value
00000B30  8C60 0006                       00000006  4230          SRDL  R6,6                       "
00000B34  8D60 0006                       00000006  4231          SLDL  R6,6                       "
00000B38  9067 2AF8                       00000CF8  4232          STM   R6,R7,ENDCLOCK             "
                                                   4233 *
00000B3C  4150 2AF0                       00000CF0  4234          LA    R5,BEGCLOCK        Starting time
00000B40  4160 2AF8                       00000CF8  4235          LA    R6,ENDCLOCK        Ending time
00000B44  4170 2B00                       00000D00  4236          LA    R7,DURATION        Difference
00000B48  45F0 2968                       00000B68  4237          BAL   R15,SUBDWORD       Calculate duration
                                                   4238 *
00000B4C  9857 295C                       00000B5C  4239          LM    R5,R7,CALCWORK     Restore work registers
00000B50  58F0 2958                       00000B58  4240          L     R15,CALCRET        Restore return address
00000B54  07FF                                     4241          BR    R15                Return to caller

00000B58  00000000                                 4243 CALCRET  DC    F'0'               R15 save area
00000B5C  00000000 00000000                        4244 CALCWORK DC    3F'0'              R5-R7 save area



                                                   4246 ********************************************************************************
                                                   4247 *        SUBDWORD                  Subtract two doublewords
                                                   4248 *        R5 --> subtrahend, R6 --> minuend, R7 --> result
                                                   4249 ********************************************************************************

00000B68  90AD 2990                       00000B90  4251 SUBDWORD STM   R10,R13,SUBDWSAV   Save registers
                                                   4252 *
00000B6C  98AB 5000                       00000000  4253          LM    R10,R11,0(R5)      Subtrahend  (value to subtract)
00000B70  98CD 6000                       00000000  4254          LM    R12,R13,0(R6)      Minuend     (what to subtract FROM)
00000B74  1FDB                                     4255          SLR   R13,R11            Subtract LOW part
00000B76  47B0 297E                       00000B7E  4256          BNM   *+4+4              (branch if no borrow)
00000B7A  5FC0 2AD4                       00000CD4  4257          SL    R12,=F'1'          (otherwise do borrow)
00000B7E  1FCA                                     4258          SLR   R12,R10            Subtract HIGH part
00000B80  90CD 7000                       00000000  4259          STM   R12,R13,0(R7)      Store results
                                                   4260 *
00000B84  98AD 2990                       00000B90  4261          LM    R10,R13,SUBDWSAV   Restore registers
00000B88  07FF                                     4262          BR    R15                Return to caller

00000B90  00000000 00000000                        4264 SUBDWSAV DC    2D'0'              R10-R13 save area
```

```
  LOC         OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4266 ********************************************************************************
                                                    4267 *        Program Initialization
                                                    4268 ********************************************************************************

00000BA0                                            4270 INIT     DS     0H               Program Initialization

00000BA0  4130 2A50                       00000C50  4272          LA     R3,IOCB_009      Point to IOCB
00000BA4  5880 3018                       00000018  4273          L      R8,IOCBORB       Point to ORB

00000BA8  45F0 29F0                       00000BF0  4275          BAL    R15,IOINIT       Initialize the CPU for I/O operations
00000BAC  45F0 29FE                       00000BFE  4276          BAL    R15,ENADEV       Enable our device making ready for use
00000BB0  07FE                                      4277          BR     R14              Return to caller
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                   4280 ********************************************************************************
                                                   4281 *        Normal completion or Abnormal termination PSWs
                                                   4282 ********************************************************************************


                                                   4284 EOJ      DWAITEND LOAD=YES          Normal completion
00000BB2                                           4286+EOJ      DS    0H
00000BB2  8200 29B8                     00000BB8   4287+          LPSW  DWAT0010
00000BB8  000A0000 00000000                        4288+DWAT0010 PSW   0,0,2,0,X'000000'


                                                   4290 FAILDEV  DWAIT LOAD=YES,CODE=01     ENADEV failed
00000BC0                                           4291+FAILDEV  DS    0H
00000BC0  8200 29C8                     00000BC8   4292+          LPSW  DWAT0011
00000BC8  000A0000 00010001                        4293+DWAT0011 PSW   0,0,2,0,X'010001'


                                                   4295 FAILIO   DWAIT LOAD=YES,CODE=02     RAWIO failed
00000BD0                                           4296+FAILIO   DS    0H
00000BD0  8200 29D8                     00000BD8   4297+          LPSW  DWAT0012
00000BD8  000A0000 00010002                        4298+DWAT0012 PSW   0,0,2,0,X'010002'


                                                   4300 FAILTEST DWAIT LOAD=YES,CODE=BAD    Abnormal termination
00000BE0                                           4301+FAILTEST DS    0H
00000BE0  8200 29E8                     00000BE8   4302+          LPSW  DWAT0013
00000BE8  000A0000 00010BAD                        4303+DWAT0013 PSW   0,0,2,0,X'010BAD'
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                  4305 ************************************************************************
                                                  4306 *        Initialize the CPU for I/O operations
                                                  4307 ************************************************************************

                                                  4309 IOINIT   IOINIT ,
00000BF0  B766 29F8                     00000BF8  4310+IOINIT   LCTL  6,6,IOMK0014       Enable subchannel subclasses for interruptions
00000BF4  47F0 29FC                     00000BFC  4311+         B     IOMK0014+4
00000BF8                                          4312+IOMK0014 DS    0F
00000BF8  FF000000                                4313+         DC    XL4'FF000000'         All subchannel subclasses enabled

00000BFC  07FF                                    4315          BR    R15                Return to caller


                                                  4317 ************************************************************************
                                                  4318 *        Enable the device, making it ready for use
                                                  4319 ************************************************************************

                                                  4321 ENADEV   ENADEV ENAOKAY,FAILDEV,REG=4
00000BFE  5810 2A44                     00000C44  4322+ENADEV   L     1,FIND0015
00000C02  5840 3028                     00000028  4323+         $L    4,IOCBSIB          Locate where the SCHIB is to be stored
00000C06                  00000000                4324+         USING SCHIB,4
00000C06                                          4325+FINL0015 DS    0H   Retrieve Subchannel Information Block for desired device number
00000C06  B234 4000                     00000000  4326+         STSCH 0(4)               Store the SCHIB for first subchannel
00000C0A  A774 FFDB                     00000BC0  4327+         $BC   B'0111',FAILDEV    Subchannel does not exist and device number not found
00000C0E  9101 4005                     00000005  4328+         TM    PMCW1_8,PMCWV      Is the subchannel device number valid?
00000C12  A784 0011                     00000C34  4329+         $BZ   FINN0015           ..No, check the next subchannel
00000C16  D501 4006 3004      00000006  00000004  4330+         CLC   PMCWDNUM,IOCBDEV   Is this the device number being sought?
00000C1C  A774 000C                     00000C34  4331+         $BNE  FINN0015           ..No, check the next subchannel
                                                  4332+* Subchannel found!
00000C20  5010 3000                     00000000  4333+         ST    1,IOCBDID          Remember the subchannel so I/O can be done to it.
00000C24  9680 4005                     00000005  4334+         OI    PMCW1_8,PMCWE      Make sure it is enabled so I/O requests accepted
00000C28  B232 4000                     00000000  4335+         MSCH  0(4)               Enable the subchannel to the channel sub-system
00000C2C  A784 0010                     00000C4C  4336+         $BC   B'1000',ENAOKAY    CC0 (SCHIB updated), device is ready.
00000C30  A7F4 FFC8                     00000BC0  4337+         $B    FAILDEV            CC1,CC2,CC3 (SCHIB update failed), quit
00000C34                                          4338+FINN0015 DS    0H  Advance to next subchannel
00000C34  4110 1001                     00000001  4339+         LA    1,1(0,1)           Advance to next subchannel
00000C38  5510 2A48                     00000C48  4340+         CL    1,FINM0015         Beyond maximum subchannel
00000C3C  A7D4 FFE5                     00000C06  4341+         $BNH  FINL0015           ..No, examine the next subchannel
00000C40  A724 FFC0                     00000BC0  4342+         $BH   FAILDEV            ..Yes, failed to enable the device
00000C44                                          4343+         DROP  4                  Forget SCHIB addressing
00000C44  00010000                                4344+FIND0015 DC    A(X'00010000')     First subchannel subsystem ID
00000C48  0001FFFF                                4345+FINM0015 DC    A(X'0001FFFF')     Last subchannel subsystem ID

00000C4C  07FF                                    4347 ENAOKAY  BR    R15                Return to caller
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                  4349 ********************************************************************************
                                                  4350 *         Structure used by RAWIO identifying
                                                  4351 *         the device and operation being performed
                                                  4352 ********************************************************************************


                                                  4354 IOCB_009 IOCB  X'009',CCW=CONPGM
00000C50  00000000                                4355+IOCB_009 DC    A(0)            +0 Device Identifier (supplied by ENADEV macro)
00000C54  0009                                    4356+         DC    AL2(X'009')     +4 Device address or device number
00000C56  0000                                    4357+         DC    H'0'            +6 Must be zeros
00000C58  D3                                      4358+         DC    AL1(X'D3')      +8 Default detected unit errors
00000C59  3F                                      4359+         DC    AL1(X'3F')      +9 Default detected channel errors
00000C5A  0000                                    4360+         DC    HL2'0'          +10 Accumulated unit and channel errors
00000C5C  0000                                    4361+         DC    HL2'0'          +12 Tested unit and channel status
00000C5E  00                                      4362+         DC    XL1'00'         +14 Accumulated subchannel status control from SCSW
00000C5F  80                                      4363+         DC    XL1'80'         +15 Default unsoliticed wait condition
00000C60  00000000                                4364+         DC    F'0'            +16 I/O status CCW address
00000C64  00000000                                4365+         DC    F'0'            +20 residual count
00000C68  00000CC0                                4366+         DC    A(IORB0016)     +24  Address where ORB is located
00000C6C  00000000                                4367+         DC    A(0)            +28  reserved
00000C70  00000C80                                4368+         DC    A(IIRB0016)     +32 Address where IRB stored
00000C74  00000000                                4369+         DC    A(0)            +36 reserved
00000C78  00000C80                                4370+         DC    A(IIRB0016)     +40 Address where SCHIB stored
00000C7C  00000000                                4371+         DC    A(0)            +44 reserved
00000C80  00000000 00000000                       4372+IIRB0016 DC    16F'0'              Embedded shared IRB and SCHIB area
00000CC0                                          4374+IORB0016 DS    0XL12
00000CC0  00000000                                4375+         DC    A(0)            Word 0 - Interruption Parameter
00000CC4  00                                      4376+         DC    AL1((0)*16+B'0000')  Word 1, bits 0-7
00000CC5  80                                      4377+         DC    BL1'10000000'       Word 1, bits 8-15
00000CC6  FF                                      4378+         DC    AL1(255)            Word 1, bits 16-23
00000CC7  00                                      4379+         DC    BL1'00000000'        Word 1, bits 24-31
00000CC8  00000D28                                4380+         DC    AL4(CONPGM)         Word 2 - CCW address
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    4382 ********************************************************************************
                                                    4383 *        Working Storage
                                                    4384 ********************************************************************************


00000CCC                                            4386          LTORG ,                 Literals pool
00000CCC  00000100                                  4387                =A(OP2LEN)
00000CD0  00000000                                  4388                =F'0'
00000CD4  00000001                                  4389                =F'1'
00000CD8  E3D9C540 40                               4390                =CL5'TRE'
00000CDD  04294967 296C                             4391                =P'4294967296'

                          00000400  00000001        4393 K        EQU   1024            One KB
                          00001000  00000001        4394 PAGE     EQU   (4*K)           Size of one page
                          00010000  00000001        4395 K64      EQU   (64*K)          64 KB
                          00100000  00000001        4396 MB       EQU   (K*K)            1 MB

                          000021FE  00000001        4398 TESTADDR EQU   (2*PAGE+X'200'-2)  Where test/subtest numbers will go
                          000021FD  00000001        4399 TIMEADDR EQU   (TESTADDR-1)       Address of timing tests option flag

                          00200000  00000001        4401 MAINSIZE EQU   (2*MB)                    Minimum required storage size
                          00000020  00000001        4402 NUMPGTBS EQU   ((MAINSIZE+K64-1)/K64)   Number of Page Tables needed
                          00000002  00000001        4403 NUMSEGTB EQU   ((NUMPGTBS*4)/(16*4))    Number of Segment Tables
                          00003000  00000001        4404 SEGTABLS EQU   (3*PAGE)                  Segment Tables Origin
                          00003080  00000001        4405 PAGETABS EQU   (SEGTABLS+(NUMPGTBS*4))  Page Tables Origin
00000CE4  00B00060                                  4406 CRLREG0  DC    0A(0),XL4'00B00060'       Control Register 0
00000CE8  00003002                                  4407 CTLREG1  DC    A(SEGTABLS+NUMSEGTB)      Control Register 1

00000CEC  00002710                                  4409 NUMLOOPS DC    F'10000'          10,000 * 100 = 1,000,000

00000CF0  BBBBBBBB BBBBBBBB                         4411 BEGCLOCK DC    0D'0',8X'BB'      Begin
00000CF8  EEEEEEEE EEEEEEEE                         4412 ENDCLOCK DC    0D'0',8X'EE'      End
00000D00  DDDDDDDD DDDDDDDD                         4413 DURATION DC    0D'0',8X'DD'      Diff
00000D08  FFFFFFFF FFFFFFFF                         4414 OVERHEAD DC    0D'0',8X'FF'      Overhead

00000D10  00000000 0000000C                         4416 TICKSAAA DC    PL8'0'            Clock ticks high part
00000D18  00000000 0000000C                         4417 TICKSBBB DC    PL8'0'            Clock ticks low part
00000D20  00000000 0000000C                         4418 TICKSTOT DC    PL8'0'            Total clock ticks

00000D28  09000044 00000D30                         4420 CONPGM   CCW1  X'09',PRTLINE,0,PRTLNG
00000D30  40404040 40404040                         4421 PRTLINE  DC    C'         1,000,000 iterations of XXXXX'
00000D56  40A39696 9240F9F9                         4422          DC    C' took 999,999,999 microseconds'
                          00000044  00000001        4423 PRTLNG   EQU   *-PRTLINE
00000D74  40202020 6B202020                         4424 EDIT     DC    X'402020206B2020206B202120'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    4426 ********************************************************************************
                                                    4427 *        TRETEST DSECT
                                                    4428 ********************************************************************************


                                                    4430 TRETEST  DSECT ,


00000000  00                                        4432 TNUM     DC    X'00'          TRE table Number
00000001  00                                        4433 TBYTE    DC    X'00'          TRE Testbyte
00000002  00                                        4434          DC    X'00'
00000003  00                                        4435          DC    X'00'


00000004  00000000                                  4437 OP1DATA  DC    A(0)           Pointer to Operand-1 data
00000008  00000000                                  4438 OP2DATA  DC    A(0)           Pointer to Operand-2 data
                                                    4439
                          0000000C  00000001        4440 OPSWHERE EQU   *              Where TRE Operands are located
0000000C  00000000                                  4441 OP1WHERE DC    A(0)           Where Operand-1 data should be placed
00000010  00000000                                  4442 OP1LEN   DC    F'0'           How much data is there - 1
00000014  00000000                                  4443 OP2WHERE DC    A(0)           Where Operand-2 data should be placed
                          00000100  00000001        4444 OP2LEN   EQU   256            Operand-2 is always 256


00000018  00000000                                  4446 FAILMASK DC    A(0)           Failure Branch on Condition mask

0000001C  00000000 00000000                         4448 ENDREGS  DC    A(0),XL4'00'   Ending R1/R2 register values

                          00000024  00000001        4450 TRENEXT  EQU   *              Start of next table entry...



                          AABBCCDD  00000001        4452 REG2PATT EQU   X'AABBCCDD'    Register 2 starting/ending CC0 value
                          000000DD  00000001        4453 REG2LOW  EQU         X'DD'    (last byte above)



                          00000000  00003000        4455 TRE02TST CSECT ,
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4457 ********************************************************************************
                                                    4458 *        TRE Performace Test data...
                                                    4459 ********************************************************************************
00000D80                                            4460 TREPERF  DC    0A(0)      start of table



00000D80  91990000                                  4462 TREPOP1  DC    X'91',X'99',X'00',X'00'
00000D84  00001118 00001C18                         4463          DC    A(TRELOP10),A(TRELOP20)
00000D8C  00020000 00000200                         4464          DC    A(00+(02*K64)),A(512),A(MB+(02*K64))      no crosses
00000D98  00000007                                  4465          DC    A(7) CC0
00000D9C  00020200 AABBCCDD                         4466          DC    A(00+(02*K64)+512),A(REG2PATT)



00000DA4  92990000                                  4468 TREPOP2  DC    X'92',X'99',X'00',X'00'
00000DA8  00001118 00001C18                         4469          DC    A(TRELOP10),A(TRELOP20)
00000DB0  0002FFF4 00000200                         4470          DC    A(00+(03*K64)-12),A(512),A(MB+(03*K64))   op1 crosses
00000DBC  00000007                                  4471          DC    A(7) CC0
00000DC0  000301F4 AABBCCDD                         4472          DC    A(00+(03*K64)-12+512),A(REG2PATT)



00000DC8  93990000                                  4474 TREPOP3  DC    X'93',X'99',X'00',X'00'
00000DCC  00001118 00001C18                         4475          DC    A(TRELOP10),A(TRELOP20)
00000DD4  00040000 00000800                         4476          DC    A(00+(04*K64)),A(2048),A(MB+(04*K64))     no crosses
00000DE0  00000007                                  4477          DC    A(7) CC0
00000DE4  00290800 AABBCCDD                         4478          DC    A(00+(041*K64)+2048),A(REG2PATT)



00000DEC  94990000                                  4480 TREPOP4  DC    X'94',X'99',X'00',X'00'
00000DF0  00001118 00001C18                         4481          DC    A(TRELOP10),A(TRELOP20)
00000DF8  0003FFF4 00000800                         4482          DC    A(00+(04*K64)-12),A(2048),A(MB+(04*K64))  op1 crosses
00000E04  00000007                                  4483          DC    A(7) CC0
00000E08  002907F4 AABBCCDD                         4484          DC    A(00+(041*K64)-12+2048),A(REG2PATT)



00000E10  00000000                                  4486          DC    A(0)       end of table
00000E14  00000000                                  4487          DC    A(0)       end of table
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4489 ********************************************************************************
                                                   4490 *        TRE op1 scan data...
                                                   4491 ********************************************************************************

00000E18  78125634 78125634                        4493 TRTOP10  DC    64XL4'78125634'                (CC0)

00000F18  78125634 78125634                        4495 TRTOP111 DC    04XL4'78125634',X'00110000',59XL4'78125634'    (CC1)

00001018  78125634 78125634                        4497 TRTOP1F0 DC    63XL4'78125634',X'000000F0'    (CC1)
                                                   4498

00001118  78125634 78125634                        4500 TRELOP10 DC    512XL4'78125634'               (CC0)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4502 ********************************************************************************
                                                   4503 *        TRE op2 stop tables...
                                                   4504 ********************************************************************************

00001918  00000000 00000000                        4506 TRTOP20  DC    256X'00'                    no stop

00001A18  00000000 00000000                        4508 TRTOP211 DC    17X'00',X'11',238X'00'      stop on X'11'

00001B18  00000000 00000000                        4510 TRTOP2F0 DC    240X'00',X'F0',15X'00'      stop on X'F0'

00001C18  FF000000 00000000                        4512 TRELOP20 DC    X'FF',255X'00'
```

```
  LOC         OBJECT CODE       ADDR1     ADDR2     STMT

                                          4514 ********************************************************************************
                                          4515 *        Fixed storage locations
                                          4516 ********************************************************************************


00001D18                        00001D18  000021FD  4518          ORG   TRE02TST+TIMEADDR      (s/b @ X'21FD')

000021FD  00                              4520 TIMEOPT  DC    X'00'      Set to non-zero to run timing tests


000021FE                        000021FE  000021FE  4522          ORG   TRE02TST+TESTADDR      (s/b @ X'21FE', X'21FF')

000021FE  00                              4524 TESTNUM  DC    X'00'      Test number of active test
000021FF  00                              4525 SUBTEST  DC    X'00'      Active test sub-test number


00002200                        00002200  00003000  4527          ORG   TRE02TST+SEGTABLS      (s/b @ X'3000')
00003000  00                              4529 DATTABS  DC    X'00'      Segment and Page Tables will go here...
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                  4531 ********************************************************************************
                                                  4532 *        IOCB DSECT
                                                  4533 ********************************************************************************

                                                  4535          DSECTS NAME=IOCB
                                                  4537+IOCB     DSECT
                                                  4538+*     Field usage by: CH SC Description (R->program read-only, X->program read/writ
00000000                                          4539+IOCBDID  DS    0F  +0     R  Device Identifier - Subsystem ID for channel subsystem
00000000  0000                                    4540+         DS    H   +0  R      reserved - must be zeros
00000002  0000                                    4541+IOCBDV   DS    H   +2  R      Channel Unit Device address of I/O operation
00000004  0000                                    4542+IOCBDEV  DS    H   +4  X  X   Device address or device number (R after ENADEV)
00000006  0000                                    4543+IOCBZERO DS    H   +6  R  R   Must be zeros
00000008  00                                      4544+IOCBUM   DS    X   +8  X  X   Unit status test mask
00000009  00                                      4545+IOCBCM   DS    X   +9  X  X   Channel status test mask
0000000A                                          4546+IOCBST   DS    0H  +10 X  X   Input/Output unit and channel status accumulation
0000000A  00                                      4547+IOCBUS   DS    X   +10 R  R   Accumulated unit status
0000000B  00                                      4548+IOCBCS   DS    X   +11 R  R   Accumulated channel status
0000000C  00                                      4549+IOCBUT   DS    X   +14 R  R   Used to test unit status
0000000D  00                                      4550+IOCBCT   DS    X   +13 R  R   Used to test channel status
0000000E  00                                      4551+IOCBSC   DS    X   +14    R   Accumulted subchanel status control
0000000F  00                                      4552+IOCBWAIT DS    X   +15 X  X   Recognized unsolicited interruption unit status events
00000010  00000000                                4553+IOCBSCCW DS    A   +16 R  R   I/O status CCW address
00000014                                          4554+IOCBSCNT DS    0F  +20 R  R   I/O status residual count as a positive full word
00000014  0000                                    4555+         DS    H   +20 R     reserved must be zeros
00000016  0000                                    4556+IOCBRCNT DS    H   +22 R     I/O status residual count as an unsigned halfword
00000018                                          4557+IOCBCAW  DS    0A  +24 X     Channel Address word
00000018  00000000 00000000                       4558+IOCBORB  DS    AD  +24    X  Address of the ORB for channel subsystem I/O
00000020  00000000 00000000                       4559+IOCBIRB  DS    AD  +32    X  Channel subsystem IRB address
00000028  00000000 00000000                       4560+IOCBSIB  DS    AD  +40    X  Channel subsystem SCHIB address
                            00000030  00000001    4561+IOCBL    EQU   *-IOCB  Length of IOCB control block (48) without embedded structures
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4563 ********************************************************************************
                                                   4564 *        ORB DSECT
                                                   4565 ********************************************************************************

                                                   4567          DSECTS NAME=ORB
                                                   4569+ORB      DSECT
00000000  00000000                                 4570+ORBPARM  DC    F'0'     Word 0, bits 0-31

00000004  00                                       4572+ORB1_0   DC    X'00'    Word 1, bits 0-7
                               000000F0  00000001  4573+ORBKEYM  EQU   X'F0'    Word 1, bits 0-3   - Storage Key Mask
                               00000008  00000001  4574+ORBS     EQU   X'08'    Word 1, bit 4      - Suspend Control
                               00000004  00000001  4575+ORBC     EQU   X'04'    Word 1, bit 5      - Streaming Mode Control
                               00000002  00000001  4576+ORBM     EQU   X'02'    Word 1, bit 6      - Modification Control
                               00000001  00000001  4577+ORBY     EQU   X'01'    Word 1, bit 7      - Synchronization Control

00000005  00                                       4579+ORB1_8   DC    X'00'    Word 1, bits 8-15
                               00000080  00000001  4580+ORBF     EQU   X'80'    Word 1, bit 8      - CCW Format-Control
                               00000040  00000001  4581+ORBP     EQU   X'40'    Word 1, bit 9      - Pre-fetch control
                               00000020  00000001  4582+ORBI     EQU   X'20'    Word 1, bit 10     - Initial-status Interruption Control
                               00000010  00000001  4583+ORBA     EQU   X'10'    Word 1, bit 11     - Address Limit Checking Control
                               00000008  00000001  4584+ORBU     EQU   X'08'    Word 1, bit 12     - Suppress-suspended-interruption control
                               00000004  00000001  4585+ORBB     EQU   X'04'    Word 1, bit 13     - Channel-Program-Type Control
                               00000002  00000001  4586+ORBH     EQU   X'02'    Word 1, bit 14     - Format 2-IDAW Control
                               00000001  00000001  4587+ORBT     EQU   X'01'    Word 1, bit 15     - 2K-IDAW control
00000006  00                                       4588+ORBLPM   DC    X'00'    Word 1, bits 16-23 - Logical Path Mask
00000007  00                                       4589+ORRB1_24 DC    X'00'    Word 1, bits 24-31
                               00000080  00000001  4590+ORBL     EQU   X'80'    Word 1, bit 24     - Incorrect Length Suppression Mode
                               0000007F  00000001  4591+ORBRSV3  EQU   X'7F'    Word 1, bits 25-31 - reserved must be zeros
                               00000040  00000001  4592+ORBD     EQU   X'40'    Word 1, bit 25     - MIDAW Addressing Control
                               0000003E  00000001  4593+ORBRSV26 EQU   X'3E'    Word 1, bits 26-30 - reserved must be zeros
                               0000007E  00000001  4594+ORBRSV25 EQU   X'7E'    Word 1, bits 25-30 - reserved must be zeros
                               00000001  00000001  4595+ORBX     EQU   X'01'    Word 1, bit 31     - ORB-extension control

00000008  00000000                                 4597+ORBCCW   DC    A(0)     Word 2, bits 1-31  - Channel Program Address
                               00000080  00000001  4598+ORBRSV4  EQU   X'80'    Word 2, bit 0      - reserved must be zero
                               0000000C  00000001  4599+ORBLEN   EQU   *-ORB Length of standard ORB
                                                   4600+* Extended ORB fields
0000000C  00                                       4601+ORBCSS   DC    X'00'    Word 3, bits 0-7   - Channel Subsystem Priority
0000000D  00                                       4602+ORBRSV5  DC    X'00'    Word 3, bits 8-15  - reserved must be zeros
0000000E                                           4603+ORBPGM   DC    0X'00'   Word 3, bits 16-23 - Transport mode reserves for program us
0000000E  00                                       4604+ORBCU    DC    X'00'    Word 3, bits 16-23 - Control Unit Priority
0000000F  00                                       4605+ORBRSV6  DC    X'00'    Word 3, bits 24-31 - reserved must be zeros
00000010  00000000 00000000                        4606+ORBRSV7  DC    XL16'00' Words 4-7          - reserved must be zeros
                               00000020  00000001  4607+ORBXLEN  EQU   *-ORB Length of extended ORB
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4610 ********************************************************************************
                                                  4611 *        IRB DSECT
                                                  4612 ********************************************************************************

                                                  4614          DSECTS NAME=IRB
                                                  4616+IRB      DSECT Interruption          Response Block
00000000  00000000 00000000                       4617+IRBSCSW  DC    XL12'00' Words 0-2 - Subchannel Status Word (Defined by DSECT SCSW)
0000000C  00000000 00000000                       4618+IRBESW   DC    XL20'00' Words 3-7 - Extended Status Word
00000020  00000000 00000000                       4619+IRBECW   DC    XL32'00' Words 8-15 - Extended Control Word
                             00000040  00000001   4620+IRBL     EQU   *-IRB    IRB Length
00000040  00000000 00000000                       4621+IRBEMW   DC    XL32'00' Words 16-23 - Extended Measurement Word
                             00000060  00000001   4622+IRBXL    EQU   *-IRB    Extended IRB Length
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4625 ********************************************************************************
                                                   4626 *        SCSW DSECT
                                                   4627 ********************************************************************************

                                                   4629          DSECTS NAME=SCSW
                                                   4631+SCSW     DSECT Subchannel          Status Word
00000000  00                                       4632+SCSWFLAG DC    X'00'    Flags
                          000000F0  00000001       4633+SCSWKEYM EQU   X'F0'    Storage Key Mask of subchannel storage key
                          00000008  00000001       4634+SCSWSUSC EQU   X'08'    Suspend Control
                          00000004  00000001       4635+SCSWESWF EQU   X'04'    Extended Status Word Format
                          00000003  00000001       4636+SCSWDCCM EQU   X'03'    Deferred condiont code mask
                          00000000  00000001       4637+SCSWDCC0 EQU   X'00'    Normal I/O interruption
                          00000001  00000001       4638+SCSWDCC1 EQU   X'01'    Deferred condition code is 1
                          00000003  00000001       4639+SCSWDCC3 EQU   X'03'    Deferred condition code is 3

00000001  00                                       4641+SCSWCTLS DC    X'00'    General Controls
                          00000080  00000001       4642+SCSWCCWF EQU   X'80'    CCW Format control when ...
                          00000040  00000001       4643+SCSWCCWP EQU   X'40'    CCW Prefetch Control
                          00000020  00000001       4644+SCSWISIC EQU   X'20'    Initial-Status-Interruption Control
                          00000010  00000001       4645+SCSWALKC EQU   X'10'    Address-Limit-Checking Control
                          00000008  00000001       4646+SCSWSSIC EQU   X'08'    Suppress suspended interruption
                          00000004  00000001       4647+SCSW0CC  EQU   X'04'    Zero-Condition Code
                          00000002  00000001       4648+SCSWECWC EQU   X'02'    Extended Control Word control
                          00000001  00000001       4649+SCSWPNOP EQU   X'01'    Path Not Operational

00000002  00                                       4651+SCSW1    DC    X'00'    Control Byte 1
                          00000070  00000001       4652+SCSWFM   EQU   X'70'    Functional Control Mask
                          00000040  00000001       4653+SCSWFS   EQU   X'40'    Function Control - Start Function
                          00000020  00000001       4654+SCSWFH   EQU   X'20'    Function Control - Halt Function
                          00000010  00000001       4655+SCSWFC   EQU   X'10'    Function Control - Clear Function
                          00000008  00000001       4656+SCSWARP  EQU   X'08'    Activity Control - Resume pending
                          00000004  00000001       4657+SCSWASP  EQU   X'04'    Activity Control - Start pending
                          00000002  00000001       4658+SCSWAHP  EQU   X'02'    Activity Control - Halt pending
                          00000001  00000001       4659+SCSWACP  EQU   X'01'    Activity Control - Clear pending
00000003  00                                       4660+SCSW2    DC    X'00'    Control Byte 2
                          00000080  00000001       4661+SCSWASA  EQU   X'80'    Activity Control - Subchannel Active
                          00000040  00000001       4662+SCSWADA  EQU   X'40'    Activity Control - Device Active
                          00000020  00000001       4663+SCSWASUS EQU   X'20'    Activity Control - Suspended
                          00000010  00000001       4664+SCSWSAS  EQU   X'10'    Status Control   - Alert Status
                          00000008  00000001       4665+SCSWSINT EQU   X'08'    Status Control   - Intermediate Status
                          00000004  00000001       4666+SCSWSPRI EQU   X'04'    Status Control   - Primary Status
                          00000002  00000001       4667+SCSWSSEC EQU   X'02'    Status Control   - Secondary Status
                          00000001  00000001       4668+SCSWSPEN EQU   X'01'    Status Control   - Status Pending

00000004  00000000                                 4670+SCSWCCW  DC    A(0)     CCW Address

00000008  00                                       4672+SCSWUS   DC    X'00'    Unit Status
                          00000080  00000001       4673+SCSWATTN EQU   X'80'    Attention
                          00000040  00000001       4674+SCSWSM   EQU   X'40'    Status modifier
                          00000020  00000001       4675+SCSWCUE  EQU   X'20'    Control-unit end
                          00000010  00000001       4676+SCSWBUSY EQU   X'10'    Busy
                          00000008  00000001       4677+SCSWCE   EQU   X'08'    Channel end
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                               00000004  00000001  4678+SCSWDE   EQU   X'04'    Device end
                               00000002  00000001  4679+SCSWUC   EQU   X'02'    Unit check
                               00000001  00000001  4680+SCSWUX   EQU   X'01'    Unit exception

00000009  00                                       4682+SCSWCS   DC    X'00'    Channel Status
                               00000080  00000001  4683+SCSWPCI  EQU   X'80'    Program-controlled interruption
                               00000040  00000001  4684+SCSWIL   EQU   X'40'    Incorrect length
                               00000020  00000001  4685+SCSWPRGM EQU   X'20'    Program check
                               00000010  00000001  4686+SCSWPROT EQU   X'10'    Protection Check
                               00000008  00000001  4687+SCSWCDAT EQU   X'08'    Channel-data check
                               00000004  00000001  4688+SCSWCCTL EQU   X'04'    Channel-control check
                               00000002  00000001  4689+SCSWICTL EQU   X'02'    Interface-control check
                               00000001  00000001  4690+SCSWCHNG EQU   X'01'    Chaining check

0000000A  0000                                     4692+SCSWCNT  DC    H'0'     Residual CCW count
                               0000000C  00000001  4693+SCSWL    EQU   *-SCSW
```

```
 LOC         OBJECT CODE        ADDR1     ADDR2     STMT
                                                    4696 ********************************************************************************
                                                    4697 *        (other DSECTS needed by SATK)
                                                    4698 ********************************************************************************

                                                    4700          DSECTS PRINT=OFF,NAME=(ASA,SCHIB,CCW0,CCW1,CSW)
```

```
                                                    4976          PRINT ON

                                                    4978 ********************************************************************************
                                                    4979 *        Register equates
                                                    4980 ********************************************************************************

                           00000000  00000001  4982 R0        EQU   0
                           00000001  00000001  4983 R1        EQU   1
                           00000002  00000001  4984 R2        EQU   2
                           00000003  00000001  4985 R3        EQU   3
                           00000004  00000001  4986 R4        EQU   4
                           00000005  00000001  4987 R5        EQU   5
                           00000006  00000001  4988 R6        EQU   6
                           00000007  00000001  4989 R7        EQU   7
                           00000008  00000001  4990 R8        EQU   8
                           00000009  00000001  4991 R9        EQU   9
                           0000000A  00000001  4992 R10       EQU   10
                           0000000B  00000001  4993 R11       EQU   11
                           0000000C  00000001  4994 R12       EQU   12
                           0000000D  00000001  4995 R13       EQU   13
                           0000000E  00000001  4996 R14       EQU   14
                           0000000F  00000001  4997 R15       EQU   15
```

```
                                                    4999          END
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ASA	4	00000000	512	4704	3550
ASBEGIN	U	00000000	1	4705	4710 4752 4788 4797 4815 4822 4828 4832 4836 4842 4859
ASEND	U	00000200	1	4858	4859
ASLENGTH	U	00000200	1	4859	
BCEXTCOD	H	0000001A	2	4722	
BCIOCOD	H	0000003A	2	4730	
BCMCKCOD	H	00000032	2	4728	
BCPGMCOD	H	0000002A	2	4726	
BCSVCCOD	H	00000022	2	4724	
BEGCLOCK	D	00000CF0	8	4411	3630 3848 4224 4227 4234
BEGIN	I	00000200	2	3556	3524 3551 3552
CALCDUR	I	00000B14	4	4221	3842 4149
CALCRET	F	00000B58	4	4243	4221 4240
CALCWORK	F	00000B5C	4	4244	4222 4239
CAW	F	00000048	4	4734	
CAWADDR	R	00000049	3	4737	
CAWKEY	X	00000048	1	4735	
CAWSUSP	U	00000008	1	4736	
CCW0	4	00000000	8	4863	4869
CCW0ADDR	R	00000001	3	4865	
CCW0CNT	H	00000006	2	4868	
CCW0CODE	X	00000000	1	4864	
CCW0FLGS	X	00000004	1	4866	
CCW0L	U	00000008	1	4869	
CCW1	4	00000000	8	4881	4886
CCW1ADDR	A	00000004	4	4885	
CCW1CNT	H	00000002	2	4884	
CCW1CODE	X	00000000	1	4882	
CCW1FLGS	X	00000001	1	4883	
CCW1L	U	00000008	1	4886	
CCWCC	U	00000040	1	4873	
CCWCD	U	00000080	1	4872	
CCWIDA	U	00000004	1	4877	
CCWPCI	U	00000008	1	4876	
CCWSKIP	U	00000010	1	4875	
CCWSLI	U	00000020	1	4874	
CCWSUSP	U	00000002	1	4878	
CHANID	F	000000A8	4	4789	
CODE	2	00000000	12289	3505	
CONPGM	W	00000D28	8	4420	4380
CPUID	U	0000031B	1	4861	
CRLREG0	A	00000CE4	4	4406	
CSW	F	00000040	8	4733	
CSWATTN	U	00000080	1	4903	
CSWBUSY	U	00000010	1	4906	
CSWCCTL	U	00000004	1	4918	
CSWCCW	R	00000001	3	4900	
CSWCDAT	U	00000008	1	4917	
CSWCE	U	00000008	1	4907	4208
CSWCHNG	U	00000001	1	4920	
CSWCNT	H	00000006	2	4922	
CSWCS	X	00000005	1	4912	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
CSWCUE	U	00000020	1	4905	
CSWDCC0	U	00000000	1	4896	
CSWDCC1	U	00000001	1	4897	
CSWDCC3	U	00000003	1	4898	
CSWDCCM	U	00000003	1	4895	
CSWDE	U	00000004	1	4908	4208
CSWFLAG	X	00000000	1	4890	
CSWFMT	4	00000000	8	4889	4923
CSWFMTL	U	00000008	1	4923	
CSWICTL	U	00000002	1	4919	
CSWIL	U	00000040	1	4914	
CSWKEYM	U	000000F0	1	4891	
CSWLOG	U	00000004	1	4894	
CSWPCI	U	00000080	1	4913	
CSWPRGM	U	00000020	1	4915	
CSWPROT	U	00000010	1	4916	
CSWSM	U	00000040	1	4904	
CSWSUSP	U	00000008	1	4893	
CSWUC	U	00000002	1	4909	
CSWUS	X	00000004	1	4902	
CSWUX	U	00000001	1	4910	
CTLREG1	A	00000CE8	4	4407	
DATTABS	X	00003000	1	4529	
DURATION	D	00000D00	8	4413	3843 4152 4153 4156 4236
DWAT0010	3	00000BB8	8	4288	4287
DWAT0011	3	00000BC8	8	4293	4292
DWAT0012	3	00000BD8	8	4298	4297
DWAT0013	3	00000BE8	8	4303	4302
EDIT	X	00000D74	12	4424	4166 4167
ENADEV	I	00000BFE	4	4322	4276
ENAOKAY	I	00000C4C	2	4347	4336
ENDCLOCK	D	00000CF8	8	4412	3841 4129 4229 4232 4235
ENDREGS	A	0000001C	4	4448	
EOJ	H	00000BB2	2	4286	3575 3583
EXTCPUAD	H	00000084	2	4754	
EXTICODE	H	00000086	2	4755	
EXTIPARM	F	00000080	4	4753	
EXTNPSW	F	00000058	8	4743	
EXTOPSW	F	00000018	8	4715	4721
FAILDEV	H	00000BC0	2	4291	4327 4337 4342
FAILIO	H	00000BD0	2	4296	4176 4199 4209
FAILMASK	A	00000018	4	4446	
FAILTEST	H	00000BE0	2	4301	3578 3581
FIND0015	A	00000C44	4	4344	4322
FINL0015	H	00000C06	2	4325	4341
FINM0015	A	00000C48	4	4345	4340
FINN0015	H	00000C34	2	4338	4329 4331
IIRB0016	F	00000C80	4	4372	4368 4370
IMAGE	1	00000000	12289	0	
INIT	H	00000BA0	2	4270	3564
IOCB	4	00000000	48	4537	4561 3553
IOCBCAW	A	00000018	4	4557	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
IOCBCM	X	00000009	1	4545	
IOCBCS	X	0000000B	1	4548	
IOCBCT	X	0000000D	1	4550	
IOCBDEV	H	00000004	2	4542	4330
IOCBDID	F	00000000	4	4539	4172 4333
IOCBDV	H	00000002	2	4541	
IOCBIRB	A	00000020	8	4559	4177
IOCBL	U	00000030	1	4561	
IOCBORB	A	00000018	8	4558	4174 4273
IOCBRCNT	H	00000016	2	4556	4206
IOCBSC	X	0000000E	1	4551	4170 4201 4203
IOCBSCCW	A	00000010	4	4553	4205
IOCBSCNT	F	00000014	4	4554	
IOCBSIB	A	00000028	8	4560	4323
IOCBST	H	0000000A	2	4546	4171 4202
IOCBUM	X	00000008	1	4544	
IOCBUS	X	0000000A	1	4547	4208
IOCBUT	X	0000000C	1	4549	
IOCBWAIT	X	0000000F	1	4552	
IOCBZERO	H	00000006	2	4543	4171
IOCB_009	A	00000C50	4	4355	4272
IOELADDR	F	000000AC	4	4790	
IOICODE	H	000000BA	2	4795	
IOIID	F	000000C0	4	4800	
IOINIT	I	00000BF0	4	4310	4275
IOIPARM	F	000000BC	4	4799	
IOMK0014	F	00000BF8	4	4312	4310 4311
ION0008	3	00000AB8	8	4187	4184
IONPSW	F	00000078	8	4747	
IOOPSW	F	00000038	8	4719	4729
IORB0016	X	00000CC0	12	4374	4366
IOS0008	X	00000AC0	8	4188	4183 4191
IOSSID	F	000000B8	4	4798	4194
IOWT0007	H	00000A9E	2	4181	4195 4198 4204
IPLCCW1	F	00000008	8	4707	
IPLCCW2	F	00000010	8	4708	
IPLPSW	F	00000000	8	4706	
IRB	4	00000000	96	4616	4620 4622 4178
IRBECW	X	00000020	32	4619	
IRBEMW	X	00000040	32	4621	
IRBESW	X	0000000C	20	4618	
IRBL	U	00000040	1	4620	
IRBSCSW	X	00000000	12	4617	4201 4202 4205 4206
IRBXL	U	00000060	1	4622	
IRST0008	H	00000AC8	2	4190	4187
K	U	00000400	1	4393	4394 4395 4396
K64	U	00010000	1	4395	4402 4464 4466 4470 4472 4476 4478 4482 4484
LCHANLOG	F	000000B0	4	4791	
MAINSIZE	U	00200000	1	4401	4402
MB	U	00100000	1	4396	4401 4464 4470 4476 4482
MCKLOG	F	00000100	4	4823	
MCKNPSW	F	00000070	8	4746	

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

MCKOPSW              F     00000030          8  4718  4727
MEASUREB             X     000000B9          1  4794
MKARCHMD             X     000000A3          1  4782
MKARS                F     00000120          4  4821
MKCLKCMP             F     000000E0          8  4807
MKCPUTIM             F     000000D8          8  4806
MKCRS                F     000001C0          4  4826
MKDMGCOD             F     000000F4          4  4810
MKFAILA              F     000000F8          4  4812
MKFPRS               D     00000160          8  4824
MKICODE              F     000000E8          4  4808
MKLOGOUT             F     00000100          4  4814
MKMODEL              F     000000FC          4  4813
MKXSAA               F     000000D4          4  4805
MONCLS               H     00000094          2  4770
MONCODE              F     0000009C          4  4777
MONNUMBR             X     00000095          1  4772
MPGACCID             X     000000A2          1  4780
NKGRS                F     00000180          4  4825
NUMLOOPS             F     00000CEC          4  4409  3629  3847
NUMPGTBS             U     00000020          1  4402  4403  4405
NUMSEGTB             U     00000002          1  4403  4407
OP1DATA              A     00000004          4  4437  3614
OP1LEN               F     00000010          4  4442  3613  3615
OP1WHERE             A     0000000C          4  4441  3612
OP2DATA              A     00000008          4  4438  3620
OP2LEN               U     00000100          1  4444  3619
OP2WHERE             A     00000014          4  4443  3618
OPSWHERE             U     0000000C          1  4440  3633  3636  3641  3643  3645  3647  3649  3651  3653  3655  3657  3659  3661
                                                     3663  3665  3667  3669  3671  3673  3675  3677  3679  3681  3683  3685  3687
                                                     3689  3691  3693  3695  3697  3699  3701  3703  3705  3707  3709  3711  3713
                                                     3715  3717  3719  3721  3723  3725  3727  3729  3731  3733  3735  3737  3739
                                                     3741  3743  3745  3747  3749  3751  3753  3755  3757  3759  3761  3763  3765
                                                     3767  3769  3771  3773  3775  3777  3779  3781  3783  3785  3787  3789  3791
                                                     3793  3795  3797  3799  3801  3803  3805  3807  3809  3811  3813  3815  3817
                                                     3819  3821  3823  3825  3827  3829  3831  3835  3837  3851  3854  3860  3863
                                                     3866  3869  3872  3875  3878  3881  3884  3887  3890  3893  3896  3899  3902
                                                     3905  3908  3911  3914  3917  3920  3923  3926  3929  3932  3935  3938  3941
                                                     3944  3947  3950  3953  3956  3959  3962  3965  3968  3971  3974  3977  3980
                                                     3983  3986  3989  3992  3995  3998  4001  4004  4007  4010  4013  4016  4019
                                                     4022  4025  4028  4031  4034  4037  4040  4043  4046  4049  4052  4055  4058
                                                     4061  4064  4067  4070  4073  4076  4079  4082  4085  4088  4091  4094  4097
                                                     4100  4103  4106  4109  4112  4115  4120  4123
ORB                  4     00000000         32  4569  4599  4607  3554
ORB1_0               X     00000004          1  4572
ORB1_8               X     00000005          1  4579
ORBA                 U     00000010          1  4583
ORBB                 U     00000004          1  4585
ORBC                 U     00000004          1  4575
ORBCCW               A     00000008          4  4597
ORBCSS               X     0000000C          1  4601
ORBCU                X     0000000E          1  4604
```

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

ORBD                 U     00000040          1  4592
ORBF                 U     00000080          1  4580
ORBH                 U     00000002          1  4586
ORBI                 U     00000020          1  4582
ORBKEYM              U     000000F0          1  4573
ORBL                 U     00000080          1  4590
ORBLEN               U     0000000C          1  4599
ORBLPM               X     00000006          1  4588
ORBM                 U     00000002          1  4576
ORBP                 U     00000040          1  4581
ORBPARM              F     00000000          4  4570
ORBPGM               X     0000000E          1  4603
ORBRSV25             U     0000007E          1  4594
ORBRSV26             U     0000003E          1  4593
ORBRSV3              U     0000007F          1  4591
ORBRSV4              U     00000080          1  4598
ORBRSV5              X     0000000D          1  4602
ORBRSV6              X     0000000F          1  4605
ORBRSV7              X     00000010         16  4606
ORBS                 U     00000008          1  4574
ORBT                 U     00000001          1  4587
ORBU                 U     00000008          1  4584
ORBX                 U     00000001          1  4595
ORBXLEN              U     00000020          1  4607
ORBY                 U     00000001          1  4577
ORRB1_24             X     00000007          1  4589
OVERHEAD             D     00000D08          8  4414  3843  4151
PAGE                 U     00001000          1  4394  4398  4404
PAGETABS             U     00003080          1  4405
PCFETO               A     000000C4          4  4801
PERACCID             X     000000A1          1  4779
PERADDR              F     00000098          4  4776
PERCODE              X     00000096          1  4773
PERCODMK             U     000000F0          1  4774
PGMACCID             X     000000A0          1  4778
PGMDXC               F     00000090          4  4768
PGMICODE             H     0000008E          2  4767
PGMIID               F     0000008C          4  4763
PGMIILC              X     0000008D          1  4765
PGMIILCM             U     0000000C          1  4766
PGMNPSW              F     00000068          8  4745
PGMOPSW              F     00000028          8  4717  4725
PGMTRX               F     00000090          4  4769
PMCW1_0              X     00000004          1  4930
PMCW1_8              X     00000005          1  4933  4328  4334
PMCWB                U     00000004          1  4965
PMCWCHP0             X     00000010          1  4954
PMCWCHP1             X     00000011          1  4955
PMCWCHP2             X     00000012          1  4956
PMCWCHP3             X     00000013          1  4957
PMCWCHP4             X     00000014          1  4958
PMCWCHP5             X     00000015          1  4959
```

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

PMCWCHP6             X     00000016          1  4960
PMCWCHP7             X     00000017          1  4961
PMCWDNUM             H     00000006          2  4945  4330
PMCWE                U     00000080          1  4934  4334
PMCWEXC              X     0000001B          1  4964
PMCWIP               F     00000000          4  4929
PMCWISCM             U     00000038          1  4931
PMCWLM               U     00000060          1  4935
PMCWLMG              U     00000020          1  4936
PMCWLML              U     00000040          1  4937
PMCWLPM              X     00000008          1  4947
PMCWLPUM             X     0000000A          1  4949
PMCWM                U     00000004          1  4941
PMCWMBI              H     0000000C          2  4951
PMCWMM               U     00000018          1  4938
PMCWMMC              U     00000008          1  4940
PMCWMME              U     00000010          1  4939
PMCWPAM              X     0000000F          1  4953
PMCWPIM              X     0000000B          1  4950
PMCWPNOM             X     00000009          1  4948
PMCWPOM              X     0000000E          1  4952
PMCWRES1             X     00000018          4  4962
PMCWRES2             X     00000018          3  4963
PMCWS                U     00000001          1  4967
PMCWT                U     00000002          1  4942
PMCWV                U     00000001          1  4943  4328
PMCWX                U     00000002          1  4966
PRTLINE              C     00000D30         38  4421  4423  4131  4166  4167  4420
PRTLNG               U     00000044          1  4423  4420
R0                   U     00000000          1  4982  3550  3624
R1                   U     00000001          1  4983  4140
R10                  U     0000000A          1  4992  3612  3616  3633  3634  3636  3641  3643  3645  3647  3649  3651  3653  3655
                                                     3657  3659  3661  3663  3665  3667  3669  3671  3673  3675  3677  3679  3681
                                                     3683  3685  3687  3689  3691  3693  3695  3697  3699  3701  3703  3705  3707
                                                     3709  3711  3713  3715  3717  3719  3721  3723  3725  3727  3729  3731  3733
                                                     3735  3737  3739  3741  3743  3745  3747  3749  3751  3753  3755  3757  3759
                                                     3761  3763  3765  3767  3769  3771  3773  3775  3777  3779  3781  3783  3785
                                                     3787  3789  3791  3793  3795  3797  3799  3801  3803  3805  3807  3809  3811
                                                     3813  3815  3817  3819  3821  3823  3825  3827  3829  3831  3835  3837  3851
                                                     3852  3854  3855  3860  3861  3863  3864  3866  3867  3869  3870  3872  3873
                                                     3875  3876  3878  3879  3881  3882  3884  3885  3887  3888  3890  3891  3893
                                                     3894  3896  3897  3899  3900  3902  3903  3905  3906  3908  3909  3911  3912
                                                     3914  3915  3917  3918  3920  3921  3923  3924  3926  3927  3929  3930  3932
                                                     3933  3935  3936  3938  3939  3941  3942  3944  3945  3947  3948  3950  3951
                                                     3953  3954  3956  3957  3959  3960  3962  3963  3965  3966  3968  3969  3971
                                                     3972  3974  3975  3977  3978  3980  3981  3983  3984  3986  3987  3989  3990
                                                     3992  3993  3995  3996  3998  3999  4001  4002  4004  4005  4007  4008  4010
                                                     4011  4013  4014  4016  4017  4019  4020  4022  4023  4025  4026  4028  4029
                                                     4031  4032  4034  4035  4037  4038  4040  4041  4043  4044  4046  4047  4049
                                                     4050  4052  4053  4055  4056  4058  4059  4061  4062  4064  4065  4067  4068
                                                     4070  4071  4073  4074  4076  4077  4079  4080  4082  4083  4085  4086  4088
                                                     4089  4091  4092  4094  4095  4097  4098  4100  4101  4103  4104  4106  4107
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
					4109 4110 4112 4113 4115 4116 4120 4121 4123 4124 4251 4253 4258 4261
R11	U	0000000B	1	4993	3613 4253 4255
R12	U	0000000C	1	4994	3618 3622 3633 3634 3636 3641 3643 3645 3647 3649 3651 3653 3655 3657 3659 3661 3663 3665 3667 3669 3671 3673 3675 3677 3679 3681
					3683 3685 3687 3689 3691 3693 3695 3697 3699 3701 3703 3705 3707 3709 3711 3713 3715 3717 3719 3721 3723 3725 3727 3729 3731 3733 3735 3737 3739 3741 3743 3745 3747 3749 3751 3753 3755 3757 3759
					3761 3763 3765 3767 3769 3771 3773 3775 3777 3779 3781 3783 3785 3787 3789 3791 3793 3795 3797 3799 3801 3803 3805 3807 3809 3811 3813 3815 3817 3819 3821 3823 3825 3827 3829 3831 3835 3837 3851
					3852 3854 3855 3860 3861 3863 3864 3866 3867 3869 3870 3872 3873 3875 3876 3878 3879 3881 3882 3884 3885 3887 3888 3890 3891 3893 3894 3896 3897 3899 3900 3902 3903 3905 3906 3908 3909 3911 3912
					3914 3915 3917 3918 3920 3921 3923 3924 3926 3927 3929 3930 3932 3933 3935 3936 3938 3939 3941 3942 3944 3945 3947 3948 3950 3951 3953 3954 3956 3957 3959 3960 3962 3963 3965 3966 3968 3969 3971
					3972 3974 3975 3977 3978 3980 3981 3983 3984 3986 3987 3989 3990 3992 3993 3995 3996 3998 3999 4001 4002 4004 4005 4007 4008 4010 4011 4013 4014 4016 4017 4019 4020 4022 4023 4025 4026 4028 4029
					4031 4032 4034 4035 4037 4038 4040 4041 4043 4044 4046 4047 4049 4050 4052 4053 4055 4056 4058 4059 4061 4062 4064 4065 4067 4068 4070 4071 4073 4074 4076 4077 4079 4080 4082 4083 4085 4086 4088
					4089 4091 4092 4094 4095 4097 4098 4100 4101 4103 4104 4106 4107 4109 4110 4112 4113 4115 4116 4120 4121 4123 4124 4156 4157 4159 4254 4257 4258 4259
R13	U	0000000D	1	4995	3619 4156 4160 4251 4254 4255 4259 4261
R14	U	0000000E	1	4996	3564 3568 3598 4142 4277
R15	U	0000000F	1	4997	3591 3842 4132 4148 4149 4154 4212 4213 4221 4237 4240 4241 4262 4275 4276 4315 4347
R2	U	00000002	1	4984	3551 3556 3557 3558 3559 3561 4141
R3	U	00000003	1	4985	3553 4272
R4	U	00000004	1	4986	
R5	U	00000005	1	4987	3600 3602 3605 4136 4137 4138 4151 4222 4234 4239 4253
R6	U	00000006	1	4988	3607 3608 3614 3616 3620 3622 3631 3840 3849 4128 4152 4224 4225 4226 4227 4229 4230 4231 4232 4235 4254
R7	U	00000007	1	4989	3615 3621 3629 3840 3847 4128 4153 4222 4224 4227 4229 4232 4236 4239 4259
R8	U	00000008	1	4990	3554 4273
R9	U	00000009	1	4991	3552 3561 3562
REG2LOW	U	000000DD	1	4453	
REG2PATT	U	AABBCCDD	1	4452	4466 4472 4478 4484
RPTSAVE	F	00000B10	4	4215	4148 4212
RPTSPEED	I	00000A3A	4	4148	4132
RSTNPSW	F	00000000	8	4711	
RSTOPSW	F	00000008	8	4712	
SAVER1	F	00000238	4	3586	4140
SAVER2	F	0000023C	4	3587	3559 4141
SAVER5	F	00000240	4	3588	3605 4136
SAVETRT	D	00000248	8	3589	
SCANOUT	X	00000080	1	4749	4750
SCANOUTL	U	00000000	1	4750	

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

SCHIB                 4    00000000         52  4926  4973  4324
SCHIBL                U    00000034          1  4973
SCHMBA                A    00000028          8  4971
SCHMDA1               X    00000030          4  4972
SCHMDA3               X    00000028         12  4970
SCHPMCW               X    00000000         28  4928
SCHSCSW               X    0000001C         12  4969
SCSW                  4    00000000         12  4631  4693
SCSW0CC               U    00000004          1  4647
SCSW1                 X    00000002          1  4651
SCSW2                 X    00000003          1  4660  4201
SCSWACP               U    00000001          1  4659
SCSWADA               U    00000040          1  4662
SCSWAHP               U    00000002          1  4658
SCSWALKC              U    00000010          1  4645
SCSWARP               U    00000008          1  4656
SCSWASA               U    00000080          1  4661
SCSWASP               U    00000004          1  4657
SCSWASUS              U    00000020          1  4663
SCSWATTN              U    00000080          1  4673
SCSWBUSY              U    00000010          1  4676
SCSWCCTL              U    00000004          1  4688
SCSWCCW               A    00000004          4  4670  4205
SCSWCCWF              U    00000080          1  4642
SCSWCCWP              U    00000040          1  4643
SCSWCDAT              U    00000008          1  4687
SCSWCE                U    00000008          1  4677
SCSWCHNG              U    00000001          1  4690
SCSWCNT               H    0000000A          2  4692  4206
SCSWCS                X    00000009          1  4682
SCSWCTLS              X    00000001          1  4641
SCSWCUE               U    00000020          1  4675
SCSWDCC0              U    00000000          1  4637
SCSWDCC1              U    00000001          1  4638
SCSWDCC3              U    00000003          1  4639
SCSWDCCM              U    00000003          1  4636
SCSWDE                U    00000004          1  4678
SCSWECWC              U    00000002          1  4648
SCSWESWF              U    00000004          1  4635
SCSWFC                U    00000010          1  4655
SCSWFH                U    00000020          1  4654
SCSWFLAG              X    00000000          1  4632
SCSWFM                U    00000070          1  4652
SCSWFS                U    00000040          1  4653
SCSWICTL              U    00000002          1  4689
SCSWIL                U    00000040          1  4684
SCSWISIC              U    00000020          1  4644
SCSWKEYM              U    000000F0          1  4633
SCSWL                 U    0000000C          1  4693
SCSWPCI               U    00000080          1  4683
SCSWPNOP              U    00000001          1  4649
SCSWPRGM              U    00000020          1  4685
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
SCSWPROT	U	00000010	1	4686	
SCSWSAS	U	00000010	1	4664	
SCSWSINT	U	00000008	1	4665	
SCSWSM	U	00000040	1	4674	
SCSWSPEN	U	00000001	1	4668	
SCSWSPRI	U	00000004	1	4666	4203
SCSWSSEC	U	00000002	1	4667	
SCSWSSIC	U	00000008	1	4646	
SCSWSUSC	U	00000008	1	4634	
SCSWUC	U	00000002	1	4679	
SCSWUS	X	00000008	1	4672	4202
SCSWUX	U	00000001	1	4680	
SEGTABLS	U	00003000	1	4404	4405 4527 4407
SSARCHMD	X	000000A3	1	4781	
SSARS	F	00000120	4	4837	
SSCLKCMP	F	000000E0	8	4831	
SSCPUTIM	F	000000D8	8	4830	
SSCRS	F	000001C0	4	4840	
SSFPRS	D	00000160	8	4838	
SSGRS	F	00000180	4	4839	
SSMODEL	F	0000010C	4	4835	
SSPREFIX	F	00000108	4	4834	
SSPSW	F	00000100	8	4833	
SSXSAA	A	000000D4	4	4829	
STFLDATA	F	000000C8	4	4802	
SUBDWORD	I	00000B68	4	4251	4154 4237
SUBDWSAV	D	00000B90	8	4264	4251 4261
SUBTEST	X	000021FF	1	4525	3580
SVCICODE	H	0000008A	2	4761	
SVCIID	F	00000088	4	4757	
SVCIILC	X	00000089	1	4759	
SVCIILCM	U	0000000C	1	4760	
SVCNPSW	F	00000060	8	4744	
SVCOPSW	F	00000020	8	4716	4723
TBYTE	X	00000001	1	4433	3624
TEST91	I	00000250	4	3597	3568
TESTADDR	U	000021FE	1	4398	4399 4522
TESTNUM	X	000021FE	1	4524	3577 3608
TICKSAAA	P	00000D10	8	4416	4159 4162
TICKSBBB	P	00000D18	8	4417	4160 4164
TICKSTOT	P	00000D20	8	4418	4162 4163 4164 4167
TIMEADDR	U	000021FD	1	4399	4518
TIMEOPT	X	000021FD	1	4520	3574 3597
TIMER	F	00000050	4	4740	
TNUM	X	00000000	1	4432	3607
TRE02TST	J	00000000	12289	3505	3508 3515 3523 3525 4518 4522 4527
TRELOP10	X	00001118	4	4500	4463 4469 4475 4481
TRELOP20	X	00001C18	1	4512	4463 4469 4475 4481
TRENEXT	U	00000024	1	4450	4137
TREPERF	A	00000D80	4	4460	3600
TREPOP1	X	00000D80	1	4462	
TREPOP2	X	00000DA4	1	4468	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
TREPOP3	X	00000DC8	1	4474	
TREPOP4	X	00000DEC	1	4480	
TRETEST	4	00000000	36	4430	3602
TRTOP10	X	00000E18	4	4493	
TRTOP111	X	00000F18	4	4495	
TRTOP1F0	X	00001018	4	4497	
TRTOP20	X	00001918	1	4506	
TRTOP211	X	00001A18	1	4508	
TRTOP2F0	X	00001B18	1	4510	
TST91LOP	U	0000025A	1	3604	4139
TTDES	F	00000054	4	4741	
UA0	F	00000010	8	4713	
UA1	F	0000004C	4	4738	
UA2	F	000000A4	4	4783	
UA3	F	000000B4	4	4792	
UA4	X	000000B8	1	4793	
UA5	X	000000CC	8	4803	
UA6	X	000000EC	8	4809	
UA7	F	00000118	8	4820	
UA8	X	00000180	32	4849	
WPSW0008	3	00000AB0	8	4186	4185
ZBRKADDR	A	00000110	8	4819	
ZEMONCNT	F	0000010C	4	4818	
ZEMONCTR	A	00000100	8	4816	
ZEMONSIZ	F	00000108	4	4817	
ZEXTNPSW	X	000001B0	16	4852	
ZEXTOPSW	X	00000130	16	4844	
ZIONPSW	X	000001F0	16	4856	
ZIOOPSW	X	00000170	16	4848	
ZMCKNPSW	X	000001E0	16	4855	
ZMCKOPSW	X	00000160	16	4847	
ZMKFAILA	F	000000F8	8	4811	
ZMONCODE	F	000000B0	8	4786	
ZPGMNPSW	X	000001D0	16	4854	
ZPGMOPSW	X	00000150	16	4846	
ZPGMTRX	F	000000A8	8	4785	
ZRSTNPSW	X	000001A0	16	4851	
ZRSTOPSW	X	00000120	16	4843	
ZSASDISP	U	000011C0	1	4857	
ZSVCNPSW	X	000001C0	16	4853	
ZSVCOPSW	X	00000140	16	4845	
=A(OP2LEN)	A	00000CCC	4	4387	3619 3621
=CL5'TRE'	C	00000CD8	5	4390	4131
=F'0'	F	00000CD0	4	4388	4138
=F'1'	F	00000CD4	4	4389	4257
=P'4294967296'	P	00000CDD	6	4391	4163

MACRO	DEFN	REFERENCES						
ANTR	120							
APROB	252							
ARCHIND	412	3442						
ARCHLVL	553	3441						
ASAIPL	679	3521						
ASALOAD	759	3504						
ASAREA	814	4703						
ASAZAREA	999							
CPUWAIT	1082	4182						
DSECTS	1408	4535	4567	4614	4629	4700		
DWAIT	1611	4285	4290	4295	4300			
DWAITEND	1668	4284						
ENADEV	1676	4321						
ESA390	1776							
IOCB	1787	4354						
IOCBDS	1963	4536						
IOFMT	1997	4568	4615	4630	4862	4880	4888	4925
IOINIT	2335	4309						
IOTRFR	2376							
ORB	2424	4373						
POINTER	2613							
PSWFMT	2641							
RAWAIT	2775							
RAWIO	2871	4169						
SIGCPU	3029							
SMMGR	3087							
SMMGRB	3187							
TRAP128	3236							
TRAP64	3213	3506	3509					
TRAPS	3249							
ZARCH	3323							
ZEROH	3335							
ZEROL	3363							
ZEROLH	3391							
ZEROLL	3414							

```
   DESC      SYMBOL     SIZE      POS         ADDR

Entry: 0

Image       IMAGE      12289  0000-3000  0000-3000
  Region    CODE       12289  0000-3000  0000-3000
    CSECT   TRE02TST   12289  0000-3000  0000-3000
```

```
   STMT                          FILE NAME

1     /devstor/dev/satk/samples/tests/TRE-02-performance.asm
2     /home/tn529/dev/satk/srcasm/satk.mac


** NO ERRORS FOUND **
```