```
 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 *
                                                    49 *     *Done
                                                    50 *
                                                    51 ************************************************************************
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                              53          PRINT OFF
                                            3434          PRINT ON

                                            3436 ********************************************************************************
                                            3437 *        SATK prolog stuff...
                                            3438 ********************************************************************************

                                            3440          ARCHLVL  ZARCH=NO,MNOTE=NO
                                            3442+$AL      OPSYN AL
                                            3443+$ALR     OPSYN ALR
                                            3444+$B       OPSYN B
                                            3445+$BAS     OPSYN BAS
                                            3446+$BASR    OPSYN BASR
                                            3447+$BC      OPSYN BC
                                            3448+$BCTR    OPSYN BCTR
                                            3449+$BE      OPSYN BE
                                            3450+$BH      OPSYN BH
                                            3451+$BL      OPSYN BL
                                            3452+$BM      OPSYN BM
                                            3453+$BNE     OPSYN BNE
                                            3454+$BNH     OPSYN BNH
                                            3455+$BNL     OPSYN BNL
                                            3456+$BNM     OPSYN BNM
                                            3457+$BNO     OPSYN BNO
                                            3458+$BNP     OPSYN BNP
                                            3459+$BNZ     OPSYN BNZ
                                            3460+$BO      OPSYN BO
                                            3461+$BP      OPSYN BP
                                            3462+$BXLE    OPSYN BXLE
                                            3463+$BZ      OPSYN BZ
                                            3464+$CH      OPSYN CH
                                            3465+$L       OPSYN L
                                            3466+$LH      OPSYN LH
                                            3467+$LM      OPSYN LM
                                            3468+$LPSW    OPSYN LPSW
                                            3469+$LR      OPSYN LR
                                            3470+$LTR     OPSYN LTR
                                            3471+$NR      OPSYN NR
                                            3472+$SL      OPSYN SL
                                            3473+$SLR     OPSYN SLR
                                            3474+$SR      OPSYN SR
                                            3475+$ST      OPSYN ST
                                            3476+$STM     OPSYN STM
                                            3477+$X       OPSYN X
                                            3478+$AHI     OPSYN AHI
                                            3479+$B       OPSYN J
                                            3480+$BC      OPSYN BRC
                                            3481+$BE      OPSYN JE
                                            3482+$BH      OPSYN JH
                                            3483+$BL      OPSYN JL
                                            3484+$BM      OPSYN JM
                                            3485+$BNE     OPSYN JNE
                                            3486+$BNH     OPSYN JNH
                                            3487+$BNL     OPSYN JNL
                                            3488+$BNM     OPSYN JNM
                                            3489+$BNO     OPSYN JNO
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                  3490+$BNP     OPSYN JNP
                                                  3491+$BNZ     OPSYN JNZ
                                                  3492+$BO      OPSYN JO
                                                  3493+$BP      OPSYN JP
                                                  3494+$BXLE    OPSYN JXLE
                                                  3495+$BZ      OPSYN JZ
                                                  3496+$CHI     OPSYN CHI
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  3498 ********************************************************************
                                                  3499 *        Initiate the TRE02TST CSECT in the CODE region
                                                  3500 *        with the location counter at 0
                                                  3501 ********************************************************************

                                                  3503 TRE02TST ASALOAD  REGION=CODE
                           00000000  000021FF     3504+TRE02TST START 0,CODE
00000000  000A0000 00000008                       3506+         PSW   0,0,2,0,X'008'      64-bit Restart ISR Trap New PSW
00000008                   00000008  00000058     3507+         ORG   TRE02TST+X'058'
00000058  000A0000 00000018                       3509+         PSW   0,0,2,0,X'018'      64-bit External ISR Trap New PSW
00000060  000A0000 00000020                       3510+         PSW   0,0,2,0,X'020'      64-bit Supervisor Call ISR Trap New PSW
00000068  000A0000 00000028                       3511+         PSW   0,0,2,0,X'028'      64-bit Program ISR Trap New PSW
00000070  000A0000 00000030                       3512+         PSW   0,0,2,0,X'030'      64-bit Machine Check Trap New PSW
00000078  000A0000 00000038                       3513+         PSW   0,0,2,0,X'038'      64-bit Input/Output Trap New PSW
00000080                   00000080  00000200     3514+         ORG   TRE02TST+512



                                                  3516 ********************************************************************
                                                  3517 *        Create IPL (restart) PSW
                                                  3518 ********************************************************************

                                                  3520          ASAIPL   IA=BEGIN
                           00000000  000021FF     3521+TRE02TST CSECT
00000200                   00000200  00000000     3522+         ORG   TRE02TST
00000000  00080000 00000200                       3523+         PSW   0,0,0,0,BEGIN,24
00000008                   00000008  00000200     3524+         ORG   TRE02TST+512     Reset CSECT to end of assigned storage area
                           00000000  000021FF     3525+TRE02TST CSECT
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    3527 ************************************************************************
                                                    3528 *               The actual "TRE02TST" program itself...
                                                    3529 ************************************************************************
                                                    3530 *
                                                    3531 *  Architecture Mode: 390
                                                    3532 *  Addressing Mode:   31-bit
                                                    3533 *  Register Usage:
                                                    3534 *
                                                    3535 *   R0       (work)
                                                    3536 *   R1       I/O device used by ENADEV and RAWIO macros
                                                    3537 *   R2       First base register
                                                    3538 *   R3       IOCB pointer for ENADEV and RAWIO macros
                                                    3539 *   R4       IO work register used by ENADEV and RAWIO
                                                    3540 *   R5-R7    (work)
                                                    3541 *   R8       ORB pointer
                                                    3542 *   R9       Second base register
                                                    3543 *   R10-R13  (work)
                                                    3544 *   R14      Subroutine call
                                                    3545 *   R15      Secondary Subroutine call or work
                                                    3546 *
                                                    3547 ************************************************************************

00000200                    00000000                3549          USING  ASA,R0          Low core addressability
00000200                    00000200                3550          USING  BEGIN,R2        FIRST Base Register
00000200                    00001200                3551          USING  BEGIN+4096,R9   SECOND Base Register
00000200                    00000000                3552          USING  IOCB,R3         SATK Device I/O Control Block
00000200                    00000000                3553          USING  ORB,R8          ESA/390 Operation Request Block

00000200  0520                                      3555 BEGIN    BALR   R2,0            Initalize FIRST base register
00000202  0620                                      3556          BCTR   R2,0            Initalize FIRST base register
00000204  0620                                      3557          BCTR   R2,0            Initalize FIRST base register
00000206  5020 203C                 0000023C        3558          ST     R2,SAVER2

0000020A  4190 2800                 00000800        3560          LA     R9,2048(,R2)    Initalize SECOND base register
0000020E  4190 9800                 00000800        3561          LA     R9,2048(,R9)    Initalize SECOND base register

00000212  45E0 2A18                 00000C18        3563          BAL    R14,INIT        Initalize Program
                                                    3564 *
                                                    3565 **       Run the tests...
                                                    3566 *
00000216  45E0 2050                 00000250        3567          BAL    R14,TEST91      Time TRE   instruction  (speed test)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  3569 ********************************************************************
                                                  3570 *         Test for normal or unexpected test completion...
                                                  3571 ********************************************************************

0000021A  95FF 9FFD                     000021FD  3573          CLI   TIMEOPT,X'FF'    Was this a timing run?
0000021E  4770 2A2A                     00000C2A  3574          BNE   EOJ              No, timing run; just go end normally

00000222  9594 9FFE                     000021FE  3576          CLI   TESTNUM,X'94'    Did we end on expected test?
00000226  4770 2A58                     00000C58  3577          BNE   FAILTEST         No?! Then FAIL the test!

0000022A  9500 9FFF                     000021FF  3579          CLI   SUBTEST,X'00'    Did we end on expected SUB-test?
0000022E  4770 2A58                     00000C58  3580          BNE   FAILTEST         No?! Then FAIL the test!

00000232  47F0 2A2A                     00000C2A  3582          B     EOJ              Yes, then normal completion!




00000238  00000000                              3584 SAVER1   DC    F'0'
0000023C  00000000                              3585 SAVER2   DC    F'0'
00000240  00000000                              3586 SAVER5   DC    F'0'
00000248  00000000 00000000                     3587 SAVETRT  DC    D'0'               (saved R1/R2 from TRT results)


00000250                                        3589          DROP  R15
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   3591 ************************************************************************
                                                   3592 *        TEST91                  Time TRE instruction  (speed test)
                                                   3593 ************************************************************************

00000250  91FF 9FFD                     000021FD  3595 TEST91   TM    TIMEOPT,X'FF'    Is timing tests option enabled?
00000254  078E                                    3596          BZR   R14              No, skip timing tests

00000256  4150 2BF0                     00000DF0  3598          LA    R5,TREPERF         Point R5 --> testing control table
0000025A                  00000000              3599          USING TRETEST,R5         What each table entry looks like
                                                  3600 *
                          0000025A  00000001    3601 TST91LOP EQU   *
0000025A  5050 2040                     00000240  3602          ST    R5,SAVER5          save current pref table base
                                                  3603 *
0000025E  4360 5000                     00000000  3604          IC    R6,TNUM            Set test number
00000262  4260 9FFE                     000021FE  3605          STC   R6,TESTNUM
                                                  3606 *
                                                  3607 **       Initialize operand data  (move data to testing address)
                                                  3608 *
00000266  58A0 500C                     0000000C  3609          L     R10,OP1WHERE       Where to move operand-1 data to
0000026A  58B0 5010                     00000010  3610          L     R11,OP1LEN           operand-1 length
0000026E  5860 5004                     00000004  3611          L     R6,OP1DATA         Where op1 data is right now
00000272  5870 5010                     00000010  3612          L     R7,OP1LEN          How much of it there is
00000276  0EA6                                    3613          MVCL  R10,R6
                                                  3614 *
00000278  58C0 5014                     00000014  3615          L     R12,OP2WHERE       Where to move operand-2 data to
0000027C  58D0 2B44                     00000D44  3616          L     R13,=A(OP2LEN)     How much of it there is
00000280  5860 5008                     00000008  3617          L     R6,OP2DATA         Where op2 data is right now
00000284  5870 2B44                     00000D44  3618          L     R7,=A(OP2LEN)          How much of it there is
00000288  0EC6                                    3619          MVCL  R12,R6
                                                  3620 *
0000028A  4300 5001                     00000001  3621          IC    R0,TBYTE           Set test byte


                                                  3623 **       Next, time the overhead...

0000028E  5870 2B5C                     00000D5C  3625          L     R7,NUMLOOPS
00000292  B205 2B60                     00000D60  3626          STCK  BEGCLOCK
00000296  0560                                    3627          BALR  R6,0

00000298  98AC 500C                     0000000C  3629          LM    R10,R12,OPSWHERE     get TRE operands
0000029C  B2A5 00AC                               3630          TRE   R10,R12                do TRE
000002A0  4710 209C                     0000029C  3631          BC    B'0001',*-4            not finished
000002A4  98AC 500C                     0000000C  3632          LM    R10,R12,OPSWHERE
000002A8  4710 20AC                     000002AC  3633          BC    B'0001',*+4
                                                  3634 *        .........ETC.........
                                                  3635          PRINT OFF
                                                  3830          PRINT ON
000005AC  98AC 500C                     0000000C  3831          LM    R10,R12,OPSWHERE
000005B0  4710 23B4                     000005B4  3832          BC    B'0001',*+4
000005B4  98AC 500C                     0000000C  3833          LM    R10,R12,OPSWHERE
000005B8  4710 23BC                     000005BC  3834          BC    B'0001',*+4
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

000005BC  0676                            3836          BCTR  R7,R6
000005BE  B205 2B68                 00000D68  3837          STCK  ENDCLOCK
000005C2  45F0 298C                 00000B8C  3838          BAL   R15,CALCDUR
000005C6  D207 2B78 2B70      00000D78  00000D70  3839          MVC   OVERHEAD,DURATION
                                            3840 *
                                            3841 **       Now do the actual timing run...
                                            3842 *
000005CC  5870 2B5C                 00000D5C  3843          L     R7,NUMLOOPS
000005D0  B205 2B60                 00000D60  3844          STCK  BEGCLOCK
000005D4  0560                            3845          BALR  R6,0

000005D6  98AC 500C                 0000000C  3847          LM    R10,R12,OPSWHERE          Load TRE operands
000005DA  B2A5 00AC                       3848          TRE   R10,R12                      do TRE
000005DE  4710 23DA                 000005DA  3849          BC    B'0001',*-4                 not finished?
000005E2  98AC 500C                 0000000C  3850          LM    R10,R12,OPSWHERE          Load TRE operands
000005E6  B2A5 00AC                       3851          TRE   R10,R12                      do TRE
000005EA  4710 23E6                 000005E6  3852          BC    B'0001',*-4                 not finished?
                                            3853 *        .........ETC.........
                                            3854          PRINT OFF
                                            4155          PRINT ON
00000A6E  98AC 500C                 0000000C  4156          LM    R10,R12,OPSWHERE
00000A72  B2A5 00AC                       4157          TRE   R10,R12
00000A76  4710 2872                 00000A72  4158          BC    B'0001',*-4
00000A7A  98AC 500C                 0000000C  4159          LM    R10,R12,OPSWHERE
00000A7E  B2A5 00AC                       4160          TRE   R10,R12
00000A82  4710 287E                 00000A7E  4161          BC    B'0001',*-4



00000A86  0676                            4163          BCTR  R7,R6
00000A88  B205 2B68                 00000D68  4164          STCK  ENDCLOCK

00000A8C  D204 2BC1 2B50      00000DC1  00000D50  4166          MVC   PRTLINE+33(5),=CL5'TRE'
00000A92  45F0 28B2                 00000AB2  4167          BAL   R15,RPTSPEED

                                            4169 *  more performance tests

00000A96  5850 2040                 00000240  4171          L     R5,SAVER5           restore perf table base
00000A9A  4150 5024                 00000024  4172          LA    R5,TRENEXT          Go on to next table entry
00000A9E  D503 2B48 5000      00000D48  00000000  4173          CLC   =F'0',0(R5)         End of table?
00000AA4  4770 205A                 0000025A  4174          BNE   TST91LOP            No, loop...

00000AA8  5810 2038                 00000238  4176          L     R1,SAVER1           Restore register 1
00000AAC  5820 203C                 0000023C  4177          L     R2,SAVER2           Restore first base register
00000AB0  07FE                            4178          BR    R14                 Return to caller or FAILTEST
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   4180 ********************************************************************************
                                                   4181 *        RPTSPEED                  Report instruction speed
                                                   4182 ********************************************************************************

00000AB2  50F0 2988                      00000B88  4184 RPTSPEED ST    R15,RPTSAVE        Save return address
00000AB6  45F0 298C                      00000B8C  4185          BAL   R15,CALCDUR        Calculate duration
                                                   4186 *
00000ABA  4150 2B78                      00000D78  4187          LA    R5,OVERHEAD        Subtract overhead
00000ABE  4160 2B70                      00000D70  4188          LA    R6,DURATION        From raw timing
00000AC2  4170 2B70                      00000D70  4189          LA    R7,DURATION        Yielding true instruction timing
00000AC6  45F0 29E0                      00000BE0  4190          BAL   R15,SUBDWORD       Do it
                                                   4191 *
00000ACA  98CD 2B70                      00000D70  4192          LM    R12,R13,DURATION   Convert to...
00000ACE  8CC0 000C                      0000000C  4193          SRDL  R12,12             ... microseconds
                                                   4194 *
00000AD2  4EC0 2B80                      00000D80  4195          CVD   R12,TICKSAAA       convert HIGH part to decimal
00000AD6  4ED0 2B88                      00000D88  4196          CVD   R13,TICKSBBB       convert LOW  part to decimal
                                                   4197 *
00000ADA  F877 2B90 2B80      00000D90   00000D80  4198          ZAP   TICKSTOT,TICKSAAA            Calculate...
00000AE0  FC75 2B90 2B55      00000D90   00000D55  4199          MP    TICKSTOT,=P'4294967296'      ...decimal...
00000AE6  FA77 2B90 2B88      00000D90   00000D88  4200          AP    TICKSTOT,TICKSBBB            ...microseconds
                                                   4201 *
00000AEC  D20B 2BCB 2BE4      00000DCB   00000DE4  4202          MVC   PRTLINE+43(L'EDIT),EDIT          (edit into...
00000AF2  DE0B 2BCB 2B93      00000DCB   00000D93  4203          ED    PRTLINE+43(L'EDIT),TICKSTOT+3     ...print line)
```

```
                                                   4205          RAWIO 4,FAIL=FAILIO      Print elapsed time on console
00000AF8  9200 300E                      0000000E  4206+         MVI   IOCBSC,X'00'          Clear SC information
00000AFC  D201 300A 3006      0000000A   00000006  4207+         MVC   IOCBST,IOCBZERO       Clear accumulated status
00000B02  5810 3000                      00000000  4208+         L     1,IOCBDID             Remember the device ID with which I am worki
                                                   4209+* Initiate Subchannel-based input/output operation
00000B06  5840 3018                      00000018  4210+         $L    4,IOCBORB             Locate the ORB for the channel subsystem
00000B0A  B233 4000                      00000000  4211+         SSCH  0(4)                  Initiate the I/O operation
00000B0E  A774 009D                      00000C48  4212+         $BC   B'0111',FAILIO        ..Start function failed, report/handle the e
00000B12  5840 3020                      00000020  4213+         $L    4,IOCBIRB             Locate the IRB storage area
00000B16                      00000000             4214+         USING IRB,4                 Make it addressable

                                                   4216+* Wait for I/O operation to present status via an interruption
00000B16                                           4217+IOWT0007 DS    0H  Wait for I/O to complete
00000B16  D207 2938 0078      00000B38   00000078  4219+         MVC   IOS0008(8),120(0)              Save Input/Output new PSW
00000B1C  D207 0078 2930      00000078   00000B30  4220+         MVC   120(8,0),ION0008              Establish Input/Ouput new PSW
00000B22  8200 2928                      00000B28  4221+         $LPSW WPSW0008                      Wait for event
00000B28  020A0000 00000000                        4222+WPSW0008 PSW   2,0,2,0,0                     Wait for event
00000B30  00082000 00000B40                        4223+ION0008  PSW   0,0,0,32,IRST0008,24               I/O New PSW: cc==2
00000B38  00000000 00000000                        4224+IOS0008  DC    XL8'00'
                                                   4225+* Handle input/output interruption
00000B40                                           4226+IRST0008 DS    0H
00000B40  D207 0078 2938      00000078   00000B38  4227+         MVC   120(8,0),IOS0008            Restore input/output new PSW
                                                   4228+* Process the interruption...
                                                   4229+* Validate interruption is for the expected subchannel
00000B46  5510 00B8                      000000B8  4230+         CL    1,IOSSID              Is this the device for which I am waiting?
00000B4A  A774 FFE6                      00000B16  4231+         $BNE  IOWT0007              ..No, continue waiting for it
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4232+* Accumulate interruption information from IRB
00000B4E  B235 4000                     00000000  4233+         TSCH  0(4)                    Retrive interrupt information
00000B52  A744 FFE2                     00000B16  4234+         $BC   B'0100',IOWT0007        CC1 (not status pending), wait for it to arr
00000B56  A714 0079                     00000C48  4235+         $BC   B'0001',FAILIO          CC3 (not operational), an error then
                                                  4236+*                                      CC0 (status was pending), accumulate the sta
00000B5A  D600 300E 4003      0000000E  00000003  4237+         OC    IOCBSC,IRBSCSW+SCSW2    Accumulate status control
00000B60  D601 300A 4008      0000000A  00000008  4238+         OC    IOCBST,IRBSCSW+SCSWUS   Accumulate device and channel status
00000B66  9104 300E                     0000000E  4239+         TM    IOCBSC,SCSWSPRI         Primary subchannel status?
00000B6A  A7E4 FFD6                     00000B16  4240+         $BNO  IOWT0007                ..No, wait for primary status
00000B6E  D203 3010 4004      00000010  00000004  4241+         MVC   IOCBSCCW,IRBSCSW+SCSWCCW  CCW address
00000B74  D201 3016 400A      00000016  0000000A  4242+         MVC   IOCBRCNT,IRBSCSW+SCSWCNT  Residual count
                                                  4243+* Test for errors as specified in the IOCB
00000B7A  910C 300A                     0000000A  4244+         TM    IOCBUS,CSWCE+CSWDE      Channel end and device end both accumulated?
00000B7E  A7E4 0065                     00000C48  4245+         $BNO  FAILIO                  Hunh? No CE and DE but do have primary status
                                                  4246+* Input/Output operation successful



00000B82  58F0 2988                     00000B88  4248          L     R15,RPTSAVE             Restore return address
00000B86  07FF                                    4249          BR    R15                     Return to caller

00000B88  00000000                                4251 RPTSAVE  DC    F'0'                    R15 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                          4253 ********************************************************************************
                                          4254 *        CALCDUR                   Calculate DURATION
                                          4255 ********************************************************************************

00000B8C  50F0 29D0                       00000BD0  4257 CALCDUR  ST    R15,CALCRET        Save return address
00000B90  9057 29D4                       00000BD4  4258          STM   R5,R7,CALCWORK     Save work registers
                                          4259 *
00000B94  9867 2B60                       00000D60  4260          LM    R6,R7,BEGCLOCK     Remove CPU number from clock value
00000B98  8C60 0006                       00000006  4261          SRDL  R6,6                       "
00000B9C  8D60 0006                       00000006  4262          SLDL  R6,6                       "
00000BA0  9067 2B60                       00000D60  4263          STM   R6,R7,BEGCLOCK             "
                                          4264 *
00000BA4  9867 2B68                       00000D68  4265          LM    R6,R7,ENDCLOCK     Remove CPU number from clock value
00000BA8  8C60 0006                       00000006  4266          SRDL  R6,6                       "
00000BAC  8D60 0006                       00000006  4267          SLDL  R6,6                       "
00000BB0  9067 2B68                       00000D68  4268          STM   R6,R7,ENDCLOCK             "
                                          4269 *
00000BB4  4150 2B60                       00000D60  4270          LA    R5,BEGCLOCK        Starting time
00000BB8  4160 2B68                       00000D68  4271          LA    R6,ENDCLOCK        Ending time
00000BBC  4170 2B70                       00000D70  4272          LA    R7,DURATION        Difference
00000BC0  45F0 29E0                       00000BE0  4273          BAL   R15,SUBDWORD       Calculate duration
                                          4274 *
00000BC4  9857 29D4                       00000BD4  4275          LM    R5,R7,CALCWORK     Restore work registers
00000BC8  58F0 29D0                       00000BD0  4276          L     R15,CALCRET        Restore return address
00000BCC  07FF                            00000BD0  4277          BR    R15                Return to caller

00000BD0  00000000                        00000BD0  4279 CALCRET  DC    F'0'               R15 save area
00000BD4  00000000 00000000               00000BD0  4280 CALCWORK DC    3F'0'              R5-R7 save area



                                          4282 ********************************************************************************
                                          4283 *        SUBDWORD                  Subtract two doublewords
                                          4284 *        R5 --> subtrahend, R6 --> minuend, R7 --> result
                                          4285 ********************************************************************************

00000BE0  90AD 2A08                       00000C08  4287 SUBDWORD STM   R10,R13,SUBDWSAV   Save registers
                                          4288 *
00000BE4  98AB 5000                       00000000  4289          LM    R10,R11,0(R5)      Subtrahend  (value to subtract)
00000BE8  98CD 6000                       00000000  4290          LM    R12,R13,0(R6)      Minuend     (what to subtract FROM)
00000BEC  1FDB                                      4291          SLR   R13,R11            Subtract LOW part
00000BEE  47B0 29F6                       00000BF6  4292          BNM   *+4+4              (branch if no borrow)
00000BF2  5FC0 2B4C                       00000D4C  4293          SL    R12,=F'1'          (otherwise do borrow)
00000BF6  1FCA                                      4294          SLR   R12,R10            Subtract HIGH part
00000BF8  90CD 7000                       00000000  4295          STM   R12,R13,0(R7)      Store results
                                          4296 *
00000BFC  98AD 2A08                       00000C08  4297          LM    R10,R13,SUBDWSAV   Restore registers
00000C00  07FF                            00000C08  4298          BR    R15                Return to caller

00000C08  00000000 00000000               00000C08  4300 SUBDWSAV DC    2D'0'              R10-R13 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4302 ********************************************************************
                                                   4303 *        Program Initialization
                                                   4304 ********************************************************************

00000C18                                           4306 INIT     DS     0H              Program Initialization

00000C18  4130 2AC8                    00000CC8    4308          LA     R3,IOCB_009     Point to IOCB
00000C1C  5880 3018                    00000018    4309          L      R8,IOCBORB      Point to ORB

00000C20  45F0 2A68                    00000C68    4311          BAL    R15,IOINIT      Initialize the CPU for I/O operations
00000C24  45F0 2A76                    00000C76    4312          BAL    R15,ENADEV      Enable our device making ready for use
00000C28  07FE                                     4313          BR     R14             Return to caller
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4316 ********************************************************************************
                                                  4317 *        Normal completion or Abnormal termination PSWs
                                                  4318 ********************************************************************************




                                                  4320 EOJ      DWAITEND LOAD=YES          Normal completion
00000C2A                                          4322+EOJ      DS    0H
00000C2A  8200 2A30                  00000C30     4323+         LPSW  DWAT0010
00000C30  000A0000 00000000                       4324+DWAT0010 PSW   0,0,2,0,X'000000'




                                                  4326 FAILDEV  DWAIT LOAD=YES,CODE=01     ENADEV failed
00000C38                                          4327+FAILDEV  DS    0H
00000C38  8200 2A40                  00000C40     4328+         LPSW  DWAT0011
00000C40  000A0000 00010001                       4329+DWAT0011 PSW   0,0,2,0,X'010001'




                                                  4331 FAILIO   DWAIT LOAD=YES,CODE=02     RAWIO failed
00000C48                                          4332+FAILIO   DS    0H
00000C48  8200 2A50                  00000C50     4333+         LPSW  DWAT0012
00000C50  000A0000 00010002                       4334+DWAT0012 PSW   0,0,2,0,X'010002'




                                                  4336 FAILTEST DWAIT LOAD=YES,CODE=BAD    Abnormal termination
00000C58                                          4337+FAILTEST DS    0H
00000C58  8200 2A60                  00000C60     4338+         LPSW  DWAT0013
00000C60  000A0000 00010BAD                       4339+DWAT0013 PSW   0,0,2,0,X'010BAD'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4341 ********************************************************************
                                                    4342 *        Initialize the CPU for I/O operations
                                                    4343 ********************************************************************


                                                    4345 IOINIT   IOINIT ,
00000C68  B766 2A70                       00000C70  4346+IOINIT   LCTL  6,6,IOMK0014       Enable subchannel subclasses for interruptions
00000C6C  47F0 2A74                       00000C74  4347+         B     IOMK0014+4
00000C70                                            4348+IOMK0014 DS    0F
00000C70  FF000000                                  4349+         DC    XL4'FF000000'         All subchannel subclasses enabled

00000C74  07FF                                      4351          BR    R15                   Return to caller


                                                    4353 ********************************************************************
                                                    4354 *        Enable the device, making it ready for use
                                                    4355 ********************************************************************

                                                    4357 ENADEV   ENADEV ENAOKAY,FAILDEV,REG=4
00000C76  5810 2ABC                       00000CBC  4358+ENADEV   L     1,FIND0015
00000C7A  5840 3028                       00000028  4359+         $L    4,IOCBSIB             Locate where the SCHIB is to be stored
00000C7E                        00000000            4360+         USING SCHIB,4
00000C7E                                            4361+FINL0015 DS    0H   Retrieve Subchannel Information Block for desired device numbe
00000C7E  B234 4000                       00000000  4362+         STSCH 0(4)                  Store the SCHIB for first subchannel
00000C82  A774 FFDB                       00000C38  4363+         $BC   B'0111',FAILDEV       Subchannel does not exist and device number not
00000C86  9101 4005                       00000005  4364+         TM    PMCW1_8,PMCWV         Is the subchannel device number valid?
00000C8A  A784 0011                       00000CAC  4365+         $BZ   FINN0015              ..No, check the next subchannel
00000C8E  D501 4006 3004        00000006  00000004  4366+         CLC   PMCWDNUM,IOCBDEV      Is this the device number being sought?
00000C94  A774 000C                       00000CAC  4367+         $BNE  FINN0015              ..No, check the next subchannel
                                                    4368+* Subchannel found!
00000C98  5010 3000                       00000000  4369+         ST    1,IOCBDID             Remember the subchannel so I/O can be done to i
00000C9C  9680 4005                       00000005  4370+         OI    PMCW1_8,PMCWE         Make sure it is enabled so I/O requests accepte
00000CA0  B232 4000                       00000000  4371+         MSCH  0(4)                  Enable the subchannel to the channel sub-system
00000CA4  A784 0010                       00000CC4  4372+         $BC   B'1000',ENAOKAY       CC0 (SCHIB updated), device is ready.
00000CA8  A7F4 FFC8                       00000C38  4373+         $B    FAILDEV               CC1,CC2,CC3 (SCHIB update failed), quit
00000CAC                                            4374+FINN0015 DS    0H  Advance to next subchannel
00000CAC  4110 1001                       00000001  4375+         LA    1,1(0,1)              Advance to next subchannel
00000CB0  5510 2AC0                       00000CC0  4376+         CL    1,FINM0015            Beyond maximum subchannel
00000CB4  A7D4 FFE5                       00000C7E  4377+         $BNH  FINL0015              ..No, examine the next subchannel
00000CB8  A724 FFC0                       00000C38  4378+         $BH   FAILDEV               ..Yes, failed to enable the device
00000CBC                                            4379+         DROP  4                     Forget SCHIB addressing
00000CBC  00010000                                  4380+FIND0015 DC    A(X'00010000')        First subchannel subsystem ID
00000CC0  0001FFFF                                  4381+FINM0015 DC    A(X'0001FFFF')        Last subchannel subsystem ID


00000CC4  07FF                                      4383 ENAOKAY  BR    R15                   Return to caller
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4385 ************************************************************************
                                                   4386 *         Structure used by RAWIO identifying
                                                   4387 *         the device and operation being performed
                                                   4388 ************************************************************************


                                                   4390 IOCB_009 IOCB  X'009',CCW=CONPGM
00000CC8  00000000                                 4391+IOCB_009 DC    A(0)            +0 Device Identifier (supplied by ENADEV macro)
00000CCC  0009                                     4392+         DC    AL2(X'009')     +4 Device address or device number
00000CCE  0000                                     4393+         DC    H'0'            +6 Must be zeros
00000CD0  D3                                       4394+         DC    AL1(X'D3')      +8 Default detected unit errors
00000CD1  3F                                       4395+         DC    AL1(X'3F')      +9 Default detected channel errors
00000CD2  0000                                     4396+         DC    HL2'0'          +10 Accumulated unit and channel errors
00000CD4  0000                                     4397+         DC    HL2'0'          +12 Tested unit and channel status
00000CD6  00                                       4398+         DC    XL1'00'         +14 Accumulated subchannel status control from SCSW
00000CD7  80                                       4399+         DC    XL1'80'         +15 Default unsoliticed wait condition
00000CD8  00000000                                 4400+         DC    F'0'            +16 I/O status CCW address
00000CDC  00000000                                 4401+         DC    F'0'            +20 residual count
00000CE0  00000D38                                 4402+         DC    A(IORB0016)     +24  Address where ORB is located
00000CE4  00000000                                 4403+         DC    A(0)            +28  reserved
00000CE8  00000CF8                                 4404+         DC    A(IIRB0016)     +32 Address where IRB stored
00000CEC  00000000                                 4405+         DC    A(0)            +36 reserved
00000CF0  00000CF8                                 4406+         DC    A(IIRB0016)     +40 Address where SCHIB stored
00000CF4  00000000                                 4407+         DC    A(0)            +44 reserved
00000CF8  00000000 00000000                        4408+IIRB0016 DC    16F'0'              Embedded shared IRB and SCHIB area
00000D38                                           4410+IORB0016 DS    0XL12
00000D38  00000000                                 4411+         DC    A(0)            Word 0 - Interruption Parameter
00000D3C  00                                       4412+         DC    AL1((0)*16+B'0000')  Word 1, bits 0-7
00000D3D  80                                       4413+         DC    BL1'10000000'   Word 1, bits 8-15
00000D3E  FF                                       4414+         DC    AL1(255)        Word 1, bits 16-23
00000D3F  00                                       4415+         DC    BL1'00000000'    Word 1, bits 24-31
00000D40  00000D98                                 4416+         DC    AL4(CONPGM)     Word 2 - CCW address
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    4418 ************************************************************************
                                                    4419 *        Working Storage
                                                    4420 ************************************************************************


00000D44                                            4422          LTORG ,                 Literals pool
00000D44  00000100                                  4423                =A(OP2LEN)
00000D48  00000000                                  4424                =F'0'
00000D4C  00000001                                  4425                =F'1'
00000D50  E3D9C540 40                               4426                =CL5'TRE'
00000D55  04294967 296C                             4427                =P'4294967296'

                          00000400  00000001        4429 K        EQU   1024            One KB
                          00001000  00000001        4430 PAGE     EQU   (4*K)           Size of one page
                          00010000  00000001        4431 K64      EQU   (64*K)          64 KB
                          00100000  00000001        4432 MB       EQU   (K*K)            1 MB

                          000021FE  00000001        4434 TESTADDR EQU   (2*PAGE+X'200'-2)  Where test/subtest numbers will go
                          000021FD  00000001        4435 TIMEADDR EQU   (TESTADDR-1)       Address of timing tests option flag

00000D5C  00002710                                  4437 NUMLOOPS DC    F'10000'          10,000 * 100 = 1,000,000

00000D60  BBBBBBBB BBBBBBBB                         4439 BEGCLOCK DC    0D'0',8X'BB'      Begin
00000D68  EEEEEEEE EEEEEEEE                         4440 ENDCLOCK DC    0D'0',8X'EE'      End
00000D70  DDDDDDDD DDDDDDDD                         4441 DURATION DC    0D'0',8X'DD'      Diff
00000D78  FFFFFFFF FFFFFFFF                         4442 OVERHEAD DC    0D'0',8X'FF'      Overhead

00000D80  00000000 0000000C                         4444 TICKSAAA DC    PL8'0'            Clock ticks high part
00000D88  00000000 0000000C                         4445 TICKSBBB DC    PL8'0'            Clock ticks low part
00000D90  00000000 0000000C                         4446 TICKSTOT DC    PL8'0'            Total clock ticks

00000D98  09000044 00000DA0                         4448 CONPGM   CCW1  X'09',PRTLINE,0,PRTLNG
00000DA0  40404040 40404040                         4449 PRTLINE  DC    C'         1,000,000 iterations of XXXXX'
00000DC6  40A39696 9240F9F9                         4450          DC    C' took 999,999,999 microseconds'
                          00000044  00000001        4451 PRTLNG   EQU   *-PRTLINE
00000DE4  40202020 6B202020                         4452 EDIT     DC    X'402020206B2020206B202120'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   4454 ********************************************************************************
                                                   4455 *        TRETEST DSECT
                                                   4456 ********************************************************************************


                                                   4458 TRETEST  DSECT ,


00000000  00                                       4460 TNUM     DC    X'00'          TRE table Number
00000001  00                                       4461 TBYTE    DC    X'00'          TRE Testbyte
00000002  00                                       4462          DC    X'00'
00000003  00                                       4463          DC    X'00'


00000004  00000000                                 4465 OP1DATA  DC    A(0)           Pointer to Operand-1 data
00000008  00000000                                 4466 OP2DATA  DC    A(0)           Pointer to Operand-2 data
                                                   4467
                          0000000C  00000001       4468 OPSWHERE EQU   *              Where TRE Operands are located
0000000C  00000000                                 4469 OP1WHERE DC    A(0)           Where Operand-1 data should be placed
00000010  00000000                                 4470 OP1LEN   DC    F'0'           How much data is there - 1
00000014  00000000                                 4471 OP2WHERE DC    A(0)           Where Operand-2 data should be placed
                          00000100  00000001       4472 OP2LEN   EQU   256            Operand-2 is always 256


00000018  00000000                                 4474 FAILMASK DC    A(0)           Failure Branch on Condition mask


0000001C  00000000 00000000                        4476 ENDREGS  DC    A(0),XL4'00'   Ending R1/R2 register values

                          00000024  00000001       4478 TRENEXT  EQU   *              Start of next table entry...


                          AABBCCDD  00000001       4480 REG2PATT EQU   X'AABBCCDD'    Register 2 starting/ending CC0 value
                          000000DD  00000001       4481 REG2LOW  EQU         X'DD'    (last byte above)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                               00000000  000021FF  4483 TRE02TST CSECT ,

                                                   4485 ********************************************************************
                                                   4486 *        TRE Performace Test data...
                                                   4487 ********************************************************************
00000DF0                                           4488 TREPERF  DC    0A(0)      start of table


00000DF0  91990000                                 4490 TREPOP1  DC    X'91',X'99',X'00',X'00'
00000DF4  00001188 00001C88                        4491          DC    A(TRELOP10),A(TRELOP20)
00000DFC  00020000 00000200                        4492          DC    A(00+(02*K64)),A(512),A(MB+(02*K64))      no crosses
00000E08  00000007                                 4493          DC    A(7) CC0
00000E0C  00020200 AABBCCDD                        4494          DC    A(00+(02*K64)+512),A(REG2PATT)


00000E14  92990000                                 4496 TREPOP2  DC    X'92',X'99',X'00',X'00'
00000E18  00001188 00001C88                        4497          DC    A(TRELOP10),A(TRELOP20)
00000E20  0002FFF4 00000200                        4498          DC    A(00+(03*K64)-12),A(512),A(MB+(03*K64))   op1 crosses
00000E2C  00000007                                 4499          DC    A(7) CC0
00000E30  000301F4 AABBCCDD                        4500          DC    A(00+(03*K64)-12+512),A(REG2PATT)


00000E38  93990000                                 4502 TREPOP3  DC    X'93',X'99',X'00',X'00'
00000E3C  00001188 00001C88                        4503          DC    A(TRELOP10),A(TRELOP20)
00000E44  00040000 00000800                        4504          DC    A(00+(04*K64)),A(2048),A(MB+(04*K64))     no crosses
00000E50  00000007                                 4505          DC    A(7) CC0
00000E54  00290800 AABBCCDD                        4506          DC    A(00+(041*K64)+2048),A(REG2PATT)


00000E5C  94990000                                 4508 TREPOP4  DC    X'94',X'99',X'00',X'00'
00000E60  00001188 00001C88                        4509          DC    A(TRELOP10),A(TRELOP20)
00000E68  0003FFF4 00000800                        4510          DC    A(00+(04*K64)-12),A(2048),A(MB+(04*K64))  op1 crosses
00000E74  00000007                                 4511          DC    A(7) CC0
00000E78  002907F4 AABBCCDD                        4512          DC    A(00+(041*K64)-12+2048),A(REG2PATT)


00000E80  00000000                                 4514          DC    A(0)       end of table
00000E84  00000000                                 4515          DC    A(0)       end of table
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4517 ********************************************************************
                                                   4518 *        TRE op1 scan data...
                                                   4519 ********************************************************************
00000E88  78125634 78125634                        4521 TRTOP10  DC    64XL4'78125634'                (CC0)
00000F88  78125634 78125634                        4523 TRTOP111 DC    04XL4'78125634',X'00110000',59XL4'78125634'    (CC1)
00001088  78125634 78125634                        4525 TRTOP1F0 DC    63XL4'78125634',X'000000F0'    (CC1)
                                                   4526
00001188  78125634 78125634                        4528 TRELOP10 DC    512XL4'78125634'               (CC0)
                                                   4530 ********************************************************************
                                                   4531 *        TRE op2 stop tables...
                                                   4532 ********************************************************************
00001988  00000000 00000000                        4534 TRTOP20  DC    256X'00'                    no stop
00001A88  00000000 00000000                        4536 TRTOP211 DC    17X'00',X'11',238X'00'      stop on X'11'
00001B88  00000000 00000000                        4538 TRTOP2F0 DC    240X'00',X'F0',15X'00'      stop on X'F0'
00001C88  FF000000 00000000                        4540 TRELOP20 DC    X'FF',255X'00'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4542 ********************************************************************
                                                  4543 *        Fixed storage locations
                                                  4544 ********************************************************************




00001D88                       00001D88  000021FD  4546          ORG   TRE02TST+TIMEADDR      (s/b @ X'21FD')

000021FD  00                                      4548 TIMEOPT  DC    X'00'      Set to non-zero to run timing tests









000021FE                       000021FE  000021FE  4550          ORG   TRE02TST+TESTADDR      (s/b @ X'21FE', X'21FF')

000021FE  00                                      4552 TESTNUM  DC    X'00'      Test number of active test
000021FF  00                                      4553 SUBTEST  DC    X'00'      Active test sub-test number
                                                  4554
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4556 ********************************************************************
                                                   4557 *        IOCB DSECT
                                                   4558 ********************************************************************

                                                   4560         DSECTS NAME=IOCB
                                                   4562+IOCB    DSECT
                                                   4563+*     Field usage by: CH SC Description (R->program read-only, X->program read/wr
00000000                                           4564+IOCBDID  DS    0F  +0     R  Device Identifier - Subsystem ID for channel subsyst
00000000  0000                                     4565+         DS    H   +0  R      reserved - must be zeros
00000002  0000                                     4566+IOCBDV   DS    H   +2  R      Channel Unit Device address of I/O operation
00000004  0000                                     4567+IOCBDEV  DS    H   +4  X  X  Device address or device number (R after ENADEV)
00000006  0000                                     4568+IOCBZERO DS    H   +6  R  R  Must be zeros
00000008  00                                       4569+IOCBUM   DS    X   +8  X  X  Unit status test mask
00000009  00                                       4570+IOCBCM   DS    X   +9  X  X  Channel status test mask
0000000A                                           4571+IOCBST   DS    0H  +10 X  X  Input/Output unit and channel status accumulation
0000000A  00                                       4572+IOCBUS   DS    X   +10 R  R  Accumulated unit status
0000000B  00                                       4573+IOCBCS   DS    X   +11 R  R  Accumulated channel status
0000000C  00                                       4574+IOCBUT   DS    X   +14 R  R  Used to test unit status
0000000D  00                                       4575+IOCBCT   DS    X   +13 R  R  Used to test channel status
0000000E  00                                       4576+IOCBSC   DS    X   +14    R  Accumulted subchanel status control
0000000F  00                                       4577+IOCBWAIT DS    X   +15 X  X  Recognized unsolicited interruption unit status even
00000010  00000000                                 4578+IOCBSCCW DS    A   +16 R  R  I/O status CCW address
00000014                                           4579+IOCBSCNT DS    0F  +20 R  R  I/O status residual count as a positive full word
00000014  0000                                     4580+         DS    H   +20 R     reserved must be zeros
00000016  0000                                     4581+IOCBRCNT DS    H   +22 R     I/O status residual count as an unsigned halfword
00000018                                           4582+IOCBCAW  DS    0A  +24 X     Channel Address word
00000018  00000000 00000000                        4583+IOCBORB  DS    AD  +24    X  Address of the ORB for channel subsystem I/O
00000020  00000000 00000000                        4584+IOCBIRB  DS    AD  +32    X  Channel subsystem IRB address
00000028  00000000 00000000                        4585+IOCBSIB  DS    AD  +40    X  Channel subsystem SCHIB address
                            00000030  00000001     4586+IOCBL    EQU   *-IOCB  Length of IOCB control block (48) without embedded structu
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4588 ********************************************************************************
                                                  4589 *        ORB DSECT
                                                  4590 ********************************************************************************

                                                  4592          DSECTS NAME=ORB
                                                  4594+ORB      DSECT
00000000  00000000                                4595+ORBPARM  DC    F'0'     Word 0, bits 0-31

00000004  00                                      4597+ORB1_0   DC    X'00'    Word 1, bits 0-7
                          000000F0  00000001      4598+ORBKEYM  EQU   X'F0'    Word 1, bits 0-3   - Storage Key Mask
                          00000008  00000001      4599+ORBS     EQU   X'08'    Word 1, bit 4      - Suspend Control
                          00000004  00000001      4600+ORBC     EQU   X'04'    Word 1, bit 5      - Streaming Mode Control
                          00000002  00000001      4601+ORBM     EQU   X'02'    Word 1, bit 6      - Modification Control
                          00000001  00000001      4602+ORBY     EQU   X'01'    Word 1, bit 7      - Synchronization Control

00000005  00                                      4604+ORB1_8   DC    X'00'    Word 1, bits 8-15
                          00000080  00000001      4605+ORBF     EQU   X'80'    Word 1, bit 8      - CCW Format-Control
                          00000040  00000001      4606+ORBP     EQU   X'40'    Word 1, bit 9      - Pre-fetch control
                          00000020  00000001      4607+ORBI     EQU   X'20'    Word 1, bit 10     - Initial-status Interruption Control
                          00000010  00000001      4608+ORBA     EQU   X'10'    Word 1, bit 11     - Address Limit Checking Control
                          00000008  00000001      4609+ORBU     EQU   X'08'    Word 1, bit 12     - Suppress-suspended-interruption cont
                          00000004  00000001      4610+ORBB     EQU   X'04'    Word 1, bit 13     - Channel-Program-Type Control
                          00000002  00000001      4611+ORBH     EQU   X'02'    Word 1, bit 14     - Format 2-IDAW Control
                          00000001  00000001      4612+ORBT     EQU   X'01'    Word 1, bit 15     - 2K-IDAW control
00000006  00                                      4613+ORBLPM   DC    X'00'    Word 1, bits 16-23 - Logical Path Mask
00000007  00                                      4614+ORRB1_24 DC    X'00'    Word 1, bits 24-31
                          00000080  00000001      4615+ORBL     EQU   X'80'    Word 1, bit 24     - Incorrect Length Suppression Mode
                          0000007F  00000001      4616+ORBRSV3  EQU   X'7F'    Word 1, bits 25-31 - reserved must be zeros
                          00000040  00000001      4617+ORBD     EQU   X'40'    Word 1, bit 25     - MIDAW Addressing Control
                          0000003E  00000001      4618+ORBRSV26 EQU   X'3E'    Word 1, bits 26-30 - reserved must be zeros
                          0000007E  00000001      4619+ORBRSV25 EQU   X'7E'    Word 1, bits 25-30 - reserved must be zeros
                          00000001  00000001      4620+ORBX     EQU   X'01'    Word 1, bit 31     - ORB-extension control

00000008  00000000                                4622+ORBCCW   DC    A(0)     Word 2, bits 1-31  - Channel Program Address
                          00000080  00000001      4623+ORBRSV4  EQU   X'80'    Word 2, bit 0      - reserved must be zero
                          0000000C  00000001      4624+ORBLEN   EQU   *-ORB Length of standard ORB
                                                  4625+* Extended ORB fields
0000000C  00                                      4626+ORBCSS   DC    X'00'    Word 3, bits 0-7   - Channel Subsystem Priority
0000000D  00                                      4627+ORBRSV5  DC    X'00'    Word 3, bits 8-15  - reserved must be zeros
0000000E                                          4628+ORBPGM   DC    0X'00'   Word 3, bits 16-23 - Transport mode reserves for program
0000000E  00                                      4629+ORBCU    DC    X'00'    Word 3, bits 16-23 - Control Unit Priority
0000000F  00                                      4630+ORBRSV6  DC    X'00'    Word 3, bits 24-31 - reserved must be zeros
00000010  00000000 00000000                       4631+ORBRSV7  DC    XL16'00' Words 4-7          - reserved must be zeros
                          00000020  00000001      4632+ORBXLEN  EQU   *-ORB Length of extended ORB
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4635 ********************************************************************
                                                  4636 *        IRB DSECT
                                                  4637 ********************************************************************

                                                  4639          DSECTS NAME=IRB
                                                  4641+IRB      DSECT Interruption          Response Block
00000000  00000000 00000000                       4642+IRBSCSW  DC    XL12'00' Words 0-2 - Subchannel Status Word (Defined by DSECT SCSW
0000000C  00000000 00000000                       4643+IRBESW   DC    XL20'00' Words 3-7 - Extended Status Word
00000020  00000000 00000000                       4644+IRBECW   DC    XL32'00' Words 8-15 - Extended Control Word
                             00000040  00000001   4645+IRBL     EQU   *-IRB    IRB Length
00000040  00000000 00000000                       4646+IRBEMW   DC    XL32'00' Words 16-23 - Extended Measurement Word
                             00000060  00000001   4647+IRBXL    EQU   *-IRB    Extended IRB Length
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4650 ********************************************************************
                                                  4651 *        SCSW DSECT
                                                  4652 ********************************************************************

                                                  4654          DSECTS NAME=SCSW
                                                  4656+SCSW     DSECT Subchannel          Status Word
00000000  00                                      4657+SCSWFLAG DC    X'00'    Flags
                           000000F0  00000001     4658+SCSWKEYM EQU   X'F0'    Storage Key Mask of subchannel storage key
                           00000008  00000001     4659+SCSWSUSC EQU   X'08'    Suspend Control
                           00000004  00000001     4660+SCSWESWF EQU   X'04'    Extended Status Word Format
                           00000003  00000001     4661+SCSWDCCM EQU   X'03'    Deferred condiont code mask
                           00000000  00000001     4662+SCSWDCC0 EQU   X'00'    Normal I/O interruption
                           00000001  00000001     4663+SCSWDCC1 EQU   X'01'    Deferred condition code is 1
                           00000003  00000001     4664+SCSWDCC3 EQU   X'03'    Deferred condition code is 3

00000001  00                                      4666+SCSWCTLS DC    X'00'    General Controls
                           00000080  00000001     4667+SCSWCCWF EQU   X'80'    CCW Format control when ...
                           00000040  00000001     4668+SCSWCCWP EQU   X'40'    CCW Prefetch Control
                           00000020  00000001     4669+SCSWISIC EQU   X'20'    Initial-Status-Interruption Control
                           00000010  00000001     4670+SCSWALKC EQU   X'10'    Address-Limit-Checking Control
                           00000008  00000001     4671+SCSWSSIC EQU   X'08'    Suppress suspended interruption
                           00000004  00000001     4672+SCSW0CC  EQU   X'04'    Zero-Condition Code
                           00000002  00000001     4673+SCSWECWC EQU   X'02'    Extended Control Word control
                           00000001  00000001     4674+SCSWPNOP EQU   X'01'    Path Not Operational

00000002  00                                      4676+SCSW1    DC    X'00'    Control Byte 1
                           00000070  00000001     4677+SCSWFM   EQU   X'70'    Functional Control Mask
                           00000040  00000001     4678+SCSWFS   EQU   X'40'    Function Control - Start Function
                           00000020  00000001     4679+SCSWFH   EQU   X'20'    Function Control - Halt Function
                           00000010  00000001     4680+SCSWFC   EQU   X'10'    Function Control - Clear Function
                           00000008  00000001     4681+SCSWARP  EQU   X'08'    Activity Control - Resume pending
                           00000004  00000001     4682+SCSWASP  EQU   X'04'    Activity Control - Start pending
                           00000002  00000001     4683+SCSWAHP  EQU   X'02'    Activity Control - Halt pending
                           00000001  00000001     4684+SCSWACP  EQU   X'01'    Activity Control - Clear pending
00000003  00                                      4685+SCSW2    DC    X'00'    Control Byte 2
                           00000080  00000001     4686+SCSWASA  EQU   X'80'    Activity Control - Subchannel Active
                           00000040  00000001     4687+SCSWADA  EQU   X'40'    Activity Control - Device Active
                           00000020  00000001     4688+SCSWASUS EQU   X'20'    Activity Control - Suspended
                           00000010  00000001     4689+SCSWSAS  EQU   X'10'    Status Control   - Alert Status
                           00000008  00000001     4690+SCSWSINT EQU   X'08'    Status Control   - Intermediate Status
                           00000004  00000001     4691+SCSWSPRI EQU   X'04'    Status Control   - Primary Status
                           00000002  00000001     4692+SCSWSSEC EQU   X'02'    Status Control   - Secondary Status
                           00000001  00000001     4693+SCSWSPEN EQU   X'01'    Status Control   - Status Pending

00000004  00000000                               4695+SCSWCCW  DC    A(0)     CCW Address

00000008  00                                      4697+SCSWUS   DC    X'00'    Unit Status
                           00000080  00000001     4698+SCSWATTN EQU   X'80'    Attention
                           00000040  00000001     4699+SCSWSM   EQU   X'40'    Status modifier
                           00000020  00000001     4700+SCSWCUE  EQU   X'20'    Control-unit end
                           00000010  00000001     4701+SCSWBUSY EQU   X'10'    Busy
                           00000008  00000001     4702+SCSWCE   EQU   X'08'    Channel end
                           00000004  00000001     4703+SCSWDE   EQU   X'04'    Device end
                           00000002  00000001     4704+SCSWUC   EQU   X'02'    Unit check
                           00000001  00000001     4705+SCSWUX   EQU   X'01'    Unit exception
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

00000009  00                                      4707+SCSWCS   DC    X'00'    Channel Status
                             00000080  00000001  4708+SCSWPCI  EQU   X'80'    Program-controlled interruption
                             00000040  00000001  4709+SCSWIL   EQU   X'40'    Incorrect length
                             00000020  00000001  4710+SCSWPRGM EQU   X'20'    Program check
                             00000010  00000001  4711+SCSWPROT EQU   X'10'    Protection Check
                             00000008  00000001  4712+SCSWCDAT EQU   X'08'    Channel-data check
                             00000004  00000001  4713+SCSWCCTL EQU   X'04'    Channel-control check
                             00000002  00000001  4714+SCSWICTL EQU   X'02'    Interface-control check
                             00000001  00000001  4715+SCSWCHNG EQU   X'01'    Chaining check

0000000A  0000                                    4717+SCSWCNT  DC    H'0'     Residual CCW count
                             0000000C  00000001  4718+SCSWL    EQU   *-SCSW
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4721 ********************************************************************
                                                   4722 *        (other DSECTS needed by SATK)
                                                   4723 ********************************************************************

                                                   4725          DSECTS PRINT=OFF,NAME=(ASA,SCHIB,CCW0,CCW1,CSW)
```

```
                                                   5001          PRINT ON

                                                   5003 ********************************************************************
                                                   5004 *        Register equates
                                                   5005 ********************************************************************

                           00000000  00000001  5007 R0        EQU   0
                           00000001  00000001  5008 R1        EQU   1
                           00000002  00000001  5009 R2        EQU   2
                           00000003  00000001  5010 R3        EQU   3
                           00000004  00000001  5011 R4        EQU   4
                           00000005  00000001  5012 R5        EQU   5
                           00000006  00000001  5013 R6        EQU   6
                           00000007  00000001  5014 R7        EQU   7
                           00000008  00000001  5015 R8        EQU   8
                           00000009  00000001  5016 R9        EQU   9
                           0000000A  00000001  5017 R10       EQU   10
                           0000000B  00000001  5018 R11       EQU   11
                           0000000C  00000001  5019 R12       EQU   12
                           0000000D  00000001  5020 R13       EQU   13
                           0000000E  00000001  5021 R14       EQU   14
                           0000000F  00000001  5022 R15       EQU   15
```

```
                                                   5024          END
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ASA	4	00000000	512	4729	3549
ASBEGIN	U	00000000	1	4730	4735 4777 4813 4822 4840 4847 4853 4857 4861 4867 4884
ASEND	U	00000200	1	4883	4884
ASLENGTH	U	00000200	1	4884	
BCEXTCOD	H	0000001A	2	4747	
BCIOCOD	H	0000003A	2	4755	
BCMCKCOD	H	00000032	2	4753	
BCPGMCOD	H	0000002A	2	4751	
BCSVCCOD	H	00000022	2	4749	
BEGCLOCK	D	00000D60	8	4439	3626 3844 4260 4263 4270
BEGIN	I	00000200	2	3555	3523 3550 3551
CALCDUR	I	00000B8C	4	4257	3838 4185
CALCRET	F	00000BD0	4	4279	4257 4276
CALCWORK	F	00000BD4	4	4280	4258 4275
CAW	F	00000048	4	4759	
CAWADDR	R	00000049	3	4762	
CAWKEY	X	00000048	1	4760	
CAWSUSP	U	00000008	1	4761	
CCW0	4	00000000	8	4888	4894
CCW0ADDR	R	00000001	3	4890	
CCW0CNT	H	00000006	2	4893	
CCW0CODE	X	00000000	1	4889	
CCW0FLGS	X	00000004	1	4891	
CCW0L	U	00000008	1	4894	
CCW1	4	00000000	8	4906	4911
CCW1ADDR	A	00000004	4	4910	
CCW1CNT	H	00000002	2	4909	
CCW1CODE	X	00000000	1	4907	
CCW1FLGS	X	00000001	1	4908	
CCW1L	U	00000008	1	4911	
CCWCC	U	00000040	1	4898	
CCWCD	U	00000080	1	4897	
CCWIDA	U	00000004	1	4902	
CCWPCI	U	00000008	1	4901	
CCWSKIP	U	00000010	1	4900	
CCWSLI	U	00000020	1	4899	
CCWSUSP	U	00000002	1	4903	
CHANID	F	000000A8	4	4814	
CODE	2	00000000	8704	3504	
CONPGM	W	00000D98	8	4448	4416
CPUID	U	0000031B	1	4886	
CSW	F	00000040	8	4758	
CSWATTN	U	00000080	1	4928	
CSWBUSY	U	00000010	1	4931	
CSWCCTL	U	00000004	1	4943	
CSWCCW	R	00000001	3	4925	
CSWCDAT	U	00000008	1	4942	
CSWCE	U	00000008	1	4932	4244
CSWCHNG	U	00000001	1	4945	
CSWCNT	H	00000006	2	4947	
CSWCS	X	00000005	1	4937	
CSWCUE	U	00000020	1	4930	
CSWDCC0	U	00000000	1	4921	
CSWDCC1	U	00000001	1	4922	
CSWDCC3	U	00000003	1	4923	
CSWDCCM	U	00000003	1	4920	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
CSWDE	U	00000004	1	4933	4244
CSWFLAG	X	00000000	1	4915	
CSWFMT	4	00000000	8	4914	4948
CSWFMTL	U	00000008	1	4948	
CSWICTL	U	00000002	1	4944	
CSWIL	U	00000040	1	4939	
CSWKEYM	U	000000F0	1	4916	
CSWLOG	U	00000004	1	4919	
CSWPCI	U	00000080	1	4938	
CSWPRGM	U	00000020	1	4940	
CSWPROT	U	00000010	1	4941	
CSWSM	U	00000040	1	4929	
CSWSUSP	U	00000008	1	4918	
CSWUC	U	00000002	1	4934	
CSWUS	X	00000004	1	4927	
CSWUX	U	00000001	1	4935	
DURATION	D	00000D70	8	4441	3839 4188 4189 4192 4272
DWAT0010	3	00000C30	8	4324	4323
DWAT0011	3	00000C40	8	4329	4328
DWAT0012	3	00000C50	8	4334	4333
DWAT0013	3	00000C60	8	4339	4338
EDIT	X	00000DE4	12	4452	4202 4203
ENADEV	I	00000C76	4	4358	4312
ENAOKAY	I	00000CC4	2	4383	4372
ENDCLOCK	D	00000D68	8	4440	3837 4164 4265 4268 4271
ENDREGS	A	0000001C	4	4476	
EOJ	H	00000C2A	2	4322	3574 3582
EXTCPUAD	H	00000084	2	4779	
EXTICODE	H	00000086	2	4780	
EXTIPARM	F	00000080	4	4778	
EXTNPSW	F	00000058	8	4768	
EXTOPSW	F	00000018	8	4740	4746
FAILDEV	H	00000C38	2	4327	4363 4373 4378
FAILIO	H	00000C48	2	4332	4212 4235 4245
FAILMASK	A	00000018	4	4474	
FAILTEST	H	00000C58	2	4337	3577 3580
FIND0015	A	00000CBC	4	4380	4358
FINL0015	H	00000C7E	2	4361	4377
FINM0015	A	00000CC0	4	4381	4376
FINN0015	H	00000CAC	2	4374	4365 4367
IIRB0016	F	00000CF8	4	4408	4404 4406
IMAGE	1	00000000	8704	0	
INIT	H	00000C18	2	4306	3563
IOCB	4	00000000	48	4562	4586 3552
IOCBCAW	A	00000018	4	4582	
IOCBCM	X	00000009	1	4570	
IOCBCS	X	0000000B	1	4573	
IOCBCT	X	0000000D	1	4575	
IOCBDEV	H	00000004	2	4567	4366
IOCBDID	F	00000000	4	4564	4208 4369
IOCBDV	H	00000002	2	4566	
IOCBIRB	A	00000020	8	4584	4213
IOCBL	U	00000030	1	4586	
IOCBORB	A	00000018	8	4583	4210 4309
IOCBRCNT	H	00000016	2	4581	4242
IOCBSC	X	0000000E	1	4576	4206 4237 4239

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
IOCBSCCW	A	00000010	4	4578	4241
IOCBSCNT	F	00000014	4	4579	
IOCBSIB	A	00000028	8	4585	4359
IOCBST	H	0000000A	2	4571	4207 4238
IOCBUM	X	00000008	1	4569	
IOCBUS	X	0000000A	1	4572	4244
IOCBUT	X	0000000C	1	4574	
IOCBWAIT	X	0000000F	1	4577	
IOCBZERO	H	00000006	2	4568	4207
IOCB_009	A	00000CC8	4	4391	4308
IOELADDR	F	000000AC	4	4815	
IOICODE	H	000000BA	2	4820	
IOIID	F	000000C0	4	4825	
IOINIT	I	00000C68	4	4346	4311
IOIPARM	F	000000BC	4	4824	
IOMK0014	F	00000C70	4	4348	4346 4347
ION0008	3	00000B30	8	4223	4220
IONPSW	F	00000078	8	4772	
IOOPSW	F	00000038	8	4744	4754
IORB0016	X	00000D38	12	4410	4402
IOS0008	X	00000B38	8	4224	4219 4227
IOSSID	F	000000B8	4	4823	4230
IOWT0007	H	00000B16	2	4217	4231 4234 4240
IPLCCW1	F	00000008	8	4732	
IPLCCW2	F	00000010	8	4733	
IPLPSW	F	00000000	8	4731	
IRB	4	00000000	96	4641	4645 4647 4214
IRBECW	X	00000020	32	4644	
IRBEMW	X	00000040	32	4646	
IRBESW	X	0000000C	20	4643	
IRBL	U	00000040	1	4645	
IRBSCSW	X	00000000	12	4642	4237 4238 4241 4242
IRBXL	U	00000060	1	4647	
IRST0008	H	00000B40	2	4226	4223
K	U	00000400	1	4429	4430 4431 4432
K64	U	00010000	1	4431	4492 4494 4498 4500 4504 4506 4510 4512
LCHANLOG	F	000000B0	4	4816	
MB	U	00100000	1	4432	4492 4498 4504 4510
MCKLOG	F	00000100	4	4848	
MCKNPSW	F	00000070	8	4771	
MCKOPSW	F	00000030	8	4743	4752
MEASUREB	X	000000B9	1	4819	
MKARCHMD	X	000000A3	1	4807	
MKARS	F	00000120	4	4846	
MKCLKCMP	F	000000E0	8	4832	
MKCPUTIM	F	000000D8	8	4831	
MKCRS	F	000001C0	4	4851	
MKDMGCOD	F	000000F4	4	4835	
MKFAILA	F	000000F8	4	4837	
MKFPRS	D	00000160	8	4849	
MKICODE	F	000000E8	4	4833	
MKLOGOUT	F	00000100	4	4839	
MKMODEL	F	000000FC	4	4838	
MKXSAA	F	000000D4	4	4830	
MONCLS	H	00000094	2	4795	
MONCODE	F	0000009C	4	4802	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
MONNUMBR	X	00000095	1	4797	
MPGACCID	X	000000A2	1	4805	
NKGRS	F	00000180	4	4850	
NUMLOOPS	F	00000D5C	4	4437	3625 3843
OP1DATA	A	00000004	4	4465	3611
OP1LEN	F	00000010	4	4470	3610 3612
OP1WHERE	A	0000000C	4	4469	3609
OP2DATA	A	00000008	4	4466	3617
OP2LEN	U	00000100	1	4472	3616
OP2WHERE	A	00000014	4	4471	3615
OPSWHERE	U	0000000C	1	4468	3629 3632 3637 3639 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 3831 3833 3847 3850 3857 3860
					3863 3866 3869 3872 3875 3878 3881 3884 3888 3891 3894 3897 3900
					3903 3906 3909 3912 3915 3919 3922 3925 3928 3931 3934 3937 3940
					3943 3946 3950 3953 3956 3959 3962 3965 3968 3971 3974 3977 3981
					3984 3987 3990 3993 3996 3999 4002 4005 4008 4012 4015 4018 4021
					4024 4027 4030 4033 4036 4039 4043 4046 4049 4052 4055 4058 4061
					4064 4067 4070 4074 4077 4080 4083 4086 4089 4092 4095 4098 4101
					4105 4108 4111 4114 4117 4120 4123 4126 4129 4132 4136 4139 4142
					4145 4148 4151 4156 4159
ORB	4	00000000	32	4594	4624 4632 3553
ORB1_0	X	00000004	1	4597	
ORB1_8	X	00000005	1	4604	
ORBA	U	00000010	1	4608	
ORBB	U	00000004	1	4610	
ORBC	U	00000004	1	4600	
ORBCCW	A	00000008	4	4622	
ORBCSS	X	0000000C	1	4626	
ORBCU	X	0000000E	1	4629	
ORBD	U	00000040	1	4617	
ORBF	U	00000080	1	4605	
ORBH	U	00000002	1	4611	
ORBI	U	00000020	1	4607	
ORBKEYM	U	000000F0	1	4598	
ORBL	U	00000080	1	4615	
ORBLEN	U	0000000C	1	4624	
ORBLPM	X	00000006	1	4613	
ORBM	U	00000002	1	4601	
ORBP	U	00000040	1	4606	
ORBPARM	F	00000000	4	4595	
ORBPGM	X	0000000E	1	4628	
ORBRSV25	U	0000007E	1	4619	
ORBRSV26	U	0000003E	1	4618	
ORBRSV3	U	0000007F	1	4616	
ORBRSV4	U	00000080	1	4623	
ORBRSV5	X	0000000D	1	4627	
ORBRSV6	X	0000000F	1	4630	
ORBRSV7	X	00000010	16	4631	
ORBS	U	00000008	1	4599	
ORBT	U	00000001	1	4612	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ORBU	U	00000008	1	4609	
ORBX	U	00000001	1	4620	
ORBXLEN	U	00000020	1	4632	
ORBY	U	00000001	1	4602	
ORRB1_24	X	00000007	1	4614	
OVERHEAD	D	00000D78	8	4442	3839 4187
PAGE	U	00001000	1	4430	4434
PCFETO	A	000000C4	4	4826	
PERACCID	X	000000A1	1	4804	
PERADDR	F	00000098	4	4801	
PERCODE	X	00000096	1	4798	
PERCODMK	U	000000F0	1	4799	
PGMACCID	X	000000A0	1	4803	
PGMDXC	F	00000090	4	4793	
PGMICODE	H	0000008E	2	4792	
PGMIID	F	0000008C	4	4788	
PGMIILC	X	0000008D	1	4790	
PGMIILCM	U	0000000C	1	4791	
PGMNPSW	F	00000068	8	4770	
PGMOPSW	F	00000028	8	4742	4750
PGMTRX	F	00000090	4	4794	
PMCW1_0	X	00000004	1	4955	
PMCW1_8	X	00000005	1	4958	4364 4370
PMCWB	U	00000004	1	4990	
PMCWCHP0	X	00000010	1	4979	
PMCWCHP1	X	00000011	1	4980	
PMCWCHP2	X	00000012	1	4981	
PMCWCHP3	X	00000013	1	4982	
PMCWCHP4	X	00000014	1	4983	
PMCWCHP5	X	00000015	1	4984	
PMCWCHP6	X	00000016	1	4985	
PMCWCHP7	X	00000017	1	4986	
PMCWDNUM	H	00000006	2	4970	4366
PMCWE	U	00000080	1	4959	4370
PMCWEXC	X	0000001B	1	4989	
PMCWIP	F	00000000	4	4954	
PMCWISCM	U	00000038	1	4956	
PMCWLM	U	00000060	1	4960	
PMCWLMG	U	00000020	1	4961	
PMCWLML	U	00000040	1	4962	
PMCWLPM	X	00000008	1	4972	
PMCWLPUM	X	0000000A	1	4974	
PMCWM	U	00000004	1	4966	
PMCWMBI	H	0000000C	2	4976	
PMCWMM	U	00000018	1	4963	
PMCWMMC	U	00000008	1	4965	
PMCWMME	U	00000010	1	4964	
PMCWPAM	X	0000000F	1	4978	
PMCWPIM	X	0000000B	1	4975	
PMCWPNOM	X	00000009	1	4973	
PMCWPOM	X	0000000E	1	4977	
PMCWRES1	X	00000018	4	4987	
PMCWRES2	X	00000018	3	4988	
PMCWS	U	00000001	1	4992	
PMCWT	U	00000002	1	4967	
PMCWV	U	00000001	1	4968	4364

```
     SYMBOL          TYPE    VALUE      LENGTH    DEFN  REFERENCES

PMCWX                 U     00000002          1  4991
PRTLINE               C     00000DA0         38  4449  4451  4166  4202  4203  4448
PRTLNG                U     00000044          1  4451  4448
R0                    U     00000000          1  5007  3549  3621
R1                    U     00000001          1  5008  4176
R10                   U     0000000A          1  5017  3609  3613  3629  3630  3632  3637  3639  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  3831  3833  3847
                                                      3848  3850  3851  3857  3858  3860  3861  3863  3864  3866  3867  3869  3870
                                                      3872  3873  3875  3876  3878  3879  3881  3882  3884  3885  3888  3889  3891
                                                      3892  3894  3895  3897  3898  3900  3901  3903  3904  3906  3907  3909  3910
                                                      3912  3913  3915  3916  3919  3920  3922  3923  3925  3926  3928  3929  3931
                                                      3932  3934  3935  3937  3938  3940  3941  3943  3944  3946  3947  3950  3951
                                                      3953  3954  3956  3957  3959  3960  3962  3963  3965  3966  3968  3969  3971
                                                      3972  3974  3975  3977  3978  3981  3982  3984  3985  3987  3988  3990  3991
                                                      3993  3994  3996  3997  3999  4000  4002  4003  4005  4006  4008  4009  4012
                                                      4013  4015  4016  4018  4019  4021  4022  4024  4025  4027  4028  4030  4031
                                                      4033  4034  4036  4037  4039  4040  4043  4044  4046  4047  4049  4050  4052
                                                      4053  4055  4056  4058  4059  4061  4062  4064  4065  4067  4068  4070  4071
                                                      4074  4075  4077  4078  4080  4081  4083  4084  4086  4087  4089  4090  4092
                                                      4093  4095  4096  4098  4099  4101  4102  4105  4106  4108  4109  4111  4112
                                                      4114  4115  4117  4118  4120  4121  4123  4124  4126  4127  4129  4130  4132
                                                      4133  4136  4137  4139  4140  4142  4143  4145  4146  4148  4149  4151  4152
                                                      4156  4157  4159  4160  4287  4289  4294  4297
R11                   U     0000000B          1  5018  3610  4289  4291
R12                   U     0000000C          1  5019  3615  3619  3629  3630  3632  3637  3639  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  3831  3833  3847
                                                      3848  3850  3851  3857  3858  3860  3861  3863  3864  3866  3867  3869  3870
                                                      3872  3873  3875  3876  3878  3879  3881  3882  3884  3885  3888  3889  3891
                                                      3892  3894  3895  3897  3898  3900  3901  3903  3904  3906  3907  3909  3910
                                                      3912  3913  3915  3916  3919  3920  3922  3923  3925  3926  3928  3929  3931
                                                      3932  3934  3935  3937  3938  3940  3941  3943  3944  3946  3947  3950  3951
                                                      3953  3954  3956  3957  3959  3960  3962  3963  3965  3966  3968  3969  3971
                                                      3972  3974  3975  3977  3978  3981  3982  3984  3985  3987  3988  3990  3991
                                                      3993  3994  3996  3997  3999  4000  4002  4003  4005  4006  4008  4009  4012
                                                      4013  4015  4016  4018  4019  4021  4022  4024  4025  4027  4028  4030  4031
                                                      4033  4034  4036  4037  4039  4040  4043  4044  4046  4047  4049  4050  4052
                                                      4053  4055  4056  4058  4059  4061  4062  4064  4065  4067  4068  4070  4071
                                                      4074  4075  4077  4078  4080  4081  4083  4084  4086  4087  4089  4090  4092
                                                      4093  4095  4096  4098  4099  4101  4102  4105  4106  4108  4109  4111  4112
                                                      4114  4115  4117  4118  4120  4121  4123  4124  4126  4127  4129  4130  4132
                                                      4133  4136  4137  4139  4140  4142  4143  4145  4146  4148  4149  4151  4152
                                                      4156  4157  4159  4160  4192  4193  4195  4290  4293  4294  4295
R13                   U     0000000D          1  5020  3616  4192  4196  4287  4290  4291  4295  4297
R14                   U     0000000E          1  5021  3563  3567  3596  4178  4313
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
R15	U	0000000F	1	5022	3589 3838 4167 4184 4185 4190 4248 4249 4257 4273 4276 4277 4298 4311 4312 4351 4383
R2	U	00000002	1	5009	3550 3555 3556 3557 3558 3560 4177
R3	U	00000003	1	5010	3552 4308
R4	U	00000004	1	5011	
R5	U	00000005	1	5012	3598 3599 3602 4171 4172 4173 4187 4258 4270 4275 4289
R6	U	00000006	1	5013	3604 3605 3611 3613 3617 3619 3627 3836 3845 4163 4188 4260 4261 4262 4263 4265 4266 4267 4268 4271 4290
R7	U	00000007	1	5014	3612 3618 3625 3836 3843 4163 4189 4258 4260 4263 4265 4268 4272 4275 4295
R8	U	00000008	1	5015	3553 4309
R9	U	00000009	1	5016	3551 3560 3561
REG2LOW	U	000000DD	1	4481	
REG2PATT	U	AABBCCDD	1	4480	4494 4500 4506 4512
RPTSAVE	F	00000B88	4	4251	4184 4248
RPTSPEED	I	00000AB2	4	4184	4167
RSTNPSW	F	00000000	8	4736	
RSTOPSW	F	00000008	8	4737	
SAVER1	F	00000238	4	3584	4176
SAVER2	F	0000023C	4	3585	3558 4177
SAVER5	F	00000240	4	3586	3602 4171
SAVETRT	D	00000248	8	3587	
SCANOUT	X	00000080	1	4774	4775
SCANOUTL	U	00000000	1	4775	
SCHIB	4	00000000	52	4951	4998 4360
SCHIBL	U	00000034	1	4998	
SCHMBA	A	00000028	8	4996	
SCHMDA1	X	00000030	4	4997	
SCHMDA3	X	00000028	12	4995	
SCHPMCW	X	00000000	28	4953	
SCHSCSW	X	0000001C	12	4994	
SCSW	4	00000000	12	4656	4718
SCSW0CC	U	00000004	1	4672	
SCSW1	X	00000002	1	4676	
SCSW2	X	00000003	1	4685	4237
SCSWACP	U	00000001	1	4684	
SCSWADA	U	00000040	1	4687	
SCSWAHP	U	00000002	1	4683	
SCSWALKC	U	00000010	1	4670	
SCSWARP	U	00000008	1	4681	
SCSWASA	U	00000080	1	4686	
SCSWASP	U	00000004	1	4682	
SCSWASUS	U	00000020	1	4688	
SCSWATTN	U	00000080	1	4698	
SCSWBUSY	U	00000010	1	4701	
SCSWCCTL	U	00000004	1	4713	
SCSWCCW	A	00000004	4	4695	4241
SCSWCCWF	U	00000080	1	4667	
SCSWCCWP	U	00000040	1	4668	
SCSWCDAT	U	00000008	1	4712	
SCSWCE	U	00000008	1	4702	
SCSWCHNG	U	00000001	1	4715	
SCSWCNT	H	0000000A	2	4717	4242
SCSWCS	X	00000009	1	4707	
SCSWCTLS	X	00000001	1	4666	
SCSWCUE	U	00000020	1	4700	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
SCSWDCC0	U	00000000	1	4662	
SCSWDCC1	U	00000001	1	4663	
SCSWDCC3	U	00000003	1	4664	
SCSWDCCM	U	00000003	1	4661	
SCSWDE	U	00000004	1	4703	
SCSWECWC	U	00000002	1	4673	
SCSWESWF	U	00000004	1	4660	
SCSWFC	U	00000010	1	4680	
SCSWFH	U	00000020	1	4679	
SCSWFLAG	X	00000000	1	4657	
SCSWFM	U	00000070	1	4677	
SCSWFS	U	00000040	1	4678	
SCSWICTL	U	00000002	1	4714	
SCSWIL	U	00000040	1	4709	
SCSWISIC	U	00000020	1	4669	
SCSWKEYM	U	000000F0	1	4658	
SCSWL	U	0000000C	1	4718	
SCSWPCI	U	00000080	1	4708	
SCSWPNOP	U	00000001	1	4674	
SCSWPRGM	U	00000020	1	4710	
SCSWPROT	U	00000010	1	4711	
SCSWSAS	U	00000010	1	4689	
SCSWSINT	U	00000008	1	4690	
SCSWSM	U	00000040	1	4699	
SCSWSPEN	U	00000001	1	4693	
SCSWSPRI	U	00000004	1	4691	4239
SCSWSSEC	U	00000002	1	4692	
SCSWSSIC	U	00000008	1	4671	
SCSWSUSC	U	00000008	1	4659	
SCSWUC	U	00000002	1	4704	
SCSWUS	X	00000008	1	4697	4238
SCSWUX	U	00000001	1	4705	
SSARCHMD	X	000000A3	1	4806	
SSARS	F	00000120	4	4862	
SSCLKCMP	F	000000E0	8	4856	
SSCPUTIM	F	000000D8	8	4855	
SSCRS	F	000001C0	4	4865	
SSFPRS	D	00000160	8	4863	
SSGRS	F	00000180	4	4864	
SSMODEL	F	0000010C	4	4860	
SSPREFIX	F	00000108	4	4859	
SSPSW	F	00000100	8	4858	
SSXSAA	A	000000D4	4	4854	
STFLDATA	F	000000C8	4	4827	
SUBDWORD	I	00000BE0	4	4287	4190 4273
SUBDWSAV	D	00000C08	8	4300	4287 4297
SUBTEST	X	000021FF	1	4553	3579
SVCICODE	H	0000008A	2	4786	
SVCIID	F	00000088	4	4782	
SVCIILC	X	00000089	1	4784	
SVCIILCM	U	0000000C	1	4785	
SVCNPSW	F	00000060	8	4769	
SVCOPSW	F	00000020	8	4741	4748
TBYTE	X	00000001	1	4461	3621
TEST91	I	00000250	4	3595	3567
TESTADDR	U	000021FE	1	4434	4435 4550

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
TESTNUM	X	000021FE	1	4552	3576 3605
TICKSAAA	P	00000D80	8	4444	4195 4198
TICKSBBB	P	00000D88	8	4445	4196 4200
TICKSTOT	P	00000D90	8	4446	4198 4199 4200 4203
TIMEADDR	U	000021FD	1	4435	4546
TIMEOPT	X	000021FD	1	4548	3573 3595
TIMER	F	00000050	4	4765	
TNUM	X	00000000	1	4460	3604
TRE02TST	J	00000000	8704	3504	3507 3514 3522 3524 4546 4550
TRELOP10	X	00001188	4	4528	4491 4497 4503 4509
TRELOP20	X	00001C88	1	4540	4491 4497 4503 4509
TRENEXT	U	00000024	1	4478	4172
TREPERF	A	00000DF0	4	4488	3598
TREPOP1	X	00000DF0	1	4490	
TREPOP2	X	00000E14	1	4496	
TREPOP3	X	00000E38	1	4502	
TREPOP4	X	00000E5C	1	4508	
TRETEST	4	00000000	36	4458	3599
TRTOP10	X	00000E88	4	4521	
TRTOP111	X	00000F88	4	4523	
TRTOP1F0	X	00001088	4	4525	
TRTOP20	X	00001988	1	4534	
TRTOP211	X	00001A88	1	4536	
TRTOP2F0	X	00001B88	1	4538	
TST91LOP	U	0000025A	1	3601	4174
TTDES	F	00000054	4	4766	
UA0	F	00000010	8	4738	
UA1	F	0000004C	4	4763	
UA2	F	000000A4	4	4808	
UA3	F	000000B4	4	4817	
UA4	X	000000B8	1	4818	
UA5	X	000000CC	8	4828	
UA6	X	000000EC	8	4834	
UA7	F	00000118	8	4845	
UA8	X	00000180	32	4874	
WPSW0008	3	00000B28	8	4222	4221
ZBRKADDR	A	00000110	8	4844	
ZEMONCNT	F	0000010C	4	4843	
ZEMONCTR	A	00000100	8	4841	
ZEMONSIZ	F	00000108	4	4842	
ZEXTNPSW	X	000001B0	16	4877	
ZEXTOPSW	X	00000130	16	4869	
ZIONPSW	X	000001F0	16	4881	
ZIOOPSW	X	00000170	16	4873	
ZMCKNPSW	X	000001E0	16	4880	
ZMCKOPSW	X	00000160	16	4872	
ZMKFAILA	F	000000F8	8	4836	
ZMONCODE	F	000000B0	8	4811	
ZPGMNPSW	X	000001D0	16	4879	
ZPGMOPSW	X	00000150	16	4871	
ZPGMTRX	F	000000A8	8	4810	
ZRSTNPSW	X	000001A0	16	4876	
ZRSTOPSW	X	00000120	16	4868	
ZSASDISP	U	000011C0	1	4882	
ZSVCNPSW	X	000001C0	16	4878	
ZSVCOPSW	X	00000140	16	4870	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
=A(OP2LEN)	A	00000D44	4	4423	3616 3618
=CL5'TRE'	C	00000D50	5	4426	4166
=F'0'	F	00000D48	4	4424	4173
=F'1'	F	00000D4C	4	4425	4293
=P'4294967296'	P	00000D55	6	4427	4199

```
 MACRO    DEFN  REFERENCES

ANTR       119
APROB      251
ARCHIND    411   3441
ARCHLVL    552   3440
ASAIPL     678   3520
ASALOAD    758   3503
ASAREA     813   4728
ASAZAREA   998
CPUWAIT   1081   4218
DSECTS    1407   4560   4592   4639   4654   4725
DWAIT     1610   4321   4326   4331   4336
DWAITEND  1667   4320
ENADEV    1675   4357
ESA390    1775
IOCB      1786   4390
IOCBDS    1962   4561
IOFMT     1996   4593   4640   4655   4887   4905   4913   4950
IOINIT    2334   4345
IOTRFR    2375
ORB       2423   4409
POINTER   2612
PSWFMT    2640
RAWAIT    2774
RAWIO     2870   4205
SIGCPU    3028
SMMGR     3086
SMMGRB    3186
TRAP128   3235
TRAP64    3212   3505   3508
TRAPS     3248
ZARCH     3322
ZEROH     3334
ZEROL     3362
ZEROLH    3390
ZEROLL    3413
```

```
   DESC      SYMBOL    SIZE      POS         ADDR

Entry: 0

Image       IMAGE     8704   0000-21FF   0000-21FF
  Region    CODE      8704   0000-21FF   0000-21FF
    CSECT   TRE02TST  8704   0000-21FF   0000-21FF
```

```
   STMT                  FILE NAME

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


** NO ERRORS FOUND **
```