```
 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   # (uncomment to enable timing tests!)
                                                    47 *     runtest     20        # (depends on the host)
                                                    48 *
                                                    49 *     *Done
                                                    50 *
                                                    51 *
                                                    52 ************************************************************************
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    54          PRINT OFF
                                                  3435          PRINT ON

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

                                                  3441          ARCHLVL  ZARCH=NO,MNOTE=NO
                                                  3443+$AL      OPSYN AL
                                                  3444+$ALR     OPSYN ALR
                                                  3445+$B       OPSYN B
                                                  3446+$BAS     OPSYN BAS
                                                  3447+$BASR    OPSYN BASR
                                                  3448+$BC      OPSYN BC
                                                  3449+$BCTR    OPSYN BCTR
                                                  3450+$BE      OPSYN BE
                                                  3451+$BH      OPSYN BH
                                                  3452+$BL      OPSYN BL
                                                  3453+$BM      OPSYN BM
                                                  3454+$BNE     OPSYN BNE
                                                  3455+$BNH     OPSYN BNH
                                                  3456+$BNL     OPSYN BNL
                                                  3457+$BNM     OPSYN BNM
                                                  3458+$BNO     OPSYN BNO
                                                  3459+$BNP     OPSYN BNP
                                                  3460+$BNZ     OPSYN BNZ
                                                  3461+$BO      OPSYN BO
                                                  3462+$BP      OPSYN BP
                                                  3463+$BXLE    OPSYN BXLE
                                                  3464+$BZ      OPSYN BZ
                                                  3465+$CH      OPSYN CH
                                                  3466+$L       OPSYN L
                                                  3467+$LH      OPSYN LH
                                                  3468+$LM      OPSYN LM
                                                  3469+$LPSW    OPSYN LPSW
                                                  3470+$LR      OPSYN LR
                                                  3471+$LTR     OPSYN LTR
                                                  3472+$NR      OPSYN NR
                                                  3473+$SL      OPSYN SL
                                                  3474+$SLR     OPSYN SLR
                                                  3475+$SR      OPSYN SR
                                                  3476+$ST      OPSYN ST
                                                  3477+$STM     OPSYN STM
                                                  3478+$X       OPSYN X
                                                  3479+$AHI     OPSYN AHI
                                                  3480+$B       OPSYN J
                                                  3481+$BC      OPSYN BRC
                                                  3482+$BE      OPSYN JE
                                                  3483+$BH      OPSYN JH
                                                  3484+$BL      OPSYN JL
                                                  3485+$BM      OPSYN JM
                                                  3486+$BNE     OPSYN JNE
                                                  3487+$BNH     OPSYN JNH
                                                  3488+$BNL     OPSYN JNL
                                                  3489+$BNM     OPSYN JNM
                                                  3490+$BNO     OPSYN JNO
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                  3491+$BNP     OPSYN JNP
                                                  3492+$BNZ     OPSYN JNZ
                                                  3493+$BO      OPSYN JO
                                                  3494+$BP      OPSYN JP
                                                  3495+$BXLE    OPSYN JXLE
                                                  3496+$BZ      OPSYN JZ
                                                  3497+$CHI     OPSYN CHI
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

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

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



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

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

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

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

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

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

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

00000212  45E0 2A18                  00000C18       3564          BAL    R14,INIT        Initalize Program
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   3566 ********************************************************************************
                                                   3567 *        Run the tests...
                                                   3568 ********************************************************************************

00000216  45E0 2050                      00000250  3570          BAL   R14,TEST91       Time TRE   instruction  (speed test)




                                                   3572 ********************************************************************************
                                                   3573 *         Test for normal or unexpected test completion...
                                                   3574 ********************************************************************************

0000021A  95FF 9FFD                      000021FD  3576          CLI   TIMEOPT,X'FF'    Was this a timing run?
0000021E  4770 2A2A                      00000C2A  3577          BNE   EOJ              No, timing run; just go end normally

00000222  9594 9FFE                      000021FE  3579          CLI   TESTNUM,X'94'    Did we end on expected test?
00000226  4770 2A58                      00000C58  3580          BNE   FAILTEST         No?! Then FAIL the test!

0000022A  9500 9FFF                      000021FF  3582          CLI   SUBTEST,X'00'    Did we end on expected SUB-test?
0000022E  4770 2A58                      00000C58  3583          BNE   FAILTEST         No?! Then FAIL the test!

00000232  47F0 2A2A                      00000C2A  3585          B     EOJ              Yes, then normal completion!



00000238  00000000                                 3587 SAVER1   DC    F'0'
0000023C  00000000                                 3588 SAVER2   DC    F'0'
00000240  00000000                                 3589 SAVER5   DC    F'0'
00000248  00000000 00000000                        3590 SAVETRT  DC    D'0'                (saved R1/R2 from TRT results)

00000250                                           3592          DROP  R15
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   3594 ********************************************************************************
                                                   3595 *        TEST91                  Time TRE instruction  (speed test)
                                                   3596 ********************************************************************************

00000250  91FF 9FFD                      000021FD  3598 TEST91   TM    TIMEOPT,X'FF'    Is timing tests option enabled?
00000254  078E                                     3599          BZR   R14              No, skip timing tests

00000256  4150 2BF8                      00000DF8  3601          LA    R5,TREPERF         Point R5 --> testing control table

0000025A                  00000000               3603          USING TRETEST,R5         What each table entry looks like

                          0000025A       00000001  3605 TST91LOP EQU   *
0000025A  5050 2040                      00000240  3606          ST    R5,SAVER5          save current pref table base

0000025E  4360 5000                      00000000  3608          IC    R6,TNUM            Set test number
00000262  4260 9FFE                      000021FE  3609          STC   R6,TESTNUM

                                                   3611 *
                                                   3612 **       Initialize operand data  (move data to testing address)
                                                   3613 *
00000266  58A0 500C                      0000000C  3614          L     R10,OP1WHERE       Where to move operand-1 data to
0000026A  58B0 5010                      00000010  3615          L     R11,OP1LEN           operand-1 length
0000026E  5860 5004                      00000004  3616          L     R6,OP1DATA         Where op1 data is right now
00000272  5870 5010                      00000010  3617          L     R7,OP1LEN          How much of it there is
00000276  0EA6                                     3618          MVCL  R10,R6

00000278  58C0 5014                      00000014  3620          L     R12,OP2WHERE       Where to move operand-2 data to
0000027C  58D0 2B44                      00000D44  3621          L     R13,=A(OP2LEN)     How much of it there is
00000280  5860 5008                      00000008  3622          L     R6,OP2DATA         Where op2 data is right now
00000284  5870 2B44                      00000D44  3623          L     R7,=A(OP2LEN)          How much of it there is
00000288  0EC6                                     3624          MVCL  R12,R6

0000028A  4300 5001                      00000001  3626          IC    R0,TBYTE           Set test byte
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   3629 ************************************************************************
                                                   3630 *     Define come helpful macros to ensure our counts are correct
                                                   3631 ************************************************************************


                                                   3633          MACRO
                                                   3634          OVERONLY &NUM              &NUM = number of sets
                                                   3635          LCLA  &CTR
                                                   3636 &CTR     SETA  &NUM
                                                   3637 .LOOP    ANOP
                                                   3638 .*
                                                   3639 *
                                                   3640          LM    R10,R12,OPSWHERE
                                                   3641          BC    B'0001',*+4
                                                   3642 .*
                                                   3643 &CTR     SETA  &CTR-1
                                                   3644          AIF   (&CTR GT 0).LOOP
                                                   3645          MEND


                                                   3647          MACRO
                                                   3648          DOINSTR &NUM               &NUM = number of sets
                                                   3649          LCLA  &CTR
                                                   3650 &CTR     SETA  &NUM
                                                   3651 .LOOP    ANOP
                                                   3652 .*
                                                   3653 *
                                                   3654          LM    R10,R12,OPSWHERE
                                                   3655          TRE   R10,R12
                                                   3656          BC    B'0001',*-4
                                                   3657 .*
                                                   3658 &CTR     SETA  &CTR-1
                                                   3659          AIF   (&CTR GT 0).LOOP
                                                   3660          MEND
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                  3662 ************************************************************************
                                                  3663 *        Next, time the overhead...
                                                  3664 ************************************************************************

0000028E  5870 2B64                    00000D64   3666         L     R7,NUMLOOPS
00000292  B205 2B68                    00000D68   3667         STCK  BEGCLOCK
00000296  0560                                    3668         BALR  R6,0

                                                  3670 *                                  100 sets of overhead
                                                  3671         OVERONLY 2                 (first 2)
                                                  3672+*
00000298  98AC 500C                    0000000C   3673+         LM    R10,R12,OPSWHERE
0000029C  4710 20A0                    000002A0   3674+         BC    B'0001',*+4
                                                  3675+*
000002A0  98AC 500C                    0000000C   3676+         LM    R10,R12,OPSWHERE
000002A4  4710 20A8                    000002A8   3677+         BC    B'0001',*+4

                                                  3679 *        .........ETC.........

                                                  3681         PRINT OFF
                                                  3971         PRINT ON

                                                  3973         OVERONLY 2                 (last 2)
                                                  3974+*
000005A8  98AC 500C                    0000000C   3975+         LM    R10,R12,OPSWHERE
000005AC  4710 23B0                    000005B0   3976+         BC    B'0001',*+4
                                                  3977+*
000005B0  98AC 500C                    0000000C   3978+         LM    R10,R12,OPSWHERE
000005B4  4710 23B8                    000005B8   3979+         BC    B'0001',*+4

000005B8  0676                                    3981         BCTR  R7,R6
000005BA  B205 2B70                    00000D70   3982         STCK  ENDCLOCK
000005BE  45F0 298C                    00000B8C   3983         BAL   R15,CALCDUR
000005C2  D207 2B80 2B78       00000D80 00000D78   3984         MVC   OVERHEAD,DURATION
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   3986 ********************************************************************
                                                   3987 *        Now do the actual timing run...
                                                   3988 ********************************************************************

000005C8  5870 2B64                      00000D64  3990         L     R7,NUMLOOPS
000005CC  B205 2B68                      00000D68  3991         STCK  BEGCLOCK
000005D0  0560                                     3992         BALR  R6,0

                                                   3994 *                                  100 sets of instructions
                                                   3995         DOINSTR 2                  (first 2)
                                                   3996+*
000005D2  98AC 500C                      0000000C  3997+         LM    R10,R12,OPSWHERE
000005D6  B2A5 00AC                                3998+         TRE   R10,R12
000005DA  4710 23D6                      000005D6  3999+         BC    B'0001',*-4
                                                   4000+*
000005DE  98AC 500C                      0000000C  4001+         LM    R10,R12,OPSWHERE
000005E2  B2A5 00AC                                4002+         TRE   R10,R12
000005E6  4710 23E2                      000005E2  4003+         BC    B'0001',*-4

                                                   4005 *        .........ETC.........

                                                   4007         PRINT OFF
                                                   4393         PRINT ON

                                                   4395         DOINSTR 2                  (last 2)
                                                   4396+*
00000A6A  98AC 500C                      0000000C  4397+         LM    R10,R12,OPSWHERE
00000A6E  B2A5 00AC                                4398+         TRE   R10,R12
00000A72  4710 286E                      00000A6E  4399+         BC    B'0001',*-4
                                                   4400+*
00000A76  98AC 500C                      0000000C  4401+         LM    R10,R12,OPSWHERE
00000A7A  B2A5 00AC                                4402+         TRE   R10,R12
00000A7E  4710 287A                      00000A7A  4403+         BC    B'0001',*-4

00000A82  0676                                     4405         BCTR  R7,R6
00000A84  B205 2B70                      00000D70  4406         STCK  ENDCLOCK

00000A88  D204 2BC9 2B50       00000DC9  00000D50  4408         MVC   PRTLINE+33(5),=CL5'TRE'
00000A8E  45F0 28AE                      00000AAE  4409         BAL   R15,RPTSPEED
                                                   4410 *
                                                   4411 **       More performance tests?
                                                   4412 *
00000A92  5850 2040                      00000240  4413         L     R5,SAVER5          restore perf table base
00000A96  4150 5024                      00000024  4414         LA    R5,TRENEXT         Go on to next table entry
00000A9A  D503 2B48 5000       00000D48  00000000  4415         CLC   =F'0',0(R5)        End of table?
00000AA0  4770 205A                      0000025A  4416         BNE   TST91LOP           No, loop...
00000AA4  5810 2038                      00000238  4417         L     R1,SAVER1          Restore register 1
00000AA8  5820 203C                      0000023C  4418         L     R2,SAVER2          Restore first base register
00000AAC  07FE                                     4419         BR    R14                Return to caller or FAILTEST
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                          4421 ********************************************************************
                                          4422 *        RPTSPEED                  Report instruction speed
                                          4423 ********************************************************************

00000AAE  50F0 2988                 00000B88  4425 RPTSPEED ST    R15,RPTSAVE        Save return address
00000AB2  45F0 298C                 00000B8C  4426          BAL   R15,CALCDUR        Calculate duration

00000AB6  4150 2B80                 00000D80  4428          LA    R5,OVERHEAD        Subtract overhead
00000ABA  4160 2B78                 00000D78  4429          LA    R6,DURATION        From raw timing
00000ABE  4170 2B78                 00000D78  4430          LA    R7,DURATION        Yielding true instruction timing
00000AC2  45F0 29E0                 00000BE0  4431          BAL   R15,SUBDWORD       Do it

00000AC6  98CD 2B78                 00000D78  4433          LM    R12,R13,DURATION   Convert to...
00000ACA  8CC0 000C                 0000000C  4434          SRDL  R12,12            ... microseconds

00000ACE  4EC0 2B88                 00000D88  4436          CVD   R12,TICKSAAA       convert HIGH part to decimal
00000AD2  4ED0 2B90                 00000D90  4437          CVD   R13,TICKSBBB       convert LOW  part to decimal

00000AD6  F877 2B98 2B88      00000D98  00000D88  4439          ZAP   TICKSTOT,TICKSAAA            Calculate...
00000ADC  FC75 2B98 2B55      00000D98  00000D55  4440          MP    TICKSTOT,=P'4294967296'      ...decimal...
00000AE2  FA77 2B98 2B90      00000D98  00000D90  4441          AP    TICKSTOT,TICKSBBB            ...microseconds

00000AE8  D20B 2BD3 2BEC      00000DD3  00000DEC  4443          MVC   PRTLINE+43(L'EDIT),EDIT          (edit into...
00000AEE  DE0B 2BD3 2B9B      00000DD3  00000D9B  4444          ED    PRTLINE+43(L'EDIT),TICKSTOT+3     ...print line)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                          4446          RAWIO 4,FAIL=FAILIO      Print elapsed time on console
00000AF4  9200 300E                 0000000E  4447+         MVI   IOCBSC,X'00'          Clear SC information
00000AF8  D201 300A 3006      0000000A  00000006  4448+         MVC   IOCBST,IOCBZERO       Clear accumulated status
00000AFE  5810 3000                 00000000  4449+         L     1,IOCBDID             Remember the device ID with which I am worki
                                          4450+* Initiate Subchannel-based input/output operation
00000B02  5840 3018                 00000018  4451+         $L    4,IOCBORB             Locate the ORB for the channel subsystem
00000B06  B233 4000                 00000000  4452+         SSCH  0(4)                  Initiate the I/O operation
00000B0A  A774 009F                 00000C48  4453+         $BC   B'0111',FAILIO        ..Start function failed, report/handle the e
00000B0E  5840 3020                 00000020  4454+         $L    4,IOCBIRB             Locate the IRB storage area
00000B12                      00000000        4455+         USING IRB,4                 Make it addressable

                                          4457+* Wait for I/O operation to present status via an interruption
00000B12                                  4458+IOWT0013 DS    0H  Wait for I/O to complete
00000B12  D207 2938 0078      00000B38  00000078  4460+         MVC   IOS0014(8),120(0)               Save Input/Output new PSW
00000B18  D207 0078 2930      00000078  00000B30  4461+         MVC   120(8,0),ION0014               Establish Input/Ouput new PSW
00000B1E  8200 2928                 00000B28  4462+         $LPSW WPSW0014                Wait for event
00000B28  020A0000 00000000               4463+WPSW0014 PSW   2,0,2,0,0                   Wait for event
00000B30  00082000 00000B40               4464+ION0014  PSW   0,0,0,32,IRST0014,24              I/O New PSW: cc==2
00000B38  00000000 00000000               4465+IOS0014  DC    XL8'00'
                                          4466+* Handle input/output interruption
00000B40                                  4467+IRST0014 DS    0H
00000B40  D207 0078 2938      00000078  00000B38  4468+         MVC   120(8,0),IOS0014             Restore input/output new PSW
                                          4469+* Process the interruption...
                                          4470+* Validate interruption is for the expected subchannel
00000B46  5510 00B8                 000000B8  4471+         CL    1,IOSSID              Is this the device for which I am waiting?
00000B4A  A774 FFE4                 00000B12  4472+         $BNE  IOWT0013              ..No, continue waiting for it
                                          4473+* Accumulate interruption information from IRB
00000B4E  B235 4000                 00000000  4474+         TSCH  0(4)                  Retrive interrupt information
00000B52  A744 FFE0                 00000B12  4475+         $BC   B'0100',IOWT0013      CC1 (not status pending), wait for it to arr
00000B56  A714 0079                 00000C48  4476+         $BC   B'0001',FAILIO        CC3 (not operational), an error then
                                          4477+*                                      CC0 (status was pending), accumulate the sta
00000B5A  D600 300E 4003      0000000E  00000003  4478+         OC    IOCBSC,IRBSCSW+SCSW2  Accumulate status control
00000B60  D601 300A 4008      0000000A  00000008  4479+         OC    IOCBST,IRBSCSW+SCSWUS Accumulate device and channel status
00000B66  9104 300E                 0000000E  4480+         TM    IOCBSC,SCSWSPRI       Primary subchannel status?
00000B6A  A7E4 FFD4                 00000B12  4481+         $BNO  IOWT0013              ..No, wait for primary status
00000B6E  D203 3010 4004      00000010  00000004  4482+         MVC   IOCBSCCW,IRBSCSW+SCSWCCW  CCW address
00000B74  D201 3016 400A      00000016  0000000A  4483+         MVC   IOCBRCNT,IRBSCSW+SCSWCNT  Residual count
                                          4484+* Test for errors as specified in the IOCB
00000B7A  910C 300A                 0000000A  4485+         TM    IOCBUS,CSWCE+CSWDE    Channel end and device end both accumulated?
00000B7E  A7E4 0065                 00000C48  4486+         $BNO  FAILIO                Hunh? No CE and DE but do have primary statu
                                          4487+* Input/Output operation successful


00000B82  58F0 2988                 00000B88  4489          L     R15,RPTSAVE           Restore return address
00000B86  07FF                            4490          BR    R15                   Return to caller

00000B88  00000000                        4492 RPTSAVE  DC    F'0'                  R15 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                         4494 ********************************************************************************
                                         4495 *        CALCDUR                   Calculate DURATION
                                         4496 ********************************************************************************

00000B8C  50F0 29D0                      00000BD0  4498 CALCDUR  ST    R15,CALCRET        Save return address
00000B90  9057 29D4                      00000BD4  4499          STM   R5,R7,CALCWORK     Save work registers

00000B94  9867 2B68                      00000D68  4501          LM    R6,R7,BEGCLOCK     Remove CPU number from clock value
00000B98  8C60 0006                      00000006  4502          SRDL  R6,6                       "
00000B9C  8D60 0006                      00000006  4503          SLDL  R6,6                       "
00000BA0  9067 2B68                      00000D68  4504          STM   R6,R7,BEGCLOCK             "

00000BA4  9867 2B70                      00000D70  4506          LM    R6,R7,ENDCLOCK     Remove CPU number from clock value
00000BA8  8C60 0006                      00000006  4507          SRDL  R6,6                       "
00000BAC  8D60 0006                      00000006  4508          SLDL  R6,6                       "
00000BB0  9067 2B70                      00000D70  4509          STM   R6,R7,ENDCLOCK             "

00000BB4  4150 2B68                      00000D68  4511          LA    R5,BEGCLOCK        Starting time
00000BB8  4160 2B70                      00000D70  4512          LA    R6,ENDCLOCK        Ending time
00000BBC  4170 2B78                      00000D78  4513          LA    R7,DURATION        Difference
00000BC0  45F0 29E0                      00000BE0  4514          BAL   R15,SUBDWORD       Calculate duration

00000BC4  9857 29D4                      00000BD4  4516          LM    R5,R7,CALCWORK     Restore work registers
00000BC8  58F0 29D0                      00000BD0  4517          L     R15,CALCRET        Restore return address
00000BCC  07FF                                     4518          BR    R15                Return to caller

00000BD0  00000000                                 4520 CALCRET  DC    F'0'               R15 save area
00000BD4  00000000 00000000                        4521 CALCWORK DC    3F'0'              R5-R7 save area



                                         4523 ********************************************************************************
                                         4524 *        SUBDWORD                  Subtract two doublewords
                                         4525 *        R5 --> subtrahend, R6 --> minuend, R7 --> result
                                         4526 ********************************************************************************

00000BE0  90AD 2A08                00000C08  4528 SUBDWORD STM   R10,R13,SUBDWSAV   Save registers

00000BE4  98AB 5000                00000000  4530          LM    R10,R11,0(R5)      Subtrahend  (value to subtract)
00000BE8  98CD 6000                00000000  4531          LM    R12,R13,0(R6)      Minuend     (what to subtract FROM)
00000BEC  1FDB                               4532          SLR   R13,R11            Subtract LOW part
00000BEE  47B0 29F6                00000BF6  4533          BNM   *+4+4              (branch if no borrow)
00000BF2  5FC0 2B4C                00000D4C  4534          SL    R12,=F'1'          (otherwise do borrow)
00000BF6  1FCA                               4535          SLR   R12,R10            Subtract HIGH part
00000BF8  90CD 7000                00000000  4536          STM   R12,R13,0(R7)      Store results

00000BFC  98AD 2A08                00000C08  4538          LM    R10,R13,SUBDWSAV   Restore registers
00000C00  07FF                               4539          BR    R15                Return to caller

00000C08  00000000 00000000                  4541 SUBDWSAV DC    2D'0'              R10-R13 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4543 ***************************************************************************
                                                    4544 *        Program Initialization
                                                    4545 ***************************************************************************

00000C18                                            4547 INIT     DS     0H               Program Initialization

00000C18  4130 2AC8                       00000CC8  4549          LA     R3,IOCB_009      Point to IOCB
00000C1C  5880 3018                       00000018  4550          L      R8,IOCBORB       Point to ORB

00000C20  45F0 2A68                       00000C68  4552          BAL    R15,IOINIT       Initialize the CPU for I/O operations
00000C24  45F0 2A76                       00000C76  4553          BAL    R15,ENADEV       Enable our device making ready for use
00000C28  07FE                                      4554          BR     R14              Return to caller




                                                    4556 ***************************************************************************
                                                    4557 *        Normal completion or Abnormal termination PSWs
                                                    4558 ***************************************************************************


                                                    4560 EOJ      DWAITEND LOAD=YES          Normal completion
00000C2A                                            4562+EOJ      DS    0H
00000C2A  8200 2A30                       00000C30  4563+         LPSW  DWAT0016
00000C30  000A0000 00000000                         4564+DWAT0016 PSW   0,0,2,0,X'000000'


                                                    4566 FAILDEV  DWAIT LOAD=YES,CODE=01     ENADEV failed
00000C38                                            4567+FAILDEV  DS    0H
00000C38  8200 2A40                       00000C40  4568+         LPSW  DWAT0017
00000C40  000A0000 00010001                         4569+DWAT0017 PSW   0,0,2,0,X'010001'



                                                    4571 FAILIO   DWAIT LOAD=YES,CODE=02     RAWIO failed
00000C48                                            4572+FAILIO   DS    0H
00000C48  8200 2A50                       00000C50  4573+         LPSW  DWAT0018
00000C50  000A0000 00010002                         4574+DWAT0018 PSW   0,0,2,0,X'010002'



                                                    4576 FAILTEST DWAIT LOAD=YES,CODE=BAD    Abnormal termination
00000C58                                            4577+FAILTEST DS    0H
00000C58  8200 2A60                       00000C60  4578+         LPSW  DWAT0019
00000C60  000A0000 00010BAD                         4579+DWAT0019 PSW   0,0,2,0,X'010BAD'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4581 ************************************************************************
                                                   4582 *        Initialize the CPU for I/O operations
                                                   4583 ************************************************************************


                                                   4585 IOINIT   IOINIT ,
00000C68  B766 2A70                      00000C70  4586+IOINIT   LCTL  6,6,IOMK0020       Enable subchannel subclasses for interruptions
00000C6C  47F0 2A74                      00000C74  4587+         B     IOMK0020+4
00000C70                                           4588+IOMK0020 DS    0F
00000C70  FF000000                                 4589+         DC    XL4'FF000000'         All subchannel subclasses enabled


00000C74  07FF                                     4591          BR    R15                Return to caller


                                                   4593 ************************************************************************
                                                   4594 *        Enable the device, making it ready for use
                                                   4595 ************************************************************************


                                                   4597 ENADEV   ENADEV ENAOKAY,FAILDEV,REG=4
00000C76  5810 2ABC                      00000CBC  4598+ENADEV   L     1,FIND0021
00000C7A  5840 3028                      00000028  4599+         $L    4,IOCBSIB          Locate where the SCHIB is to be stored
00000C7E                  00000000                 4600+         USING SCHIB,4
00000C7E                                           4601+FINL0021 DS    0H   Retrieve Subchannel Information Block for desired device numbe
00000C7E  B234 4000                      00000000  4602+         STSCH 0(4)               Store the SCHIB for first subchannel
00000C82  A774 FFDB                      00000C38  4603+         $BC   B'0111',FAILDEV    Subchannel does not exist and device number not
00000C86  9101 4005                      00000005  4604+         TM    PMCW1_8,PMCWV      Is the subchannel device number valid?
00000C8A  A784 0011                      00000CAC  4605+         $BZ   FINN0021           ..No, check the next subchannel
00000C8E  D501 4006 3004      00000006   00000004  4606+         CLC   PMCWDNUM,IOCBDEV   Is this the device number being sought?
00000C94  A774 000C                      00000CAC  4607+         $BNE  FINN0021           ..No, check the next subchannel
                                                   4608+* Subchannel found!
00000C98  5010 3000                      00000000  4609+         ST    1,IOCBDID          Remember the subchannel so I/O can be done to i
00000C9C  9680 4005                      00000005  4610+         OI    PMCW1_8,PMCWE      Make sure it is enabled so I/O requests accepte
00000CA0  B232 4000                      00000000  4611+         MSCH  0(4)               Enable the subchannel to the channel sub-system
00000CA4  A784 0010                      00000CC4  4612+         $BC   B'1000',ENAOKAY    CC0 (SCHIB updated), device is ready.
00000CA8  A7F4 FFC8                      00000C38  4613+         $B    FAILDEV            CC1,CC2,CC3 (SCHIB update failed), quit
00000CAC                                           4614+FINN0021 DS    0H  Advance to next subchannel
00000CAC  4110 1001                      00000001  4615+         LA    1,1(0,1)           Advance to next subchannel
00000CB0  5510 2AC0                      00000CC0  4616+         CL    1,FINM0021         Beyond maximum subchannel
00000CB4  A7D4 FFE5                      00000C7E  4617+         $BNH  FINL0021           ..No, examine the next subchannel
00000CB8  A724 FFC0                      00000C38  4618+         $BH   FAILDEV            ..Yes, failed to enable the device
00000CBC                                           4619+         DROP  4                  Forget SCHIB addressing
00000CBC  00010000                                 4620+FIND0021 DC    A(X'00010000')     First subchannel subsystem ID
00000CC0  0001FFFF                                 4621+FINM0021 DC    A(X'0001FFFF')     Last subchannel subsystem ID


00000CC4  07FF                                     4623 ENAOKAY  BR    R15                Return to caller
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4625 ************************************************************************
                                                    4626 *         Structure used by RAWIO identifying
                                                    4627 *         the device and operation being performed
                                                    4628 ************************************************************************


                                                    4630 IOCB_009 IOCB  X'009',CCW=CONPGM
00000CC8  00000000                                  4631+IOCB_009 DC    A(0)            +0 Device Identifier (supplied by ENADEV macro)
00000CCC  0009                                      4632+         DC    AL2(X'009')     +4 Device address or device number
00000CCE  0000                                      4633+         DC    H'0'            +6 Must be zeros
00000CD0  D3                                        4634+         DC    AL1(X'D3')      +8 Default detected unit errors
00000CD1  3F                                        4635+         DC    AL1(X'3F')      +9 Default detected channel errors
00000CD2  0000                                      4636+         DC    HL2'0'          +10 Accumulated unit and channel errors
00000CD4  0000                                      4637+         DC    HL2'0'          +12 Tested unit and channel status
00000CD6  00                                        4638+         DC    XL1'00'         +14 Accumulated subchannel status control from SCSW
00000CD7  80                                        4639+         DC    XL1'80'         +15 Default unsoliticed wait condition
00000CD8  00000000                                  4640+         DC    F'0'            +16 I/O status CCW address
00000CDC  00000000                                  4641+         DC    F'0'            +20 residual count
00000CE0  00000D38                                  4642+         DC    A(IORB0022)     +24  Address where ORB is located
00000CE4  00000000                                  4643+         DC    A(0)            +28  reserved
00000CE8  00000CF8                                  4644+         DC    A(IIRB0022)     +32 Address where IRB stored
00000CEC  00000000                                  4645+         DC    A(0)            +36 reserved
00000CF0  00000CF8                                  4646+         DC    A(IIRB0022)     +40 Address where SCHIB stored
00000CF4  00000000                                  4647+         DC    A(0)            +44 reserved
00000CF8  00000000 00000000                         4648+IIRB0022 DC    16F'0'              Embedded shared IRB and SCHIB area
00000D38                                            4650+IORB0022 DS    0XL12
00000D38  00000000                                  4651+         DC    A(0)            Word 0 - Interruption Parameter
00000D3C  00                                        4652+         DC    AL1((0)*16+B'0000')  Word 1, bits 0-7
00000D3D  80                                        4653+         DC    BL1'10000000'   Word 1, bits 8-15
00000D3E  FF                                        4654+         DC    AL1(255)        Word 1, bits 16-23
00000D3F  00                                        4655+         DC    BL1'00000000'    Word 1, bits 24-31
00000D40  00000DA0                                  4656+         DC    AL4(CONPGM)     Word 2 - CCW address
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                  4658 ********************************************************************************
                                                  4659 *        Working Storage
                                                  4660 ********************************************************************************



00000D44                                          4662          LTORG ,                 Literals pool
00000D44  00000100                                4663                =A(OP2LEN)
00000D48  00000000                                4664                =F'0'
00000D4C  00000001                                4665                =F'1'
00000D50  E3D9C540 40                             4666                =CL5'TRE'
00000D55  04294967 296C                           4667                =P'4294967296'

                          00000400  00000001      4669 K         EQU   1024            One KB
                          00001000  00000001      4670 PAGE      EQU   (4*K)           Size of one page
                          00010000  00000001      4671 K64       EQU   (64*K)          64 KB
                          00100000  00000001      4672 MB        EQU   (K*K)            1 MB

                          000021FE  00000001      4674 TESTADDR  EQU   (2*PAGE+X'200'-2)  Where test/subtest numbers will go
                          000021FD  00000001      4675 TIMEADDR  EQU   (TESTADDR-1)       Address of timing tests option flag

                          00200000  00000001      4677 MAINSIZE  EQU   (2*MB)                    Minimum required storage size
                          00000020  00000001      4678 NUMPGTBS  EQU   ((MAINSIZE+K64-1)/K64)   Number of Page Tables needed
                          00000002  00000001      4679 NUMSEGTB  EQU   ((NUMPGTBS*4)/(16*4))    Number of Segment Tables
                          00003000  00000001      4680 SEGTABLS  EQU   (3*PAGE)                  Segment Tables Origin
                          00003080  00000001      4681 PAGETABS  EQU   (SEGTABLS+(NUMPGTBS*4))  Page Tables Origin
00000D5C  00B00060                                4682 CRLREG0   DC    0A(0),XL4'00B00060'      Control Register 0
00000D60  00003002                                4683 CTLREG1   DC    A(SEGTABLS+NUMSEGTB)     Control Register 1

00000D64  00002710                                4685 NUMLOOPS  DC    F'10000'         10,000 * 100 = 1,000,000

00000D68  BBBBBBBB BBBBBBBB                       4687 BEGCLOCK  DC    0D'0',8X'BB'     Begin
00000D70  EEEEEEEE EEEEEEEE                       4688 ENDCLOCK  DC    0D'0',8X'EE'     End
00000D78  DDDDDDDD DDDDDDDD                       4689 DURATION  DC    0D'0',8X'DD'     Diff
00000D80  FFFFFFFF FFFFFFFF                       4690 OVERHEAD  DC    0D'0',8X'FF'     Overhead

00000D88  00000000 0000000C                       4692 TICKSAAA  DC    PL8'0'           Clock ticks high part
00000D90  00000000 0000000C                       4693 TICKSBBB  DC    PL8'0'           Clock ticks low part
00000D98  00000000 0000000C                       4694 TICKSTOT  DC    PL8'0'           Total clock ticks

00000DA0  09000044 00000DA8                       4696 CONPGM    CCW1  X'09',PRTLINE,0,PRTLNG
00000DA8  40404040 40404040                       4697 PRTLINE   DC    C'         1,000,000 iterations of XXXXX'
00000DCE  40A39696 9240F9F9                       4698           DC    C' took 999,999,999 microseconds'
                          00000044  00000001      4699 PRTLNG    EQU   *-PRTLINE
00000DEC  40202020 6B202020                       4700 EDIT      DC    X'402020206B2020206B202120'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   4702 ********************************************************************************
                                                   4703 *        TRETEST DSECT
                                                   4704 ********************************************************************************


                                                   4706 TRETEST  DSECT ,


00000000  00                                       4708 TNUM     DC    X'00'          TRE table Number
00000001  00                                       4709 TBYTE    DC    X'00'          TRE Testbyte
00000002  00                                       4710          DC    X'00'
00000003  00                                       4711          DC    X'00'


00000004  00000000                                 4713 OP1DATA  DC    A(0)           Pointer to Operand-1 data
00000008  00000000                                 4714 OP2DATA  DC    A(0)           Pointer to Operand-2 data

                          0000000C  00000001       4716 OPSWHERE EQU   *              Where TRE Operands are located
0000000C  00000000                                 4717 OP1WHERE DC    A(0)           Where Operand-1 data should be placed
00000010  00000000                                 4718 OP1LEN   DC    F'0'           How much data is there - 1
00000014  00000000                                 4719 OP2WHERE DC    A(0)           Where Operand-2 data should be placed
                          00000100  00000001       4720 OP2LEN   EQU   256            Operand-2 is always 256


00000018  00000000                                 4722 FAILMASK DC    A(0)           Failure Branch on Condition mask


0000001C  00000000 00000000                        4724 ENDREGS  DC    A(0),XL4'00'   Ending R1/R2 register values

                          00000024  00000001       4726 TRENEXT  EQU   *              Start of next table entry...


                          AABBCCDD  00000001       4728 REG2PATT EQU   X'AABBCCDD'    Register 2 starting/ending CC0 value
                          000000DD  00000001       4729 REG2LOW  EQU         X'DD'    (last byte above)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   4731 ************************************************************************
                                                   4732 *        TRE Performace Test data...
                                                   4733 ************************************************************************
                                00000000  00003000 4735 TRE02TST CSECT ,
00000DF8                                           4736 TREPERF  DC    0A(0)      start of table


00000DF8  91990000                                 4738 TREPOP1  DC    X'91',X'99',X'00',X'00'
00000DFC  00001190 00001C90                        4739          DC    A(TRELOP10),A(TRELOP20)
00000E04  00020000 00000200                        4740          DC    A(00+(02*K64)),A(512),A(MB+(02*K64))      no crosses
00000E10  00000007                                 4741          DC    A(7) CC0
00000E14  00020200 AABBCCDD                        4742          DC    A(00+(02*K64)+512),A(REG2PATT)




00000E1C  92990000                                 4744 TREPOP2  DC    X'92',X'99',X'00',X'00'
00000E20  00001190 00001C90                        4745          DC    A(TRELOP10),A(TRELOP20)
00000E28  0002FFF4 00000200                        4746          DC    A(00+(03*K64)-12),A(512),A(MB+(03*K64))   op1 crosses
00000E34  00000007                                 4747          DC    A(7) CC0
00000E38  000301F4 AABBCCDD                        4748          DC    A(00+(03*K64)-12+512),A(REG2PATT)


00000E40  93990000                                 4750 TREPOP3  DC    X'93',X'99',X'00',X'00'
00000E44  00001190 00001C90                        4751          DC    A(TRELOP10),A(TRELOP20)
00000E4C  00040000 00000800                        4752          DC    A(00+(04*K64)),A(2048),A(MB+(04*K64))     no crosses
00000E58  00000007                                 4753          DC    A(7) CC0
00000E5C  00290800 AABBCCDD                        4754          DC    A(00+(041*K64)+2048),A(REG2PATT)



00000E64  94990000                                 4756 TREPOP4  DC    X'94',X'99',X'00',X'00'
00000E68  00001190 00001C90                        4757          DC    A(TRELOP10),A(TRELOP20)
00000E70  0003FFF4 00000800                        4758          DC    A(00+(04*K64)-12),A(2048),A(MB+(04*K64))  op1 crosses
00000E7C  00000007                                 4759          DC    A(7) CC0
00000E80  002907F4 AABBCCDD                        4760          DC    A(00+(041*K64)-12+2048),A(REG2PATT)




00000E88  00000000                                 4762          DC    A(0)       end of table
00000E8C  00000000                                 4763          DC    A(0)       end of table
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4765 ************************************************************************
                                                    4766 *        TRE op1 scan data...
                                                    4767 ************************************************************************

00000E90  78125634 78125634                         4769 TRTOP10  DC    64XL4'78125634'                                (CC0)

00000F90  78125634 78125634                         4771 TRTOP111 DC    04XL4'78125634',X'00110000',59XL4'78125634'  (CC1)

00001090  78125634 78125634                         4773 TRTOP1F0 DC    63XL4'78125634',X'000000F0'                    (CC1)

00001190  78125634 78125634                         4775 TRELOP10 DC    512XL4'78125634'                               (CC0)




                                                    4777 ************************************************************************
                                                    4778 *        TRE op2 stop tables...
                                                    4779 ************************************************************************

00001990  00000000 00000000                         4781 TRTOP20  DC    256X'00'                     no stop

00001A90  00000000 00000000                         4783 TRTOP211 DC    17X'00',X'11',238X'00'     stop on X'11'

00001B90  00000000 00000000                         4785 TRTOP2F0 DC    240X'00',X'F0',15X'00'     stop on X'F0'

00001C90  FF000000 00000000                         4787 TRELOP20 DC    X'FF',255X'00'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                         4789 ********************************************************************
                                         4790 *        Fixed storage locations
                                         4791 ********************************************************************



00001D90                       00001D90  000021FD  4793          ORG   TRE02TST+TIMEADDR      (s/b @ X'21FD')


000021FD  00                           4795 TIMEOPT  DC    X'00'      Set to non-zero to run timing tests


000021FE                       000021FE  000021FE  4797          ORG   TRE02TST+TESTADDR      (s/b @ X'21FE', X'21FF')


000021FE  00                           4799 TESTNUM  DC    X'00'      Test number of active test
000021FF  00                           4800 SUBTEST  DC    X'00'      Active test sub-test number


00002200                       00002200  00003000  4802          ORG   TRE02TST+SEGTABLS      (s/b @ X'3000')


00003000  00                           4804 DATTABS  DC    X'00'      Segment and Page Tables will go here...
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4806 ************************************************************************
                                                   4807 *        IOCB DSECT
                                                   4808 ************************************************************************

                                                   4810          DSECTS NAME=IOCB
                                                   4812+IOCB     DSECT
                                                   4813+*     Field usage by: CH SC Description (R->program read-only, X->program read/wr
00000000                                           4814+IOCBDID  DS    0F  +0     R  Device Identifier - Subsystem ID for channel subsyst
00000000  0000                                     4815+         DS    H   +0  R      reserved - must be zeros
00000002  0000                                     4816+IOCBDV   DS    H   +2  R      Channel Unit Device address of I/O operation
00000004  0000                                     4817+IOCBDEV  DS    H   +4  X  X  Device address or device number (R after ENADEV)
00000006  0000                                     4818+IOCBZERO DS    H   +6  R  R  Must be zeros
00000008  00                                       4819+IOCBUM   DS    X   +8  X  X  Unit status test mask
00000009  00                                       4820+IOCBCM   DS    X   +9  X  X  Channel status test mask
0000000A                                           4821+IOCBST   DS    0H  +10 X  X  Input/Output unit and channel status accumulation
0000000A  00                                       4822+IOCBUS   DS    X   +10 R  R  Accumulated unit status
0000000B  00                                       4823+IOCBCS   DS    X   +11 R  R  Accumulated channel status
0000000C  00                                       4824+IOCBUT   DS    X   +14 R  R  Used to test unit status
0000000D  00                                       4825+IOCBCT   DS    X   +13 R  R  Used to test channel status
0000000E  00                                       4826+IOCBSC   DS    X   +14    R  Accumulted subchanel status control
0000000F  00                                       4827+IOCBWAIT DS    X   +15 X  X  Recognized unsolicited interruption unit status even
00000010  00000000                                 4828+IOCBSCCW DS    A   +16 R  R  I/O status CCW address
00000014                                           4829+IOCBSCNT DS    0F  +20 R  R  I/O status residual count as a positive full word
00000014  0000                                     4830+         DS    H   +20 R     reserved must be zeros
00000016  0000                                     4831+IOCBRCNT DS    H   +22 R     I/O status residual count as an unsigned halfword
00000018                                           4832+IOCBCAW  DS    0A  +24 X     Channel Address word
00000018  00000000 00000000                        4833+IOCBORB  DS    AD  +24    X  Address of the ORB for channel subsystem I/O
00000020  00000000 00000000                        4834+IOCBIRB  DS    AD  +32    X  Channel subsystem IRB address
00000028  00000000 00000000                        4835+IOCBSIB  DS    AD  +40    X  Channel subsystem SCHIB address
                            00000030  00000001     4836+IOCBL    EQU   *-IOCB  Length of IOCB control block (48) without embedded structu
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4838 ********************************************************************************
                                                  4839 *        ORB DSECT
                                                  4840 ********************************************************************************

                                                  4842          DSECTS NAME=ORB
                                                  4844+ORB      DSECT
00000000  00000000                                4845+ORBPARM  DC    F'0'     Word 0, bits 0-31

00000004  00                                      4847+ORB1_0   DC    X'00'    Word 1, bits 0-7
                          000000F0  00000001      4848+ORBKEYM  EQU   X'F0'    Word 1, bits 0-3   - Storage Key Mask
                          00000008  00000001      4849+ORBS     EQU   X'08'    Word 1, bit 4      - Suspend Control
                          00000004  00000001      4850+ORBC     EQU   X'04'    Word 1, bit 5      - Streaming Mode Control
                          00000002  00000001      4851+ORBM     EQU   X'02'    Word 1, bit 6      - Modification Control
                          00000001  00000001      4852+ORBY     EQU   X'01'    Word 1, bit 7      - Synchronization Control

00000005  00                                      4854+ORB1_8   DC    X'00'    Word 1, bits 8-15
                          00000080  00000001      4855+ORBF     EQU   X'80'    Word 1, bit 8      - CCW Format-Control
                          00000040  00000001      4856+ORBP     EQU   X'40'    Word 1, bit 9      - Pre-fetch control
                          00000020  00000001      4857+ORBI     EQU   X'20'    Word 1, bit 10     - Initial-status Interruption Control
                          00000010  00000001      4858+ORBA     EQU   X'10'    Word 1, bit 11     - Address Limit Checking Control
                          00000008  00000001      4859+ORBU     EQU   X'08'    Word 1, bit 12     - Suppress-suspended-interruption cont
                          00000004  00000001      4860+ORBB     EQU   X'04'    Word 1, bit 13     - Channel-Program-Type Control
                          00000002  00000001      4861+ORBH     EQU   X'02'    Word 1, bit 14     - Format 2-IDAW Control
                          00000001  00000001      4862+ORBT     EQU   X'01'    Word 1, bit 15     - 2K-IDAW control
00000006  00                                      4863+ORBLPM   DC    X'00'    Word 1, bits 16-23 - Logical Path Mask
00000007  00                                      4864+ORRB1_24 DC    X'00'    Word 1, bits 24-31
                          00000080  00000001      4865+ORBL     EQU   X'80'    Word 1, bit 24     - Incorrect Length Suppression Mode
                          0000007F  00000001      4866+ORBRSV3  EQU   X'7F'    Word 1, bits 25-31 - reserved must be zeros
                          00000040  00000001      4867+ORBD     EQU   X'40'    Word 1, bit 25     - MIDAW Addressing Control
                          0000003E  00000001      4868+ORBRSV26 EQU   X'3E'    Word 1, bits 26-30 - reserved must be zeros
                          0000007E  00000001      4869+ORBRSV25 EQU   X'7E'    Word 1, bits 25-30 - reserved must be zeros
                          00000001  00000001      4870+ORBX     EQU   X'01'    Word 1, bit 31     - ORB-extension control

00000008  00000000                                4872+ORBCCW   DC    A(0)     Word 2, bits 1-31  - Channel Program Address
                          00000080  00000001      4873+ORBRSV4  EQU   X'80'    Word 2, bit 0      - reserved must be zero
                          0000000C  00000001      4874+ORBLEN   EQU   *-ORB Length of standard ORB
                                                  4875+* Extended ORB fields
0000000C  00                                      4876+ORBCSS   DC    X'00'    Word 3, bits 0-7   - Channel Subsystem Priority
0000000D  00                                      4877+ORBRSV5  DC    X'00'    Word 3, bits 8-15  - reserved must be zeros
0000000E                                          4878+ORBPGM   DC    0X'00'   Word 3, bits 16-23 - Transport mode reserves for program
0000000E  00                                      4879+ORBCU    DC    X'00'    Word 3, bits 16-23 - Control Unit Priority
0000000F  00                                      4880+ORBRSV6  DC    X'00'    Word 3, bits 24-31 - reserved must be zeros
00000010  00000000 00000000                       4881+ORBRSV7  DC    XL16'00' Words 4-7          - reserved must be zeros
                          00000020  00000001      4882+ORBXLEN  EQU   *-ORB Length of extended ORB
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4885 ********************************************************************
                                                   4886 *        IRB DSECT
                                                   4887 ********************************************************************

                                                   4889          DSECTS NAME=IRB
                                                   4891+IRB      DSECT Interruption          Response Block
00000000  00000000 00000000                        4892+IRBSCSW  DC    XL12'00' Words 0-2 - Subchannel Status Word (Defined by DSECT SCSW
0000000C  00000000 00000000                        4893+IRBESW   DC    XL20'00' Words 3-7 - Extended Status Word
00000020  00000000 00000000                        4894+IRBECW   DC    XL32'00' Words 8-15 - Extended Control Word
                             00000040  00000001    4895+IRBL     EQU   *-IRB    IRB Length
00000040  00000000 00000000                        4896+IRBEMW   DC    XL32'00' Words 16-23 - Extended Measurement Word
                             00000060  00000001    4897+IRBXL    EQU   *-IRB    Extended IRB Length
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4900 ********************************************************************
                                                  4901 *        SCSW DSECT
                                                  4902 ********************************************************************

                                                  4904          DSECTS NAME=SCSW
                                                  4906+SCSW     DSECT Subchannel          Status Word
00000000  00                                      4907+SCSWFLAG DC    X'00'    Flags
                           000000F0  00000001     4908+SCSWKEYM EQU   X'F0'    Storage Key Mask of subchannel storage key
                           00000008  00000001     4909+SCSWSUSC EQU   X'08'    Suspend Control
                           00000004  00000001     4910+SCSWESWF EQU   X'04'    Extended Status Word Format
                           00000003  00000001     4911+SCSWDCCM EQU   X'03'    Deferred condiont code mask
                           00000000  00000001     4912+SCSWDCC0 EQU   X'00'    Normal I/O interruption
                           00000001  00000001     4913+SCSWDCC1 EQU   X'01'    Deferred condition code is 1
                           00000003  00000001     4914+SCSWDCC3 EQU   X'03'    Deferred condition code is 3

00000001  00                                      4916+SCSWCTLS DC    X'00'    General Controls
                           00000080  00000001     4917+SCSWCCWF EQU   X'80'    CCW Format control when ...
                           00000040  00000001     4918+SCSWCCWP EQU   X'40'    CCW Prefetch Control
                           00000020  00000001     4919+SCSWISIC EQU   X'20'    Initial-Status-Interruption Control
                           00000010  00000001     4920+SCSWALKC EQU   X'10'    Address-Limit-Checking Control
                           00000008  00000001     4921+SCSWSSIC EQU   X'08'    Suppress suspended interruption
                           00000004  00000001     4922+SCSW0CC  EQU   X'04'    Zero-Condition Code
                           00000002  00000001     4923+SCSWECWC EQU   X'02'    Extended Control Word control
                           00000001  00000001     4924+SCSWPNOP EQU   X'01'    Path Not Operational

00000002  00                                      4926+SCSW1    DC    X'00'    Control Byte 1
                           00000070  00000001     4927+SCSWFM   EQU   X'70'    Functional Control Mask
                           00000040  00000001     4928+SCSWFS   EQU   X'40'    Function Control - Start Function
                           00000020  00000001     4929+SCSWFH   EQU   X'20'    Function Control - Halt Function
                           00000010  00000001     4930+SCSWFC   EQU   X'10'    Function Control - Clear Function
                           00000008  00000001     4931+SCSWARP  EQU   X'08'    Activity Control - Resume pending
                           00000004  00000001     4932+SCSWASP  EQU   X'04'    Activity Control - Start pending
                           00000002  00000001     4933+SCSWAHP  EQU   X'02'    Activity Control - Halt pending
                           00000001  00000001     4934+SCSWACP  EQU   X'01'    Activity Control - Clear pending
00000003  00                                      4935+SCSW2    DC    X'00'    Control Byte 2
                           00000080  00000001     4936+SCSWASA  EQU   X'80'    Activity Control - Subchannel Active
                           00000040  00000001     4937+SCSWADA  EQU   X'40'    Activity Control - Device Active
                           00000020  00000001     4938+SCSWASUS EQU   X'20'    Activity Control - Suspended
                           00000010  00000001     4939+SCSWSAS  EQU   X'10'    Status Control   - Alert Status
                           00000008  00000001     4940+SCSWSINT EQU   X'08'    Status Control   - Intermediate Status
                           00000004  00000001     4941+SCSWSPRI EQU   X'04'    Status Control   - Primary Status
                           00000002  00000001     4942+SCSWSSEC EQU   X'02'    Status Control   - Secondary Status
                           00000001  00000001     4943+SCSWSPEN EQU   X'01'    Status Control   - Status Pending

00000004  00000000                                4945+SCSWCCW  DC    A(0)     CCW Address

00000008  00                                      4947+SCSWUS   DC    X'00'    Unit Status
                           00000080  00000001     4948+SCSWATTN EQU   X'80'    Attention
                           00000040  00000001     4949+SCSWSM   EQU   X'40'    Status modifier
                           00000020  00000001     4950+SCSWCUE  EQU   X'20'    Control-unit end
                           00000010  00000001     4951+SCSWBUSY EQU   X'10'    Busy
                           00000008  00000001     4952+SCSWCE   EQU   X'08'    Channel end
                           00000004  00000001     4953+SCSWDE   EQU   X'04'    Device end
                           00000002  00000001     4954+SCSWUC   EQU   X'02'    Unit check
                           00000001  00000001     4955+SCSWUX   EQU   X'01'    Unit exception
```

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  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
00000009  00                                      4957+SCSWCS   DC    X'00'    Channel Status
                             00000080  00000001  4958+SCSWPCI  EQU   X'80'    Program-controlled interruption
                             00000040  00000001  4959+SCSWIL   EQU   X'40'    Incorrect length
                             00000020  00000001  4960+SCSWPRGM EQU   X'20'    Program check
                             00000010  00000001  4961+SCSWPROT EQU   X'10'    Protection Check
                             00000008  00000001  4962+SCSWCDAT EQU   X'08'    Channel-data check
                             00000004  00000001  4963+SCSWCCTL EQU   X'04'    Channel-control check
                             00000002  00000001  4964+SCSWICTL EQU   X'02'    Interface-control check
                             00000001  00000001  4965+SCSWCHNG EQU   X'01'    Chaining check

0000000A  0000                                    4967+SCSWCNT  DC    H'0'     Residual CCW count
                             0000000C  00000001  4968+SCSWL    EQU   *-SCSW
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                   4971 ********************************************************************************
                                                   4972 *        (other DSECTS needed by SATK)
                                                   4973 ********************************************************************************

                                                   4975          DSECTS PRINT=OFF,NAME=(ASA,SCHIB,CCW0,CCW1,CSW)
```

```
                                                   5251          PRINT ON

                                                   5253 ********************************************************************************
                                                   5254 *        Register equates
                                                   5255 ********************************************************************************

                           00000000  00000001  5257 R0        EQU   0
                           00000001  00000001  5258 R1        EQU   1
                           00000002  00000001  5259 R2        EQU   2
                           00000003  00000001  5260 R3        EQU   3
                           00000004  00000001  5261 R4        EQU   4
                           00000005  00000001  5262 R5        EQU   5
                           00000006  00000001  5263 R6        EQU   6
                           00000007  00000001  5264 R7        EQU   7
                           00000008  00000001  5265 R8        EQU   8
                           00000009  00000001  5266 R9        EQU   9
                           0000000A  00000001  5267 R10       EQU   10
                           0000000B  00000001  5268 R11       EQU   11
                           0000000C  00000001  5269 R12       EQU   12
                           0000000D  00000001  5270 R13       EQU   13
                           0000000E  00000001  5271 R14       EQU   14
                           0000000F  00000001  5272 R15       EQU   15
```

```
                                                   5274          END
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ASA	4	00000000	512	4979	3550
ASBEGIN	U	00000000	1	4980	4985 5027 5063 5072 5090 5097 5103 5107 5111 5117 5134
ASEND	U	00000200	1	5133	5134
ASLENGTH	U	00000200	1	5134	
BCEXTCOD	H	0000001A	2	4997	
BCIOCOD	H	0000003A	2	5005	
BCMCKCOD	H	00000032	2	5003	
BCPGMCOD	H	0000002A	2	5001	
BCSVCCOD	H	00000022	2	4999	
BEGCLOCK	D	00000D68	8	4687	3667 3991 4501 4504 4511
BEGIN	I	00000200	2	3556	3524 3551 3552
CALCDUR	I	00000B8C	4	4498	3983 4426
CALCRET	F	00000BD0	4	4520	4498 4517
CALCWORK	F	00000BD4	4	4521	4499 4516
CAW	F	00000048	4	5009	
CAWADDR	R	00000049	3	5012	
CAWKEY	X	00000048	1	5010	
CAWSUSP	U	00000008	1	5011	
CCW0	4	00000000	8	5138	5144
CCW0ADDR	R	00000001	3	5140	
CCW0CNT	H	00000006	2	5143	
CCW0CODE	X	00000000	1	5139	
CCW0FLGS	X	00000004	1	5141	
CCW0L	U	00000008	1	5144	
CCW1	4	00000000	8	5156	5161
CCW1ADDR	A	00000004	4	5160	
CCW1CNT	H	00000002	2	5159	
CCW1CODE	X	00000000	1	5157	
CCW1FLGS	X	00000001	1	5158	
CCW1L	U	00000008	1	5161	
CCWCC	U	00000040	1	5148	
CCWCD	U	00000080	1	5147	
CCWIDA	U	00000004	1	5152	
CCWPCI	U	00000008	1	5151	
CCWSKIP	U	00000010	1	5150	
CCWSLI	U	00000020	1	5149	
CCWSUSP	U	00000002	1	5153	
CHANID	F	000000A8	4	5064	
CODE	2	00000000	12289	3505	
CONPGM	W	00000DA0	8	4696	4656
CPUID	U	0000031B	1	5136	
CRLREG0	A	00000D5C	4	4682	
CSW	F	00000040	8	5008	
CSWATTN	U	00000080	1	5178	
CSWBUSY	U	00000010	1	5181	
CSWCCTL	U	00000004	1	5193	
CSWCCW	R	00000001	3	5175	
CSWCDAT	U	00000008	1	5192	
CSWCE	U	00000008	1	5182	4485
CSWCHNG	U	00000001	1	5195	
CSWCNT	H	00000006	2	5197	
CSWCS	X	00000005	1	5187	
CSWCUE	U	00000020	1	5180	
CSWDCC0	U	00000000	1	5171	
CSWDCC1	U	00000001	1	5172	
CSWDCC3	U	00000003	1	5173	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
CSWDCCM	U	00000003	1	5170	
CSWDE	U	00000004	1	5183	4485
CSWFLAG	X	00000000	1	5165	
CSWFMT	4	00000000	8	5164	5198
CSWFMTL	U	00000008	1	5198	
CSWICTL	U	00000002	1	5194	
CSWIL	U	00000040	1	5189	
CSWKEYM	U	000000F0	1	5166	
CSWLOG	U	00000004	1	5169	
CSWPCI	U	00000080	1	5188	
CSWPRGM	U	00000020	1	5190	
CSWPROT	U	00000010	1	5191	
CSWSM	U	00000040	1	5179	
CSWSUSP	U	00000008	1	5168	
CSWUC	U	00000002	1	5184	
CSWUS	X	00000004	1	5177	
CSWUX	U	00000001	1	5185	
CTLREG1	A	00000D60	4	4683	
DATTABS	X	00003000	1	4804	
DURATION	D	00000D78	8	4689	3984 4429 4430 4433 4513
DWAT0016	3	00000C30	8	4564	4563
DWAT0017	3	00000C40	8	4569	4568
DWAT0018	3	00000C50	8	4574	4573
DWAT0019	3	00000C60	8	4579	4578
EDIT	X	00000DEC	12	4700	4443 4444
ENADEV	I	00000C76	4	4598	4553
ENAOKAY	I	00000CC4	2	4623	4612
ENDCLOCK	D	00000D70	8	4688	3982 4406 4506 4509 4512
ENDREGS	A	0000001C	4	4724	
EOJ	H	00000C2A	2	4562	3577 3585
EXTCPUAD	H	00000084	2	5029	
EXTICODE	H	00000086	2	5030	
EXTIPARM	F	00000080	4	5028	
EXTNPSW	F	00000058	8	5018	
EXTOPSW	F	00000018	8	4990	4996
FAILDEV	H	00000C38	2	4567	4603 4613 4618
FAILIO	H	00000C48	2	4572	4453 4476 4486
FAILMASK	A	00000018	4	4722	
FAILTEST	H	00000C58	2	4577	3580 3583
FIND0021	A	00000CBC	4	4620	4598
FINL0021	H	00000C7E	2	4601	4617
FINM0021	A	00000CC0	4	4621	4616
FINN0021	H	00000CAC	2	4614	4605 4607
IIRB0022	F	00000CF8	4	4648	4644 4646
IMAGE	1	00000000	12289	0	
INIT	H	00000C18	2	4547	3564
IOCB	4	00000000	48	4812	4836 3553
IOCBCAW	A	00000018	4	4832	
IOCBCM	X	00000009	1	4820	
IOCBCS	X	0000000B	1	4823	
IOCBCT	X	0000000D	1	4825	
IOCBDEV	H	00000004	2	4817	4606
IOCBDID	F	00000000	4	4814	4449 4609
IOCBDV	H	00000002	2	4816	
IOCBIRB	A	00000020	8	4834	4454
IOCBL	U	00000030	1	4836	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
IOCBORB	A	00000018	8	4833	4451 4550
IOCBRCNT	H	00000016	2	4831	4483
IOCBSC	X	0000000E	1	4826	4447 4478 4480
IOCBSCCW	A	00000010	4	4828	4482
IOCBSCNT	F	00000014	4	4829	
IOCBSIB	A	00000028	8	4835	4599
IOCBST	H	0000000A	2	4821	4448 4479
IOCBUM	X	00000008	1	4819	
IOCBUS	X	0000000A	1	4822	4485
IOCBUT	X	0000000C	1	4824	
IOCBWAIT	X	0000000F	1	4827	
IOCBZERO	H	00000006	2	4818	4448
IOCB_009	A	00000CC8	4	4631	4549
IOELADDR	F	000000AC	4	5065	
IOICODE	H	000000BA	2	5070	
IOIID	F	000000C0	4	5075	
IOINIT	I	00000C68	4	4586	4552
IOIPARM	F	000000BC	4	5074	
IOMK0020	F	00000C70	4	4588	4586 4587
ION0014	3	00000B30	8	4464	4461
IONPSW	F	00000078	8	5022	
IOOPSW	F	00000038	8	4994	5004
IORB0022	X	00000D38	12	4650	4642
IOS0014	X	00000B38	8	4465	4460 4468
IOSSID	F	000000B8	4	5073	4471
IOWT0013	H	00000B12	2	4458	4472 4475 4481
IPLCCW1	F	00000008	8	4982	
IPLCCW2	F	00000010	8	4983	
IPLPSW	F	00000000	8	4981	
IRB	4	00000000	96	4891	4895 4897 4455
IRBECW	X	00000020	32	4894	
IRBEMW	X	00000040	32	4896	
IRBESW	X	0000000C	20	4893	
IRBL	U	00000040	1	4895	
IRBSCSW	X	00000000	12	4892	4478 4479 4482 4483
IRBXL	U	00000060	1	4897	
IRST0014	H	00000B40	2	4467	4464
K	U	00000400	1	4669	4670 4671 4672
K64	U	00010000	1	4671	4678 4740 4742 4746 4748 4752 4754 4758 4760
LCHANLOG	F	000000B0	4	5066	
MAINSIZE	U	00200000	1	4677	4678
MB	U	00100000	1	4672	4677 4740 4746 4752 4758
MCKLOG	F	00000100	4	5098	
MCKNPSW	F	00000070	8	5021	
MCKOPSW	F	00000030	8	4993	5002
MEASUREB	X	000000B9	1	5069	
MKARCHMD	X	000000A3	1	5057	
MKARS	F	00000120	4	5096	
MKCLKCMP	F	000000E0	8	5082	
MKCPUTIM	F	000000D8	8	5081	
MKCRS	F	000001C0	4	5101	
MKDMGCOD	F	000000F4	4	5085	
MKFAILA	F	000000F8	4	5087	
MKFPRS	D	00000160	8	5099	
MKICODE	F	000000E8	4	5083	
MKLOGOUT	F	00000100	4	5089	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
MKMODEL	F	000000FC	4	5088	
MKXSAA	F	000000D4	4	5080	
MONCLS	H	00000094	2	5045	
MONCODE	F	0000009C	4	5052	
MONNUMBR	X	00000095	1	5047	
MPGACCID	X	000000A2	1	5055	
NKGRS	F	00000180	4	5100	
NUMLOOPS	F	00000D64	4	4685	3666 3990
NUMPGTBS	U	00000020	1	4678	4679 4681
NUMSEGTB	U	00000002	1	4679	4683
OP1DATA	A	00000004	4	4713	3616
OP1LEN	F	00000010	4	4718	3615 3617
OP1WHERE	A	0000000C	4	4717	3614
OP2DATA	A	00000008	4	4714	3622
OP2LEN	U	00000100	1	4720	3621
OP2WHERE	A	00000014	4	4719	3620
OPSWHERE	U	0000000C	1	4716	3673 3676 3684 3687 3690 3693 3696 3699 3702 3705 3708 3711 3714 3717 3720 3723 3726 3729 3732 3735 3738 3741 3744 3747 3750 3753 3756 3759 3762 3765 3768 3771 3774 3777 3780 3783 3786 3789 3792 3795 3798 3801 3804 3807 3810 3813 3816 3819 3822 3825 3828 3831 3834 3837 3840 3843 3846 3849 3852 3855 3858 3861 3864 3867 3870 3873 3876 3879 3882 3885 3888 3891 3894 3897 3900 3903 3906 3909 3912 3915 3918 3921 3924 3927 3930 3933 3936 3939 3942 3945 3948 3951 3954 3957 3960 3963 3966 3969 3975 3978 3997 4001 4010 4014 4018 4022 4026 4030 4034 4038 4042 4046 4050 4054 4058 4062 4066 4070 4074 4078 4082 4086 4090 4094 4098 4102 4106 4110 4114 4118 4122 4126 4130 4134 4138 4142 4146 4150 4154 4158 4162 4166 4170 4174 4178 4182 4186 4190 4194 4198 4202 4206 4210 4214 4218 4222 4226 4230 4234 4238 4242 4246 4250 4254 4258 4262 4266 4270 4274 4278 4282 4286 4290 4294 4298 4302 4306 4310 4314 4318 4322 4326 4330 4334 4338 4342 4346 4350 4354 4358 4362 4366 4370 4374 4378 4382 4386 4390 4397 4401
ORB	4	00000000	32	4844	4874 4882 3554
ORB1_0	X	00000004	1	4847	
ORB1_8	X	00000005	1	4854	
ORBA	U	00000010	1	4858	
ORBB	U	00000004	1	4860	
ORBC	U	00000004	1	4850	
ORBCCW	A	00000008	4	4872	
ORBCSS	X	0000000C	1	4876	
ORBCU	X	0000000E	1	4879	
ORBD	U	00000040	1	4867	
ORBF	U	00000080	1	4855	
ORBH	U	00000002	1	4861	
ORBI	U	00000020	1	4857	
ORBKEYM	U	000000F0	1	4848	
ORBL	U	00000080	1	4865	
ORBLEN	U	0000000C	1	4874	
ORBLPM	X	00000006	1	4863	
ORBM	U	00000002	1	4851	
ORBP	U	00000040	1	4856	
ORBPARM	F	00000000	4	4845	
ORBPGM	X	0000000E	1	4878	
ORBRSV25	U	0000007E	1	4869	
ORBRSV26	U	0000003E	1	4868	
ORBRSV3	U	0000007F	1	4866	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ORBRSV4	U	00000080	1	4873	
ORBRSV5	X	0000000D	1	4877	
ORBRSV6	X	0000000F	1	4880	
ORBRSV7	X	00000010	16	4881	
ORBS	U	00000008	1	4849	
ORBT	U	00000001	1	4862	
ORBU	U	00000008	1	4859	
ORBX	U	00000001	1	4870	
ORBXLEN	U	00000020	1	4882	
ORBY	U	00000001	1	4852	
ORRB1_24	X	00000007	1	4864	
OVERHEAD	D	00000D80	8	4690	3984 4428
PAGE	U	00001000	1	4670	4674 4680
PAGETABS	U	00003080	1	4681	
PCFETO	A	000000C4	4	5076	
PERACCID	X	000000A1	1	5054	
PERADDR	F	00000098	4	5051	
PERCODE	X	00000096	1	5048	
PERCODMK	U	000000F0	1	5049	
PGMACCID	X	000000A0	1	5053	
PGMDXC	F	00000090	4	5043	
PGMICODE	H	0000008E	2	5042	
PGMIID	F	0000008C	4	5038	
PGMIILC	X	0000008D	1	5040	
PGMIILCM	U	0000000C	1	5041	
PGMNPSW	F	00000068	8	5020	
PGMOPSW	F	00000028	8	4992	5000
PGMTRX	F	00000090	4	5044	
PMCW1_0	X	00000004	1	5205	
PMCW1_8	X	00000005	1	5208	4604 4610
PMCWB	U	00000004	1	5240	
PMCWCHP0	X	00000010	1	5229	
PMCWCHP1	X	00000011	1	5230	
PMCWCHP2	X	00000012	1	5231	
PMCWCHP3	X	00000013	1	5232	
PMCWCHP4	X	00000014	1	5233	
PMCWCHP5	X	00000015	1	5234	
PMCWCHP6	X	00000016	1	5235	
PMCWCHP7	X	00000017	1	5236	
PMCWDNUM	H	00000006	2	5220	4606
PMCWE	U	00000080	1	5209	4610
PMCWEXC	X	0000001B	1	5239	
PMCWIP	F	00000000	4	5204	
PMCWISCM	U	00000038	1	5206	
PMCWLM	U	00000060	1	5210	
PMCWLMG	U	00000020	1	5211	
PMCWLML	U	00000040	1	5212	
PMCWLPM	X	00000008	1	5222	
PMCWLPUM	X	0000000A	1	5224	
PMCWM	U	00000004	1	5216	
PMCWMBI	H	0000000C	2	5226	
PMCWMM	U	00000018	1	5213	
PMCWMMC	U	00000008	1	5215	
PMCWMME	U	00000010	1	5214	
PMCWPAM	X	0000000F	1	5228	
PMCWPIM	X	0000000B	1	5225	

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

PMCWPNOM             X     00000009          1  5223
PMCWPOM              X     0000000E          1  5227
PMCWRES1             X     00000018          4  5237
PMCWRES2             X     00000018          3  5238
PMCWS                U     00000001          1  5242
PMCWT                U     00000002          1  5217
PMCWV                U     00000001          1  5218  4604
PMCWX                U     00000002          1  5241
PRTLINE              C     00000DA8         38  4697  4699  4408  4443  4444  4696
PRTLNG               U     00000044          1  4699  4696
R0                   U     00000000          1  5257  3550  3626
R1                   U     00000001          1  5258  4417
R10                  U     0000000A          1  5267  3614  3618  3673  3676  3684  3687  3690  3693  3696  3699  3702  3705  3708
                                                     3711  3714  3717  3720  3723  3726  3729  3732  3735  3738  3741  3744  3747
                                                     3750  3753  3756  3759  3762  3765  3768  3771  3774  3777  3780  3783  3786
                                                     3789  3792  3795  3798  3801  3804  3807  3810  3813  3816  3819  3822  3825
                                                     3828  3831  3834  3837  3840  3843  3846  3849  3852  3855  3858  3861  3864
                                                     3867  3870  3873  3876  3879  3882  3885  3888  3891  3894  3897  3900  3903
                                                     3906  3909  3912  3915  3918  3921  3924  3927  3930  3933  3936  3939  3942
                                                     3945  3948  3951  3954  3957  3960  3963  3966  3969  3975  3978  3997  3998
                                                     4001  4002  4010  4011  4014  4015  4018  4019  4022  4023  4026  4027  4030
                                                     4031  4034  4035  4038  4039  4042  4043  4046  4047  4050  4051  4054  4055
                                                     4058  4059  4062  4063  4066  4067  4070  4071  4074  4075  4078  4079  4082
                                                     4083  4086  4087  4090  4091  4094  4095  4098  4099  4102  4103  4106  4107
                                                     4110  4111  4114  4115  4118  4119  4122  4123  4126  4127  4130  4131  4134
                                                     4135  4138  4139  4142  4143  4146  4147  4150  4151  4154  4155  4158  4159
                                                     4162  4163  4166  4167  4170  4171  4174  4175  4178  4179  4182  4183  4186
                                                     4187  4190  4191  4194  4195  4198  4199  4202  4203  4206  4207  4210  4211
                                                     4214  4215  4218  4219  4222  4223  4226  4227  4230  4231  4234  4235  4238
                                                     4239  4242  4243  4246  4247  4250  4251  4254  4255  4258  4259  4262  4263
                                                     4266  4267  4270  4271  4274  4275  4278  4279  4282  4283  4286  4287  4290
                                                     4291  4294  4295  4298  4299  4302  4303  4306  4307  4310  4311  4314  4315
                                                     4318  4319  4322  4323  4326  4327  4330  4331  4334  4335  4338  4339  4342
                                                     4343  4346  4347  4350  4351  4354  4355  4358  4359  4362  4363  4366  4367
                                                     4370  4371  4374  4375  4378  4379  4382  4383  4386  4387  4390  4391  4397
                                                     4398  4401  4402  4528  4530  4535  4538
R11                  U     0000000B          1  5268  3615  4530  4532
R12                  U     0000000C          1  5269  3620  3624  3673  3676  3684  3687  3690  3693  3696  3699  3702  3705  3708
                                                     3711  3714  3717  3720  3723  3726  3729  3732  3735  3738  3741  3744  3747
                                                     3750  3753  3756  3759  3762  3765  3768  3771  3774  3777  3780  3783  3786
                                                     3789  3792  3795  3798  3801  3804  3807  3810  3813  3816  3819  3822  3825
                                                     3828  3831  3834  3837  3840  3843  3846  3849  3852  3855  3858  3861  3864
                                                     3867  3870  3873  3876  3879  3882  3885  3888  3891  3894  3897  3900  3903
                                                     3906  3909  3912  3915  3918  3921  3924  3927  3930  3933  3936  3939  3942
                                                     3945  3948  3951  3954  3957  3960  3963  3966  3969  3975  3978  3997  3998
                                                     4001  4002  4010  4011  4014  4015  4018  4019  4022  4023  4026  4027  4030
                                                     4031  4034  4035  4038  4039  4042  4043  4046  4047  4050  4051  4054  4055
                                                     4058  4059  4062  4063  4066  4067  4070  4071  4074  4075  4078  4079  4082
                                                     4083  4086  4087  4090  4091  4094  4095  4098  4099  4102  4103  4106  4107
                                                     4110  4111  4114  4115  4118  4119  4122  4123  4126  4127  4130  4131  4134
                                                     4135  4138  4139  4142  4143  4146  4147  4150  4151  4154  4155  4158  4159
                                                     4162  4163  4166  4167  4170  4171  4174  4175  4178  4179  4182  4183  4186
                                                     4187  4190  4191  4194  4195  4198  4199  4202  4203  4206  4207  4210  4211
                                                     4214  4215  4218  4219  4222  4223  4226  4227  4230  4231  4234  4235  4238
                                                     4239  4242  4243  4246  4247  4250  4251  4254  4255  4258  4259  4262  4263
                                                     4266  4267  4270  4271  4274  4275  4278  4279  4282  4283  4286  4287  4290
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
					4291 4294 4295 4298 4299 4302 4303 4306 4307 4310 4311 4314 4315
					4318 4319 4322 4323 4326 4327 4330 4331 4334 4335 4338 4339 4342
					4343 4346 4347 4350 4351 4354 4355 4358 4359 4362 4363 4366 4367
					4370 4371 4374 4375 4378 4379 4382 4383 4386 4387 4390 4391 4397
					4398 4401 4402 4433 4434 4436 4531 4534 4535 4536
R13	U	0000000D	1	5270	3621 4433 4437 4528 4531 4532 4536 4538
R14	U	0000000E	1	5271	3564 3570 3599 4419 4554
R15	U	0000000F	1	5272	3592 3983 4409 4425 4426 4431 4489 4490 4498 4514 4517 4518 4539
					4552 4553 4591 4623
R2	U	00000002	1	5259	3551 3556 3557 3558 3559 3561 4418
R3	U	00000003	1	5260	3553 4549
R4	U	00000004	1	5261	
R5	U	00000005	1	5262	3601 3603 3606 4413 4414 4415 4428 4499 4511 4516 4530
R6	U	00000006	1	5263	3608 3609 3616 3618 3622 3624 3668 3981 3992 4405 4429 4501 4502
					4503 4504 4506 4507 4508 4509 4512 4531
R7	U	00000007	1	5264	3617 3623 3666 3981 3990 4405 4430 4499 4501 4504 4506 4509 4513
					4516 4536
R8	U	00000008	1	5265	3554 4550
R9	U	00000009	1	5266	3552 3561 3562
REG2LOW	U	000000DD	1	4729	
REG2PATT	U	AABBCCDD	1	4728	4742 4748 4754 4760
RPTSAVE	F	00000B88	4	4492	4425 4489
RPTSPEED	I	00000AAE	4	4425	4409
RSTNPSW	F	00000000	8	4986	
RSTOPSW	F	00000008	8	4987	
SAVER1	F	00000238	4	3587	4417
SAVER2	F	0000023C	4	3588	3559 4418
SAVER5	F	00000240	4	3589	3606 4413
SAVETRT	D	00000248	8	3590	
SCANOUT	X	00000080	1	5024	5025
SCANOUTL	U	00000000	1	5025	
SCHIB	4	00000000	52	5201	5248 4600
SCHIBL	U	00000034	1	5248	
SCHMBA	A	00000028	8	5246	
SCHMDA1	X	00000030	4	5247	
SCHMDA3	X	00000028	12	5245	
SCHPMCW	X	00000000	28	5203	
SCHSCSW	X	0000001C	12	5244	
SCSW	4	00000000	12	4906	4968
SCSW0CC	U	00000004	1	4922	
SCSW1	X	00000002	1	4926	
SCSW2	X	00000003	1	4935	4478
SCSWACP	U	00000001	1	4934	
SCSWADA	U	00000040	1	4937	
SCSWAHP	U	00000002	1	4933	
SCSWALKC	U	00000010	1	4920	
SCSWARP	U	00000008	1	4931	
SCSWASA	U	00000080	1	4936	
SCSWASP	U	00000004	1	4932	
SCSWASUS	U	00000020	1	4938	
SCSWATTN	U	00000080	1	4948	
SCSWBUSY	U	00000010	1	4951	
SCSWCCTL	U	00000004	1	4963	
SCSWCCW	A	00000004	4	4945	4482
SCSWCCWF	U	00000080	1	4917	
SCSWCCWP	U	00000040	1	4918	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
SCSWCDAT	U	00000008	1	4962	
SCSWCE	U	00000008	1	4952	
SCSWCHNG	U	00000001	1	4965	
SCSWCNT	H	0000000A	2	4967	4483
SCSWCS	X	00000009	1	4957	
SCSWCTLS	X	00000001	1	4916	
SCSWCUE	U	00000020	1	4950	
SCSWDCC0	U	00000000	1	4912	
SCSWDCC1	U	00000001	1	4913	
SCSWDCC3	U	00000003	1	4914	
SCSWDCCM	U	00000003	1	4911	
SCSWDE	U	00000004	1	4953	
SCSWECWC	U	00000002	1	4923	
SCSWESWF	U	00000004	1	4910	
SCSWFC	U	00000010	1	4930	
SCSWFH	U	00000020	1	4929	
SCSWFLAG	X	00000000	1	4907	
SCSWFM	U	00000070	1	4927	
SCSWFS	U	00000040	1	4928	
SCSWICTL	U	00000002	1	4964	
SCSWIL	U	00000040	1	4959	
SCSWISIC	U	00000020	1	4919	
SCSWKEYM	U	000000F0	1	4908	
SCSWL	U	0000000C	1	4968	
SCSWPCI	U	00000080	1	4958	
SCSWPNOP	U	00000001	1	4924	
SCSWPRGM	U	00000020	1	4960	
SCSWPROT	U	00000010	1	4961	
SCSWSAS	U	00000010	1	4939	
SCSWSINT	U	00000008	1	4940	
SCSWSM	U	00000040	1	4949	
SCSWSPEN	U	00000001	1	4943	
SCSWSPRI	U	00000004	1	4941	4480
SCSWSSEC	U	00000002	1	4942	
SCSWSSIC	U	00000008	1	4921	
SCSWSUSC	U	00000008	1	4909	
SCSWUC	U	00000002	1	4954	
SCSWUS	X	00000008	1	4947	4479
SCSWUX	U	00000001	1	4955	
SEGTABLS	U	00003000	1	4680	4681 4802 4683
SSARCHMD	X	000000A3	1	5056	
SSARS	F	00000120	4	5112	
SSCLKCMP	F	000000E0	8	5106	
SSCPUTIM	F	000000D8	8	5105	
SSCRS	F	000001C0	4	5115	
SSFPRS	D	00000160	8	5113	
SSGRS	F	00000180	4	5114	
SSMODEL	F	0000010C	4	5110	
SSPREFIX	F	00000108	4	5109	
SSPSW	F	00000100	8	5108	
SSXSAA	A	000000D4	4	5104	
STFLDATA	F	000000C8	4	5077	
SUBDWORD	I	00000BE0	4	4528	4431 4514
SUBDWSAV	D	00000C08	8	4541	4528 4538
SUBTEST	X	000021FF	1	4800	3582
SVCICODE	H	0000008A	2	5036	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
SVCIID	F	00000088	4	5032	
SVCIILC	X	00000089	1	5034	
SVCIILCM	U	0000000C	1	5035	
SVCNPSW	F	00000060	8	5019	
SVCOPSW	F	00000020	8	4991	4998
TBYTE	X	00000001	1	4709	3626
TEST91	I	00000250	4	3598	3570
TESTADDR	U	000021FE	1	4674	4675 4797
TESTNUM	X	000021FE	1	4799	3579 3609
TICKSAAA	P	00000D88	8	4692	4436 4439
TICKSBBB	P	00000D90	8	4693	4437 4441
TICKSTOT	P	00000D98	8	4694	4439 4440 4441 4444
TIMEADDR	U	000021FD	1	4675	4793
TIMEOPT	X	000021FD	1	4795	3576 3598
TIMER	F	00000050	4	5015	
TNUM	X	00000000	1	4708	3608
TRE02TST	J	00000000	12289	3505	3508 3515 3523 3525 4793 4797 4802
TRELOP10	X	00001190	4	4775	4739 4745 4751 4757
TRELOP20	X	00001C90	1	4787	4739 4745 4751 4757
TRENEXT	U	00000024	1	4726	4414
TREPERF	A	00000DF8	4	4736	3601
TREPOP1	X	00000DF8	1	4738	
TREPOP2	X	00000E1C	1	4744	
TREPOP3	X	00000E40	1	4750	
TREPOP4	X	00000E64	1	4756	
TRETEST	4	00000000	36	4706	3603
TRTOP10	X	00000E90	4	4769	
TRTOP111	X	00000F90	4	4771	
TRTOP1F0	X	00001090	4	4773	
TRTOP20	X	00001990	1	4781	
TRTOP211	X	00001A90	1	4783	
TRTOP2F0	X	00001B90	1	4785	
TST91LOP	U	0000025A	1	3605	4416
TTDES	F	00000054	4	5016	
UA0	F	00000010	8	4988	
UA1	F	0000004C	4	5013	
UA2	F	000000A4	4	5058	
UA3	F	000000B4	4	5067	
UA4	X	000000B8	1	5068	
UA5	X	000000CC	8	5078	
UA6	X	000000EC	8	5084	
UA7	F	00000118	8	5095	
UA8	X	00000180	32	5124	
WPSW0014	3	00000B28	8	4463	4462
ZBRKADDR	A	00000110	8	5094	
ZEMONCNT	F	0000010C	4	5093	
ZEMONCTR	A	00000100	8	5091	
ZEMONSIZ	F	00000108	4	5092	
ZEXTNPSW	X	000001B0	16	5127	
ZEXTOPSW	X	00000130	16	5119	
ZIONPSW	X	000001F0	16	5131	
ZIOOPSW	X	00000170	16	5123	
ZMCKNPSW	X	000001E0	16	5130	
ZMCKOPSW	X	00000160	16	5122	
ZMKFAILA	F	000000F8	8	5086	
ZMONCODE	F	000000B0	8	5061	

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

ZPGMNPSW             X     000001D0         16  5129
ZPGMOPSW             X     00000150         16  5121
ZPGMTRX              F     000000A8          8  5060
ZRSTNPSW             X     000001A0         16  5126
ZRSTOPSW             X     00000120         16  5118
ZSASDISP             U     000011C0          1  5132
ZSVCNPSW             X     000001C0         16  5128
ZSVCOPSW             X     00000140         16  5120
=A(OP2LEN)           A     00000D44          4  4663  3621  3623
=CL5'TRE'            C     00000D50          5  4666  4408
=F'0'                F     00000D48          4  4664  4415
=F'1'                F     00000D4C          4  4665  4534
=P'4294967296'       P     00000D55          6  4667  4440
```

```
 MACRO    DEFN  REFERENCES

ANTR      120
APROB     252
ARCHIND   412   3442
ARCHLVL   553   3441
ASAIPL    679   3521
ASALOAD   759   3504
ASAREA    814   4978
ASAZAREA  999
CPUWAIT  1082   4459
DOINSTR  3648   3995   4008   4395
DSECTS   1408   4810   4842   4889   4904   4975
DWAIT    1611   4561   4566   4571   4576
DWAITEND 1668   4560
ENADEV   1676   4597
ESA390   1776
IOCB     1787   4630
IOCBDS   1963   4811
IOFMT    1997   4843   4890   4905   5137   5155   5163   5200
IOINIT   2335   4585
IOTRFR   2376
ORB      2424   4649
OVERONLY 3634   3671   3682   3973
POINTER  2613
PSWFMT   2641
RAWAIT   2775
RAWIO    2871   4446
SIGCPU   3029
SMMGR    3087
SMMGRB   3187
TRAP128  3236
TRAP64   3213   3506   3509
TRAPS    3249
ZARCH    3323
ZEROH    3335
ZEROL    3363
ZEROLH   3391
ZEROLL   3414
```

```
   DESC      SYMBOL     SIZE      POS         ADDR

Entry: 0

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

```
   STMT                                                FILE NAME

1     c:\Users\Fish\Documents\Visual Studio 2008\Projects\MyProjects\ASMA-0\TRE-02-performance\TRE-02-performance.asm
2     C:\Users\Fish\Documents\Visual Studio 2008\Projects\Hercules\_Git\_Harold\SATK-0\srcasm\satk.mac


** NO ERRORS FOUND **
```