```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                       2 ************************************************************************
                                                       3 *
                                                       4 *            CLCLE instruction tests
                                                       5 *
                                                       6 *        NOTE: This is based on the CLCL-et-al Test and modified
                                                       7 *              to ONLY test CLCLE instruction performance.
                                                       8 *
                                                       9 *        James Wekel August 2022
                                                      10 ************************************************************************
                                                      11 ************************************************************************
                                                      12 *
                                                      13 *  This program ONY tests performancce of the CLCLE instructions.
                                                      14 *
                                                      15 ************************************************************************
                                                      16 *  NOTE: When assembling using SATK, use the "-t S390" option.
                                                      17 ************************************************************************
                                                      18 *
                                                      19 *  Example Hercules Testcase:
                                                      20 *
                                                      21 *        *Testcase CLCE-04-performance (Test CLCLE instructions)
                                                      22 *
                                                      23 *        archlvl     390
                                                      24 *        mainsize    3
                                                      25 *        numcpu      1
                                                      26 *        sysclear
                                                      27 *
                                                      28 *        loadcore    "$(testpath)/CLCLE-04-performance.core" 0x0
                                                      29 *
                                                      30 *        ##r           21fd=ff   # (enable timing tests too!)
                                                      31 *        ##runtest     300       # (TIMING too test duration)
                                                      32 *        runtest     1         # (NON-timing test duration)
                                                      33 *        *Done
                                                      34 *
                                                      35 ************************************************************************
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                          37          PRINT OFF
                                        3418          PRINT ON

                                        3420 ********************************************************************************
                                        3421 *        SATK prolog stuff...
                                        3422 ********************************************************************************

                                        3424          ARCHLVL  ZARCH=NO,MNOTE=NO
                                        3426+$AL      OPSYN AL
                                        3427+$ALR     OPSYN ALR
                                        3428+$B       OPSYN B
                                        3429+$BAS     OPSYN BAS
                                        3430+$BASR    OPSYN BASR
                                        3431+$BC      OPSYN BC
                                        3432+$BCTR    OPSYN BCTR
                                        3433+$BE      OPSYN BE
                                        3434+$BH      OPSYN BH
                                        3435+$BL      OPSYN BL
                                        3436+$BM      OPSYN BM
                                        3437+$BNE     OPSYN BNE
                                        3438+$BNH     OPSYN BNH
                                        3439+$BNL     OPSYN BNL
                                        3440+$BNM     OPSYN BNM
                                        3441+$BNO     OPSYN BNO
                                        3442+$BNP     OPSYN BNP
                                        3443+$BNZ     OPSYN BNZ
                                        3444+$BO      OPSYN BO
                                        3445+$BP      OPSYN BP
                                        3446+$BXLE    OPSYN BXLE
                                        3447+$BZ      OPSYN BZ
                                        3448+$CH      OPSYN CH
                                        3449+$L       OPSYN L
                                        3450+$LH      OPSYN LH
                                        3451+$LM      OPSYN LM
                                        3452+$LPSW    OPSYN LPSW
                                        3453+$LR      OPSYN LR
                                        3454+$LTR     OPSYN LTR
                                        3455+$NR      OPSYN NR
                                        3456+$SL      OPSYN SL
                                        3457+$SLR     OPSYN SLR
                                        3458+$SR      OPSYN SR
                                        3459+$ST      OPSYN ST
                                        3460+$STM     OPSYN STM
                                        3461+$X       OPSYN X
                                        3462+$AHI     OPSYN AHI
                                        3463+$B       OPSYN J
                                        3464+$BC      OPSYN BRC
                                        3465+$BE      OPSYN JE
                                        3466+$BH      OPSYN JH
                                        3467+$BL      OPSYN JL
                                        3468+$BM      OPSYN JM
                                        3469+$BNE     OPSYN JNE
                                        3470+$BNH     OPSYN JNH
                                        3471+$BNL     OPSYN JNL
                                        3472+$BNM     OPSYN JNM
                                        3473+$BNO     OPSYN JNO
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                3474+$BNP     OPSYN JNP
                                                3475+$BNZ     OPSYN JNZ
                                                3476+$BO      OPSYN JO
                                                3477+$BP      OPSYN JP
                                                3478+$BXLE    OPSYN JXLE
                                                3479+$BZ      OPSYN JZ
                                                3480+$CHI     OPSYN CHI
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  3482 ********************************************************************
                                                  3483 *        Initiate the CLCLE04 CSECT in the CODE region
                                                  3484 *        with the location counter at 0
                                                  3485 ********************************************************************

                                                  3487 CLCLE04  ASALOAD  REGION=CODE
                             00000000  00003000   3488+CLCLE04  START 0,CODE
00000000  000A0000 00000008                       3490+         PSW   0,0,2,0,X'008'      64-bit Restart ISR Trap New PSW
00000008                     00000008  00000058   3491+         ORG   CLCLE04+X'058'
00000058  000A0000 00000018                       3493+         PSW   0,0,2,0,X'018'      64-bit External ISR Trap New PSW
00000060  000A0000 00000020                       3494+         PSW   0,0,2,0,X'020'      64-bit Supervisor Call ISR Trap New PSW
00000068  000A0000 00000028                       3495+         PSW   0,0,2,0,X'028'      64-bit Program ISR Trap New PSW
00000070  000A0000 00000030                       3496+         PSW   0,0,2,0,X'030'      64-bit Machine Check Trap New PSW
00000078  000A0000 00000038                       3497+         PSW   0,0,2,0,X'038'      64-bit Input/Output Trap New PSW
00000080                     00000080  00000200   3498+         ORG   CLCLE04+512



                                                  3500 ********************************************************************
                                                  3501 *        Create IPL (restart) PSW
                                                  3502 ********************************************************************

                                                  3504          ASAIPL   IA=BEGIN
                             00000000  00003000   3505+CLCLE04  CSECT
00000200                     00000200  00000000   3506+         ORG   CLCLE04
00000000  00080000 00000200                       3507+         PSW   0,0,0,0,BEGIN,24
00000008                     00000008  00000200   3508+         ORG   CLCLE04+512      Reset CSECT to end of assigned storage area
                             00000000  00003000   3509+CLCLE04  CSECT
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    3511 ************************************************************************
                                                    3512 *               The actual "CLCLE04" program itself...
                                                    3513 ************************************************************************
                                                    3514 *
                                                    3515 *  Architecture Mode: 390
                                                    3516 *  Addressing Mode:   31-bit
                                                    3517 *  Register Usage:
                                                    3518 *
                                                    3519 *   R0       (work)
                                                    3520 *   R1       I/O device used by ENADEV and RAWIO macros
                                                    3521 *   R2       First base register
                                                    3522 *   R3       IOCB pointer for ENADEV and RAWIO macros
                                                    3523 *   R4       IO work register used by ENADEV and RAWIO
                                                    3524 *   R5-R7    (work)
                                                    3525 *   R8       ORB pointer
                                                    3526 *   R9       Second base register
                                                    3527 *   R10-R13  (work)
                                                    3528 *   R14      Subroutine call
                                                    3529 *   R15      Secondary Subroutine call or work
                                                    3530 *
                                                    3531 ************************************************************************

00000200                    00000000                3533          USING  ASA,R0          Low core addressability
00000200                    00000200                3534          USING  BEGIN,R2        FIRST Base Register
00000200                    00001200                3535          USING  BEGIN+4096,R9   SECOND Base Register
00000200                    00000000                3536          USING  IOCB,R3         SATK Device I/O Control Block
00000200                    00000000                3537          USING  ORB,R8          ESA/390 Operation Request Block

00000200  0520                                      3539 BEGIN    BALR   R2,0            Initalize FIRST base register
00000202  0620                                      3540          BCTR   R2,0            Initalize FIRST base register
00000204  0620                                      3541          BCTR   R2,0            Initalize FIRST base register
00000206  5020 203C                  0000023C       3542          ST     R2,SAVER2

0000020A  4190 2800                  00000800       3544          LA     R9,2048(,R2)    Initalize SECOND base register
0000020E  4190 9800                  00000800       3545          LA     R9,2048(,R9)    Initalize SECOND base register

00000212  45E0 2A10                  00000C10       3547          BAL    R14,INIT        Initalize Program
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   3549 ********************************************************************
                                                   3550 *        Run the test...
                                                   3551 ********************************************************************
00000216  45E0 2044                        00000244  3553         BAL   R14,TEST91       Time CLCLE  instruction  (speed test)


                                                   3555 ********************************************************************
                                                   3556 *         Test for normal or unexpected test completion...
                                                   3557 ********************************************************************
0000021A  95FF 9FFD                        000021FD  3559         CLI   TIMEOPT,X'FF'    Normal (timing) run?
0000021E  4770 2A22                        00000C22  3560         BNE   EOJ              Not timing run; just go end normally

00000222  9595 9FFE                        000021FE  3562         CLI   TESTNUM,X'95'    Did we end on expected test?
00000226  4770 2A50                        00000C50  3563         BNE   FAILTEST         No?! Then FAIL the test!

0000022A  9500 9FFF                        000021FF  3565         CLI   SUBTEST,X'00'    Did we end on expected SUB-test?
0000022E  4770 2A50                        00000C50  3566         BNE   FAILTEST         No?! Then FAIL the test!

00000232  47F0 2A22                        00000C22  3568         B     EOJ              Yes, then normal completion!



00000238  00000000                                   3570 SAVER1   DC    F'0'
0000023C  00000000                                   3571 SAVER2   DC    F'0'
00000240  00000000                                   3572 SAVER5   DC    F'0'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   3574 ************************************************************************
                                                   3575 *        TEST91                  Time CLCLE instruction  (speed test)
                                                   3576 ************************************************************************

00000244  91FF 9FFD                     000021FD  3578 TEST91   TM    TIMEOPT,X'FF'    Is timing tests option enabled?
00000248  078E                                    3579          BZR   R14              No, skip timing tests

0000024A  4150 2BF0                     00000DF0  3581          LA    R5,CLEPERF         Point R5 --> testing control table
0000024E                  00000000                3582          USING CLETEST,R5         What each table entry looks like

                          0000024E      00000001  3584 TST91LOP EQU   *
0000024E  5050 2040                     00000240  3585          ST    R5,SAVER5          save current pref table base

00000252  4360 5000                     00000000  3587          IC    R6,TNUM            Set test number
00000256  4260 9FFE                     000021FE  3588          STC   R6,TESTNUM
0000025A  4360 5001                     00000001  3589          IC    R6,TSUBNUM         Set sub test number
0000025E  4260 9FFF                     000021FF  3590          STC   R6,SUBTEST

                                                   3592 *
                                                   3593 **       First, make sure we start clean!
                                                   3594 **       Initialize operand data  (move data to testing address)
                                                   3595 *
00000262  58A0 5014                     00000014  3596          L     R10,OP1WHERE       Where to move operand-1 data to
00000266  58B0 5008                     00000008  3597          L     R11,OP1LEN           operand-1 length
0000026A  5860 5004                     00000004  3598          L     R6,OP1DATA         Where op1 data is right now
0000026E  5870 5008                     00000008  3599          L     R7,OP1LEN          How much of it there is
00000272  0EA6                                    3600          MVCL  R10,R6

00000274  58C0 501C                     0000001C  3602          L     R12,OP2WHERE       Where to move operand-2 data to
00000278  58D0 5010                     00000010  3603          L     R13,OP2LEN         How much of it there is
0000027C  5860 500C                     0000000C  3604          L     R6,OP2DATA         Where op2 data is right now
00000280  5870 5010                     00000010  3605          L     R7,OP2LEN          How much of it there is
00000284  0EC6                                    3606          MVCL  R12,R6
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  3609 ************************************************************************
                                                  3610 *     Define come helpful macros to ensure our counts are correct
                                                  3611 ************************************************************************


                                                  3613          MACRO
                                                  3614          OVERONLY &NUM              &NUM = number of sets
                                                  3615          LCLA  &CTR
                                                  3616 &CTR     SETA  &NUM
                                                  3617 .LOOP    ANOP
                                                  3618 .*
                                                  3619 *
                                                  3620          LM    R10,R13,OPSWHERE
                                                  3621          BC    B'0001',*+4
                                                  3622 .*
                                                  3623 &CTR     SETA  &CTR-1
                                                  3624          AIF   (&CTR GT 0).LOOP
                                                  3625          MEND


                                                  3627          MACRO
                                                  3628          DOINSTR &NUM               &NUM = number of sets
                                                  3629          LCLA  &CTR
                                                  3630 &CTR     SETA  &NUM
                                                  3631 .LOOP    ANOP
                                                  3632 .*
                                                  3633 *
                                                  3634          LM    R10,R13,OPSWHERE
                                                  3635          CLCLE R10,R12,0
                                                  3636          BC    B'0001',*-4
                                                  3637 .*
                                                  3638 &CTR     SETA  &CTR-1
                                                  3639          AIF   (&CTR GT 0).LOOP
                                                  3640          MEND
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   3642 ************************************************************************
                                                   3643 *        Next, time the overhead...
                                                   3644 ************************************************************************
00000286  5870 2B58                      00000D58  3646         L     R7,NUMLOOPS
0000028A  B205 2B60                      00000D60  3647         STCK  BEGCLOCK
0000028E  0560                                     3648         BALR  R6,0

                                                   3650 *                                    100 sets of overhead
                                                   3651         OVERONLY 2                   (first 2)
                                                   3652+*
00000290  98AD 5014                      00000014  3653+         LM    R10,R13,OPSWHERE
00000294  4710 2098                      00000298  3654+         BC    B'0001',*+4
                                                   3655+*
00000298  98AD 5014                      00000014  3656+         LM    R10,R13,OPSWHERE
0000029C  4710 20A0                      000002A0  3657+         BC    B'0001',*+4

                                                   3659 *        .........ETC.........

                                                   3661         PRINT OFF
                                                   3951         PRINT ON

                                                   3953         OVERONLY 2                   (last 2)
                                                   3954+*
000005A0  98AD 5014                      00000014  3955+         LM    R10,R13,OPSWHERE
000005A4  4710 23A8                      000005A8  3956+         BC    B'0001',*+4
                                                   3957+*
000005A8  98AD 5014                      00000014  3958+         LM    R10,R13,OPSWHERE
000005AC  4710 23B0                      000005B0  3959+         BC    B'0001',*+4

000005B0  0676                                     3961         BCTR  R7,R6
000005B2  B205 2B68                      00000D68  3962         STCK  ENDCLOCK
000005B6  45F0 2984                      00000B84  3963         BAL   R15,CALCDUR
000005BA  D207 2B78 2B70       00000D78  00000D70  3964         MVC   OVERHEAD,DURATION
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   3966 ********************************************************************
                                                   3967 *        Now do the actual timing run...
                                                   3968 ********************************************************************

000005C0  5870 2B58                      00000D58  3970         L     R7,NUMLOOPS
000005C4  B205 2B60                      00000D60  3971         STCK  BEGCLOCK
000005C8  0560                                     3972         BALR  R6,0
                                                   3973 *                                  100 sets of instructions
                                                   3974         DOINSTR 2                  (first 2)
                                                   3975+**
000005CA  98AD 5014                      00000014  3976+         LM    R10,R13,OPSWHERE
000005CE  A9AC 0000                      00000000  3977+         CLCLE R10,R12,0
000005D2  4710 23CE                      000005CE  3978+         BC    B'0001',*-4
                                                   3979+**
000005D6  98AD 5014                      00000014  3980+         LM    R10,R13,OPSWHERE
000005DA  A9AC 0000                      00000000  3981+         CLCLE R10,R12,0
000005DE  4710 23DA                      000005DA  3982+         BC    B'0001',*-4

                                                   3984 *        .........ETC.........

                                                   3986         PRINT OFF
                                                   4372         PRINT ON

                                                   4374         DOINSTR 2                  (last 2)
                                                   4375+**
00000A62  98AD 5014                      00000014  4376+         LM    R10,R13,OPSWHERE
00000A66  A9AC 0000                      00000000  4377+         CLCLE R10,R12,0
00000A6A  4710 2866                      00000A66  4378+         BC    B'0001',*-4
                                                   4379+**
00000A6E  98AD 5014                      00000014  4380+         LM    R10,R13,OPSWHERE
00000A72  A9AC 0000                      00000000  4381+         CLCLE R10,R12,0
00000A76  4710 2872                      00000A72  4382+         BC    B'0001',*-4

00000A7A  0676                                     4384         BCTR  R7,R6
00000A7C  B205 2B68                      00000D68  4385         STCK  ENDCLOCK

00000A80                                           4387         DROP  R5                     RPTSPEED uses R5 as a work register

00000A80  D204 2BC1 2B44       00000DC1  00000D44  4389         MVC   PRTLINE+33(5),=CL6'CLCLE'
00000A86  45F0 28A6                      00000AA6  4390         BAL   R15,RPTSPEED
                                                   4391 *
                                                   4392 **       More performance tests?
                                                   4393 *
00000A8A  5850 2040                      00000240  4394         L     R5,SAVER5            restore perf table base
00000A8E                       00000000            4395         USING CLETEST,R5           What each table entry looks like

00000A8E  4150 5030                      00000030  4397         LA    R5,CLENEXT           Go on to next table entry
00000A92  D503 2B3C 5000       00000D3C  00000000  4398         CLC   =F'0',0(R5)           End of table?
00000A98  4770 204E                      0000024E  4399         BNE   TST91LOP             No, loop...

00000A9C  5810 2038                      00000238  4401         L     R1,SAVER1            Restore register 1
00000AA0  5820 203C                      0000023C  4402         L     R2,SAVER2            Restore first base register
00000AA4  07FE                                     4403         BR    R14                  Return to caller or FAILTEST

00000AA6                                           4405         DROP  R5
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                          4407 ********************************************************************
                                          4408 *        RPTSPEED                  Report instruction speed
                                          4409 ********************************************************************

00000AA6  50F0 2980                 00000B80  4411 RPTSPEED ST    R15,RPTSAVE        Save return address
00000AAA  45F0 2984                 00000B84  4412          BAL   R15,CALCDUR        Calculate duration

00000AAE  4150 2B78                 00000D78  4414          LA    R5,OVERHEAD        Subtract overhead
00000AB2  4160 2B70                 00000D70  4415          LA    R6,DURATION        From raw timing
00000AB6  4170 2B70                 00000D70  4416          LA    R7,DURATION        Yielding true instruction timing
00000ABA  45F0 29D8                 00000BD8  4417          BAL   R15,SUBDWORD       Do it

00000ABE  98CD 2B70                 00000D70  4419          LM    R12,R13,DURATION   Convert to...
00000AC2  8CC0 000C                 0000000C  4420          SRDL  R12,12            ... microseconds

00000AC6  4EC0 2B80                 00000D80  4422          CVD   R12,TICKSAAA       convert HIGH part to decimal
00000ACA  4ED0 2B88                 00000D88  4423          CVD   R13,TICKSBBB       convert LOW  part to decimal

00000ACE  F877 2B90 2B80      00000D90  00000D80  4425          ZAP   TICKSTOT,TICKSAAA           Calculate...
00000AD4  FC75 2B90 2B4A      00000D90  00000D4A  4426          MP    TICKSTOT,=P'4294967296'     ...decimal...
00000ADA  FA77 2B90 2B88      00000D90  00000D88  4427          AP    TICKSTOT,TICKSBBB           ...microseconds

00000AE0  D20B 2BCB 2BE4      00000DCB  00000DE4  4429          MVC   PRTLINE+43(L'EDIT),EDIT         (edit into...
00000AE6  DE0B 2BCB 2B93      00000DCB  00000D93  4430          ED    PRTLINE+43(L'EDIT),TICKSTOT+3     ...print line)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                          4432          RAWIO 4,FAIL=FAILIO      Print elapsed time on console
00000AEC  9200 300E                 0000000E  4433+         MVI   IOCBSC,X'00'          Clear SC information
00000AF0  D201 300A 3006      0000000A  00000006  4434+         MVC   IOCBST,IOCBZERO       Clear accumulated status
00000AF6  5810 3000                 00000000  4435+         L     1,IOCBDID             Remember the device ID with which I am worki
                                          4436+* Initiate Subchannel-based input/output operation
00000AFA  5840 3018                 00000018  4437+         $L    4,IOCBORB             Locate the ORB for the channel subsystem
00000AFE  B233 4000                 00000000  4438+         SSCH  0(4)                  Initiate the I/O operation
00000B02  A774 009F                 00000C40  4439+         $BC   B'0111',FAILIO        ..Start function failed, report/handle the e
00000B06  5840 3020                 00000020  4440+         $L    4,IOCBIRB             Locate the IRB storage area
00000B0A                      00000000          4441+         USING IRB,4                 Make it addressable

                                          4443+* Wait for I/O operation to present status via an interruption
00000B0A                                  4444+IOWT0013 DS    0H  Wait for I/O to complete
00000B0A  D207 2930 0078      00000B30  00000078  4446+         MVC   IOS0014(8),120(0)               Save Input/Output new PSW
00000B10  D207 0078 2928      00000078  00000B28  4447+         MVC   120(8,0),ION0014               Establish Input/Ouput new PSW
00000B16  8200 2920                 00000B20  4448+         $LPSW WPSW0014                Wait for event
00000B20  020A0000 00000000               4449+WPSW0014 PSW   2,0,2,0,0                  Wait for event
00000B28  00082000 00000B38               4450+ION0014  PSW   0,0,0,32,IRST0014,24              I/O New PSW: cc==2
00000B30  00000000 00000000               4451+IOS0014  DC    XL8'00'
                                          4452+* Handle input/output interruption
00000B38                                  4453+IRST0014 DS    0H
00000B38  D207 0078 2930      00000078  00000B30  4454+         MVC   120(8,0),IOS0014             Restore input/output new PSW
                                          4455+* Process the interruption...
                                          4456+* Validate interruption is for the expected subchannel
00000B3E  5510 00B8                 000000B8  4457+         CL    1,IOSSID              Is this the device for which I am waiting?
00000B42  A774 FFE4                 00000B0A  4458+         $BNE  IOWT0013              ..No, continue waiting for it
                                          4459+* Accumulate interruption information from IRB
00000B46  B235 4000                 00000000  4460+         TSCH  0(4)                  Retrive interrupt information
00000B4A  A744 FFE0                 00000B0A  4461+         $BC   B'0100',IOWT0013      CC1 (not status pending), wait for it to arr
00000B4E  A714 0079                 00000C40  4462+         $BC   B'0001',FAILIO        CC3 (not operational), an error then
                                          4463+*                                      CC0 (status was pending), accumulate the sta
00000B52  D600 300E 4003      0000000E  00000003  4464+         OC    IOCBSC,IRBSCSW+SCSW2  Accumulate status control
00000B58  D601 300A 4008      0000000A  00000008  4465+         OC    IOCBST,IRBSCSW+SCSWUS Accumulate device and channel status
00000B5E  9104 300E                 0000000E  4466+         TM    IOCBSC,SCSWSPRI       Primary subchannel status?
00000B62  A7E4 FFD4                 00000B0A  4467+         $BNO  IOWT0013              ..No, wait for primary status
00000B66  D203 3010 4004      00000010  00000004  4468+         MVC   IOCBSCCW,IRBSCSW+SCSWCCW  CCW address
00000B6C  D201 3016 400A      00000016  0000000A  4469+         MVC   IOCBRCNT,IRBSCSW+SCSWCNT  Residual count
                                          4470+* Test for errors as specified in the IOCB
00000B72  910C 300A                 0000000A  4471+         TM    IOCBUS,CSWCE+CSWDE    Channel end and device end both accumulated?
00000B76  A7E4 0065                 00000C40  4472+         $BNO  FAILIO                Hunh? No CE and DE but do have primary statu
                                          4473+* Input/Output operation successful


00000B7A  58F0 2980                 00000B80  4475          L     R15,RPTSAVE           Restore return address
00000B7E  07FF                            4476          BR    R15                   Return to caller

00000B80  00000000                        4478 RPTSAVE  DC    F'0'                  R15 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4480 ********************************************************************************
                                                   4481 *        CALCDUR                  Calculate DURATION
                                                   4482 ********************************************************************************

00000B84  50F0 29C8                      00000BC8  4484 CALCDUR  ST    R15,CALCRET        Save return address
00000B88  9057 29CC                      00000BCC  4485          STM   R5,R7,CALCWORK     Save work registers

00000B8C  9867 2B60                      00000D60  4487          LM    R6,R7,BEGCLOCK     Remove CPU number from clock value
00000B90  8C60 0006                      00000006  4488          SRDL  R6,6                       "
00000B94  8D60 0006                      00000006  4489          SLDL  R6,6                       "
00000B98  9067 2B60                      00000D60  4490          STM   R6,R7,BEGCLOCK             "

00000B9C  9867 2B68                      00000D68  4492          LM    R6,R7,ENDCLOCK     Remove CPU number from clock value
00000BA0  8C60 0006                      00000006  4493          SRDL  R6,6                       "
00000BA4  8D60 0006                      00000006  4494          SLDL  R6,6                       "
00000BA8  9067 2B68                      00000D68  4495          STM   R6,R7,ENDCLOCK             "

00000BAC  4150 2B60                      00000D60  4497          LA    R5,BEGCLOCK        Starting time
00000BB0  4160 2B68                      00000D68  4498          LA    R6,ENDCLOCK        Ending time
00000BB4  4170 2B70                      00000D70  4499          LA    R7,DURATION        Difference
00000BB8  45F0 29D8                      00000BD8  4500          BAL   R15,SUBDWORD       Calculate duration

00000BBC  9857 29CC                      00000BCC  4502          LM    R5,R7,CALCWORK     Restore work registers
00000BC0  58F0 29C8                      00000BC8  4503          L     R15,CALCRET        Restore return address
00000BC4  07FF                                     4504          BR    R15                Return to caller

00000BC8  00000000                                 4506 CALCRET  DC    F'0'               R15 save area
00000BCC  00000000 00000000                        4507 CALCWORK DC    3F'0'              R5-R7 save area



                                                   4509 ********************************************************************************
                                                   4510 *        SUBDWORD                 Subtract two doublewords
                                                   4511 *        R5 --> subtrahend, R6 --> minuend, R7 --> result
                                                   4512 ********************************************************************************

00000BD8  90AD 2A00                      00000C00  4514 SUBDWORD STM   R10,R13,SUBDWSAV   Save registers

00000BDC  98AB 5000                      00000000  4516          LM    R10,R11,0(R5)      Subtrahend  (value to subtract)
00000BE0  98CD 6000                      00000000  4517          LM    R12,R13,0(R6)      Minuend     (what to subtract FROM)
00000BE4  1FDB                                     4518          SLR   R13,R11            Subtract LOW part
00000BE6  47B0 29EE                      00000BEE  4519          BNM   *+4+4              (branch if no borrow)
00000BEA  5FC0 2B40                      00000D40  4520          SL    R12,=F'1'          (otherwise do borrow)
00000BEE  1FCA                                     4521          SLR   R12,R10            Subtract HIGH part
00000BF0  90CD 7000                      00000000  4522          STM   R12,R13,0(R7)      Store results

00000BF4  98AD 2A00                      00000C00  4524          LM    R10,R13,SUBDWSAV   Restore registers
00000BF8  07FF                                     4525          BR    R15                Return to caller

00000C00  00000000 00000000                        4527 SUBDWSAV DC    2D'0'              R10-R13 save area
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4529 ********************************************************************
                                                   4530 *        Program Initialization
                                                   4531 ********************************************************************

00000C10                                           4533 INIT     DS     0H               Program Initialization

00000C10  4130 2AC0                    00000CC0    4535          LA     R3,IOCB_009      Point to IOCB
00000C14  5880 3018                    00000018    4536          L      R8,IOCBORB       Point to ORB

00000C18  45F0 2A60                    00000C60    4538          BAL    R15,IOINIT       Initialize the CPU for I/O operations
00000C1C  45F0 2A6E                    00000C6E    4539          BAL    R15,ENADEV       Enable our device making ready for use
00000C20  07FE                                     4540          BR     R14              Return to caller




                                                   4542 ********************************************************************
                                                   4543 *        Normal completion or Abnormal termination PSWs
                                                   4544 ********************************************************************



                                                   4546 EOJ      DWAITEND LOAD=YES          Normal completion
00000C22                                           4548+EOJ      DS     0H
00000C22  8200 2A28                    00000C28    4549+         LPSW   DWAT0016
00000C28  000A0000 00000000                        4550+DWAT0016 PSW    0,0,2,0,X'000000'



                                                   4552 FAILDEV  DWAIT LOAD=YES,CODE=01     ENADEV failed
00000C30                                           4553+FAILDEV  DS     0H
00000C30  8200 2A38                    00000C38    4554+         LPSW   DWAT0017
00000C38  000A0000 00010001                        4555+DWAT0017 PSW    0,0,2,0,X'010001'



                                                   4557 FAILIO   DWAIT LOAD=YES,CODE=02     RAWIO failed
00000C40                                           4558+FAILIO   DS     0H
00000C40  8200 2A48                    00000C48    4559+         LPSW   DWAT0018
00000C48  000A0000 00010002                        4560+DWAT0018 PSW    0,0,2,0,X'010002'



                                                   4562 FAILTEST DWAIT LOAD=YES,CODE=BAD    Abnormal termination
00000C50                                           4563+FAILTEST DS     0H
00000C50  8200 2A58                    00000C58    4564+         LPSW   DWAT0019
00000C58  000A0000 00010BAD                        4565+DWAT0019 PSW    0,0,2,0,X'010BAD'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4567 ********************************************************************
                                                   4568 *        Initialize the CPU for I/O operations
                                                   4569 ********************************************************************


                                                   4571 IOINIT   IOINIT ,
00000C60  B766 2A68                    00000C68    4572+IOINIT   LCTL  6,6,IOMK0020       Enable subchannel subclasses for interruptions
00000C64  47F0 2A6C                    00000C6C    4573+         B     IOMK0020+4
00000C68                                           4574+IOMK0020 DS    0F
00000C68  FF000000                                 4575+         DC    XL4'FF000000'         All subchannel subclasses enabled

00000C6C  07FF                                     4577          BR    R15                   Return to caller


                                                   4579 ********************************************************************
                                                   4580 *        Enable the device, making it ready for use
                                                   4581 ********************************************************************


                                                   4583 ENADEV   ENADEV ENAOKAY,FAILDEV,REG=4
00000C6E  5810 2AB4                    00000CB4    4584+ENADEV   L     1,FIND0021
00000C72  5840 3028                    00000028    4585+         $L    4,IOCBSIB             Locate where the SCHIB is to be stored
00000C76                    00000000               4586+         USING SCHIB,4
00000C76                                           4587+FINL0021 DS    0H   Retrieve Subchannel Information Block for desired device numbe
00000C76  B234 4000                    00000000    4588+         STSCH 0(4)                  Store the SCHIB for first subchannel
00000C7A  A774 FFDB                    00000C30    4589+         $BC   B'0111',FAILDEV       Subchannel does not exist and device number not
00000C7E  9101 4005                    00000005    4590+         TM    PMCW1_8,PMCWV         Is the subchannel device number valid?
00000C82  A784 0011                    00000CA4    4591+         $BZ   FINN0021              ..No, check the next subchannel
00000C86  D501 4006 3004      00000006 00000004    4592+         CLC   PMCWDNUM,IOCBDEV      Is this the device number being sought?
00000C8C  A774 000C                    00000CA4    4593+         $BNE  FINN0021              ..No, check the next subchannel
                                                   4594+* Subchannel found!
00000C90  5010 3000                    00000000    4595+         ST    1,IOCBDID             Remember the subchannel so I/O can be done to i
00000C94  9680 4005                    00000005    4596+         OI    PMCW1_8,PMCWE         Make sure it is enabled so I/O requests accepte
00000C98  B232 4000                    00000000    4597+         MSCH  0(4)                  Enable the subchannel to the channel sub-system
00000C9C  A784 0010                    00000CBC    4598+         $BC   B'1000',ENAOKAY       CC0 (SCHIB updated), device is ready.
00000CA0  A7F4 FFC8                    00000C30    4599+         $B    FAILDEV               CC1,CC2,CC3 (SCHIB update failed), quit
00000CA4                                           4600+FINN0021 DS    0H  Advance to next subchannel
00000CA4  4110 1001                    00000001    4601+         LA    1,1(0,1)              Advance to next subchannel
00000CA8  5510 2AB8                    00000CB8    4602+         CL    1,FINM0021            Beyond maximum subchannel
00000CAC  A7D4 FFE5                    00000C76    4603+         $BNH  FINL0021              ..No, examine the next subchannel
00000CB0  A724 FFC0                    00000C30    4604+         $BH   FAILDEV               ..Yes, failed to enable the device
00000CB4                                           4605+         DROP  4                     Forget SCHIB addressing
00000CB4  00010000                                 4606+FIND0021 DC    A(X'00010000')        First subchannel subsystem ID
00000CB8  0001FFFF                                 4607+FINM0021 DC    A(X'0001FFFF')        Last subchannel subsystem ID


00000CBC  07FF                                     4609 ENAOKAY  BR    R15                   Return to caller
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                  4611 ********************************************************************
                                                  4612 *         Structure used by RAWIO identifying
                                                  4613 *         the device and operation being performed
                                                  4614 ********************************************************************


                                                  4616 IOCB_009 IOCB  X'009',CCW=CONPGM
00000CC0  00000000                                4617+IOCB_009 DC    A(0)            +0 Device Identifier (supplied by ENADEV macro)
00000CC4  0009                                    4618+         DC    AL2(X'009')     +4 Device address or device number
00000CC6  0000                                    4619+         DC    H'0'            +6 Must be zeros
00000CC8  D3                                      4620+         DC    AL1(X'D3')      +8 Default detected unit errors
00000CC9  3F                                      4621+         DC    AL1(X'3F')      +9 Default detected channel errors
00000CCA  0000                                    4622+         DC    HL2'0'          +10 Accumulated unit and channel errors
00000CCC  0000                                    4623+         DC    HL2'0'          +12 Tested unit and channel status
00000CCE  00                                      4624+         DC    XL1'00'         +14 Accumulated subchannel status control from SCSW
00000CCF  80                                      4625+         DC    XL1'80'         +15 Default unsoliticed wait condition
00000CD0  00000000                                4626+         DC    F'0'            +16 I/O status CCW address
00000CD4  00000000                                4627+         DC    F'0'            +20 residual count
00000CD8  00000D30                                4628+         DC    A(IORB0022)     +24  Address where ORB is located
00000CDC  00000000                                4629+         DC    A(0)            +28  reserved
00000CE0  00000CF0                                4630+         DC    A(IIRB0022)     +32 Address where IRB stored
00000CE4  00000000                                4631+         DC    A(0)            +36 reserved
00000CE8  00000CF0                                4632+         DC    A(IIRB0022)     +40 Address where SCHIB stored
00000CEC  00000000                                4633+         DC    A(0)            +44 reserved
00000CF0  00000000 00000000                       4634+IIRB0022 DC    16F'0'              Embedded shared IRB and SCHIB area
00000D30                                          4636+IORB0022 DS    0XL12
00000D30  00000000                                4637+         DC    A(0)            Word 0 - Interruption Parameter
00000D34  00                                      4638+         DC    AL1((0)*16+B'0000')  Word 1, bits 0-7
00000D35  80                                      4639+         DC    BL1'10000000'   Word 1, bits 8-15
00000D36  FF                                      4640+         DC    AL1(255)        Word 1, bits 16-23
00000D37  00                                      4641+         DC    BL1'00000000'    Word 1, bits 24-31
00000D38  00000D98                                4642+         DC    AL4(CONPGM)     Word 2 - CCW address
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4644 ********************************************************************************
                                                    4645 *        Working Storage
                                                    4646 ********************************************************************************



00000D3C                                            4648          LTORG ,                 Literals pool
00000D3C  00000000                                  4649                =F'0'
00000D40  00000001                                  4650                =F'1'
00000D44  C3D3C3D3 C540                             4651                =CL6'CLCLE'
00000D4A  04294967 296C                             4652                =P'4294967296'

                          00000400  00000001        4654 K        EQU   1024              One KB
                          00001000  00000001        4655 PAGE     EQU   (4*K)             Size of one page
                          00010000  00000001        4656 K64      EQU   (64*K)            64 KB
                          00100000  00000001        4657 MB       EQU   (K*K)              1 MB

                          000021FE  00000001        4659 TESTADDR EQU   (2*PAGE+X'200'-2)  Where test/subtest numbers will go
                          000021FD  00000001        4660 TIMEADDR EQU   (TESTADDR-1)       Address of timing tests option flag

                          00200000  00000001        4662 MAINSIZE EQU   (2*MB)                    Minimum required storage size
                          00000020  00000001        4663 NUMPGTBS EQU   ((MAINSIZE+K64-1)/K64)   Number of Page Tables needed
                          00000002  00000001        4664 NUMSEGTB EQU   ((NUMPGTBS*4)/(16*4))    Number of Segment Tables
                          00003000  00000001        4665 SEGTABLS EQU   (3*PAGE)                  Segment Tables Origin
                          00003080  00000001        4666 PAGETABS EQU   (SEGTABLS+(NUMPGTBS*4))  Page Tables Origin
00000D50  00B00060                                  4667 CRLREG0  DC    0A(0),XL4'00B00060'      Control Register 0
00000D54  00003002                                  4668 CTLREG1  DC    A(SEGTABLS+NUMSEGTB)     Control Register 1

00000D58  00002710                                  4670 NUMLOOPS DC    F'10000'         10,000 * 100 = 1,000,000

00000D60  BBBBBBBB BBBBBBBB                         4672 BEGCLOCK DC    0D'0',8X'BB'     Begin
00000D68  EEEEEEEE EEEEEEEE                         4673 ENDCLOCK DC    0D'0',8X'EE'     End
00000D70  DDDDDDDD DDDDDDDD                         4674 DURATION DC    0D'0',8X'DD'     Diff
00000D78  FFFFFFFF FFFFFFFF                         4675 OVERHEAD DC    0D'0',8X'FF'     Overhead

00000D80  00000000 0000000C                         4677 TICKSAAA DC    PL8'0'           Clock ticks high part
00000D88  00000000 0000000C                         4678 TICKSBBB DC    PL8'0'           Clock ticks low part
00000D90  00000000 0000000C                         4679 TICKSTOT DC    PL8'0'           Total clock ticks

00000D98  09000044 00000DA0                         4681 CONPGM   CCW1  X'09',PRTLINE,0,PRTLNG
00000DA0  40404040 40404040                         4682 PRTLINE  DC    C'         1,000,000 iterations of XXXXX'
00000DC6  40A39696 9240F9F9                         4683          DC    C' took 999,999,999 microseconds'
                          00000044  00000001        4684 PRTLNG   EQU   *-PRTLINE
00000DE4  40202020 6B202020                         4685 EDIT     DC    X'402020206B2020206B202120'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                   4687 ********************************************************************
                                                   4688 *        CLETEST DSECT
                                                   4689 ********************************************************************



                                                   4691 CLETEST  DSECT ,



00000000  00                                       4693 TNUM     DC    X'00'          CLCLE table Number
00000001  00                                       4694 TSUBNUM  DC    X'00'                 sub table number
00000002  00                                       4695          DC    X'00'
00000003  00                                       4696          DC    X'00'



00000004  00000000                                 4698 OP1DATA  DC    A(0)           Pointer to Operand-1 data
00000008  00000000                                 4699 OP1LEN   DC    A(0)           Operand-1 data length
0000000C  00000000                                 4700 OP2DATA  DC    A(0)           Pointer to Operand-2 data
00000010  00000000                                 4701 OP2LEN   DC    A(0)           Operand-2 data length

                          00000014  00000001       4703 OPSWHERE EQU   *              Where CLCLE Operands are located
00000014  00000000                                 4704 OP1WHERE DC    A(0)           Where Operand-1 data should be placed
00000018  00000000                                 4705 OP1WLEN  DC    F'0'           How much data is there - 1
0000001C  00000000                                 4706 OP2WHERE DC    A(0)           Where Operand-2 data should be placed
00000020  00000000                                 4707 OP2WLEN  DC    F'0'           How much data is there - 2



00000024  00000000                                 4709 FAILMASK DC    A(0)           not used in performance test


00000028  00000000                                 4711 ENDREG   DC    A(0)           not used in performance test
0000002C  00000000                                 4712 ENDSTOR  DC    A(0)           not used in performance test

                                00000030  00000001 4714 CLENEXT  EQU   *              Start of next table entry...
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                   4716 ************************************************************************
                                                   4717 *        CLCLE Performace Test data...
                                                   4718 *
                                                   4719 *        Note: The test CLCLE pad byte is always X'00'.
                                                   4720 *
                                                   4721 *        Note: These timing test do not generate a CC=3 as the
                                                   4722 *              operands are less than 3,840 bytes in length.
                                                   4723 *              The test loop does test for CC=3 for any future
                                                   4724 *              tests introduced to this table.
                                                   4725 ************************************************************************

                            00000000  00003000   4727 CLCLE04  CSECT ,
00000DF0                                           4728 CLEPERF  DC    0A(0)      start of table




00000DF0  91000000                                 4730 CLEPOP1  DC    X'91',X'00',X'00',X'00'
00000DF4  00000EE8 00000200                        4731          DC    A(CLEOP10),A(512)
00000DFC  00000EE8 00000200                        4732          DC    A(CLEOP10),A(512)
00000E04  00010000 00000200                        4733          DC    A(00+(01*K64)),A(512)
00000E0C  00110000 00000200                        4734          DC    A(MB+(01*K64)),A(512)            no crosses
00000E14  00000007                                 4735          DC    A(7) CC0
00000E18  00010200 AABBCCDD                        4736          DC    A(00+(01*K64)+512),A(REG2PATT)



00000E20  92000000                                 4738 CLEPOP2  DC    X'92',X'00',X'00',X'00'
00000E24  00000EE8 00000200                        4739          DC    A(CLEOP10),A(512)
00000E2C  00000EE8 00000200                        4740          DC    A(CLEOP10),A(512)
00000E34  0001FFF4 00000200                        4741          DC    A(00+(02*K64)-12),A(512)         op1 crosses
00000E3C  00120000 00000200                        4742          DC    A(MB+(02*K64)),A(512)
00000E44  00000007                                 4743          DC    A(7) CC0
00000E48  000201F4 AABBCCDD                        4744          DC    A(00+(02*K64)-12+512),A(REG2PATT)



00000E50  93000000                                 4746 CLEPOP3  DC    X'93',X'00',X'00',X'00'
00000E54  00000EE8 00000800                        4747          DC    A(CLEOP10),A(2048)
00000E5C  00000EE8 00000800                        4748          DC    A(CLEOP10),A(2048)
00000E64  00030000 00000800                        4749          DC    A(00+(03*K64)),A(2048)
00000E6C  00130000 00000800                        4750          DC    A(MB+(03*K64)),A(2048)           no crosses
00000E74  00000007                                 4751          DC    A(7) CC0
00000E78  00030200 AABBCCDD                        4752          DC    A(00+(03*K64)+512),A(REG2PATT)
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

00000E80  94000000                                4754 CLEPOP4  DC    X'94',X'00',X'00',X'00'
00000E84  00000EE8 00000800                       4755          DC    A(CLEOP10),A(2048)
00000E8C  00000EE8 00000800                       4756          DC    A(CLEOP10),A(2048)
00000E94  00040000 00000800                       4757          DC    A(00+(04*K64)),A(2048)
00000E9C  0013FFF4 00000800                       4758          DC    A(MB+(04*K64)-12),A(2048)        op2 crosses
00000EA4  00000007                                4759          DC    A(7) CC0
00000EA8  00040200 AABBCCDD                       4760          DC    A(00+(04*K64)+512),A(REG2PATT)



00000EB0  95000000                                4762 CLEPOP5  DC    X'95',X'00',X'00',X'00'
00000EB4  00000EE8 00000800                       4763          DC    A(CLEOP10),A(2048)
00000EBC  00000EE8 00000800                       4764          DC    A(CLEOP10),A(2048)
00000EC4  0004FFF4 00000800                       4765          DC    A(00+(05*K64)-12),A(2048)        op1 crosses
00000ECC  0014FFF4 00000800                       4766          DC    A(MB+(05*K64)-12),A(2048)        op2 crosses
00000ED4  00000007                                4767          DC    A(7) CC0
00000ED8  000501F4 AABBCCDD                       4768          DC    A(00+(05*K64)-12+512),A(REG2PATT)



00000EE0  00000000                                4770          DC    A(0)        end of table
00000EE4  00000000                                4771          DC    A(0)        end of table

                            AABBCCDD  00000001    4773 REG2PATT EQU   X'AABBCCDD'    Register 2 starting/ending CC0 value
                            000000DD  00000001    4774 REG2LOW  EQU         X'DD'    (last byte above)


                                                  4776 ********************************************************************
                                                  4777 *        CLCLE compare data...
                                                  4778 ********************************************************************
00000EE8                                          4779          DS    0F
00000EE8  78125634 78125634                       4780 CLEOP10  DC    512XL4'78125634'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    4782 ********************************************************************
                                                    4783 *        Fixed storage locations
                                                    4784 ********************************************************************



000016E8                      000016E8  000021FD  4786          ORG   CLCLE04+TIMEADDR      (s/b @ X'21FD')

000021FD  00                                      4788 TIMEOPT  DC    X'00'      Set to non-zero to run timing tests



000021FE                      000021FE  000021FE  4791          ORG   CLCLE04+TESTADDR      (s/b @ X'21FE', X'21FF')

000021FE  00                                      4793 TESTNUM  DC    X'00'      Test number of active test
000021FF  00                                      4794 SUBTEST  DC    X'00'      Active test sub-test number



00002200                      00002200  00003000  4796          ORG   CLCLE04+SEGTABLS      (s/b @ X'3000')

00003000  00                                      4798 DATTABS  DC    X'00'      Segment and Page Tables will go here...
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4800 ********************************************************************
                                                  4801 *        IOCB DSECT
                                                  4802 ********************************************************************

                                                  4804          DSECTS NAME=IOCB
                                                  4806+IOCB     DSECT
                                                  4807+*     Field usage by: CH SC Description (R->program read-only, X->program read/wr
00000000                                          4808+IOCBDID  DS    0F  +0     R  Device Identifier - Subsystem ID for channel subsyst
00000000  0000                                    4809+         DS    H   +0  R      reserved - must be zeros
00000002  0000                                    4810+IOCBDV   DS    H   +2  R      Channel Unit Device address of I/O operation
00000004  0000                                    4811+IOCBDEV  DS    H   +4  X  X  Device address or device number (R after ENADEV)
00000006  0000                                    4812+IOCBZERO DS    H   +6  R  R  Must be zeros
00000008  00                                      4813+IOCBUM   DS    X   +8  X  X  Unit status test mask
00000009  00                                      4814+IOCBCM   DS    X   +9  X  X  Channel status test mask
0000000A                                          4815+IOCBST   DS    0H  +10 X  X  Input/Output unit and channel status accumulation
0000000A  00                                      4816+IOCBUS   DS    X   +10 R  R  Accumulated unit status
0000000B  00                                      4817+IOCBCS   DS    X   +11 R  R  Accumulated channel status
0000000C  00                                      4818+IOCBUT   DS    X   +14 R  R  Used to test unit status
0000000D  00                                      4819+IOCBCT   DS    X   +13 R  R  Used to test channel status
0000000E  00                                      4820+IOCBSC   DS    X   +14    R  Accumulted subchanel status control
0000000F  00                                      4821+IOCBWAIT DS    X   +15 X  X  Recognized unsolicited interruption unit status even
00000010  00000000                                4822+IOCBSCCW DS    A   +16 R  R  I/O status CCW address
00000014                                          4823+IOCBSCNT DS    0F  +20 R  R  I/O status residual count as a positive full word
00000014  0000                                    4824+         DS    H   +20 R     reserved must be zeros
00000016  0000                                    4825+IOCBRCNT DS    H   +22 R     I/O status residual count as an unsigned halfword
00000018                                          4826+IOCBCAW  DS    0A  +24 X     Channel Address word
00000018  00000000 00000000                       4827+IOCBORB  DS    AD  +24    X  Address of the ORB for channel subsystem I/O
00000020  00000000 00000000                       4828+IOCBIRB  DS    AD  +32    X  Channel subsystem IRB address
00000028  00000000 00000000                       4829+IOCBSIB  DS    AD  +40    X  Channel subsystem SCHIB address
                            00000030  00000001    4830+IOCBL    EQU   *-IOCB  Length of IOCB control block (48) without embedded structu
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4832 ********************************************************************************
                                                  4833 *        ORB DSECT
                                                  4834 ********************************************************************************

                                                  4836          DSECTS NAME=ORB
                                                  4838+ORB      DSECT
00000000  00000000                                4839+ORBPARM  DC    F'0'     Word 0, bits 0-31

00000004  00                                      4841+ORB1_0   DC    X'00'    Word 1, bits 0-7
                          000000F0  00000001      4842+ORBKEYM  EQU   X'F0'    Word 1, bits 0-3   - Storage Key Mask
                          00000008  00000001      4843+ORBS     EQU   X'08'    Word 1, bit 4      - Suspend Control
                          00000004  00000001      4844+ORBC     EQU   X'04'    Word 1, bit 5      - Streaming Mode Control
                          00000002  00000001      4845+ORBM     EQU   X'02'    Word 1, bit 6      - Modification Control
                          00000001  00000001      4846+ORBY     EQU   X'01'    Word 1, bit 7      - Synchronization Control

00000005  00                                      4848+ORB1_8   DC    X'00'    Word 1, bits 8-15
                          00000080  00000001      4849+ORBF     EQU   X'80'    Word 1, bit 8      - CCW Format-Control
                          00000040  00000001      4850+ORBP     EQU   X'40'    Word 1, bit 9      - Pre-fetch control
                          00000020  00000001      4851+ORBI     EQU   X'20'    Word 1, bit 10     - Initial-status Interruption Control
                          00000010  00000001      4852+ORBA     EQU   X'10'    Word 1, bit 11     - Address Limit Checking Control
                          00000008  00000001      4853+ORBU     EQU   X'08'    Word 1, bit 12     - Suppress-suspended-interruption cont
                          00000004  00000001      4854+ORBB     EQU   X'04'    Word 1, bit 13     - Channel-Program-Type Control
                          00000002  00000001      4855+ORBH     EQU   X'02'    Word 1, bit 14     - Format 2-IDAW Control
                          00000001  00000001      4856+ORBT     EQU   X'01'    Word 1, bit 15     - 2K-IDAW control
00000006  00                                      4857+ORBLPM   DC    X'00'    Word 1, bits 16-23 - Logical Path Mask
00000007  00                                      4858+ORRB1_24 DC    X'00'    Word 1, bits 24-31
                          00000080  00000001      4859+ORBL     EQU   X'80'    Word 1, bit 24     - Incorrect Length Suppression Mode
                          0000007F  00000001      4860+ORBRSV3  EQU   X'7F'    Word 1, bits 25-31 - reserved must be zeros
                          00000040  00000001      4861+ORBD     EQU   X'40'    Word 1, bit 25     - MIDAW Addressing Control
                          0000003E  00000001      4862+ORBRSV26 EQU   X'3E'    Word 1, bits 26-30 - reserved must be zeros
                          0000007E  00000001      4863+ORBRSV25 EQU   X'7E'    Word 1, bits 25-30 - reserved must be zeros
                          00000001  00000001      4864+ORBX     EQU   X'01'    Word 1, bit 31     - ORB-extension control

00000008  00000000                                4866+ORBCCW   DC    A(0)     Word 2, bits 1-31  - Channel Program Address
                          00000080  00000001      4867+ORBRSV4  EQU   X'80'    Word 2, bit 0      - reserved must be zero
                          0000000C  00000001      4868+ORBLEN   EQU   *-ORB Length of standard ORB
                                                  4869+* Extended ORB fields
0000000C  00                                      4870+ORBCSS   DC    X'00'    Word 3, bits 0-7   - Channel Subsystem Priority
0000000D  00                                      4871+ORBRSV5  DC    X'00'    Word 3, bits 8-15  - reserved must be zeros
0000000E                                          4872+ORBPGM   DC    0X'00'   Word 3, bits 16-23 - Transport mode reserves for program
0000000E  00                                      4873+ORBCU    DC    X'00'    Word 3, bits 16-23 - Control Unit Priority
0000000F  00                                      4874+ORBRSV6  DC    X'00'    Word 3, bits 24-31 - reserved must be zeros
00000010  00000000 00000000                       4875+ORBRSV7  DC    XL16'00' Words 4-7          - reserved must be zeros
                          00000020  00000001      4876+ORBXLEN  EQU   *-ORB Length of extended ORB
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4879 ********************************************************************
                                                  4880 *        IRB DSECT
                                                  4881 ********************************************************************

                                                  4883          DSECTS NAME=IRB
                                                  4885+IRB      DSECT Interruption          Response Block
00000000  00000000 00000000                       4886+IRBSCSW  DC    XL12'00' Words 0-2 - Subchannel Status Word (Defined by DSECT SCSW
0000000C  00000000 00000000                       4887+IRBESW   DC    XL20'00' Words 3-7 - Extended Status Word
00000020  00000000 00000000                       4888+IRBECW   DC    XL32'00' Words 8-15 - Extended Control Word
                            00000040  00000001    4889+IRBL     EQU   *-IRB    IRB Length
00000040  00000000 00000000                       4890+IRBEMW   DC    XL32'00' Words 16-23 - Extended Measurement Word
                            00000060  00000001    4891+IRBXL    EQU   *-IRB    Extended IRB Length
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

                                                  4894 ********************************************************************
                                                  4895 *        SCSW DSECT
                                                  4896 ********************************************************************

                                                  4898          DSECTS NAME=SCSW
                                                  4900+SCSW     DSECT Subchannel          Status Word
00000000  00                                      4901+SCSWFLAG DC    X'00'    Flags
                                 000000F0  00000001 4902+SCSWKEYM EQU   X'F0'    Storage Key Mask of subchannel storage key
                                 00000008  00000001 4903+SCSWSUSC EQU   X'08'    Suspend Control
                                 00000004  00000001 4904+SCSWESWF EQU   X'04'    Extended Status Word Format
                                 00000003  00000001 4905+SCSWDCCM EQU   X'03'    Deferred condiont code mask
                                 00000000  00000001 4906+SCSWDCC0 EQU   X'00'    Normal I/O interruption
                                 00000001  00000001 4907+SCSWDCC1 EQU   X'01'    Deferred condition code is 1
                                 00000003  00000001 4908+SCSWDCC3 EQU   X'03'    Deferred condition code is 3

00000001  00                                      4910+SCSWCTLS DC    X'00'    General Controls
                                 00000080  00000001 4911+SCSWCCWF EQU   X'80'    CCW Format control when ...
                                 00000040  00000001 4912+SCSWCCWP EQU   X'40'    CCW Prefetch Control
                                 00000020  00000001 4913+SCSWISIC EQU   X'20'    Initial-Status-Interruption Control
                                 00000010  00000001 4914+SCSWALKC EQU   X'10'    Address-Limit-Checking Control
                                 00000008  00000001 4915+SCSWSSIC EQU   X'08'    Suppress suspended interruption
                                 00000004  00000001 4916+SCSW0CC  EQU   X'04'    Zero-Condition Code
                                 00000002  00000001 4917+SCSWECWC EQU   X'02'    Extended Control Word control
                                 00000001  00000001 4918+SCSWPNOP EQU   X'01'    Path Not Operational

00000002  00                                      4920+SCSW1    DC    X'00'    Control Byte 1
                                 00000070  00000001 4921+SCSWFM   EQU   X'70'    Functional Control Mask
                                 00000040  00000001 4922+SCSWFS   EQU   X'40'    Function Control - Start Function
                                 00000020  00000001 4923+SCSWFH   EQU   X'20'    Function Control - Halt Function
                                 00000010  00000001 4924+SCSWFC   EQU   X'10'    Function Control - Clear Function
                                 00000008  00000001 4925+SCSWARP  EQU   X'08'    Activity Control - Resume pending
                                 00000004  00000001 4926+SCSWASP  EQU   X'04'    Activity Control - Start pending
                                 00000002  00000001 4927+SCSWAHP  EQU   X'02'    Activity Control - Halt pending
                                 00000001  00000001 4928+SCSWACP  EQU   X'01'    Activity Control - Clear pending
00000003  00                                      4929+SCSW2    DC    X'00'    Control Byte 2
                                 00000080  00000001 4930+SCSWASA  EQU   X'80'    Activity Control - Subchannel Active
                                 00000040  00000001 4931+SCSWADA  EQU   X'40'    Activity Control - Device Active
                                 00000020  00000001 4932+SCSWASUS EQU   X'20'    Activity Control - Suspended
                                 00000010  00000001 4933+SCSWSAS  EQU   X'10'    Status Control   - Alert Status
                                 00000008  00000001 4934+SCSWSINT EQU   X'08'    Status Control   - Intermediate Status
                                 00000004  00000001 4935+SCSWSPRI EQU   X'04'    Status Control   - Primary Status
                                 00000002  00000001 4936+SCSWSSEC EQU   X'02'    Status Control   - Secondary Status
                                 00000001  00000001 4937+SCSWSPEN EQU   X'01'    Status Control   - Status Pending

00000004  00000000                                4939+SCSWCCW  DC    A(0)     CCW Address

00000008  00                                      4941+SCSWUS   DC    X'00'    Unit Status
                                 00000080  00000001 4942+SCSWATTN EQU   X'80'    Attention
                                 00000040  00000001 4943+SCSWSM   EQU   X'40'    Status modifier
                                 00000020  00000001 4944+SCSWCUE  EQU   X'20'    Control-unit end
                                 00000010  00000001 4945+SCSWBUSY EQU   X'10'    Busy
                                 00000008  00000001 4946+SCSWCE   EQU   X'08'    Channel end
                                 00000004  00000001 4947+SCSWDE   EQU   X'04'    Device end
                                 00000002  00000001 4948+SCSWUC   EQU   X'02'    Unit check
                                 00000001  00000001 4949+SCSWUX   EQU   X'01'    Unit exception
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT

00000009  00                                      4951+SCSWCS   DC    X'00'    Channel Status
                             00000080  00000001  4952+SCSWPCI  EQU   X'80'    Program-controlled interruption
                             00000040  00000001  4953+SCSWIL   EQU   X'40'    Incorrect length
                             00000020  00000001  4954+SCSWPRGM EQU   X'20'    Program check
                             00000010  00000001  4955+SCSWPROT EQU   X'10'    Protection Check
                             00000008  00000001  4956+SCSWCDAT EQU   X'08'    Channel-data check
                             00000004  00000001  4957+SCSWCCTL EQU   X'04'    Channel-control check
                             00000002  00000001  4958+SCSWICTL EQU   X'02'    Interface-control check
                             00000001  00000001  4959+SCSWCHNG EQU   X'01'    Chaining check

0000000A  0000                                    4961+SCSWCNT  DC    H'0'     Residual CCW count
                             0000000C  00000001  4962+SCSWL    EQU   *-SCSW
```

```
 LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                  4965 ********************************************************************
                                                  4966 *        (other DSECTS needed by SATK)
                                                  4967 ********************************************************************

                                                  4969          DSECTS PRINT=OFF,NAME=(ASA,SCHIB,CCW0,CCW1,CSW)
```

```
                                                  5245          PRINT ON

                                                  5247 ********************************************************************
                                                  5248 *        Register equates
                                                  5249 ********************************************************************

                          00000000  00000001  5251 R0        EQU   0
                          00000001  00000001  5252 R1        EQU   1
                          00000002  00000001  5253 R2        EQU   2
                          00000003  00000001  5254 R3        EQU   3
                          00000004  00000001  5255 R4        EQU   4
                          00000005  00000001  5256 R5        EQU   5
                          00000006  00000001  5257 R6        EQU   6
                          00000007  00000001  5258 R7        EQU   7
                          00000008  00000001  5259 R8        EQU   8
                          00000009  00000001  5260 R9        EQU   9
                          0000000A  00000001  5261 R10       EQU   10
                          0000000B  00000001  5262 R11       EQU   11
                          0000000C  00000001  5263 R12       EQU   12
                          0000000D  00000001  5264 R13       EQU   13
                          0000000E  00000001  5265 R14       EQU   14
                          0000000F  00000001  5266 R15       EQU   15
```

```
                                                  5268          END
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ASA	4	00000000	512	4973	3533
ASBEGIN	U	00000000	1	4974	4979 5021 5057 5066 5084 5091 5097 5101 5105 5111 5128
ASEND	U	00000200	1	5127	5128
ASLENGTH	U	00000200	1	5128	
BCEXTCOD	H	0000001A	2	4991	
BCIOCOD	H	0000003A	2	4999	
BCMCKCOD	H	00000032	2	4997	
BCPGMCOD	H	0000002A	2	4995	
BCSVCCOD	H	00000022	2	4993	
BEGCLOCK	D	00000D60	8	4672	3647 3971 4487 4490 4497
BEGIN	I	00000200	2	3539	3507 3534 3535
CALCDUR	I	00000B84	4	4484	3963 4412
CALCRET	F	00000BC8	4	4506	4484 4503
CALCWORK	F	00000BCC	4	4507	4485 4502
CAW	F	00000048	4	5003	
CAWADDR	R	00000049	3	5006	
CAWKEY	X	00000048	1	5004	
CAWSUSP	U	00000008	1	5005	
CCW0	4	00000000	8	5132	5138
CCW0ADDR	R	00000001	3	5134	
CCW0CNT	H	00000006	2	5137	
CCW0CODE	X	00000000	1	5133	
CCW0FLGS	X	00000004	1	5135	
CCW0L	U	00000008	1	5138	
CCW1	4	00000000	8	5150	5155
CCW1ADDR	A	00000004	4	5154	
CCW1CNT	H	00000002	2	5153	
CCW1CODE	X	00000000	1	5151	
CCW1FLGS	X	00000001	1	5152	
CCW1L	U	00000008	1	5155	
CCWCC	U	00000040	1	5142	
CCWCD	U	00000080	1	5141	
CCWIDA	U	00000004	1	5146	
CCWPCI	U	00000008	1	5145	
CCWSKIP	U	00000010	1	5144	
CCWSLI	U	00000020	1	5143	
CCWSUSP	U	00000002	1	5147	
CHANID	F	000000A8	4	5058	
CLCLE04	J	00000000	12289	3488	3491 3498 3506 3508 4786 4791 4796
CLENEXT	U	00000030	1	4714	4397
CLEOP10	X	00000EE8	4	4780	4731 4732 4739 4740 4747 4748 4755 4756 4763 4764
CLEPERF	A	00000DF0	4	4728	3581
CLEPOP1	X	00000DF0	1	4730	
CLEPOP2	X	00000E20	1	4738	
CLEPOP3	X	00000E50	1	4746	
CLEPOP4	X	00000E80	1	4754	
CLEPOP5	X	00000EB0	1	4762	
CLETEST	4	00000000	48	4691	3582 4395
CODE	2	00000000	12289	3488	
CONPGM	W	00000D98	8	4681	4642
CPUID	U	0000031B	1	5130	
CRLREG0	A	00000D50	4	4667	
CSW	F	00000040	8	5002	
CSWATTN	U	00000080	1	5172	
CSWBUSY	U	00000010	1	5175	
CSWCCTL	U	00000004	1	5187	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
CSWCCW	R	00000001	3	5169	
CSWCDAT	U	00000008	1	5186	
CSWCE	U	00000008	1	5176	4471
CSWCHNG	U	00000001	1	5189	
CSWCNT	H	00000006	2	5191	
CSWCS	X	00000005	1	5181	
CSWCUE	U	00000020	1	5174	
CSWDCC0	U	00000000	1	5165	
CSWDCC1	U	00000001	1	5166	
CSWDCC3	U	00000003	1	5167	
CSWDCCM	U	00000003	1	5164	
CSWDE	U	00000004	1	5177	4471
CSWFLAG	X	00000000	1	5159	
CSWFMT	4	00000000	8	5158	5192
CSWFMTL	U	00000008	1	5192	
CSWICTL	U	00000002	1	5188	
CSWIL	U	00000040	1	5183	
CSWKEYM	U	000000F0	1	5160	
CSWLOG	U	00000004	1	5163	
CSWPCI	U	00000080	1	5182	
CSWPRGM	U	00000020	1	5184	
CSWPROT	U	00000010	1	5185	
CSWSM	U	00000040	1	5173	
CSWSUSP	U	00000008	1	5162	
CSWUC	U	00000002	1	5178	
CSWUS	X	00000004	1	5171	
CSWUX	U	00000001	1	5179	
CTLREG1	A	00000D54	4	4668	
DATTABS	X	00003000	1	4798	
DURATION	D	00000D70	8	4674	3964 4415 4416 4419 4499
DWAT0016	3	00000C28	8	4550	4549
DWAT0017	3	00000C38	8	4555	4554
DWAT0018	3	00000C48	8	4560	4559
DWAT0019	3	00000C58	8	4565	4564
EDIT	X	00000DE4	12	4685	4429 4430
ENADEV	I	00000C6E	4	4584	4539
ENAOKAY	I	00000CBC	2	4609	4598
ENDCLOCK	D	00000D68	8	4673	3962 4385 4492 4495 4498
ENDREG	A	00000028	4	4711	
ENDSTOR	A	0000002C	4	4712	
EOJ	H	00000C22	2	4548	3560 3568
EXTCPUAD	H	00000084	2	5023	
EXTICODE	H	00000086	2	5024	
EXTIPARM	F	00000080	4	5022	
EXTNPSW	F	00000058	8	5012	
EXTOPSW	F	00000018	8	4984	4990
FAILDEV	H	00000C30	2	4553	4589 4599 4604
FAILIO	H	00000C40	2	4558	4439 4462 4472
FAILMASK	A	00000024	4	4709	
FAILTEST	H	00000C50	2	4563	3563 3566
FIND0021	A	00000CB4	4	4606	4584
FINL0021	H	00000C76	2	4587	4603
FINM0021	A	00000CB8	4	4607	4602
FINN0021	H	00000CA4	2	4600	4591 4593
IIRB0022	F	00000CF0	4	4634	4630 4632
IMAGE	1	00000000	12289	0	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
INIT	H	00000C10	2	4533	3547
IOCB	4	00000000	48	4806	4830 3536
IOCBCAW	A	00000018	4	4826	
IOCBCM	X	00000009	1	4814	
IOCBCS	X	0000000B	1	4817	
IOCBCT	X	0000000D	1	4819	
IOCBDEV	H	00000004	2	4811	4592
IOCBDID	F	00000000	4	4808	4435 4595
IOCBDV	H	00000002	2	4810	
IOCBIRB	A	00000020	8	4828	4440
IOCBL	U	00000030	1	4830	
IOCBORB	A	00000018	8	4827	4437 4536
IOCBRCNT	H	00000016	2	4825	4469
IOCBSC	X	0000000E	1	4820	4433 4464 4466
IOCBSCCW	A	00000010	4	4822	4468
IOCBSCNT	F	00000014	4	4823	
IOCBSIB	A	00000028	8	4829	4585
IOCBST	H	0000000A	2	4815	4434 4465
IOCBUM	X	00000008	1	4813	
IOCBUS	X	0000000A	1	4816	4471
IOCBUT	X	0000000C	1	4818	
IOCBWAIT	X	0000000F	1	4821	
IOCBZERO	H	00000006	2	4812	4434
IOCB_009	A	00000CC0	4	4617	4535
IOELADDR	F	000000AC	4	5059	
IOICODE	H	000000BA	2	5064	
IOIID	F	000000C0	4	5069	
IOINIT	I	00000C60	4	4572	4538
IOIPARM	F	000000BC	4	5068	
IOMK0020	F	00000C68	4	4574	4572 4573
ION0014	3	00000B28	8	4450	4447
IONPSW	F	00000078	8	5016	
IOOPSW	F	00000038	8	4988	4998
IORB0022	X	00000D30	12	4636	4628
IOS0014	X	00000B30	8	4451	4446 4454
IOSSID	F	000000B8	4	5067	4457
IOWT0013	H	00000B0A	2	4444	4458 4461 4467
IPLCCW1	F	00000008	8	4976	
IPLCCW2	F	00000010	8	4977	
IPLPSW	F	00000000	8	4975	
IRB	4	00000000	96	4885	4889 4891 4441
IRBECW	X	00000020	32	4888	
IRBEMW	X	00000040	32	4890	
IRBESW	X	0000000C	20	4887	
IRBL	U	00000040	1	4889	
IRBSCSW	X	00000000	12	4886	4464 4465 4468 4469
IRBXL	U	00000060	1	4891	
IRST0014	H	00000B38	2	4453	4450
K	U	00000400	1	4654	4655 4656 4657
K64	U	00010000	1	4656	4663 4733 4734 4736 4741 4742 4744 4749 4750 4752 4757 4758 4760 4765 4766 4768
LCHANLOG	F	000000B0	4	5060	
MAINSIZE	U	00200000	1	4662	4663
MB	U	00100000	1	4657	4662 4734 4742 4750 4758 4766
MCKLOG	F	00000100	4	5092	
MCKNPSW	F	00000070	8	5015	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
MCKOPSW	F	00000030	8	4987	4996
MEASUREB	X	000000B9	1	5063	
MKARCHMD	X	000000A3	1	5051	
MKARS	F	00000120	4	5090	
MKCLKCMP	F	000000E0	8	5076	
MKCPUTIM	F	000000D8	8	5075	
MKCRS	F	000001C0	4	5095	
MKDMGCOD	F	000000F4	4	5079	
MKFAILA	F	000000F8	4	5081	
MKFPRS	D	00000160	8	5093	
MKICODE	F	000000E8	4	5077	
MKLOGOUT	F	00000100	4	5083	
MKMODEL	F	000000FC	4	5082	
MKXSAA	F	000000D4	4	5074	
MONCLS	H	00000094	2	5039	
MONCODE	F	0000009C	4	5046	
MONNUMBR	X	00000095	1	5041	
MPGACCID	X	000000A2	1	5049	
NKGRS	F	00000180	4	5094	
NUMLOOPS	F	00000D58	4	4670	3646 3970
NUMPGTBS	U	00000020	1	4663	4664 4666
NUMSEGTB	U	00000002	1	4664	4668
OP1DATA	A	00000004	4	4698	3598
OP1LEN	A	00000008	4	4699	3597 3599
OP1WHERE	A	00000014	4	4704	3596
OP1WLEN	F	00000018	4	4705	
OP2DATA	A	0000000C	4	4700	3604
OP2LEN	A	00000010	4	4701	3603 3605
OP2WHERE	A	0000001C	4	4706	3602
OP2WLEN	F	00000020	4	4707	
OPSWHERE	U	00000014	1	4703	3653 3656 3664 3667 3670 3673 3676 3679 3682 3685 3688 3691 3694 3697 3700 3703 3706 3709 3712 3715 3718 3721 3724 3727 3730 3733 3736 3739 3742 3745 3748 3751 3754 3757 3760 3763 3766 3769 3772 3775 3778 3781 3784 3787 3790 3793 3796 3799 3802 3805 3808 3811 3814 3817 3820 3823 3826 3829 3832 3835 3838 3841 3844 3847 3850 3853 3856 3859 3862 3865 3868 3871 3874 3877 3880 3883 3886 3889 3892 3895 3898 3901 3904 3907 3910 3913 3916 3919 3922 3925 3928 3931 3934 3937 3940 3943 3946 3949 3955 3958 3976 3980 3989 3993 3997 4001 4005 4009 4013 4017 4021 4025 4029 4033 4037 4041 4045 4049 4053 4057 4061 4065 4069 4073 4077 4081 4085 4089 4093 4097 4101 4105 4109 4113 4117 4121 4125 4129 4133 4137 4141 4145 4149 4153 4157 4161 4165 4169 4173 4177 4181 4185 4189 4193 4197 4201 4205 4209 4213 4217 4221 4225 4229 4233 4237 4241 4245 4249 4253 4257 4261 4265 4269 4273 4277 4281 4285 4289 4293 4297 4301 4305 4309 4313 4317 4321 4325 4329 4333 4337 4341 4345 4349 4353 4357 4361 4365 4369 4376 4380
ORB	4	00000000	32	4838	4868 4876 3537
ORB1_0	X	00000004	1	4841	
ORB1_8	X	00000005	1	4848	
ORBA	U	00000010	1	4852	
ORBB	U	00000004	1	4854	
ORBC	U	00000004	1	4844	
ORBCCW	A	00000008	4	4866	
ORBCSS	X	0000000C	1	4870	
ORBCU	X	0000000E	1	4873	
ORBD	U	00000040	1	4861	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ORBF	U	00000080	1	4849	
ORBH	U	00000002	1	4855	
ORBI	U	00000020	1	4851	
ORBKEYM	U	000000F0	1	4842	
ORBL	U	00000080	1	4859	
ORBLEN	U	0000000C	1	4868	
ORBLPM	X	00000006	1	4857	
ORBM	U	00000002	1	4845	
ORBP	U	00000040	1	4850	
ORBPARM	F	00000000	4	4839	
ORBPGM	X	0000000E	1	4872	
ORBRSV25	U	0000007E	1	4863	
ORBRSV26	U	0000003E	1	4862	
ORBRSV3	U	0000007F	1	4860	
ORBRSV4	U	00000080	1	4867	
ORBRSV5	X	0000000D	1	4871	
ORBRSV6	X	0000000F	1	4874	
ORBRSV7	X	00000010	16	4875	
ORBS	U	00000008	1	4843	
ORBT	U	00000001	1	4856	
ORBU	U	00000008	1	4853	
ORBX	U	00000001	1	4864	
ORBXLEN	U	00000020	1	4876	
ORBY	U	00000001	1	4846	
ORRB1_24	X	00000007	1	4858	
OVERHEAD	D	00000D78	8	4675	3964 4414
PAGE	U	00001000	1	4655	4659 4665
PAGETABS	U	00003080	1	4666	
PCFETO	A	000000C4	4	5070	
PERACCID	X	000000A1	1	5048	
PERADDR	F	00000098	4	5045	
PERCODE	X	00000096	1	5042	
PERCODMK	U	000000F0	1	5043	
PGMACCID	X	000000A0	1	5047	
PGMDXC	F	00000090	4	5037	
PGMICODE	H	0000008E	2	5036	
PGMIID	F	0000008C	4	5032	
PGMIILC	X	0000008D	1	5034	
PGMIILCM	U	0000000C	1	5035	
PGMNPSW	F	00000068	8	5014	
PGMOPSW	F	00000028	8	4986	4994
PGMTRX	F	00000090	4	5038	
PMCW1_0	X	00000004	1	5199	
PMCW1_8	X	00000005	1	5202	4590 4596
PMCWB	U	00000004	1	5234	
PMCWCHP0	X	00000010	1	5223	
PMCWCHP1	X	00000011	1	5224	
PMCWCHP2	X	00000012	1	5225	
PMCWCHP3	X	00000013	1	5226	
PMCWCHP4	X	00000014	1	5227	
PMCWCHP5	X	00000015	1	5228	
PMCWCHP6	X	00000016	1	5229	
PMCWCHP7	X	00000017	1	5230	
PMCWDNUM	H	00000006	2	5214	4592
PMCWE	U	00000080	1	5203	4596
PMCWEXC	X	0000001B	1	5233	

```
     SYMBOL         TYPE    VALUE      LENGTH    DEFN  REFERENCES

PMCWIP               F     00000000          4  5198
PMCWISCM             U     00000038          1  5200
PMCWLM               U     00000060          1  5204
PMCWLMG              U     00000020          1  5205
PMCWLML              U     00000040          1  5206
PMCWLPM              X     00000008          1  5216
PMCWLPUM             X     0000000A          1  5218
PMCWM                U     00000004          1  5210
PMCWMBI              H     0000000C          2  5220
PMCWMM               U     00000018          1  5207
PMCWMMC              U     00000008          1  5209
PMCWMME              U     00000010          1  5208
PMCWPAM              X     0000000F          1  5222
PMCWPIM              X     0000000B          1  5219
PMCWPNOM             X     00000009          1  5217
PMCWPOM              X     0000000E          1  5221
PMCWRES1             X     00000018          4  5231
PMCWRES2             X     00000018          3  5232
PMCWS                U     00000001          1  5236
PMCWT                U     00000002          1  5211
PMCWV                U     00000001          1  5212  4590
PMCWX                U     00000002          1  5235
PRTLINE              C     00000DA0         38  4682  4684  4389  4429  4430  4681
PRTLNG               U     00000044          1  4684  4681
R0                   U     00000000          1  5251  3533
R1                   U     00000001          1  5252  4401
R10                  U     0000000A          1  5261  3596  3600  3653  3656  3664  3667  3670  3673  3676  3679  3682  3685  3688
                                                     3691  3694  3697  3700  3703  3706  3709  3712  3715  3718  3721  3724  3727
                                                     3730  3733  3736  3739  3742  3745  3748  3751  3754  3757  3760  3763  3766
                                                     3769  3772  3775  3778  3781  3784  3787  3790  3793  3796  3799  3802  3805
                                                     3808  3811  3814  3817  3820  3823  3826  3829  3832  3835  3838  3841  3844
                                                     3847  3850  3853  3856  3859  3862  3865  3868  3871  3874  3877  3880  3883
                                                     3886  3889  3892  3895  3898  3901  3904  3907  3910  3913  3916  3919  3922
                                                     3925  3928  3931  3934  3937  3940  3943  3946  3949  3955  3958  3976  3977
                                                     3980  3981  3989  3990  3993  3994  3997  3998  4001  4002  4005  4006  4009
                                                     4010  4013  4014  4017  4018  4021  4022  4025  4026  4029  4030  4033  4034
                                                     4037  4038  4041  4042  4045  4046  4049  4050  4053  4054  4057  4058  4061
                                                     4062  4065  4066  4069  4070  4073  4074  4077  4078  4081  4082  4085  4086
                                                     4089  4090  4093  4094  4097  4098  4101  4102  4105  4106  4109  4110  4113
                                                     4114  4117  4118  4121  4122  4125  4126  4129  4130  4133  4134  4137  4138
                                                     4141  4142  4145  4146  4149  4150  4153  4154  4157  4158  4161  4162  4165
                                                     4166  4169  4170  4173  4174  4177  4178  4181  4182  4185  4186  4189  4190
                                                     4193  4194  4197  4198  4201  4202  4205  4206  4209  4210  4213  4214  4217
                                                     4218  4221  4222  4225  4226  4229  4230  4233  4234  4237  4238  4241  4242
                                                     4245  4246  4249  4250  4253  4254  4257  4258  4261  4262  4265  4266  4269
                                                     4270  4273  4274  4277  4278  4281  4282  4285  4286  4289  4290  4293  4294
                                                     4297  4298  4301  4302  4305  4306  4309  4310  4313  4314  4317  4318  4321
                                                     4322  4325  4326  4329  4330  4333  4334  4337  4338  4341  4342  4345  4346
                                                     4349  4350  4353  4354  4357  4358  4361  4362  4365  4366  4369  4370  4376
                                                     4377  4380  4381  4514  4516  4521  4524
R11                  U     0000000B          1  5262  3597  4516  4518
R12                  U     0000000C          1  5263  3602  3606  3977  3981  3990  3994  3998  4002  4006  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
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
					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 4377 4381 4419 4420
					4422 4517 4520 4521 4522
R13	U	0000000D	1	5264	3603 3653 3656 3664 3667 3670 3673 3676 3679 3682 3685 3688 3691
					3694 3697 3700 3703 3706 3709 3712 3715 3718 3721 3724 3727 3730
					3733 3736 3739 3742 3745 3748 3751 3754 3757 3760 3763 3766 3769
					3772 3775 3778 3781 3784 3787 3790 3793 3796 3799 3802 3805 3808
					3811 3814 3817 3820 3823 3826 3829 3832 3835 3838 3841 3844 3847
					3850 3853 3856 3859 3862 3865 3868 3871 3874 3877 3880 3883 3886
					3889 3892 3895 3898 3901 3904 3907 3910 3913 3916 3919 3922 3925
					3928 3931 3934 3937 3940 3943 3946 3949 3955 3958 3976 3980 3989
					3993 3997 4001 4005 4009 4013 4017 4021 4025 4029 4033 4037 4041
					4045 4049 4053 4057 4061 4065 4069 4073 4077 4081 4085 4089 4093
					4097 4101 4105 4109 4113 4117 4121 4125 4129 4133 4137 4141 4145
					4149 4153 4157 4161 4165 4169 4173 4177 4181 4185 4189 4193 4197
					4201 4205 4209 4213 4217 4221 4225 4229 4233 4237 4241 4245 4249
					4253 4257 4261 4265 4269 4273 4277 4281 4285 4289 4293 4297 4301
					4305 4309 4313 4317 4321 4325 4329 4333 4337 4341 4345 4349 4353
					4357 4361 4365 4369 4376 4380 4419 4423 4514 4517 4518 4522 4524
R14	U	0000000E	1	5265	3547 3553 3579 4403 4540
R15	U	0000000F	1	5266	3963 4390 4411 4412 4417 4475 4476 4484 4500 4503 4504 4525 4538
					4539 4577 4609
R2	U	00000002	1	5253	3534 3539 3540 3541 3542 3544 4402
R3	U	00000003	1	5254	3536 4535
R4	U	00000004	1	5255	
R5	U	00000005	1	5256	3581 3582 3585 4387 4394 4395 4397 4398 4405 4414 4485 4497 4502
					4516
R6	U	00000006	1	5257	3587 3588 3589 3590 3598 3600 3604 3606 3648 3961 3972 4384 4415
					4487 4488 4489 4490 4492 4493 4494 4495 4498 4517
R7	U	00000007	1	5258	3599 3605 3646 3961 3970 4384 4416 4485 4487 4490 4492 4495 4499
					4502 4522
R8	U	00000008	1	5259	3537 4536
R9	U	00000009	1	5260	3535 3544 3545
REG2LOW	U	000000DD	1	4774	
REG2PATT	U	AABBCCDD	1	4773	4736 4744 4752 4760 4768
RPTSAVE	F	00000B80	4	4478	4411 4475
RPTSPEED	I	00000AA6	4	4411	4390
RSTNPSW	F	00000000	8	4980	
RSTOPSW	F	00000008	8	4981	
SAVER1	F	00000238	4	3570	4401
SAVER2	F	0000023C	4	3571	3542 4402
SAVER5	F	00000240	4	3572	3585 4394
SCANOUT	X	00000080	1	5018	5019
SCANOUTL	U	00000000	1	5019	
SCHIB	4	00000000	52	5195	5242 4586
SCHIBL	U	00000034	1	5242	
SCHMBA	A	00000028	8	5240	
SCHMDA1	X	00000030	4	5241	
SCHMDA3	X	00000028	12	5239	
SCHPMCW	X	00000000	28	5197	
SCHSCSW	X	0000001C	12	5238	
SCSW	4	00000000	12	4900	4962
SCSW0CC	U	00000004	1	4916	
SCSW1	X	00000002	1	4920	
SCSW2	X	00000003	1	4929	4464

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
SCSWACP	U	00000001	1	4928	
SCSWADA	U	00000040	1	4931	
SCSWAHP	U	00000002	1	4927	
SCSWALKC	U	00000010	1	4914	
SCSWARP	U	00000008	1	4925	
SCSWASA	U	00000080	1	4930	
SCSWASP	U	00000004	1	4926	
SCSWASUS	U	00000020	1	4932	
SCSWATTN	U	00000080	1	4942	
SCSWBUSY	U	00000010	1	4945	
SCSWCCTL	U	00000004	1	4957	
SCSWCCW	A	00000004	4	4939	4468
SCSWCCWF	U	00000080	1	4911	
SCSWCCWP	U	00000040	1	4912	
SCSWCDAT	U	00000008	1	4956	
SCSWCE	U	00000008	1	4946	
SCSWCHNG	U	00000001	1	4959	
SCSWCNT	H	0000000A	2	4961	4469
SCSWCS	X	00000009	1	4951	
SCSWCTLS	X	00000001	1	4910	
SCSWCUE	U	00000020	1	4944	
SCSWDCC0	U	00000000	1	4906	
SCSWDCC1	U	00000001	1	4907	
SCSWDCC3	U	00000003	1	4908	
SCSWDCCM	U	00000003	1	4905	
SCSWDE	U	00000004	1	4947	
SCSWECWC	U	00000002	1	4917	
SCSWESWF	U	00000004	1	4904	
SCSWFC	U	00000010	1	4924	
SCSWFH	U	00000020	1	4923	
SCSWFLAG	X	00000000	1	4901	
SCSWFM	U	00000070	1	4921	
SCSWFS	U	00000040	1	4922	
SCSWICTL	U	00000002	1	4958	
SCSWIL	U	00000040	1	4953	
SCSWISIC	U	00000020	1	4913	
SCSWKEYM	U	000000F0	1	4902	
SCSWL	U	0000000C	1	4962	
SCSWPCI	U	00000080	1	4952	
SCSWPNOP	U	00000001	1	4918	
SCSWPRGM	U	00000020	1	4954	
SCSWPROT	U	00000010	1	4955	
SCSWSAS	U	00000010	1	4933	
SCSWSINT	U	00000008	1	4934	
SCSWSM	U	00000040	1	4943	
SCSWSPEN	U	00000001	1	4937	
SCSWSPRI	U	00000004	1	4935	4466
SCSWSSEC	U	00000002	1	4936	
SCSWSSIC	U	00000008	1	4915	
SCSWSUSC	U	00000008	1	4903	
SCSWUC	U	00000002	1	4948	
SCSWUS	X	00000008	1	4941	4465
SCSWUX	U	00000001	1	4949	
SEGTABLS	U	00003000	1	4665	4666 4796 4668
SSARCHMD	X	000000A3	1	5050	
SSARS	F	00000120	4	5106	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
SSCLKCMP	F	000000E0	8	5100	
SSCPUTIM	F	000000D8	8	5099	
SSCRS	F	000001C0	4	5109	
SSFPRS	D	00000160	8	5107	
SSGRS	F	00000180	4	5108	
SSMODEL	F	0000010C	4	5104	
SSPREFIX	F	00000108	4	5103	
SSPSW	F	00000100	8	5102	
SSXSAA	A	000000D4	4	5098	
STFLDATA	F	000000C8	4	5071	
SUBDWORD	I	00000BD8	4	4514	4417 4500
SUBDWSAV	D	00000C00	8	4527	4514 4524
SUBTEST	X	000021FF	1	4794	3565 3590
SVCICODE	H	0000008A	2	5030	
SVCIID	F	00000088	4	5026	
SVCIILC	X	00000089	1	5028	
SVCIILCM	U	0000000C	1	5029	
SVCNPSW	F	00000060	8	5013	
SVCOPSW	F	00000020	8	4985	4992
TEST91	I	00000244	4	3578	3553
TESTADDR	U	000021FE	1	4659	4660 4791
TESTNUM	X	000021FE	1	4793	3562 3588
TICKSAAA	P	00000D80	8	4677	4422 4425
TICKSBBB	P	00000D88	8	4678	4423 4427
TICKSTOT	P	00000D90	8	4679	4425 4426 4427 4430
TIMEADDR	U	000021FD	1	4660	4786
TIMEOPT	X	000021FD	1	4788	3559 3578
TIMER	F	00000050	4	5009	
TNUM	X	00000000	1	4693	3587
TST91LOP	U	0000024E	1	3584	4399
TSUBNUM	X	00000001	1	4694	3589
TTDES	F	00000054	4	5010	
UA0	F	00000010	8	4982	
UA1	F	0000004C	4	5007	
UA2	F	000000A4	4	5052	
UA3	F	000000B4	4	5061	
UA4	X	000000B8	1	5062	
UA5	X	000000CC	8	5072	
UA6	X	000000EC	8	5078	
UA7	F	00000118	8	5089	
UA8	X	00000180	32	5118	
WPSW0014	3	00000B20	8	4449	4448
ZBRKADDR	A	00000110	8	5088	
ZEMONCNT	F	0000010C	4	5087	
ZEMONCTR	A	00000100	8	5085	
ZEMONSIZ	F	00000108	4	5086	
ZEXTNPSW	X	000001B0	16	5121	
ZEXTOPSW	X	00000130	16	5113	
ZIONPSW	X	000001F0	16	5125	
ZIOOPSW	X	00000170	16	5117	
ZMCKNPSW	X	000001E0	16	5124	
ZMCKOPSW	X	00000160	16	5116	
ZMKFAILA	F	000000F8	8	5080	
ZMONCODE	F	000000B0	8	5055	
ZPGMNPSW	X	000001D0	16	5123	
ZPGMOPSW	X	00000150	16	5115	

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ZPGMTRX	F	000000A8	8	5054	
ZRSTNPSW	X	000001A0	16	5120	
ZRSTOPSW	X	00000120	16	5112	
ZSASDISP	U	000011C0	1	5126	
ZSVCNPSW	X	000001C0	16	5122	
ZSVCOPSW	X	00000140	16	5114	
=CL6'CLCLE'	C	00000D44	6	4651	4389
=F'0'	F	00000D3C	4	4649	4398
=F'1'	F	00000D40	4	4650	4520
=P'4294967296'	P	00000D4A	6	4652	4426

```
 MACRO    DEFN  REFERENCES

ANTR      103
APROB     235
ARCHIND   395   3425
ARCHLVL   536   3424
ASAIPL    662   3504
ASALOAD   742   3487
ASAREA    797   4972
ASAZAREA  982
CPUWAIT  1065   4445
DOINSTR  3628   3974   3987   4374
DSECTS   1391   4804   4836   4883   4898   4969
DWAIT    1594   4547   4552   4557   4562
DWAITEND 1651   4546
ENADEV   1659   4583
ESA390   1759
IOCB     1770   4616
IOCBDS   1946   4805
IOFMT    1980   4837   4884   4899   5131   5149   5157   5194
IOINIT   2318   4571
IOTRFR   2359
ORB      2407   4635
OVERONLY 3614   3651   3662   3953
POINTER  2596
PSWFMT   2624
RAWAIT   2758
RAWIO    2854   4432
SIGCPU   3012
SMMGR    3070
SMMGRB   3170
TRAP128  3219
TRAP64   3196   3489   3492
TRAPS    3232
ZARCH    3306
ZEROH    3318
ZEROL    3346
ZEROLH   3374
ZEROLL   3397
```

```
   DESC      SYMBOL    SIZE      POS         ADDR

Entry: 0

Image       IMAGE     12289   0000-3000   0000-3000
  Region    CODE      12289   0000-3000   0000-3000
    CSECT   CLCLE04   12289   0000-3000   0000-3000
```

```
   STMT                                                  FILE NAME

1     c:\Users\Fish\Documents\Visual Studio 2008\Projects\MyProjects\ASMA-0\CLCLE-04-performance\CLCLE-04-performance.asm
2     C:\Users\Fish\Documents\Visual Studio 2008\Projects\Hercules\_Git\_Harold\SATK-0\srcasm\satk.mac


** NO ERRORS FOUND **
```