```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                     2 ************************************************************************
                                                     3 *                              TXFPER.ASM
                                                     4 ************************************************************************
                                                     5 *
                                                     6 *  This program performs a PER instruction trace of TXF transactions.
                                                     7 *  It enables PER instruction fetch events for a range of instructions
                                                     8 *  that includes two transactions.
                                                     9 *
                                                    10 *  The first transaction, a CONSTRAINED transaction, and a separate
                                                    11 *  second transaction being an unconstrained transaction with another
                                                    12 *  unconstrained transaction nested within it.
                                                    13 *
                                                    14 *  The test is performed with both the Instruction Fetch and Event-
                                                    15 *  Suppression (ES) PER flags set. It should trace all instructions
                                                    16 *  EXCEPT FOR the instructions comprising the actual transactions.
                                                    17 *
                                                    18 ************************************************************************

                          00000000  00000FFF    20 TXFPER   START 0
00000000                  00000000              21          USING TXFPER,R0


00000000                  00000000  0000008C    23          ORG   TXFPER+X'8C'         Program interrupt code
0000008C  00000000                              24 PGMCODE  DC    F'0'                  Program interrupt code
                          00000080  00000001    25 PGM_PER_EVENT  EQU  X'80'            PER Event program interrupt code
                                                    26

00000090                  00000090  00000096    28          ORG   TXFPER+X'96'         PER interrupt fields
00000096  0000                                  29 PERCODE  DC    XL2'00'               PER interrupt code
                          00000001  00000001    30 PERIFNUL EQU   X'01'                PER IFetch Nullification event
00000098  00000000 00000000                     31 PERADDR  DC    AD(0)                 PER interrupt address


                          00000150  00000000    33 PGMOPSW  EQU   TXFPER+X'150'        z Program Old PSW

000000A0                  000000A0  000001A0    35          ORG   TXFPER+X'1A0'        z Restart New PSW
000001A0  00000001 80000000                     36          DC    X'0000000180000000'
000001A8  00000000 00000200                     37          DC    AD(GO)

000001B0                  000001B0  000001D0    39          ORG   TXFPER+X'1D0'        z Program New PSW
000001D0  00000001 80000000                     40          DC    X'0000000180000000'
000001D8  00000000 00000374                     41          DC    AD(PGMRUPT)
```

```
  LOC         OBJECT CODE        ADDR1     ADDR2     STMT
                                                      43 ************************************************************************
                                                      44 *                    Start of actual program...
                                                      45 ************************************************************************

000001E0                         000001E0  00000200    47          ORG   TXFPER+X'200'


                                                      49 ************************************************************************
                                                      50 *                Perform basic TXF sanity checks...
                                                      51 ************************************************************************
00000200  4100 001F                         0000001F    53 GO       LA    R0,(L'FACLIST/8)-1           Store Facility List
00000204  B2B0 0428                         00000428    54          STFLE FACLIST

00000208  9120 0428                         00000428    56          TM    FACLIST+ZAFACBYT,ZAFACBIT    z/Arch mode?
0000020C  A784 01B1                         0000056E    57          JZ    ZAFAIL

00000210  9140 042E                         0000042E    59          TM    FACLIST+PAFACBYT,PAFACBIT    PPA available?
00000214  A784 01B1                         00000576    60          JZ    PAFAIL

00000218  9140 0431                         00000431    62          TM    FACLIST+TXFACBYT,TXFACBIT    TXF available?
0000021C  A784 01B5                         00000586    63          JZ    TXFAIL

00000220  9120 042E                         0000042E    65          TM    FACLIST+CTFACBYT,CTFACBIT    Constrained TXF?
00000224  A784 01AD                         0000057E    66          JZ    CTFAIL


                                                      68 ************************************************************************
                                                      69 *                          Enable TXF
                                                      70 ************************************************************************

00000228  EB00 0528 0025                    00000528    72          STCTG R0,R0,CTL0         Save CR0
0000022E  E300 0528 0004                    00000528    73          LG    R0,CTL0            Load into GR0
00000234  A508 0080                                     74          OIHH  R0,CR0TXF          Enable TXF flag
00000238  E300 0528 0024                    00000528    75          STG   R0,CTL0            Save GR0
0000023E  EB00 0528 002F                    00000528    76          LCTLG R0,R0,CTL0         Load CR0


                                                      78 ************************************************************************
                                                      79 *                          Begin test...
                                                      80 ************************************************************************

00000244  EB9B 0530 002F                    00000530    82          LCTLG R9,R11,PERCTL      Load CR9-CR11 PER Control Registers
0000024A  8000 056D                         0000056D    83          SSM   ENPER              Enable Program Event Recording
0000024E  45E0 025A                         0000025A    84          BAL   R14,CTRANS         Execute a Constrained Transaction
00000252  45E0 0272                         00000272    85          BAL   R14,UTRANS         Execute an Unconstrained Transaction
00000256  A7F4 00E5                         00000420    86          J     SUCCESS            Done!
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    88 ************************************************************************
                                                    89 *              Dummy Transactions to be Traced...
                                                    90 ************************************************************************
                               0000025A  00000001    92 BEGRANGE EQU   *                   Begin of PER Range



0000025A  4111 1001                      00000001    94 CTRANS   LA    R1,1(R1,R1)
0000025E  E561 0000 0000                 00000000    95          TBEGINC 0,0             Begin Constrained Transaction
00000264  4122 2002                      00000002    96          LA    R2,2(R2,R2)
00000268  B2F8 0000                                  97          TEND  ,                 End of Transaction
0000026C  4133 3003                      00000003    98          LA    R3,3(R3,R3)
00000270  07FE                                       99          BR    R14               Return to caller



00000272  A729 2000                                 101 UTRANS   LGHI  R2,X'2000'        R2 --> TDB
00000276  1FFF                                      102          SLR   R15,R15           R15 <== failure count = none yet
00000278  E560 2000 FE00                 00000000   103 URETRY   TBEGIN 0(R2),X'FE00'   unconstrained, WITH TDB, save R0-R13
0000027E  A774 0012                      000002A2   104          JNZ   UFAILED          CC != 0: aborted or can't be started
00000282  4144 4004                      00000004   105          LA    R4,4(R4,R4)
00000286  E560 0000 0000                 00000000   106          TBEGIN 0,0              Begin Nested Transaction
0000028C  4155 5005                      00000005   107          LA    R5,5(R5,R5)
00000290  B2F8 0000                                 108          TEND  ,                 End of Nested Transaction
00000294  4166 6006                      00000006   109          LA    R6,6(R6,R6)
00000298  B2F8 0000                                 110          TEND  ,                 End of Outermost Transaction
0000029C  4177 7007                      00000007   111 USKIP    LA    R7,7(R7,R7)
000002A0  07FE                                      112          BR    R14               Return to caller



000002A2  A744 000E                      000002BE   114 UFAILED  BRC   CC1,UFAILCC1      Indeterminate condition (unexpected)
000002A6  A714 0010                      000002C6   115          BRC   CC3,UFAILCC3      Persistent    condition (unexpected)

000002AA  A7FA 0001                                 117          AHI   R15,1             Increment temporary failure count
000002AE  A7FE 0003                                 118          CHI   R15,3             Have we reached our maximum retry?
000002B2  A7B4 FFF5                      0000029C   119          JNL   USKIP             Yes, then do it the hard way

000002B6  B2E8 10F0                                 121          PPA   R15,0,1           Otherwise request assistance
000002BA  A7F4 FFDF                      00000278   122          J     URETRY            And try the transaction again

000002BE  9201 0567                      00000567   124 UFAILCC1 MVI   BADPSW+16-1,1     Unexpected CC1
000002C2  A7F4 00B1                      00000424   125          J     FAILURE           FAIL test
000002C6  9203 0567                      00000567   126 UFAILCC3 MVI   BADPSW+16-1,3     Unexpected CC3
000002CA  A7F4 00AD                      00000424   127          J     FAILURE           FAIL test



                          000002CE  00000001   129 ENDRANGE EQU   *                   End of PER Range
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

                                                    131 ********************************************************************************
                                                    132 *        Issue Hercules MESSAGE pointed to by R1, length in R0
                                                    133 ********************************************************************************

000002CE  4900 058E                      0000058E   135 MSG      CH    R0,=H'0'              Do we even HAVE a message?
000002D2  07DF                                      136          BNHR  R15                   No, ignore

000002D4  9002 0304                      00000304   138          STM   R0,R2,MSGSAVE         Save registers
000002D8  4900 0590                      00000590   139          CH    R0,=AL2(L'MSGMSG)     Message length within limits?
000002DC  47D0 02E4                      000002E4   140          BNH   MSGOK                 Yes, continue
000002E0  4100 0015                      00000015   141          LA    R0,L'MSGMSG           No, set to maximum

000002E4  1820                                      143 MSGOK    LR    R2,R0                 Copy length to work register
000002E6  0620                                      144          BCTR  R2,0                  Minus-1 for execute
000002E8  4420 0310                      00000310   145          EX    R2,MSGMVC             Copy message to O/P buffer
000002EC  4120 200A                      0000000A   146          LA    R2,1+L'MSGCMD(,R2)    Calculate true command length
000002F0  4110 0316                      00000316   147          LA    R1,MSGCMD             Point to true command

000002F4  83120008                                  149          DC    X'83',X'12',X'0008'   Issue Hercules Diagnose X'008'
000002F8  4780 02FE                      000002FE   150          BZ    MSGRET                Return if successful
000002FC  0000                                      151          DC    H'0'                  ** CRASH ** otherwise!

000002FE  9802 0304                      00000304   153 MSGRET   LM    R0,R2,MSGSAVE         Restore registers
00000302  07FF                                      154          BR    R15                   Return to caller

00000304  00000000 00000000                         156 MSGSAVE  DC    3F'0'                 Registers save area

00000310  D200 031F 1000      0000031F  00000000    157 MSGMVC   MVC   MSGMSG(0),0(R1)      Executed instruction

00000316  D4E2C7D5 D6C8405C                         159 MSGCMD   DC    C'MSGNOH * '
0000031F  F1F2F3F4 F5F6F7F8                         160 MSGMSG   DC    C'12345678 ==> 12345678',C' ' (extra byte for unpk)


                                                    162 ********************************************************************************
                                                    163 *        Trace instructions that was either fetched or executed
                                                    164 ********************************************************************************

00000336  F384 031F 009C      0000031F  0000009C    166 ITRACE   UNPK  MSGMSG(9),PERADDR+4(5)   Address of instruction
0000033C  9240 0327                      00000327   167          MVI   MSGMSG+8,C' '
00000340  DC07 031F 0274      0000031F  00000274    168          TR    MSGMSG(8),HEXCHARS-X'F0'

00000346  5810 009C                      0000009C   170          L     R1,PERADDR+4            The instruction itself
0000034A  F384 032C 1000      0000032C  00000000    171          UNPK  MSGMSG+13(9),0(5,R1)
00000350  DC07 032C 0274      0000032C  00000274    172          TR    MSGMSG+13(8),HEXCHARS-X'F0'

00000356  4110 031F                      0000031F   174          LA    R1,MSGMSG
0000035A  4100 0015                      00000015   175          LA    R0,L'MSGMSG
0000035E  45F0 02CE                      000002CE   176          BAL   R15,MSG                 "Trace" the instruction
00000362  07FE                                      177          BR    R14

00000364  F0F1F2F3 F4F5F6F7                         179 HEXCHARS DC    CL16'0123456789ABCDEF'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2    STMT
                                                    181 ********************************************************************************
                                                    182 *                  Program Interrupt Handler...
                                                    183 ********************************************************************************

00000374  9180 008F                      0000008F   185 PGMRUPT  TM    PGMCODE+3,PGM_PER_EVENT  Expected interrupt?
00000378  A784 004C                      00000410   186          JZ    ABORT                    No?! ** ABORT!! **
0000037C  EB0F 0390 0024                 00000390   187          STMG  R0,R15,PGMREGS           Save caller's registers
00000382  45E0 0336                      00000336   188          BAL   R14,ITRACE               Trace the instruction
00000386  EB0F 0390 0004                 00000390   189          LMG   R0,R15,PGMREGS           Restore caller's registers
0000038C  B2B2 0150                      00000150   190          LPSWE PGMOPSW                  Return to caller...

00000390  00000000 00000000                         192 PGMREGS  DC    16D'0'                   Saved GR registers 0 - 15



                                                    194 ********************************************************************************
                                                    195 *          ABORT test run due to unexpected program interrupt
                                                    196 ********************************************************************************

00000410  D201 0562 0592       00000562  00000592   198 ABORT    MVC   BADPSW+8+2(2),=XL2'DEAD'
00000416  D203 0564 008C       00000564  0000008C   199          MVC   BADPSW+16-L'PGMCODE(L'PGMCODE),PGMCODE
0000041C  A7F4 0004                      00000424   200          J     FAILURE



                                                    202 ********************************************************************************
                                                    203 *          Successful completion / Abnormal termination
                                                    204 ********************************************************************************

00000420  B2B2 0548                      00000548   206 SUCCESS  LPSWE    GOODPSW         Load test completed successfully PSW
00000424  B2B2 0558                      00000558   207 FAILURE  LPSWE    BADPSW          Load the test FAILED somewhere!! PSW
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT
                                                    209 ********************************************************************************
                                                    210 *                          WORKING STORAGE
                                                    211 ********************************************************************************

00000428                                            213          DC    0D'0'               (doubleword boundary)
00000428  00000000 00000000                         214 FACLIST  DC    XL256'00'           Facility List

00000528  00000000 00000000                         216 CTL0     DC    D'0'                Control Register 0
                            00000080  00000001      217 CR0TXF   EQU   X'0080'            CR0 bit 8: TXF Control
                            00000004  00000001      218 CC1      EQU   B'0100'            Condition Code 1
                            00000001  00000001      219 CC3      EQU   B'0001'            Condition Code 3

00000530  00000000 40400000                         221 PERCTL   DC    AD(X'40400000')     CR9  = Ifetch + Event Suppress
00000538  00000000 0000025A                         222          DC    AD(BEGRANGE)        CR10 = Range begining address
00000540  00000000 000002CE                         223          DC    AD(ENDRANGE)        CR11 = Range ending   address

00000548  00020001 80000000                         225 GOODPSW  DC    XL8'0002000180000000'
00000550  00000000 00000000                         226          DC    XL4'00000000',A(X'00000000')

00000558  00020001 80000000                         228 BADPSW   DC    XL8'0002000180000000'
00000560  0000DEAD 000000FF                         229          DC    XL4'0000DEAD',A(X'000000FF')  (FF = Reason for Failure)

00000568  00000000                                  231 SAVEADDR DC    A(0)                Saved PER Address
0000056C  00                                        232 SAVEPERC DC    X'00'               Saved PER Code
0000056D  40                                        233 ENPER    DC    B'01000000'         Enable PER bit in PSW

                            00000002  00000001      235 ZAFACNUM EQU   2                   z/Architecture architectural mode is active
                            00000000  00000001      236 ZAFACBYT EQU   X'00'
                            00000020  00000001      237 ZAFACBIT EQU   X'20'
0000056E  9201 0567                     00000567    238 ZAFAIL   MVI   BADPSW+16-1,1
00000572  A7F4 FF59                     00000424    239          J     FAILURE

                            00000031  00000001      241 PAFACNUM EQU   49                  Processor-Assist Facility
                            00000006  00000001      242 PAFACBYT EQU   X'06'
                            00000040  00000001      243 PAFACBIT EQU   X'40'
00000576  9202 0567                     00000567    244 PAFAIL   MVI   BADPSW+16-1,2
0000057A  A7F4 FF55                     00000424    245          J     FAILURE

                            00000032  00000001      247 CTFACNUM EQU   50                  Constrained-Transactional-Execution Facility
                            00000006  00000001      248 CTFACBYT EQU   X'06'
                            00000020  00000001      249 CTFACBIT EQU   X'20'
0000057E  9203 0567                     00000567    250 CTFAIL   MVI   BADPSW+16-1,3
00000582  A7F4 FF51                     00000424    251          J     FAILURE

                            00000049  00000001      253 TXFACNUM EQU   73                  Transactional-Execution Facility
                            00000009  00000001      254 TXFACBYT EQU   X'09'
                            00000040  00000001      255 TXFACBIT EQU   X'40'
00000586  9204 0567                     00000567    256 TXFAIL   MVI   BADPSW+16-1,4
0000058A  A7F4 FF4D                     00000424    257          J     FAILURE

0000058E                                            259          LTORG ,
0000058E  0000                                      260                =H'0'
```

```
  LOC        OBJECT CODE       ADDR1     ADDR2     STMT

00000590  0015                                     261                =AL2(L'MSGMSG)
00000592  DEAD                                     262                =XL2'DEAD'



                                                   264 ********************************************************************
                                                   265 *                    Testing option byte
                                                   266 ********************************************************************


00000594                      00000594  00000FFF   268           ORG    TXFPER+X'FFF'

00000FFF  78                                       270 TESTFLAG DC     AL1(TEST2OPT+TEST3OPT+TEST4OPT+TEST5OPT)



                              00000080  00000001   272 TEST1OPT EQU    X'80'    Perform Test 1
                              00000040  00000001   273 TEST2OPT EQU    X'40'    Perform Test 2
                              00000020  00000001   274 TEST3OPT EQU    X'20'    Perform Test 3
                              00000010  00000001   275 TEST4OPT EQU    X'10'    Perform Test 4
                              00000008  00000001   276 TEST5OPT EQU    X'08'    Perform Test 5



                                                   278 ********************************************************************
                                                   279 *        Register equates
                                                   280 ********************************************************************


                              00000000  00000001   282 R0       EQU    0
                              00000001  00000001   283 R1       EQU    1
                              00000002  00000001   284 R2       EQU    2
                              00000003  00000001   285 R3       EQU    3
                              00000004  00000001   286 R4       EQU    4
                              00000005  00000001   287 R5       EQU    5
                              00000006  00000001   288 R6       EQU    6
                              00000007  00000001   289 R7       EQU    7
                              00000008  00000001   290 R8       EQU    8
                              00000009  00000001   291 R9       EQU    9
                              0000000A  00000001   292 R10      EQU    10
                              0000000B  00000001   293 R11      EQU    11
                              0000000C  00000001   294 R12      EQU    12
                              0000000D  00000001   295 R13      EQU    13
                              0000000E  00000001   296 R14      EQU    14
                              0000000F  00000001   297 R15      EQU    15



                                                   299           END
```

SYMBOL	TYPE	VALUE	LENGTH	DEFN	REFERENCES
ABORT	I	000410	6	198	186
BADPSW	X	000558	8	228	124 126 198 199 207 238 244 250 256
BEGRANGE	U	00025A	1	92	222
CC1	U	000004	1	218	114
CC3	U	000001	1	219	115
CR0TXF	U	000080	1	217	74
CTFACBIT	U	000020	1	249	65
CTFACBYT	U	000006	1	248	65
CTFACNUM	U	000032	1	247	
CTFAIL	I	00057E	4	250	66
CTL0	D	000528	8	216	72 73 75 76
CTRANS	I	00025A	4	94	84
ENDRANGE	U	0002CE	1	129	223
ENPER	B	00056D	1	233	83
FACLIST	X	000428	256	214	53 54 56 59 62 65
FAILURE	I	000424	4	207	125 127 200 239 245 251 257
GO	I	000200	4	53	37
GOODPSW	X	000548	8	225	206
HEXCHARS	C	000364	16	179	168 172
IMAGE	1	000000	4096	0	
ITRACE	I	000336	6	166	188
MSG	I	0002CE	4	135	176
MSGCMD	C	000316	9	159	146 147
MSGMSG	C	00031F	21	160	141 157 166 167 168 171 172 174 175 139
MSGMVC	I	000310	6	157	145
MSGOK	I	0002E4	2	143	140
MSGRET	I	0002FE	4	153	150
MSGSAVE	F	000304	4	156	138 153
PAFACBIT	U	000040	1	243	59
PAFACBYT	U	000006	1	242	59
PAFACNUM	U	000031	1	241	
PAFAIL	I	000576	4	244	60
PERADDR	A	000098	8	31	166 170
PERCODE	X	000096	2	29	
PERCTL	A	000530	8	221	82
PERIFNUL	U	000001	1	30	
PGMCODE	F	00008C	4	24	185 199
PGMOPSW	U	000150	0	33	190
PGMREGS	D	000390	8	192	187 189
PGMRUPT	I	000374	4	185	41
PGM_PER_EVENT	U	000080	1	25	185
R0	U	000000	1	282	21 53 72 73 74 75 76 135 138 139 141 143 153 175 187 189
R1	U	000001	1	283	94 147 157 170 171 174
R10	U	00000A	1	292	
R11	U	00000B	1	293	82
R12	U	00000C	1	294	
R13	U	00000D	1	295	
R14	U	00000E	1	296	84 85 99 112 177 188
R15	U	00000F	1	297	102 117 118 121 136 154 176 187 189
R2	U	000002	1	284	96 101 103 138 143 144 145 146 153
R3	U	000003	1	285	98
R4	U	000004	1	286	105

```
     SYMBOL         TYPE  VALUE    LENGTH  DEFN  REFERENCES

R5                   U    000005        1   287  107
R6                   U    000006        1   288  109
R7                   U    000007        1   289  111
R8                   U    000008        1   290
R9                   U    000009        1   291   82
SAVEADDR             A    000568        4   231
SAVEPERC             X    00056C        1   232
SUCCESS              I    000420        4   206   86
TEST1OPT             U    000080        1   272
TEST2OPT             U    000040        1   273  270
TEST3OPT             U    000020        1   274  270
TEST4OPT             U    000010        1   275  270
TEST5OPT             U    000008        1   276  270
TESTFLAG             R    000FFF        1   270
TXFACBIT             U    000040        1   255   62
TXFACBYT             U    000009        1   254   62
TXFACNUM             U    000049        1   253
TXFAIL               I    000586        4   256   63
TXFPER               J    000000     4096    20   23   28   33   35   39   47  268   21
UFAILCC1             I    0002BE        4   124  114
UFAILCC3             I    0002C6        4   126  115
UFAILED              I    0002A2        4   114  104
URETRY               I    000278        6   103  122
USKIP                I    00029C        4   111  119
UTRANS               I    000272        4   101   85
ZAFACBIT             U    000020        1   237   56
ZAFACBYT             U    000000        1   236   56
ZAFACNUM             U    000002        1   235
ZAFAIL               I    00056E        4   238   57
=AL2(L'MSGMSG)       R    000590        2   261  139
=H'0'                H    00058E        2   260  135
=XL2'DEAD'           X    000592        2   262  198
```

MACRO DEFN REFERENCES

No defined macros

```
   DESC    SYMBOL  SIZE    POS      ADDR

Entry: 0

Image      IMAGE   4096  000-FFF  000-FFF
  Region           4096  000-FFF  000-FFF
    CSECT  TXFPER  4096  000-FFF  000-FFF
```

```
   STMT                                        FILE NAME
1     c:\Users\Fish\Documents\Visual Studio 2008\Projects\MyProjects\ASMA-0\TXFPER\TXFPER.asm

** NO ERRORS FOUND **
```