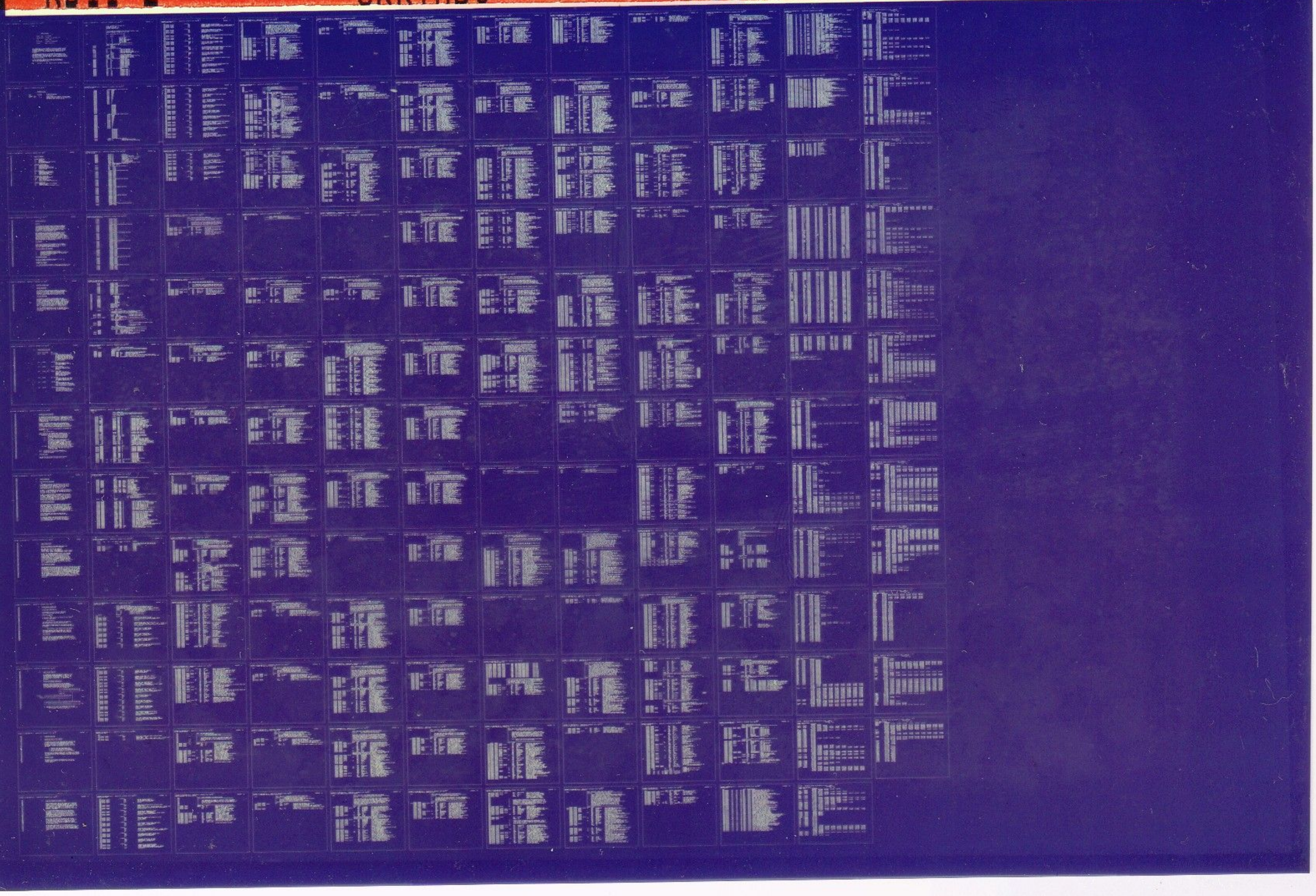
KD11-Z 11/44 MEM MGMT PRT A AH-F611B-MC AUG 1981
CKKTABO FICHE 1 OF 1 COPYRIGHT© 79 81
MADE IN USA



```
                .REM    @
```

IDENTIFICATION

PRODUCT CODE: AC-F6098-MC

PRODUCT NAME: CKKTAB0 11/44 MEM MGMT PRT A

DATE: APRIL, 1981

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: DAN P. MILLEVILLE

```
43
44                                  PROGRAM HISTORY
45                                  ---------------
46
47          DATE                    REVISION        REASON FOR REVISION
48          ----                    --------        ------------------
49          OCTOBER, 1979             A             FIRST RELEASE
50          APRIL,   1981             B             CORRECT TRACE TRAP COMMENTS, USE NEW SYSMAC
51                                                  CONTAINING CHECK FOR BIT 0 OF CPU ERROR REGIS-
52                                                  TER AND ^Q CHECK IN INPUT ROUTINE.
```

TABLE OF CONTENTS

```
                                1.0     PROGRAM INFORMATION
                                        -------------------

                                1.1     ABSTRACT
                                        --------

                                        THIS PROGRAM WAS DESIGNED USING A 'BOTTOM UP'' APPROACH
                                        STARTING WITH THE SMALLEST SEGMENT OF MEMORY MANAGMENT
                                        LOGIC POSSIBLE AND BUILDING TO COVER ALL OF THE LOGIC.
                                        THE DIAGNOSTIC WILL PROVIDE ENOUGH INFORMATION SUCH THAT
                                        BY DEDUCTION, THE FAILURE CAN BE ISOLATED TO A SMALL
                                        SEGMENT OF THE MEMORY MANAGEMENT LOGIC.

                                        PART A BEGINS BY TESTING SOME OF THE INTERNAL CPU DATA
                                        AND ADDRESS PATHS AND ADDRESS DETECTION LOGIC, THEN
                                        WORKS OUTWARD THROUGH THE MEMORY MANAGEMENT REGISTERS.
                                        AFTER THE REGISTERS ARE FOUND TO BE USEABLE, RELOCATION
                                        (CONSTRUCTION OF PHYSICAL ADDRESSES FROM A VIRTUAL ADDRESS
                                        AND THE ASSOCIATED PAR/PDR INFORMATION) IS TESTED. PART B
                                        BEGINS BY TESTING THE ABORT AND STATUS SEGMENTS OF LOGIC.
                                        PART B THEN CHECKS THE SPECIAL ABORT SEQUENCES, THE MFPI/MTPI
                                        INSTRUCTIONS AND THE CSM INSTRUCTION.

                                1.2     REQUIREMENTS
                                        ------------

                                        A PDP 11/44 PROCESSOR WITH A MINIMUM OF 16K OF MEMORY
                                        AND A CONSOLE TERMINAL ARE REQUIRED TO RUN THE PROGRAM
                                        UNLESS THE PROGRAM IS RUNNING UNDER APT OR ACT IN WHICH
                                        CASE THE CONSOLE TERMINAL IS NOT NECESSARY.

                                1.3     RELATED DOCUMENTS AND STANDARDS
                                        -------------------------------

                                        1.      ACT11/XXDP PROGRAMMING SPECIFICATION
                                        2.      STANDARD APT SYSTEM TO A PDP11 DIAGNOSTIC INTERFACE
                                        3.      DIAGNOSITC ENGINEERING STANDARDS AND CONVENTIONS
                                        4.      PDP11 MAINDEC SYSMAC PACKAGE
                                        5.      XXDP USER'S MANUAL

                                1.4     PRELIMINARY PROGRAMS
                                        --------------------

                                        BEFORE THIS MEMORY MANAGEMENT DIAGNOSITC IS RUN, THE
                                        FOLLOWING DIAGNOSTICS SHOULD BE RUN:

                                        CKKAAB0 1/44 CPU/EIS
                                        CKKABC0 11/44 TRAPS

                                        ALSO, THE MAIN MEMORY DIAGNOSTIC (CZMSD) SHOULD BE RUN TO SCAN
                                        AT LEAST THE FIRST 16K TO SEE THAT A PROGRAM CAN BE EXECUTED.
```

2.0 OPERATING INSTRUCTIONS

2.1 LOADING PROCEDURES

THE PROGRAM IS SUPPLIED ON THE DIAGNOSTIC LOAD MEDIA.
REFER TO THE XXDP USER'S MANUAL FOR FURTHER INFORMATION.
FOR USE WITH ACT OR APT, REFER TO THEIR RESPECTIVE
DOCUMENTS. THE PROGRAM CAN ALSO BE DIRECTLY LOADED
USING THE ABSOLUTE LOADER AND THE BINARY PAPER TAPE.

2.2 STARTING PROCEDURES

THE PROGRAM IS STARTED BY LOADING ADDRESS 200 AND
STARTING. THE SWITCH REGISTER SHOULD BE SET ACCORDING TO
SECTION 2.3 BEFORE THE PROGRAM IS STARTED. HOWEVER, IF
DESIRED, THE PROGRAM WILL USE THE SOFTWARE SWITCH REGISTER
AT LOCATION 176 (LOCATION 174 WILL BE USED AS THE SOFTWARE
DISPLAY REGISTER). IN THAT CASE, THE PROGRAM WILL ASK FOR
THE INITIAL SWITCH REGISTER VALUE BY TYPING "SWR= XXXXXX
NEW= " AFTER TYPING THE NAME OF THE PROGRAM (XXXXXX =
THE OCTAL CONTENTS OF LOCATION 176). (SEE SECTION 2.4)

ALSO THE PROGRAM CAN BE MADE TO USE THE SOFTWARE SWITCH
REG. EVEN IF THE CONSOLE SWITCH REG. IS PRESENT BY LOADING
"177777" INTO THE CONSOLE SWITCH REG. BEFORE STARTING
THE PROGRAM.

2.3 CONTROL SWITCH SETTINGS

SWITCH	OCTAL VALUE	USE
SW15	100000	HALT ON ERROR THIS SWITCH WHEN SET WILL HALT THE PROCESSOR WHEN AN ERROR IS DETECTED AFTER THE ERROR MESSAGE HAS BEEN TYPED. PRESSING CONTINUE WILL RESUME TESTING (SEE SECTION 3.1 ABOUT LOADING THE SWITCH REG BEFORE CONTINUING).
SW14	040000	LOOP ON TEST THIS SWITCH WHEN SET WILL CAUSE THE PROGRAM TO LOOP ON THE CURRENT SUBTEST.
SW13	020000	INHIBIT ERROR TYPEOUTS THIS SWITCH WHEN SET WILL INHIBIT THE TYPING OF ERROR MESSAGES.
SW12	010000	INHIBIT TRACE TRAP THIS SWITCH WHEN SET WILL INHIBIT T-BIT TRAPPING WHICH NORMALLY TAKES PLACE DURING EVERY ODD PASS STARTING WITH THE THIRD PASS.
SW10	002000	BELL ON ERROR THIS SWITCH WHEN SET WILL RING THE CONSOLE TERMINAL BELL WHEN AN ERROR HAS BEEN DETECTED.
SW9	001000	LOOP ON ERROR THIS SWITCH WHEN SET WILL CAUSE THE PROGRAM TO LOOP ON THE FIRST FAILURE WHICH IS ENCOUNTERED EVEN IF THE FAILURE IS INTERMITTANT
SW8	000400	LOOP ON TEST IN SWR<7:0> THIS SWITCH WHEN SET WILL CAUSE THE PROGRAM TO LOOP ON THE TEST WHOSE TEST NUMBER IS SET IN BITS 7-0 OF THE SWITCH REG.

2.4 LOADING THE SWITCH REGISTER

THE CONSOLE SWITCH REGISTER PROVIDED IS LOADED DIRECTLY FROM THE CONSOLE BY TYPING A CONTROL P (^P), THEN WHEN THE CONSOLE PROMPT IS RECIEVED, TYPE 'D SW XXXXXX', WHERE 'XXXXXX' IS THE INTENDED VALUE OF THE SWITCH REGISTER. THE VALUE OF THE CONSOLE SWITCH REG. CAN BE CHANGED ANY TIME WHETHER THE PROGRAM IS RUNNING OR NOT.

TO LOAD THE SOFTWARE SWITCH REG. WHILE THE PROGRAM IS RUNNING, A CONTROL G (^G) SHOULD BE TYPED ON THE CONSOLE TERMINAL. (THE 'SCOPE' AND 'ERROR' ROUTINES CHECK TO SEE IF A ^G HAS BEEN TYPED.) THE ORIGINAL VALUE OF THE SOFTWARE SWTICH REG. WILL BE REQUESTED AS MENTIONED IN SECTION 2.2.

IN RESPONSE TO A ^G OR AT THE BEGINNING OF THE PROGRAM, THE PROGRAM WILL TYPE:

```
        SWR = XXXXXX  NEW =
```

WHERE 'XXXXXX' IS THE CURRENT OCTAL CONTENTS OF LOC. 176.
THE OPERATOR MAY THEN TYPE ANY ONE OF THE FOLLOWING:

XXXXXX<CR>	ONE TO SIX OCTAL DIGITS FOLLOWED BY A CARRIAGE RETURN WHICH WILL BE LOADED AS THE NEW VALUE FOR THE SWITCH REG.
<CR>	JUST A <CR>, LEAVES THE SWITCH REG. AS IT IS.
XXX^U	A CONTROL-U (^U) WILL CAUSE ALL OF THE DIGITS TYPED SO FAR TO BE IGNORED.
^C	WILL CAUSE THE PROGRAM TO TYPE THE PRESENT TEST AND PASS NUMBERS, REQUEST A NEW VALUE FOR THE SWITCH REG., AND JUMP TO THE END-OF-PASS ROUTINE SO THE PROGRAM WILL GO DIRECTLY TO THE NEXT PASS WITH A NEW SW. REG. VALUE
<ILL.CHAR>	ANY CHARACTER TYPED WHICH IS NOT ANY OF THE ABOVE OR AN OCTAL DIGIT WILL CAUSE THE PROGRAM TO TYPE A '?<CRLF>' AND REACT AS THOUGH A ^U HAD BEEN TYPED.

NOTE: RECOGNITION OF A ^G MAY BE HAMPERED BY EXECUTION OF A COUPLE 'RESET' INSTRUCTIONS WITHIN THE PROGRAM.

2.5 EXECUTION TIMES

THE RUN TIME FOR A SINGLE PASS WITH TRACE TRAPPING ENABLED IS APPROXIMATELY 8 SECONDS WITH CACHE.

3.0 ERROR INFORMATION

3.1 ERROR REPORTING PROCEDURES

IF AN ERROR IS DETECTED, THE PROGRAM WILL TRAP TO THE ERROR HANDLING ROUTINE ($ERROR). THE VALUE OF BITS 15,13,10, AND 9 IN THE SWITCH REGISTER ARE CONSIDERED IN REPORTING AN ERROR (SEE SECTION 2.3). THE ERROR INFORMATION WILL BE TYPED UNLESS SW13 = 1.

IF SW15 = 1, THE PROCESSOR WILL HALT AFTER THE ERROR IS REPORTED. IF THE CONTENTS OF THE SOFTWARE SWITCH REGISTER ARE TO BE CHANGED, A ^G SHOULD BE TYPED BEFORE PRESSING "CONTINUE" TO RESUME TESTING.

IF SW9 = 1 (LOOP ON ERROR), THE PROGRAM WILL GO TO THE ADDRESS CONTAINED IN LOCATION "$LPERR". AFTER REPORTING THE ERROR. "$LPERR" IS SET BY EACH "SCOPE" CALL AND IS SET DIRECTLY DURING SOME SUBTESTS TO PROVIDE THE SMALLEST LOOP FOR LOOPING ON ERROR. IF SW9 = 0, THE PROGRAM WILL RETURN TO THE INSTRUCTION FOLLOWING THE ERROR CALL. (SEE SECTION 5.3 FOR MORE ON "LOOP ON ERROR").

3.2 INTERPRETING ERROR REPORTS

EVERY ERROR REPORT TYPES THE NUMBER OF THE TEST IN WHICH THE ERROR TOOK PLACE (TESTNO) AND THE LOCATION OF THE ERROR CALL (ERRORPC). THESE TWO VALUES PINPOINT THE PLACE IN THE CODE THAT THE ERROR OCCURRED. BY REFERRING TO THE PROGRAM LISTING, THE OPERATOR CAN THEN READ THE COMMENTS ASSOCIATED WITH THAT PARTICULAR ERROR AND SUBTEST. A DESCRIPTION OF THE TEST FOUND IN THE PROGRAM LISTING WILL ALSO PROVIDE THE OPERATOR WITH INFORMATION ON THE LOGIC AND FUNCTIONS BEING TESTED.

EVERY ERROR REPORT ALSO TYPES AN ERROR MESSAGE GIVING A VERBAL DESCRIPTION OF THE ERROR THAT HAS BEEN DETECTED.

BY USING THE COMMENTS AND TEST DESCRIPTION FOUND IN THE PROGRAM LISTING TO DETERMINE WHAT FUNCTION OR LOGIC WAS BEING TESTED, THE OPERATOR CAN THEN REFER TO THE ENGINEERING DRAWINGS TO ISOLATE THE PROBABLE CAUSE FOR THE FAILURE.

3.3 SAMPLE ERROR REPORT

BELOW IS AN EXAMPLE OF AN ERROR WHICH COULD HAVE
OCCURRED DURING EXECUTION OF THE PROGRAM:

```
MEM. MGMT. REG. BITS NOT SET CORRECTLY
REGISTR WROTE   READ    READ-(BINARY)
ADDRESS (OCTAL) (OCTAL) 5432109876543210  TESTNO  ERRORPC
177572  040000  060000  0110000000000000  000012  022060
```

WE SEE THAT THE ERROR OCCURRED IN TEST 12 AT LOCATION
022060. THE "REGISTER ADDRESS" TELLS US THAT WE WERE
TESTING MEMORY MANAGEMENT'S STATUS RGISTER 0 (SR0).
IN THE LISTING, THE TEST DESCRIPTION SAYS THAT THE
ERROR BITS (BITS <15:13>) OF SR0 WERE BEING SET AND
CLEARED INDIVIDUALLY. THE ERROR REPORT SAYS WE TRIED
TO SET BIT 14 BY WRITING "040000" TO SR0 BUT WHEN WE
READ IT BACK WE READ "060000". IT APPEARS THAT BIT 13 IS
STUCK AT "1" OR IT IS GETTING SET WHEN BIT 14 IS SET
TO "1". ERROR REPORTS BEFORE AND AFTER THIS ONE COULD
TELL US WHICH IS THE CASE.

3.4 POWER MONITOR BIT ERRORS

THE NEW $ERROR AND $SCOPE ROUTINES USED CONTAIN A CHECK OF BIT 0 (POWER
MONITOR BIT) OF THE CPU ERROR REGISTER. IF THE BIT SHOULD BECOME SET,
AN ERROR CALL WILL BE CALLED FROM THE $SCOPE ROUTINE. THE TEST NUMBER
IN THE ERROR PRINTOUT WILL BE THE TEST *BEFORE* THE SCOPE CALL THE SET
BIT WAS FOUND. IF THE BIT BECOMES SET AFTER THE SCOPE AND DURING THE
TEST, AND AN ERROR SHOULD BE CALLED FOR WHATEVER REASON, *TWO* ERRORS
WILL BE CALLED. THE FIRST ERROR WILL BE THE POWER MONITOR BIT ERROR,
AND THE SECOND WILL BE THE ERROR ORIGINALLY CALLED. THE ERROR WAS
CALLED, LOOP-ON-ERROR IS DISABLED FOR THIS ERROR ONLY. IF THIS ERROR
SHOULD APPEAR, IT IS SUGGESTED THAT THE PROBLEM CAUSING THE BIT TO BE
SET BE CORRECTED BEFORE USING THE RESULTS OF THIS DIAGNOSTIC AS
CONCLUSIVE.

4.0 MISCELLANEOUS INFORMATION

4.1 ACT/APT/XXDP COMPATABILITY

THE PROGRAM IS FULLY ACT AND APT COMPATABLE
AND IS SUPPORTED UNDER THE XXDP PACKAGE.

4.2 END-OF-PASS MESSAGE

AT THE END OF EACH PASS OF THE PROGRAM THE PASS NUMBER
IS PRINTED. FOR EXAMPLE:

```
        END OF PASS #2
```

THAT WOULD INDICATE THAT PASS TWO WAS JUST COMPLETED
AND NO ERRORS WERE DETECTED DURING THAT PASS.

TOTAL NUMBER OF ERRORS SINCE THE LAST END-OF-PASS ARE
REPORTED ONLY IF THERE ARE ANY IN THE END-OF-PASS MESSAGE
AS FOLLOWS:

```
        END OF PASS #2  TOTAL ERRORS SINCE LAST REPORT 2
```

THAT WOULD INDICATE THAT PASS TWO WAS JUST COMPLETED
WITH TWO ERRORS DETECTED DURING THAT PASS. BOTH THE
PASS NUMBER AND NUMBER OF ERRORS ARE DECIMAL NUMBERS.

4.3 T-BIT TRAPPING

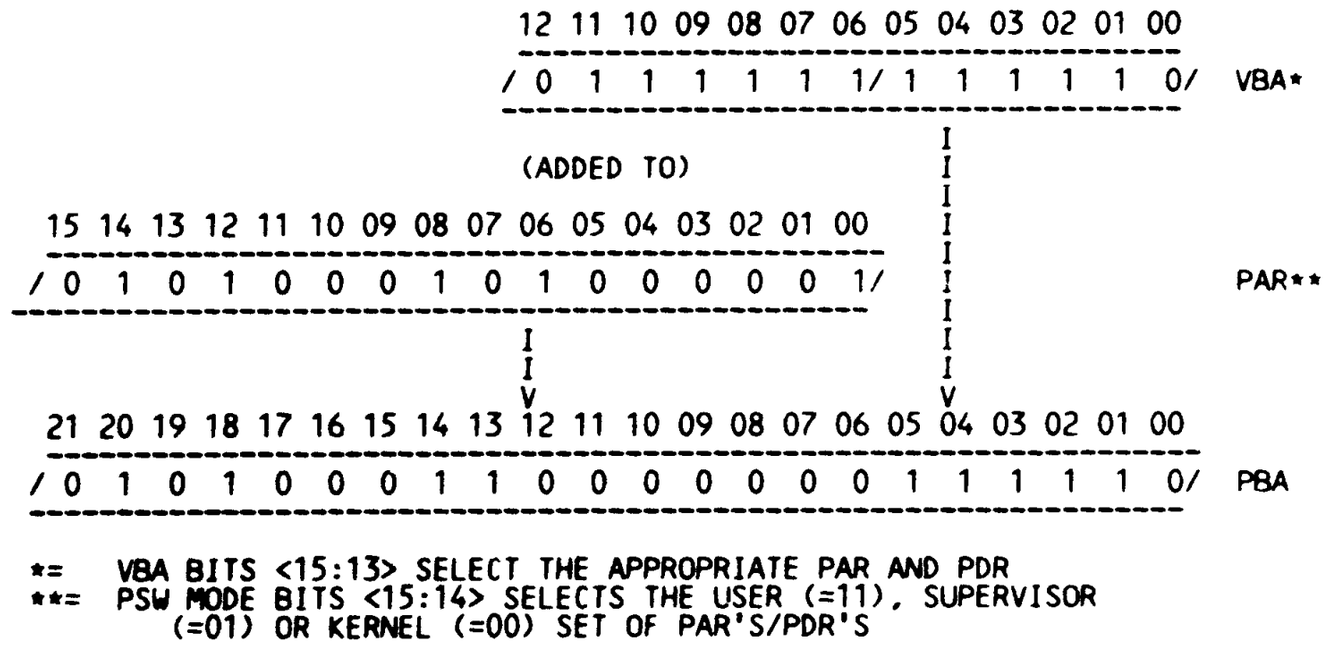
THE ''T-BIT'' (BIT 4) IN THE PROCESSOR STATUS WORD IS SET
BY AN ''RTI'' IN THE END-OF-PASS ROUTINE FOR EVERY OTHER PASS
BEGINNING WITH THE THIRD PASS (PASSES 3,5,7,9...). T-BIT
TRAPPING CAN BE INHIBITED BY SETTING BIT 12 = 1 IN THE SWITCH
REGISTER (SEE SECTION 2.4).

4.4 POWER FAILURE HANDLING

IF A POWER FAIL OCCURS (FOLLOWED BY A POWER UP), THE MESSAGE 'POWER FAILURE-RESTARTING' IS TYPED OUT AND THE PROGRAM WILL RESTART EXECUTION AT 'START:' (THE VERY BEGINNING OF THE PROGRAM. IF THE SOFTWARE SWITCH REGISTER IS BEING USED, ITS CONTENTS WILI BE RESTORED.

4.5 PHYSICAL BUS ADDRESS CONSTRUCTION

BELOW IS A SIMPLIFIED DIAGRAM OF HOW THE MEMORY MANAGEMENT LOGIC CONSTRUCTS A PHYSICAL BUS ADDRESS USING THE VIRTUAL ADDRESS AND THE PAGE ADDRESS REGISTER. THE PAGE DESCRIPTOR REGISTER SELECTED WILL CONTAIN THE PAGE EXPANSION, LENGTH, AND ACCESS INFORMATION.



*= VBA BITS <15:13> SELECT THE APPROPRIATE PAR AND PDR

**= PSW MODE BITS <15:14> SELECTS THE USER (=11), SUPERVISOR (=01) OR KERNEL (=00) SET OF PAR'S/PDR'S

```
434
435                          5.0     PROGRAM DESCRIPTION
436                                  -------------------
437
438                          5.1     SUBROUTINES USED BY THIS PROGRAM
439                                  --------------------------------
440
441                                  FOLLOWING IS A LIST OF THE SUBROUTINES AND HANDLERS USED
442                                  BY THIS PROGRAM THAT ARE NOT PROVIDED BY THE ''SYSMAC
443                                  PACKAGE''.  DETAILS OF THE SUBROUTINES UNIQUE TO THIS
444                                  PROGRAM MAY BE FOUND IN THE PROGRAM LISTING.  REFER TO
445                                  THE ''SYSMAC'' DOCUMENT AND PROGRAM LISTING FOR THE OTHER
446                                  ROUTINES.
447
448                                          1. TURN OFF T-BIT AND SAVE CURRENT PSW
449                                          2. TURN ON T-BIT AND RESTORE PREVIOUS PSW
450                                          3. SET ALL WRITEABLE BITS IN ALL PAR/PDR'S
451                                          4. CONVERT VIRTUAL ADDRESS TO PHYSICAL ADDRESS
452
453                                  NOTE ALSO THAT THE MACRO LIBRARY USED TO ASSEMBLE THIS PROGRAM
454                                  HAS OTHER SPECIAL ROUTINES APPENDED TO THE SYSMAC MACRO PACKAGE;
455                                  THIS LIBRARY MUST BE USED TO ASSEMBLE EITHER PART A OR PART B
456                                  CORRECTLY.
457
458                          5.2     PROGRAM LISTING
459                                  ---------------
460
461                                  FOLLOWING THIS SECTION OF DOCUMENTATION IS THE ACTUAL
462                                  PROGRAM LISTING COMPLETE WITH SUBTEST DESCRIPTIONS AND
463                                  ''CODING COMMENTS''.
```

5.3 USING THE PROGRAM TO DIAGNOSE A FAULT

WHEN AN ERROR OCCURS, ONE OF THE THINGS THAT'S IMPORTANT TO NOTE IS WHAT PASS THE ERROR OCCURRED ON. IF THE PASS NUMBER IS ODD AND IS THREE OR GREATER, THE ERROR MIGHT BE T-BIT SENSITIVE. TRY RUNNING THE PROGRAM AGAIN WITH BIT 12 OF THE SWITCH REG. EQUAL TO "1" TO INHIBIT T-BIT TRAPPING. THIS SHOULD HELP YOU DETERMINE WHAT MAKES THE MACHINE FAIL AND WHEN.

IF YOU HAVE BEEN RUNNING WITH BIT 15 OF THE SWITCH REG. EQUAL TO "0", THEN YOU ARE ABLE TO LOOK AT ALL THE ERRORS THAT MAY BE RELATED TO THE FAULT YOU ARE DIAGNOSING. A FAULT IN AN EARLIER TEST MAY RESULT IN ERRORS DURING LATER TESTS WHICH MAY GIVE YOU MORE CLUES ABOUT THE NATURE OF THE FAULT. NOW USE THE METHOD OUTLINED IN SECTION 3.2 FOR EACH ERROR TO GATHER AS MUCH INFORMATION AS POSSIBLE.

NOW TO TEST YOUR IDEAS ON THE CAUSE OF THE FAILURE, YOU MAY WANT TO SCOPE THIS ERROR CONDITION. SET BIT 09 OF THE SWITCH REG. EQUAL TO "1" TO LOOP ON THE ERROR. FOR AN EVEN TIGHTER SCOPE LOOP THE ERROR CALL CAN BE REPLACED WITH A BRANCH (REFER TO COMMENTS BY ERROR CALLS IN THE PROGRAM LISTING).

OR YOU COULD LOOP ON THE TEST BY EITHER SETTING BIT 14 OF THE SWITCH REG. EQUAL TO "1" OF BY SETTING BIT 08 OF THE SWITCH REG. EQUAL TO "1" AND THEN SETTING THE TEST NUMBER IN BITS 07-00 OF THE SWITCH REG. YOU WILL PROBABLY WANT TO INHIBIT ERROR TYPEOUTS BY SETTING BIT 13 OF THE SWITCH REG. EQUAL TO "1".

```
1196
1197                            .TITLE  CKKTAB0 11/44 MEM MGMT PRT A
                                ;*COPYRIGHT (C) 1981
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C5), JAN, 1981.
                                ;*
1198                            .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            INHIBIT TRACE TRAP
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
1199                            .SBTTL  BASIC DEFINITIONS
                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                          STACK=  1100
104000                                  ERROR=EMT
000004                                  SCOPE=IOT
                                ;*MISCELLANEOUS DEFINITIONS
000011                          HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                          LF=     12              ;;CODE FOR LINE FEED
000015                          CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                          CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
177776                                  PSW=PS
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
000003                          R3=     %3              ;;GENERAL REGISTER
000004                          R4=     %4              ;;GENERAL REGISTER
000005                          R5=     %5              ;;GENERAL REGISTER
000006                          R6=     %6              ;;GENERAL REGISTER
000007                          R7=     %7              ;;GENERAL REGISTER
000006                          SP=     %6              ;;STACK POINTER
000007                          PC=     %7              ;;PROGRAM COUNTER
                                ;*PRIORITY LEVEL DEFINITIONS
000000                          PR0=    0               ;;PRIORITY LEVEL 0
000040                          PR1=    40              ;;PRIORITY LEVEL 1
000100                          PR2=    100             ;;PRIORITY LEVEL 2
000140                          PR3=    140             ;;PRIORITY LEVEL 3
000200                          PR4=    200             ;;PRIORITY LEVEL 4
000240                          PR5=    240             ;;PRIORITY LEVEL 5
000300                          PR6=    300             ;;PRIORITY LEVEL 6
000340                          PR7=    340             ;;PRIORITY LEVEL 7
```

```
                        ;*'SWITCH REGISTER'' SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
001000                          SW9=SW09
000400                          SW8=SW08
000200                          SW7=SW07
000100                          SW6=SW06
000040                          SW5=SW05
000020                          SW4=SW04
000010                          SW3=SW03
000004                          SW2=SW02
000002                          SW1=SW01
000001                          SW0=SW00
                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT09=  1000
000400                  BIT08=  400
000200                  BIT07=  200
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
001000                          BIT9=BIT09
000400                          BIT8=BIT08
000200                          BIT7=BIT07
000100                          BIT6=BIT06
000040                          BIT5=BIT05
000020                          BIT4=BIT04
000010                          BIT3=BIT03
000004                          BIT2=BIT02
000002                          BIT1=BIT01
000001                          BIT0=BIT00
                        ;*BASIC ''CPU'' TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
```

BASIC DEFINITIONS

```
000014                  TBITVEC=14              ;;'T' BIT
000014                  TRTVEC= 14              ;;TRACE TRAP
000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
000024                  PWRVEC= 24              ;;POWER FAIL
000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
000034                  TRAPVEC=34              ;;'TRAP' TRAP
000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
  1200                  .SBTTL  MEMORY MANAGEMENT DEFINITIONS
                        ;*KT11 VECTOR ADDRESS
000250                  MMVEC=  250
                        ;*KT11 STATUS REGISTER ADDRESSES
177572                  SR0=    177572
177574                  SR1=    177574
177576                  SR2=    177576
172516                  SR3=    172516
                        ;*USER 'I' PAGE DESCRIPTOR REGISTERS
177600                  UIPDR0= 177600
177602                  UIPDR1= 177602
177604                  UIPDR2= 177604
177606                  UIPDR3= 177606
177610                  UIPDR4= 177610
177612                  UIPDR5= 177612
177614                  UIPDR6= 177614
177616                  UIPDR7= 177616
                        ;*USER 'D' PAGE DESCRIPTOR REGISTORS
177620                  UDPDR0= 177620
177622                  UDPDR1= 177622
177624                  UDPDR2= 177624
177626                  UDPDR3= 177626
177630                  UDPDR4= 177630
177632                  UDPDR5= 177632
177634                  UDPDR6= 177634
177636                  UDPDR7= 177636
                        ;*USER 'I' PAGE ADDRESS REGISTERS
177640                  UIPAR0= 177640
177642                  UIPAR1= 177642
177644                  UIPAR2= 177644
177646                  UIPAR3= 177646
177650                  UIPAR4= 177650
177652                  UIPAR5= 177652
177654                  UIPAR6= 177654
177656                  UIPAR7= 177656
                        ;*USER 'D' PAGE ADDRESS REGISTERS
177660                  UDPAR0= 177660
177662                  UDPAR1= 177662
177664                  UDPAR2= 177664
177666                  UDPAR3= 177666
177670                  UDPAR4= 177670
177672                  UDPAR5= 177672
177674                  UDPAR6= 177674
177676                  UDPAR7= 177676
                        ;*SUPERVISOR 'I' PAGE DESCRIPTOR REGISTERS
172200                  SIPDR0= 172200
172202                  SIPDR1= 172202
```

MEMORY MANAGEMENT DEFINITIONS

```
172204                  SIPDR2= 172204
172206                  SIPDR3= 172206
172210                  SIPDR4= 172210
172212                  SIPDR5= 172212
172214                  SIPDR6= 172214
172216                  SIPDR7= 172216
                        ;*SUPERVISOR 'D' PAGE DESCRIPTOR REGISTERS
172220                  SDPDR0= 172220
172222                  SDPDR1= 172222
172224                  SDPDR2= 172224
172226                  SDPDR3= 172226
172230                  SDPDR4= 172230
172232                  SDPDR5= 172232
172234                  SDPDR6= 172234
172236                  SDPDR7= 172236
                        ;*SUPERVISOR 'I' PAGE ADDRESS REGISTERS
172240                  SIPAR0= 172240
172242                  SIPAR1= 172242
172244                  SIPAR2= 172244
172246                  SIPAR3= 172246
172250                  SIPAR4= 172250
172252                  SIPAR5= 172252
172254                  SIPAR6= 172254
172256                  SIPAR7= 172256
                        ;*SUPERVISOR 'D' PAGE ADDRESS REGISTERS
172260                  SDPAR0= 172260
172262                  SDPAR1= 172262
172264                  SDPAR2= 172264
172266                  SDPAR3= 172266
172270                  SDPAR4= 172270
172272                  SDPAR5= 172272
172274                  SDPAR6= 172274
172276                  SDPAR7= 172276
                        ;*KERNEL 'I' PAGE DESCRIPTOR REGISTERS
172300                  KIPDR0= 172300
172302                  KIPDR1= 172302
172304                  KIPDR2= 172304
172306                  KIPDR3= 172306
172310                  KIPDR4= 172310
172312                  KIPDR5= 172312
172314                  KIPDR6= 172314
172316                  KIPDR7= 172316
                        ;*KERNEL 'D' PAGE DESCRIPTOR REGISTERS
172320                  KDPDR0= 172320
172322                  KDPDR1= 172322
172324                  KDPDR2= 172324
172326                  KDPDR3= 172326
172330                  KDPDR4= 172330
172332                  KDPDR5= 172332
172334                  KDPDR6= 172334
172336                  KDPDR7= 172336
                        ;*KERNEL 'I' PAGE ADDRESS REGISTERS
172340                  KIPAR0= 172340
172342                  KIPAR1= 172342
172344                  KIPAR2= 172344
172346                  KIPAR3= 172346
172350                  KIPAR4= 172350
```

MEMORY MANAGEMENT DEFINITIONS

```
                172352                  KIPAR5= 172352
                172354                  KIPAR6= 172354
                172356                  KIPAR7= 172356
                                        ;*KERNEL 'D' PAGE ADDRESS REGISTERS
                172360                  KDPAR0= 172360
                172362                  KDPAR1= 172362
                172364                  KDPAR2= 172364
                172366                  KDPAR3= 172366
                172370                  KDPAR4= 172370
                172372                  KDPAR5= 172372
                172374                  KDPAR6= 172374
                172376                  KDPAR7= 172376
  1201                                  ;*ADDITIONAL DEFINITIONS
  1202                                  ;*
  1203          177572                          MMR0=SR0
  1204          177574                          MMR1=SR1
  1205          177576                          MMR2=SR2
  1206          172516                          MMR3=SR3
  1207          000006                          KSP=SP
  1208          000006                          SSP=SP
  1209          000006                          USP=SP
  1210          000020                          TBIT=BIT4
  1211          000100                          WBIT=BIT6
  1212          001100                  KERSTK=STACK
  1213          000700                  SUPSTK=STACK-200
  1214          000600                  USESTK=STACK-300
  1215          177766                  CPUERR=177766
  1216          177770                  RMIREG=177770
  1271
  1273                                  .SBTTL  TRAP CATCHER
                000000                          .=0
                                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ''.+2,HALT''
                                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                        ;*LOCATION 0 CONTAIN 0 TO CATCH IMPROPERLY LOADED VECTORS
                000174                          .=174
     000174     000000             DISPREG: .WORD  0                ;;SOFTWARE DISPLAY REGISTER
     000176     000000             SWREG:   .WORD  0                ;;SOFTWARE SWITCH REGISTER
                                    .SBTTL  STARTING ADDRESS(ES)
     000200     000137  020000             JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
  1274                              .SBTTL  ACT11 HOOKS
                                    ;;******************************************************************
                                    ;HOOKS REQUIRED BY ACT11
                000204                  $SVPC=.                  ;SAVE PC
                000046                  .=46
     000046     032742                  $ENDAD                   ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                000052                  .=52
     000052     000000                  .WORD   0                ;;2)SET LOC.52 TO ZERO
                000204                  .=$SVPC                  ;; RESTORE PC
  1275                              .SBTTL  APT PARAMETER BLOCK
                                    ;;******************************************************************
                                    ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                                    ;;******************************************************************
                000204                  .$X=.   ;;SAVE CURRENT LOCATION
                000024                  .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
     000024     000200                  200     ;;FOR APT START UP
                000044                  .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
     000044     000204                  $APTHDR ;;POINT TO APT HEADER BLOCK
```

```
000204                          .=.$X   ;;RESET LOCATION COUNTER
                        ;;**************************************************************
                        ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                        ;INTERFACE SPEC.
000204                  $APTHD:
000204  000000          $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
000206  001224          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
000210  000010          $TSTM:  .WORD   10      ;;RUN TIM OF LONGEST TEST
000212  000020          $PASTM: .WORD   20      ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
000214  000005          $UNITM: .WORD   5       ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
000216  000014                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

COMMON TAGS

```
1276                                    .SBTTL  COMMON TAGS
                                        ;;**********************************************************************
                                        ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                        ;*USED IN THE PROGRAM.
                 001100                         .=1100
001100                          $CMTAG:                         ;;START OF COMMON TAGS
001100  000000                          .WORD   0
001102     000                  $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001103     000                  $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001104  000000                  $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUN'
001106  000000                  $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001110  000000                  $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001112  000000                  $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001114     000                  $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001115     001                  $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001116  000000                  $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001120  000000                  $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001122  000000                  $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001124  000000                  $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001126  000000                  $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001130  000000                          .WORD   0               ;;RESERVED--NOT TO BE USED
001132  000000                          .WORD   0
001134     000                  $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001135     000                  $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001136  000000                          .WORD   0
001140  177570                  SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001142  177570                  DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001144  177560                  $TKS:   177560                  ;;TTY KBD STATUS
001146  177562                  $TKB.   177562                  ;;TTY KBD BUFFER
001150  177564                  $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001152  177566                  $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001154     000                  $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001155     002                  $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001156     012                  $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED''
001157     000                  $TPFLG: .BYTE   0               ;;'TERMINAL AVAILABLE'' FLAG (BIT<07>=0=YES)
001160  000000                  $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                                ;;WHICH  ($REG0) WAS OBTAINED
                 000006                 .REPT   $CM3
001162  000000                  $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001164  000000                  $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001166  000000                  $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001170  000000                  $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001172  000000                  $REG4:  .WORD   0               ;;CONTAINS (($REGAD)+10)
001174  000000                  $REG5:  .WORD   0               ;;CONTAINS (($REGAD)+12)
                 000006                 .REPT   6
001176  000000                  $TMP0:  .WORD   0               ;;USER DEFINED
001200  000000                  $TMP1:  .WORD   0               ;;USER DEFINED
001202  000000                  $TMP2:  .WORD   0               ;;USER DEFINED
001204  000000                  $TMP3:  .WORD   0               ;;USER DEFINED
001206  000000                  $TMP4:  .WORD   0               ;;USER DEFINED
001210  000000                  $TMP5:  .WORD   0               ;;USER DEFINED
001212  000000                  $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001214     207     377     377  $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001220     077                  $QUES:  .ASCII  /?/             ;;QUESTION MARK
001221     015                  $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001222     012     000          $LF:    .ASCIZ  <12>            ;;LINE FEED
                                        ;;**********************************************************************
```

```
                                .SBTTL  APT MAILBOX-ETABLE
                                ;;*****************************************************************
                                .EVEN
001224                          $MAIL:                          ;;APT MAILBOX
001224  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001226  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001230  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001232  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
001234  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
001236  000000                  $UNIT:  .WORD   AUNIT           ;;I/O UNIT NUMBER
001240  000000                  $MSGAD: .WORD   AMSGAD          ;;MESSAGE ADDRESS
001242  000000                  $MSGLG: .WORD   AMSGLG          ;;MESSAGE LENGTH
001244                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
001244     000                  $ENV:   .BYTE   AENV            ;;ENVIRONMENT BYTE
001245     000                  $ENVM:  .BYTE   AENVM           ;;ENVIRONMENT MODE BITS
001246  000000                  $SWREG: .WORD   ASWREG          ;;APT SWITCH REGISTER
001250  000000                  $USWR:  .WORD   AUSWR           ;;USER SWITCHES
001252  000000                  $CPUOP: .WORD   ACPUOP          ;;CPU TYPE,OPTIONS
                                ;*                              BITS 15-11=CPU TYPE
                                ;*                                      11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                ;*                                      11/70=06,PDQ=07,Q=10
                                ;*                              BIT 10=REAL TIME CLOCK
                                ;*                              BIT  9=FLOATING POINT PROCESSOR
                                ;*                              BIT  8=MEMORY MANAGEMENT
001254                          $ETEND:
                                .MEXIT

001254  000000                  TESTNO: .WORD   0               ;HOLDS TEST NUMBER FOR TYPEOUTS
001256  000000                  WASR6:  .WORD   0               ;USED TO STORE THE STACK POINTER AFTER A TRAP
001260  000000                  TRAPPC: .WORD   0               ;USED TO STORE THE PC OF A TRAP OR ABORT
001262  000000                  TRAPPS: .WORD   0               ;USED TO STORE THE PS OF A TRAP OR ABORT
001264  000000                  WASSR0: .WORD   0               ;USED TO STORE CONTENTS OF SR0
001266  000000                  WASSR1: .WORD   0               ;USED TO STORE CONTENTS OF SR1
001270  000000                  WASSR2: .WORD   0               ;USED TO STORE CONTENTS OF SR2
001272  000000                  TBITPS: .WORD   0               ;SAVES THE PSW THAT MAY HAVE ITS T-BIT ON
001274  000000                  TONUM:  .WORD   0               ;HOLDS NUMBER OF TIME-OUTS
001276  000000                  VIRT1:  .WORD   0               ;HOLDS VIRTUAL ADDRESS TO BE CONVERTED
001300  000000                  VIRT2:  .WORD   0               ;  "      "       "
001302  000000                  PBALO:  .WORD   0               ;HOLDS BITS <15:00> OF PHYSICAL ADDRESS
001304  000000                  PBAHI:  .WORD   0               ;HOLDS BITS <21:16> OF PHYSICAL ADDRESS
001306  000000                  DATAOR: .WORD   0               ;HOLDS LOGICAL OR OF BAD DATA
001310  000000                  DATAND: .WORD   0               ;HOLDS LOGICAL AND OF BAD DATA
001312  000000                  PATTOR:  WORD   0               ;HOLDS LOGICAL OR OF PATTERN LOADED
001314  000000                  PATAND: .WORD   0               ;HOLDS LOGICAL AND OF PATTERN LOADED
001316  000000                  ADDROR: .WORD   0               ;HOLDS LOGICAL OR OF ADDRESS
001320  000000                  ADRAND: .WORD   0               ;HOLDS LOGICAL AND OF ADDRESS
001322  000000                  ERRCNT: .WORD   0               ;HOLDS NUMBER OF ERRORS ON TEST
001324  000000                  BADPC:  .WORD   0               ;HOLDS PC FROM ABORT OR TRAP
001326  000000                  OLDPC:  .WORD   0               ;HOLDS RETURN ADDRESS IN CASE OF LOOP ON ERROR
001330  000000                  OLDPS:  .WORD   0               ;HOLDS OLD PSW IN CASE OF LOOP ON ERROR
001332  000000                  PCPUER: .WORD   0               ;HOLDS VALUE OF CPU ERROR REGISTER
001334  000000                  CPUEXP: .WORD   0               ;HOLDS EXPECTED CPU ERROR CONDITION
001336  000000                  HOLFLG: .WORD   0               ;HOLDS NUMBER OF TIMEOUTS FOR CARRY PROPAGATION TEST
001340  000000                  HDWFLAG:.WORD   0               ;FLAGS APT SPECIAL HARDWARE FOR T47 & T50
001342  020000                  READON: .WORD   20000           ;READ ONLY BIT IN MMR0
001344  000200                  $MXCNT: .WORD   200             ;HOLD MAX. NUMBER OF LOOP ITERATIONS
001346  000000                  $TBIT:  .WORD   0               ;'T' BIT STATE INDICATOR
```

```
001350      136     103     015  $CNTLC: .ASCIZ  /^C/<15><12>     ;CONTROL C
                                          .EVEN
001356                           PARTAB:                          ;THIS IS THE TABLE OF THE FIRST PAR OR PDR
                                                                  ;OF EACH GROUP. THEY ARE USED FOR THE DUAL
                                                                  ;ADDRESSING TEST.
001356  172200                          .WORD   172200           ;SIPDR0
001360  172240                          .WORD   172240           ;SIPAR0
001362  172300                          .WORD   172300           ;KIPDR0
001364  172340                          .WORD   172340           ;KIPAR0
001366  177600                          .WORD   177600           ;UIPDR0
001370  177640                          .WORD   177640           ;UIPAR0
```

ERROR POINTER TABLE

```
                                        .SBTTL  ERROR POINTER TABLE
                                        ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
                                        ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
                                        ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
                                        ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
                                        ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
                                        ;*      EM              ;;POINTS TO THE ERROR MESSAGE
                                        ;*      DH              ;;POINTS TO THE DATA HEADER
                                        ;*      DT              ;;POINTS TO THE DATA
                                        ;*      DF              ;;POINTS TO THE DATA FORMAT
    001372                              $ERRTB:
 1277
 1278                                   ;*ITEM 1
 1279 001372  037460                            EM1             ;UNEXPECTED CPU TRAP TO LOC. 004
 1280 001374  043023                            DH1             ;OLD PC  OLD PSW R6 WAS  CPUERR  TESTNO  ERRORPC
 1281 001376  045762                            DT1             ;TRAPPC,TRAPPS,WASR6,CPUERR,TESTNO,$ERPPC, 0
 1282 001400  046534                            DF1             ;0,0,0,0,0
 1283
 1284                                   ;*ITEM 2
 1285 001402  037520                            EM2             ;UNEXPECTED MEM. MGMT. TRAP TO LOC. 250
 1286 001404  043103                            DH2             ;OLD PC  OLD PSW R6 WAS  SR0     SR1     SR2     TESTNO  ERR
 1287 001406  046000                            DT2             ;TRAPPC,TRAPPS,WASR6,WASSR0,WASSR1,WASSR2,TESTNO,$ERRPC,0
 1288 001410  046541                            DF2             ;0,0,0,0,0,0,0,0
 1289
 1290                                   ;*ITEM 3
 1291 001412  037567                            EM3             ;PRIORITY BITS SET WRONG IN PSW
 1292 001414  043202                            DH3             ;WROTE   READ    TESTNO  ERRORPC
 1293 001416  046022                            DT3             ;$REG0,$REG1,TESTNO,$ERRPC,0
 1294 001420  046551                            DF3             ;0,0,0,0
 1295
 1296                                   ;*ITEM 4
 1297 001422  037626                            EM4             ;MODE BITS SET WRONG IN PSW
 1298 001424  043202                            DH3             ;WROTE   READ    TESTNO  ERRORPC
 1299 001426  046022                            DT3             ;$REG0,$REG1,TESTNO,$ERRPC,0
 1300 001430  046551                            DF3             ;0,0,0,0
 1301
 1302                                   ;*ITEM 5
 1303 001432  037661                            EM5             ;DUAL ADDRESSING BETWEEN HI&LO BYTES OF PSW
 1304 001434  043202                            DH3             ;WROTE   READ    TESTNO  ERRORPC
 1305 001436  046022                            DT3             ;$REG0,$REG1,TESTNO,$ERRPC,0
 1306 001440  046551                            DF3             ;0,0,0,0
 1307
 1308                                   ;*ITEM 6
 1309 001442  037734                            EM6             ;KERNEL R6 CHANGED BY WRITING SUPERVISOR/USER R6
 1310 001444  043202                            DH3             ;WROTE   READ    TESTNO  ERRORPC
 1311 001446  046022                            DT3             ;$REG0,$REG1,TESTNO,$ERRPC,0
 1312 001450  046551                            DF3             ;0,0,0,0
```

ERROR POINTER TABLE

```
1313                                    ;*ITEM 7
1314 001452  040017                             EM7     ;A MEMORY MGMT. REG. TIMED OUT
1315 001454  043242                             DH7     ;ADDRESS TESTNO  ERRORPC
1316 001456  046034                             DT7     ;$REG0,TESTNO,$ERRPC,0
1317 001460  046555                             DF7     ;0,0,0
1318
1319                                    ;*ITEM 10
1320 001462  040055                             EM10    ;SUMMARY OF MEM. MGMT. REG. TIMEOUTS
1321 001464  043272                             DH10    ;REGISTER-ADDRS  NUM. OF
1322                                                    ;AND-ED  OR-ED   TIMOUTS TESTNO ERRORPC
1323 001466  046044                             DT10    ;ADRAND,ADDROR,TONUM,TESTNO,$ERRPC,0
1324 001470  046560                             DF10    ;0,0,1,0,0
1325
1326                                    ;*ITEM 11
1327 001472  040121                             EM11    ;MEM. MGMT. REG. WOULD NOT CLEAR
1328 001474  043372                             DH11    ;REGISTR READ    READ-(BINARY)
1329                                                    ;ADDRESS (OCTAL) 5432109876543210  TESTNO  ERRORPC
1330 001476  046060                             DT11    ;$REG0,$REG1,$REG1,TESTNO,$ERRPC,0
1331 001500  046565                             DF11    ;0,0,2,0,0
1332
1333                                    ;*ITEM 12
1334 001502  040161                             EM12    ;MEM. MGMT. REG. BITS NOT SET CORRECTLY
1335 001504  043512                             DH12    ;REGISTR WROTE   READ    READ
1336                                                    ;ADDRESS (OCTAL) (OCTAL) (BINARY) TESTNO ERRORPC
1337 001506  046074                             DT12    ;$REG0,$REG1,$REG2,$REG2,TESTNO,$ERRPC,0
1338 001510  046572                             DF12    ;0,0,0,2,0,0
1339
1340                                    ;*ITEM 13
1341 001512  040230                             EM13    ;SR0 EFFECTED BY WRITE TO PSW
1342 001514  043652                             DH13    ;READ    TESTNO  ERRORPC
1343 001516  046034                             DT7     ;$REG0,TESTNO,$ERRPC,0
1344 001520  046555                             DF7     ;0,0,0
1345
1346                                    ;*ITEM 14
1347 001522  040265                             EM14    ;MMR1 DID NOT TRACK PROPERLY
1348 001524  043702                             DH14    ;EXPECTD (MMR1)  TESTNO  ERRORPC
1349 001526  046112                             DT14    ;$REG3,$REG1,TESTNO,$ERRPC,0
1350 001530  046551                             DF3     ;0,0,0,0
1351
1352                                    ;*ITEM 15
1353 001532  040321                             EM15    ;MMR3 IS HOLDING THE WRONG DATA
1354 001534  043742                             DH15    ;LOADED  (MMR3)  TESTNO  ERRORPC
1355 001536  046124                             DT15    ;$REG2,$REG1,TESTNO,$ERRPC,0
1356 001540  046551                             DF3     ;0,0,0,0
1357
1358                                    ;*ITEM 16
1359 001542  040360                             EM16    ;DUAL ADDRESSING BETWEEN PAR-PDR GROUPS
1360 001544  044002                             DH16    ;INDEX   INDEX   PAR-PDR
1361                                                    ;EXPECTD RECEIVD ADDRREAD TESTNO ERRORPC
1362 001546  046136                             DT16    ;$REG0,$REG1,$REG2,TESTNO,$ERRPC,0
1363 001550  046534                             DF1     ;0,0,0,0,0
1364
1365                                    ;*ITEM 17
1366 001552  040427                             EM17    ;PHYS. ADDR. FORMED READ WRONG IN MAINT. MODE
1367 001554  044103                             DH17    ;VIR ADDR  KIPAR4 GDDATA  BADDATA TESTNO  ERRORPC
1368 001556  046152                             DT17    ;$REG0,KIPAR4,$REG1,$REG2,TESTNO,$ERRPC,0
1369 001560  046541                             DF2     ;0,0,0,0,0,0
```

ERROR POINTER TABLE

```
1370
1371                                    ;*ITEM 20
1372 001562  040505                            EM20    ;PHYS. ADDR. FORMED READ WRONG IN RELOCATE MODE
1373 001564  044164                            DH20    ;PHYSICL PAR 4   PAR 5
1374                                                   ;ADDRESS VBA     VBA     PAR 4   PAR 5   PSW     TESTNO  ERR
1375 001566  046170                            DT20    ;PBALO,VIRT1,VIRT2,$REG4,$REG5,$TMP0,TESTNO,$ERRPC,0
1376 001570  046606                            DF20    ;3,0,0,0,0,0,0,0
```

ERROR POINTER TABLE

```
1377                                    ;*ITEM 21
1378 001572  040557                             EM21            ;SR2 NOT TRACKING CORRECTLY
1379 001574  044312                             DH21            ;SR2 WAS EXPECTD TESTNO  ERROPC
1380 001576  046212                             DT21            ;WASSR2,$REG1,TESTNO,$ERRPC,0
1381 001600  046551                             DF3             ;0,0,0,0
1382
1383                                    ;*ITEM 22
1384 001602  040612                             EM22            ;WRONG PDR'S REFERENCED WHILE IN RELOCATE MODE
1385 001604  044352                             DH22            ;PHYSICL PAR 4
1386                                                            ;ADDRESS V.B.A.  PAR 4   SR0 WAS SR2 WAS PSW    TESTNO  ERRO
1387 001606  046224                             DT22            ;PBALO,VIRT1,$REG4,WASSR0,WASSR2,$TMP0,TESTNO,$ERRPC,0
1388 001610  046606                             DF20            ;3,0,0,0,0,0,0,0
1389
1390                                    ;*ITEM 23
1391 001612  040670                             EM23            ;PAR OR PDR WAS CHANGED BY A RESET
1392 001614  043372                             DH11            ;REGISTR READ    READ-(BINARY)
1393                                                            ;ADDRESS (OCTAL) 5432109876543210  TESTNO  ERRORPC
1394 001616  046060                             DT11            ;$REG0,$REG1,$REG1,TESTNO,$ERRPC,0
1395 001620  046565                             DF11            ;0,0,2,0,0
1396
1397                                    ;*ITEM 24
1398 001622  040726                             EM24            ;MAINT MODE (SR0<8>) NOT DISABLED BY A RESET
1399 001624  044470                             DH24            ;TESTNO  ERRORPC
1400 001626  046246                             DT24            ;TESTNO,$ERRPC,0
1401 001630  046616                             DF24            ;0,0
1402
1403                                    ;*ITEM 25
1404 001632  041004                             EM25            ;DATA INCORRECT AFTER A MAINT. MODE WRITE
1405 001634  043202                             DH3             ;WROTE   READ    TESTNO  ERRORPC
1406 001636  046254                             DT25            ;$REG1,$REG2,TESTNO,$ERRPC,0
1407 001640  046551                             DF3             ;0,0,0,0
1408
1409                                    ;*ITEM 26
1410 001642  041055                             EM26            ;SOURCE RELOCATED IN MAINT. MODE
1411 001644  043103                             DH2             ;OLD PC  OLD PSW R6 WAS  SR0     SR2    TESTNO  ERRORPC
1412 001646  046000                             DT2             ;TRAPPC,TRAPPS,WASR6,WASSR0,WASSR2,TESTNO,$ERRPC,0
1413 001650  046541                             DF2             ;0,0,0,0,0,0,0
1414
1415                                    ;*ITEM 27
1416 001652  041115                             EM27            ;SR2 DIDNOT LOCKUP CORRECT VIRTUAL ADDR.
1417 001654  044312                             DH21            ;SR2 WAS EXPECTD TESTNO  ERRORPC
1418 001656  046266                             DT27            ;WASSR2,$REG4,TESTNO,$ERRPC,0
1419 001660  046551                             DF3             ;0,0,0,0
1420
1421                                    ;*ITEM 30
1422 001662  041171                             EM30            ;FOLLOWING PAR/PDR WILL NOT ZERO
1423 001664  044510                             DH30            ;ADDRESS DATA    TESTNO  ERRORPC
1424 001666  046300                             DT30            ;$REG0,$REG2,TESTNO,$ERRPC,0
1425 001670  046551                             DF3             ;0,0,0,0
1426
1427                                    ;*ITEM 31
1428 001672  041231                             EM31            ;SUMMARY OF DUAL ADDRESSING ERRORS
1429 001674  044550                             DH31            ;ADDROR  ADDRAND ADDROR  ADDRAND
1430                                                            ;LOADED  LOADED ENABLED ENABLED TESTNO  #ERRORS
1431 001676  046312                             DT31            ;ADDROR,ADRAND,DATAOR,DATAND,TESTNO,ERRCNT,0
1432 001700  046551                             DF3             ;0,0,0,0,0,1
```

ERROR POINTER TABLE

```
1433                                    ;*ITEM 32
1434 001702  041273                             EM32            ;SUMMARY OF COUNT PATTERN FAILURES
1435 001704  044667                             DH32            ;ADDROR  ADDRAND PATRNOR PATRNAND DATAOR  DATAAND TESTNO  #E
1436 001706  046330                             DT32            ;ADDROR,ADRAND,PATTOR,PATAND,DATAOR,DATAND,TESTNO,ERRCNT,0
1437 001710  046620                             DF32            ;0,0,0,0,0,0,0,1
1438
1439                                    ;*ITEM 33
1440 001712  041335                             EM33            ;ERROR IN BYTE ADDRESSING OF PAR/PDR
1441 001714  044767                             DH33            ;ADDRESS EXPECTD RECEIVD TESTNO  ERRORPC
1442 001716  046352                             DT33            ;$REG0,$REG2,$REG1,TESTNO,$ERRPC,0
1443 001720  046626                             DF33            ;0,0,0,0,0
1444
1445                                    ;*ITEM 34
1446 001722  041401                             EM34            ;THE FOLLOWING ARE DUAL ADDRESSING ERRORS FOR PAR'S/PDR'S
1447 001724  045037                             DH34            ;ADDRESS ADDRESS
1448                                                            ;LOADED  JUST READ TESTNO
1449 001726  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1450 001730  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1451
1452                                    ;*ITEM 35
1453 001732  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1454 001734  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1455 001736  046366                             DT35            ;$REG0,$REG1,TESTNO,0
1456 001740  046534                             DF1             ;0,0,0
1457
1458                                    ;*ITEM 36
1459 001742  041472                             EM36            ;THE FOLLOWING ARE COUNT PATTERN ERRORS FOR PAR'S/PDR'S
1460 001744  045057                             DH36            ;ADDRESS DATAREAD PATTERN COUNT   TESTNO
1461 001746  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1462 001750  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1463
1464                                    ;*ITEM 37
1465 001752  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1466 001754  000000                             .WORD   0       ;THIS IS A NULL VALUE TO INHIBIT TYPING
1467 001756  046376                             DT37            ;$REG0,$REG2,$REG4,$REG1,TESTNO,0
1468 001760  046555                             DF7             ;0,0,0,0,0
1469
1470                                    ;*ITEM 40
1471 001762  041561                             EM40            ;ILLEGAL (MODE 10) STACK POINTER NOT MAPPED TO USER
1472 001764  045126                             DH40            ;READOFF TESTNO  ERRORPC
1473                                                            ;STACK
1474 001766  046034                             DT7             ;$REG0,TESTNO,$ERRPC,0
1475 001770  046555                             DF7             ;0,0,0
1476
1477                                    ;*ITEM 41
1478 001772  041644                             EM41            ;18-BIT MAPPING POSSIBLE HOLE IN MAIN MEMORY FROM
1479 001774  045164                             DH41            ;STARTADR  FINISHADR TESTNO  ERRORPC
1480 001776  046412                             DT41            ;$TMP1,$TMP2,TESTNO,$ERRPC,0
1481 002000  046541                             DF2             ;0,0,0,0
1482
1483                                    ;*ITEM 42
1484 002002  041725                             EM42            ;FAULTY CARRY PROPAGATION 18-BIT MAPPING
1485 002004  045225                             DH42            ;PATTERN DATA    ADDRESS
1486                                                            ;LOADED  FETCHED INTENDED  TESTNO  ERRORPC
1487 002006  046424                             DT42            ;$REG2,$REG3,$REG0,TESTNO,$ERRPC,0
1488 002010  046541                             DF2             ;0,0,0,0,0
```

ERROR POINTER TABLE

```
1489                                    ;*ITEM 43
1490 002012  041775                             EM43            ;18-BIT MAPPING POSSIBLE HOLE AT TOP OF MEMORY
1491 002014  045327                             DH43            ;STARTADR  TESTNO  ERRORPC
1492 002016  046440                             DT43            ;$TMP1,TESTNO,$ERRPC,0
1493 002020  046636                             DF43            ;4,0,0
1494
1495                                    ;*ITEM 44
1496 002022  042053                             EM44            ;NO TRAP THRU ERRVEC,AT 18-BIT ADDR. 760000
1497 002024  044470                             DH24            ;TESTNO  ERRORPC
1498 002026  046246                             DT24            ;TESTNO,$ERRPC,0
1499 002030  046616                             DF24            ;0,0
1500
1501                                    ;*ITEM 45
1502 002032  042126                             EM45            ;DIDN'T GET WRAP AROUND TO ADDRESS ZERO
1503 002034  045357                             DH45            ;DATA    TESTNO  ERRORPC
1504 002036  046450                             DT45            ;$REG1,TESTNO,$ERRPC,0
1505 002040  046555                             DF7             ;0,0,0
1506
1507                                    ;*ITEM 46
1508 002042  042175                             EM46            ;NO TRAP THRU ERRVEC, ON NON-EXISTANT ADDR.
1509 002044  045407                             DH46            ;NEADDR TESTNO  ERRORPC
1510 002046  046034                             DT7             ;$REG0,TESTNO,$ERRC,0
1511 002050  046555                             DF7             ;0,0,0
1512
1513                                    ;*ITEM 47
1514 002052  042250                             EM47            ;PREMATURE END OF MEMORY FOUND
1515 002054  045436                             DH47            ;KIPAR4  LASTBK  TESTNO  ERRORPC
1516 002056  046460                             DT47            ;KIPAR4,$LSTBK,TESTNO,$ERRPC,0
1517 002060  046541                             DF2             ;0,0,0,0
1518
1519                                    ;*ITEM 50
1520 002062  042306                             EM50            ;22-BIT MAPPING POSSIBLE HOLE IN MAIN MEMORY FROM
1521 002064  045164                             DH41            ;STARTBK FINISHBK TESTNO  ERRORPC
1522 002066  046412                             DT41            ;$TMP1,$TMP2,TESTNO,$ERRPC,0
1523 002070  046541                             DF2             ;0,0,0,0
1524
1525                                    ;*ITEM 51
1526 002072  042367                             EM51            ;BAD RELOCATION,CARRY PROPAGATION 22-BIT MAPPING
1527 002074  045225                             DH42            ;PATTERN DATA    ADDRESS
1528                                                            ;LOADED  FETCHED INTENDED  TESTNO  ERRORPC
1529 002076  046424                             DT42            ;$REG2,$REG3,$REG0,TESTNO,$ERRPC,0
1530 002100  046541                             DF2             ;0,0,0,0,0
1531
1532                                    ;*ITEM 52
1533 002102  042447                             EM52            ;22-BIT MAPPING POSSIBLE HOLE AT TOP OF MEMORY
1534 002104  045327                             DH43            ;STARTADR  TESTNO  ERRORPC
1535 002106  046440                             DT43            ;$TMP1,TESTNO,$ERRPC,0
1536 002110  046541                             DF2             ;0,0,0
1537
1538                                    ;*ITEM 53
1539 002112  042525                             EM53            ;DID NOT GET UNIBUS ADDRESS
1540 002114  045225                             DH42            ;PATTERN DATA    ADDRESS
1541                                                            ;LOADED  FETCHED INTENDED  TESTNO  ERRORPC
1542 002116  046424                             DT42            ;$REG2,$REG3,$REG0,TESTNO,$ERRPC,0
1543 002120  046541                             DF2             ;0,0,0,0,0
```

ERROR POINTER TABLE

```
1544                                    ;*ITEM 54
1545 002122  042560                             EM54            ;W-BIT DID NOT GET SET IN PDR
1546 002124  045502                             DH54            ;PDR     VIRTUAL
1547                                                            ;TESTED  ADDRESS TESTNO  ERRORPC
1548 002126  046472                             DT54            ;$REG5,$REG3,TESTNO,$ERRPC,0
1549 002130  046551                             DF3             ;0,0,0,0
1550
1551                                    ;*ITEM 55
1552 002132  042615                             EM55            ;W-BIT SET IN MORE THAN ONE PDR
1553 002134  045562                             DH55            ;PDR IN  PDR     VIRTUAL
1554                                                            ;ERROR   TESTED  ADDRESS TESTNO  ERRORPC
1555 002136  046504                             DT55            ;$REG0,$REG5,$REG3,TESTNO,$ERRPC,0
1556 002140  046534                             DF1             ;0,0,0,0,0
1557
1558                                    ;*ITEM 56
1559 002142  042654                             EM56            ;W-BIT NOT CLEARED BY WRITING TO PDR
1560 002144  045662                             DH56            ;PDR     TESTNO  ERRORPC
1561 002146  046520                             DT56            ;$REG5,TESTNO,$ERRPC,0
1562 002150  046555                             DF7             ;0,0,0
1563
1564                                    ;*ITEM 57
1565 002152  042720                             EM57            ;W-BIT GOT SET DURING ODD ADDR. ABORT
1566 002154  045712                             DH57            ;PDR WAS EXPECTD TESTNO  ERRORPC
1567 002156  046124                             DT15            ;$REG2,$REG1,TESTNO,$ERRPC,0
1568 002160  046551                             DF3             ;0,0,0,0
1569
1570                                    ;*ITEM 60
1571 002162  042765                             EM60            ;NO APT SPECIAL HARDWARE FOUND
1572 002164  045752                             DH60            ;ERRORPC
1573 002166  046530                             DT60            ;$ERRPC,0
1574 002170  046534                             DF1             ;0
```

```
                                        .SBTTL  TURN OFF T-BIT AND SAVE CURRENT PSW
                                        ;;*****************************************************************
                                        ;       *****   SUBROUTINES UNIQUE TO THIS PROGRAM    *****
                                        ;;*****************************************************************
                                        ;*
                                        ;*      THIS SUBROUTINE IS USED TO TURN OFF THE TRACE TRAP BIT IN
                                        ;*      THE PSW IF IT IS ON.  THE PROCESSOR STATUS IS SAVED IN
                                        ;*      'TBITPS'' SO THAT THE PSW CAN BE RESTORED TO ITS PREVIOUS
                                        ;*      CONDITION WHEN CONDITIONS WARRANT T-BIT TRAPPING.
                                        ;*
                                        ;;*****************************************************************
002172  033727  177776  000020  TOFF:   BIT     PSW,#TBIT       ;IS THE T-BIT SET IN THE PSW?
002200  001411                          BEQ     1$              ;EXIT IF NO
002202  013746  177776                  MOV     PSW,-(SP)       ;PUSH PRESENT PSW ON THE STACK
002206  011637  001272                  MOV     (SP),TBITPS     ;ALSO SAVE IT IN 'TBITPS'' FOR
                                                                ;RESTORING LATER
002212  042716  000020                  BIC     #TBIT,(SP)      ;CLEAR THE T-BIT (BIT 4) IN THE PSW
002216  012746  002224                  MOV     #1$,-(SP)       ;PUSH PC OF 'RTS'' ON STACK
002222  000006                          RTT                     ;'RETURN'' TO 1$ WITH T-BIT OFF
002224  000207                  1$:     RTS     PC              ;RETURN TO PROGRAM
```

```
                                        .SBTTL  TURN ON T-BIT AND RESTORE PREVIOUS PSW
                                        ;;*****************************************************************
                                        ;*
                                        ;*      THIS SUBROUTINE IS USED TO RESTORE THE PROCESSOR STATUS
                                        ;*      TO ITS PREVIOUS CONDITION BY RESTORING THE 'T-BIT PSW'
                                        ;*      SAVED BY THE 'TOFF' SUBROUTINE IN THE 'TBITPS' LOCATION.
                                        ;*
                                        ;;*****************************************************************
002226  033727  001272  000020  TON:    BIT     TBITPS,#TBIT    ;WAS T-BIT ON IN THE PREVIOUS PSW?
002234  001410                          BEQ     1$              ;EXIT IF NO
002236  013746  001272                  MOV     TBITPS,-(SP)    ;PUSH PREVIOUS PSW ON THE STACK
002242  012737  000340  001272          MOV     #340,TBITPS     ;RESET THE 'TBITPS' LOCATION
002250  012746  002256                  MOV     #1$,-(SP)       ;PUSH PC OF 'RTS' ON STACK
002254  000006                          RTT                     ;'RETURN' TO 1$ WITH T-BIT RESTORED
002256  000207                  1$:     RTS     PC              ;RETURN TO PROGRAM
```

CLEAR 16 PAR'S OR PDR'S STARTING FROM ADDRESS IN R5

```
                                .SBTTL  CLEAR 16 PAR'S OR PDR'S STARTING FROM ADDRESS IN R5
                                ;;*****************************************************************
                                ;*      THIS ROUTINE CLEARS 16 CONSECUTIVE MEMORY MANAGEMENT
                                ;*      REGISTERS STARTING WITH THE REGISTER POINTED TO BY R5.
                                ;*      IT SAVES R0 ON THE STACK, AND LOADS A COUNT IN R0,
                                ;*      CLEARS THE PAR'S OR PDR'S, AND THEN RESTORES R0
                                ;*      BEFORE RETURNING.
                                ;*
                                ;*      CALL:   MOV     #KIPAR0,R5      ;PUT ADDRESS OF FIRST KERNAL PAR INTO R5
                                ;*              JSR     PC,CLRREG       ;CLEAR ALL THE KERNAL PAR'S
                                ;;*****************************************************************

002260  010046          CLRREG: MOV     R0,-(KSP)       ;SAVE R0 ON THE STACK
002262  012700  000020          MOV     #20,R0          ;PUT COUNT IN R0
002266  005025          1$:     CLR     (R5)+           ;CLEAR PAR OR PDR POINTED TO BY R5
002270  077002                  SOB     R0,1$           ;BRANCH BACK 15 DECIMAL TIMES
002272  012600                  MOV     (KSP)+,R0       ;POP R0 FROM STACK
002274  000207                  RTS     PC              ;RETURN TO TEST
```

CLEANUP LOCATIONS THAT HOLD LOGICAL 'AND' AND 'OR'

```
                                        .SBTTL  CLEANUP LOCATIONS THAT HOLD LOGICAL 'AND' AND 'OR'
                                        ;;*****************************************************************
                                        ;*      THIS SUBROUTINE IS USED TO INITIALIZE ALL LOCATIONS THAT
                                        ;*      HOLD THE 'LOGICAL AND'' AND 'LOGICAL OR'' OF THE DATA AND
                                        ;*      ADDRESSES THAT FAILED DURING THE EXECUTION OF A TEST.
                                        ;;*****************************************************************

002276                                  CLEANUP:
002276  005037  001306                          CLR     DATAOR          ;LOCATION OF LOGICAL OR OF BAD DATA
002302  005037  001316                          CLR     ADDROR          ;LOCATION OF LOGICAL OR OF ADDRESS
002306  005037  001312                          CLR     PATTOR          ;LOCATION OF LOGICAL OR OF PATTERN LOADED
002312  012700  177777                          MOV     #-1,R0          ;LOAD -1 INTO R0 TO INITIALIZE
002316  010037  001310                          MOV     R0,DATAND       ;LOCATION OF LOGICAL AND OF BAD DATA
002322  010037  001320                          MOV     R0,ADRAND       ;LOCATION OF LOGICAL AND OF ADDRESS
002326  010037  001314                          MOV     R0,PATAND       ;LOCATION OF LOGICAL AND OF PATTERN LOADED
002332  000207                                  RTS     PC              ;RETURN TO TEST
```

```
                                        .SBTTL  DUAL ADDRESSING WHEN LOADING A PAR OR PDR
                                        ;;*****************************************************************
                                        ;*      THIS SUBROUTINE WILL LOG AND REPORT ALL DUAL ADDRESSING ERRORS
                                        ;*      FOUND IN BOTH PAR'S AND PDR'S.  A 'LOGICAL OR'' AND A 'LOGICAL
                                        ;*      AND'' OF THE WRITTEN ADDRESSES WILL BE MAINTAINED IN 'ADDROR',
                                        ;*      AND 'ADRAND'.  THE LOG ON THE ADDITIONAL OR FAILING ADDRESSES
                                        ;*      WILL BE MAINTAINED IN 'DATAOR' AND 'DATAND'.
                                        ;;*****************************************************************

002334                                  DUALADR:
002334  012637  001326                          MOV     (KSP)+,OLDPC    ;SAVE RETURN ADDRESS IN CASE OF LOOP
002340  050037  001316                          BIS     R0,ADDROR       ;LOGICAL OR OF WRITTEN ADDRESS
002344  030037  001320                          BIT     R0,ADRAND       ;LOGICAL AND OF WRITTEN ADDRESS
002350  050137  001306                          BIS     R1,DATAOR       ;LOGICAL OR OF DUALED DATA
002354  030137  001310                          BIT     R1,DATAND       ;LOGICAL AND OF DUALED DATA
002360  105737  001103                          TSTB    $ERFLG          ;SEE IF THIS IS FIRST ERROR
002364  001002                                  BNE     1$              ;BRANCH IF NOT FIRST ERROR
002366  104034                                  ERROR   +34
002370  000401                                  BR      2$              ;BRANCH TO EXIT
002372  104035                          1$:     ERROR   +35
002374  000177  176726                  2$:     JMP     @OLDPC          ;RETURN TO TEST
```

COUNT PATTERN ERRORS IN PAR'S OR PDR'S

```
                                        .SBTTL  COUNT PATTERN ERRORS IN PAR'S OR PDR'S
                                        ;;*****************************************************************
                                        ;*      THIS SUBROUTINE IS USED TO LOG AND REPORT THE COUNT PATTERN
                                        ;*      ERRORS OCCURRING WHEN TESTING THE PAR'S AND PDR'S.  THE
                                        ;*      ''LOGICAL OR'' AND ''LOGICAL AND'' OF VARIOUS DATA WILL BE
                                        ;*      MAINTAINED A FOLLOWS:
                                        ;*              1. ADDRESSES OF FAILED REGISTERS IN 'ADDROR' AND 'ADRAND'
                                        ;*              2. DATA FETCHED FROM REGISTERS IN 'DATAOR' AND 'DATAND'
                                        ;*              3. PATTERN LOADED INTO REGISTERS IN 'PATTOR' AND 'PATAND'.
                                        ;;*****************************************************************
002400                                  PARCOUNT:
002400  012637  001326                         MOV     (KSP)+,OLDPC    ;SAVE RETURN ADDRESS IN CASE OF LOOP
002404  050037  001316                         BIS     R0,ADDROR       ;LOGICAL OR OF FAILING ADDRESS
002410  030037  001320                         BIT     R0,ADRAND       ;LOGICAL AND OF FAILING ADDRESS
002414  050137  001312                         BIS     R1,PATTOR       ;LOGICAL OR OF PATTERN LOADED
002420  030137  001314                         BIT     R1,PATAND       ;LOGICAL AND OF PATTERN LOADED
002424  050237  001306                         BIS     R2,DATAOR       ;LOGICAL OR OF DATA FETCHED
002430  030237  001310                         BIT     R2,DATAND       ;LOGICAL AND OF DATA FETCHED
002434  105737  001103                         TSTB    $ERFLG          ;SEE IF THIS IS THE FIRST ERROR
002440  001002                               BNE     1$              ;BRANCH IF NOT FIRST ERROR
002442  104036                               ERROR   +36
002444  000401                               BR      2$              ;BRANCH TO EXIT
002446  104037                          1$:  ERROR   +37
002450  000177  176652                  2$:  JMP     @OLDPC          ;RETURN TO TEST
                                        ;*CALL:
                                        ;*      JSR     PC,$SIZE
                                        ;*      RETURN
                                        ;*$LSTAD WILL CONTAIN:
                                        ;*      WITH KT11 OPTION        -- LAST VIRTUAL ADDRESS OF THE LAST BANK
                                        ;*      WITHOUT KT11 OPTION     -- LAST ABSOLUTE ADDRESS OF AVAILABLE MEMORY
                                        ;*$LSTBK WILL CONTAIN THE LAST BANK AS A SAF
                                        ;*BIT07 = 0 DON'T USE MEMORY MANAGEMENT
                                        ;*      MUST BE SETUP BEFORE TH CALL
                                        ;*BIT15 = 0 DON'T HAVE MEMORY MANAGEMENT OPTION
                                        ;*      DETERMINED BY ROUTINE
                                        ;*$LSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
002454  010046                          $SIZE:  MOV     R0,-(SP)        ;;SAVE R0 ON THE STACK
002456  010146                                  MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
002460  010246                                  MOV     R2,-(SP)        ;;SAVE R2 ON THE STACK
002462  010346                                  MOV     R3,-(SP)        ;;SAVE R3 ON THE STACK
002464  013746  000004                         MOV     ERRVEC,-(SP)    ;;SAVE PRESENT ERROR VECTOR PS & PC
002470  013746  000006                         MOV     ERRVEC+2,-(SP)
002474  010600                               MOV     SP,R0           ;;SAVE THE STACK POINTER
                                        ;;SET THE ERRVEC PS TO THE PRESENT PS
002476  104400                               TRAP                    ;;PUSH OLD PSW AND PC ON STACK
002500  012637  000006                         MOV     (SP)+,ERRVEC+2  ;;SAVE THE PSW IN ERRVEC+2
002504  012701  003776                         MOV     #3776,R1        ;;SETUP ADDRESS
002510  105727                               TSTB    (PC)+           ;;USE MEMORY MANAGEMENT?
002512  000200                          $KT11:  .WORD   200             ;;SET TO USE MEMORY MANAGEMENT
002514  100070                               BPL     $CORE           ;;BR IF NO
002516  012737  002670  000004               MOV     #$KTNEX,ERRVEC  ;;SET FOR TIMEOUT
002524  005737  177572                       TST     SR0             ;;KT11 ARE YOU THERE?
002530  052737  100000  002512               BIS     #100000,$KT11   ;;YES--SET KT11 KEY
002536  012737  003330  000250               MOV     #MGMERR,MMVEC   ;;SET IN CASE OF ERROR
002544  012737  000340  000252               MOV     #340,MMVEC+2
002552  005046                               CLR     -(SP)           ;;INITIALIZE FOR ''PAR'' LOADING
002554  012702  172340                       MOV     #KIPAR0,R2      ;;ADDRESS OF FIRST ''PAR''
```

COUNT PATTERN ERRORS IN PAR'S OR PDR'S

```
002560  012703  000010                  MOV     #^D8,R3          ;;LOAD EIGHT 'PAR.'S'' AND EIGHT 'PDR.'S''
002564  012762  077406  177740  1$:     MOV     #77406,-40(R2)   ;;PDR = 4K, UP, READ/WRITE
002572  011622                          MOV     (SP),(R2)+       ;;LOAD 'PAR''
002574  062716  000200                  ADD     #200,(SP)        ;;UPDATE FOR NEXT 'PAR''
002600  077307                          SOB     R3,1$            ;;LOOP UNTIL ALL EIGHT ARE LOADED
002602  012742  177600                  MOV     #177600,-(R2)    ;;SETUP KIPAR7 FOR I/O
002606  005042                          CLR     -(R2)            ;;SETUP KIPAR6 FOR TESTING.
002610  012737  002626  000004          MOV     #2$,ERRVEC       ;;CATCH TIMEOUT IF NO SR3
002616  012737  000020  172516          MOV     #20,SR3          ;;ENABLE 22 BIT MODE
002624  000401                          BR      3$               ;;THIS PDP-11 HAS A SR3 REGISTER
002626  022626                  2$:     CMP     (SP)+,(SP)+      ;;CLEAN OFF TE STAC--NO SR3
002630  005237  177572          3$:     INC     SR0              ;;TURN ON MEMORY MANAGEMENT
002634  012737  002660  000004          MOV     #$KTOUT,ERRVEC   ;;SET FOR TIME OUT
002642  005737  143776          4$:     TST     143776           ;;TRAP ON NON-EX-MEM
002646  062712  000040                  ADD     #40,(R2)         ;;MAKE A 1K STEP
002652  023712  172356                  CMP     KIPAR7,(R2)      ;;LAST ONE?
002656  101371                          BHI     4$               ;;NO--TRY IT
002660  011202                  $KTOUT: MOV     (R2),R2          ;;GET LAST BANK+1
002662  005037  177572                  CLR     SR0              ;;TURN OFF MEMORY MANAGEMENT
002666  000421                          BR      $SIZEX
002670  042737  100000  002512  $KTNEX: BIC     #100000,$KT11    ;;KT11 NON-EXISTENT
002676  012737  002726  000004  $CORE:  MOV     #$CROUT,ERRVEC   ;;SET FOR TIMEOUT
002704  005002                          CLR     R2               ;;SET UP BANK
002706  062701  004000          1$:     ADD     #4000,R1         ;;INCREMENT BY 1K
002712  062702  000040                  ADD     #40,R2           ;;1K STEP
002716  005711                          TST     (R1)             ;;TRAP ON TIME OUT
002720  022701  177776                  CMP     #177776,R1       ;;LAST ONE
002724  001370                          BNE     1$               ;;NO--TRY AGAIN
002726  162701  004000          $CROUT: SUB     #4000,R1
002732  162702  000040          $SIZEX: SUB     #40,R2           ;;DROP BACK
002736  012737  002754  000004          MOV     #2$,ERRVEC       ;;SET FOR TIMEOUT
002744  012701  020000                  MOV     #20000,R1        ;;FIRST ADDRESS
002750  005721                  1$:     TST     (R1)+            ;;TEST AND STEP TO NEXT ADDRESS
002752  000776                          BR      1$               ;;TRY ANOTHER
002754  162701  000002          2$:     SUB     #2,R1            ;;DROP BACK
002760  010006                          MOV     R0,SP            ;;RESTORE THE STACK
002762  012637  000006                  MOV     (SP)+,ERRVEC+2   ;;RESTORE ERROR VECTOR
002766  012637  000004                  MOV     (SP)+,ERRVEC
002772  010137  003020                  MOV     R1,$LSTAD        ;;LAST ADDRESS
002776  010237  003022                  MOV     R2,$LSTBK        ;;LAST BANK
003002  012603                          MOV     (SP)+,R3         ;;RESTORE R3
003004  012602                          MOV     (SP)+,R2         ;;RESTORE R2
003006  012601                          MOV     (SP)+,R1         ;;RESTORE R1
003010  012600                          MOV     (SP)+,R0         ;;RESTORE R0
003012  005037  177766                  CLR     CPUERR           ;CLEAR THE ERROR REGISTER
003016  000207                          RTS     PC
003020  000000          $LSTAD: .WORD   0                ;;CONTAINS THE LAST ADDRESS
003022  000000          $LSTBK: .WORD   0                ;;CONTAINS THE LAST BANK
```

COUNT PATTERN ERRORS IN PAR'S OR PDR'S

```
1691 003024  005737  001206          TIMTST: TST     $TMP4           ;SEE IF THIS IS AN ERROR RETURN
1692 003030  001405                         BEQ     1$              ;BRANCH TO BEGIN IF NOT
1693 003032  022737  000001  001206         CMP     #1,$TMP4        ;SEE IF THIS IS THE 1ST ERROR CALL RETURN
1694 003040  001453                         BEQ     5$              ;GO CONTINUE AFTER 1ST ERROR CALL IF SO
1695 003042  000464                         BR      6$              ;GO CONTINUE AFTER 2ND ERROR CALL IF NOT
1696 003044  012737  003106  001110  1$:    MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1697 003052  012737  003146  000004         MOV     #4$,4           ;SET TIMEOUT VECTOR TO 4$
1698 003060  017600  000000                 MOV     @0(SP),R0       ;LOAD R0 WITH ADDRESS OF FIRST REG
1699 003064  012701  000020                 MOV     #20,R1          ;LOAD R1 WITH LOOP COUNT (16)
1700 003070  012737  177777  001320         MOV     #-1,ADRAND      ;INITIALIZE ''AND'' OF ADDR. LOC
1701 003076  005037  001316                 CLR     ADDROR          ;INITIALIZE ''OR'' OF ADR. LOC.
1702 003102  005037  001274                 CLR     TONUM           ;INITIALIZE ''TIMEOUTS'' COUNTER
1703 003106  005710                  2$:    TST     (R0)            ;TRY ADDRESSING A REGISTER, TIMEOUTS TO 5$
1704 003110  005720                  3$:    TST     (R0)+           ;PUT NEXT REGISTER ADDRESS IN R0
1705 003112  077103                         SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
1706 003114  012737  003024  001110         MOV     #TIMTST,$LPERR  ;RESET LOOP ON ERROR POINTER TO TIMTST
1707 003122  005737  001274                 TST     TONUM           ;DID ANY OF THE REGISTERS TIME OUT?
1708 003126  001433                         BEQ     7$              ;BRANCH IF NOT
1709 003130  011646                         MOV     (SP),-(SP)      ;MOVE AN EXTRA RETURN PC ONTO STACK FOR POSSIBLE ERROR LOOP
1710 003132  062716  000006                 ADD     #6,(SP)         ;FUDGE RETURN TO CALL 2ND ERROR
1711 003136  012737  000001  001206         MOV     #1,$TMP4        ;MOVE 1ST ERROR FLAG TO $TMP4
1712 003144  000207                         RTS     PC              ;RETURN TO CALL ERROR
1713 003146  062706  000004          4$:    ADD     #4,KSP          ;CLEAN UP THE STACK
1714 003152  012737  000002  001206         MOV     #2,$TMP4        ;MOVE 2ND ERROR FLAG TO $TMP4
1715 003160  011646                         MOV     (SP),-(SP)      ;MOVE AN EXTRA RETURN PC ONTO STACK FOR POSSIBLE ERROR LOOP
1716 003162  062716  000002                 ADD     #2,(SP)         ;FUDGE RETURN FOR 1ST ERROR CALL IN TEST
1717 003166  000207                         RTS     PC              ;RETURN TO CALL 2ND ERROR
1718 003170  005726                  5$:    TST     (SP)+           ;POP EXCESS RETURN OFF STACK - NO LOOP
1719 003172  010002                         MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
1720 003174  050237  001316                 BIS     R2,ADDROR       ;''OR'' IT WITH OTHER ADDRS. THAT TIMED OUT
1721 003200  005102                         COM     R2              ;''AND'' IT WITH OTHER ADDRS. THAT TIMED OUT
1722 003202  040237  001320                 BIC     R2,ADRAND
1723 003206  005237  001274                 INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
1724 003212  000736                         BR      3$              ;BRANCH BACK TO TEST THE NEXT REGISTER
1725 003214  005726                  6$:    TST     (SP)+           ;POP EXCESS RETURN OFF STACK - NO LOOP
1726 003216  012737  003232  000004  7$:    MOV     #TIMERR,4       ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
1727 003224  062716  000010                 ADD     #10,(SP)        ;FUDGE RETURN OVER BOTH ERROR CALLS
1728 003230  000207                         RTS     PC              ;RETURN TO TEST
```

```
                                .SBTTL  CPU TRAP HANDLER ROUTINE
                                ;;*****************************************************************
                                ;*      *****   TRAP HANDLING ROUTINES  *****
                                ;;*****************************************************************
                                ;*
                                ;*      THIS SUBROUTINE WILL HANDLE ALL CPU TRAPS AND ABORTS THRU
                                ;*      'ERRVEC'' (LOC. 004).  IF THIS SUBROUTINE IS ENTERED BY A
                                ;*      SECOND TRAP BEFORE THE FIRST HAS BEEN SERVICED, A HALT IS
                                ;*      EXECUTED.
                                ;*
                                ;;*****************************************************************
003232  005227                  TIMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
003234  177777                  TIMFLG: .WORD   -1              ;NEGATIVE ONE FOR 'HAVE ENTERED'' FLAG
003236  001401                          BEQ     1$              ;BRANCH IF FIRST TIME IN
003240  000000                          HALT                    ;STOP! - I'VE ENTERED THIS ROUTINE
                                                                ;A SECOND TIME BEFORE I FINISHED
                                                                ;REPORTING THE FIRST ERROR.  THE
                                                                ;SECOND ENTRY ADDRESS SHOULD BE ON
                                                                ;THE KERNEL STACK.
003242  012637  001260          1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
003246  012637  001262                  MOV     (KSP)+,TRAPS    ;SAVE PS AT TIME OF ABORT
003252  013737  177766  001332          MOV     CPUERR,PCPUER   ;SAVE CPU ERROR REGISTER
003260  010637  001256                  MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
003264  005737  001334                  TST     CPUEXP          ;SEE IF ANY ERROR CONDITION WAS EXPECTED
003270  001404                          BEQ     2$              ;BRANCH IF NO TRAP EXPECTED
003272  023737  001332  001334          CMP     PCPUER,CPUEXP   ;SEE IF EXPECTED CONDITION OCCURED
003300  001401                          BEQ     3$              ;BRANCH IF ERROR CODES MATCH
003302  104001                  2$:     ERROR   +1              ;UNEXPECTED TRAP OR ABORT TO LOC. 4
003304  005037  177766          3$:     CLR     CPUERR          ;CLEAR CPU ERROR REGISTER
003310  012737  177777  003234          MOV     #-1,TIMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
003316  013746  001262                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
003322  013746  001260                  MOV     TRAPPC,-(KSP)
003326  000006                          RTT                     ;RETURN FROM INTERRUPT OR ABORT
```

```
                                        .SBTTL  MEMORY MANAGEMENT TRAP HANDLER ROUTINE
                                        ;+*********************************************************************
                                        ;*
                                        ;*      THIS SUBROUTINE WILL HANDLE ALL UNEXPECTED MEMORY MANAGEMENT
                                        ;*      TRAPS AND ABORTS THRU 'MMVEC' (LOC. 250).  IF THIS SUBROUTINE IS
                                        ;*      ENTERED BY A SECOND TRAP BEFORE THE FIRST HAS BEEN SERVICED, A
                                        ;*      HALT IS EXECUTED.
                                        ;*
                                        ;-*********************************************************************
003330  005227                  MGMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
003332  177777                  MGMFLG: .WORD   -1              ;NEGATIVE ONE FOR 'HAVE ENTERED' FLAG
003334  001401                          BEQ     1$              ;BRANCH IF FIRST TIME IN
003336  000000                          HALT                    ;STOP! - I'VE ENTERED THIS ROUTINE
                                                                ;A SECOND TIME BEFORE I FINISHED
                                                                ;REPORTING THE FIRST ERROR.  THE
                                                                ;SECOND ENTRY ADDRESS SHOULD BE ON
                                                                ;THE KERNEL STACK.
003340  012637  001260          1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
003344  012637  001262                  MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
003350  010637  001256                  MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
003354  013737  177572  001264          MOV     SR0,WASSR0      ;SAVE CONTENTS OF KT STATUS REG. 0
003362  013737  177574  001266          MOV     SR1,WASSR1      ;SAVE CONTENTS OF KT STATUS REG. 1
003370  013737  177576  001270          MOV     SR2,WASSR2      ;SAVE CONTENTS OF KT STATUS REG. 2
003376  042737  160000  177572          BIC     #160000,SR0     ;CLEAR ERROR BITS IN STATUS REG 0
003404  104002                          ERROR   +2              ;UNEXPECTED TRAP OR ABORT TO LOC. 250
003406  012737  177777  003332          MOV     #-1,MGMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
003414  013746  001262                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
003420  013746  001260                  MOV     TRAPPC,-(KSP)
003424  000006                          RTT                     ;RETURN FROM INTERRUPT OR ABORT.
```

```
                                        .SBTTL  CONVERT VIRTUAL ADDRESS TO PHYSICAL ADDRESS
                                        ;*****************************************************************
                                        ;*
                                        ;*      THIS SUBROUTINE IS USED TO FORM AN 22-BIT PHYSICAL ADDRESS
                                        ;*      (PBA) FROM THE 16-BIT VIRTUAL ADDRESS (VBA) AND THE APPROPRIATE
                                        ;*      PAGE ADDRESS REGISTER (PAR).  THE SAME METHOD USED BY THE MEMORY
                                        ;*      MANAGEMENT LOGIC IS USED.  VBA <15:13> SELECTS WHICH PAR/PDR
                                        ;*      IS TO BE USED, VBA <5:0>+PBA <5:0>, AND VBA <12:6> IS ADDED
                                        ;*      TO PAR <15:00> TO GIVE PBA <21:6>.  BITS <21:16> OF THE
                                        ;*      PHYSICAL ADDRESS ARE LEFT IN LOC. "PBAHI" AND BITS <15:00>
                                        ;*      ARE LEFT IN LOC. "PBALO".  THE PSW'S "CURRENT MODE" BITS
                                        ;*      ARE USED TO SELECT THE KERNEL,SUPERVISOR OR USER PAR/PDR'S.
                                        ;*      THE ROUTINE IS ENTERED WITH LOC. "VIRT1" CONTAINING THE 16-BIT
                                        ;*      VIRTUAL ADDRESS.
                                        ;*
                                        ;*****************************************************************

003426  012702  172340          FORMPA: MOV     #KIPAR0,R2      ;LOAD ADDRESS OF FIRST KERNEL PAR IN R2
003432  032737  140000  177776          BIT     #140000,PSW     ;IN USER MODE?
003440  001403                        BEQ     1$              ;BRANCH IF NO
003442  012702  177640                MOV     #UIPAR0,R2      ;LOAD ADDRESS OF FIRST USER PAR IN R2
003446  000406                        BR      2$              ;BRANCH WHEN DONE
003450  032737  040000  177776  1$:   BIT     #40000,PSW      ;IN SUPERVISOR MODE?
003456  001402                        BEQ     2$              ;BRANCH IF NO
003460  012702  172240                MOV     #SIPAR0,R2      ;LOAD ADDRESS OF FIRST SUPERVISOR PAR IN R2
003464  013700  001276          2$:   MOV     VIRT1,R0        ;LOAD VIRTUAL ADDR. (VBA) INTO R0
003470  072027  177764                ASH     #-14,R0         ;GET BITS <15:13> DOWN TO BITS <3:1>
003474  042700  177761                BIC     #177761,R0      ;MASK OF ALL BITS BUT BITS <3:1>
003500  060002                        ADD     R0,R2           ;ADD OFFSET TO BASE PAR ADDRESS
003502  011200                        MOV     (R2),R0         ;GET BITS <15:00> FROM APPROPRIATE PAR
003504  010002                        MOV     R0,R2           ;COPY PAR BITS <15:00> INTO R2
003506  013737  001276  001302        MOV     VIRT1,PBALO     ;PUT VIRTUAL ADDR. IN LOC. "PBALO"
003514  042737  160000  001302        BIC     #160000,PBALO   ;CLEAR OFF BITS <15:13> OF ORIGINAL VBA
003522  072227  177766                ASH     #-12,R2         ;GET PAR <15:00> DOWN TO BITS <1:0> OF R2
003526  042702  177774                BIC     #177774,R2      ;CLEAR OFF ALL BITS BUT BITS <1:0>
003532  072027  000006                ASH     #6,R0           ;SHIFT PAR<9:0> TO <15:6> OF R0
003536  042700  000077                BIC     #77,R0          ;CLEAR BITS <5:0> OF R0
003542  060037  001302                ADD     R0,PBALO        ;IN EFFECT, ADD VBA<12:0> TO PAR<9:0>
                                                              ;(PAR<9:0> IN BITS <15:6> OF R0)
003546  005502                        ADC     R2              ;ADD ANY CARRY TO R2
003550  010237  001304                MOV     R2,PBAHI        ;PUT BITS <21:16> OF PHYSICAL ADDR. IN PBAHI
003554  000207                        RTS     PC              ;RETURN TO PROGRAM
```

PRE-DIAGNOSTIC SETUP

```
                                        .SBTTL  PRE-DIAGNOSTIC SETUP
                                ;;**************************************************************
                                ;       ***** STARTING ADDRESS IS 200 *****
                                ;;**************************************************************
            020000                      .=20000
020000                          START:
                                .SBTTL  INITIALIZE THE COMMON TAGS
                                ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
020000  012706  001100                  MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
020004  005026                          CLR     (R6)+           ;;CLEAR MEMORY LOCATION
020006  022706  001140                  CMP     #SWR,R6 ;;DONE?
020012  001374                          BNE     .-6             ;;LOOP BACK IF NO
020014  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
                                ;;INITIALIZE A FEW VECTORS
020020  012737  033020  000020          MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
020026  012737  000340  000022          MOV     #340,@#IOTVEC+2 ;;LEVEL 7
020034  012737  033246  000030          MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
020042  012737  000340  000032          MOV     #340,@#EMTVEC+2 ;;LEVEL 7
020050  012737  037144  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
020056  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
020064  012737  037232  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
020072  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
020100  013737  032570  032562          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
020106  005037  001212                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
020112  112737  000001  001115          MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
                                ;;INITIALIZE THE "T-BIT" TRAP VECTOR. THEN LOAD LOCATION "$RTRN", IN
                                ;;THE "END-OF-PASS" ($EOP) ROUTINE, WITH A "RTI" OR "RTT".
020120  012737  033006  000014          MOV     #$RTRN,@#TBITVEC ;;SET "T" BIT VECTOR TO $RTRN
020126  012737  000340  000016          MOV     #340,@#TBITVEC+2 ;;LEVEL 7
020134  012737  000002  033006          MOV     #RTI,$RTRN      ;;SET $RTRN TO A RTI
020142  012737  020170  000010          MOV     #65$,@#RESVEC   ;;TRY TO DO A RTT
020150  005046                          CLR     -(SP)           ;;DUMMY PS
020152  012746  020160                  MOV     #64$,-(SP)      ;;AND PC
020156  000006                          RTT                     ;;TRY THE RTT
020160  012737  000006  033006  64$:    MOV     #RTT,$RTRN      ;;RTT IS LEGAL--SET $RTRN TO A RTT
020166  000402                          BR      66$
020170  062706  000010          65$:    ADD     #10,SP          ;;RTT ILLEGAL--CLEAN OFF THE STACK
020174  012737  000012  000010  66$:    MOV     #RESVEC+2,@#RESVEC ;;RESTORE TRAP CATCHER
020202  005037  001346                  CLR     $TBIT           ;;CLEAR "T" BIT SWITCH
020206  012737  020206  001106          MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
020214  012737  020214  001110          MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
020222  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
020226  012737  020262  000004          MOV     #67$,@#ERRVEC   ;;SET UP ERROR VECTOR
020234  012737  177570  001140          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
020242  012737  177570  001142          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
020250  022777  177777  160662          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
020256  001012                          BNE     69$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                ;;AND  THE HARDWARE SWR IS NOT = -1
020260  000403                          BR      68$             ;;BRANCH IF NO TIMEOUT
020262  012716  020270          67$:    MOV     #68$,(SP)       ;;SET UP FOR TRAP RETURN
020266  000002                          RTI
020270  012737  000176  001140  68$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
020276  012737  000174  001142          MOV     #DISPREG,DISPLAY
020304  012637  000004          69$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
020310  005037  001232                  CLR     $PASS           ;;CLEAR PASS COUNT
```

```
INITIALIZE THE COMMON TAGS

        020314  132737  000200  001245          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
        020322  001403                          BEQ     70$             ;;YES,USE NON-APT SWITCH
        020324  012737  001246  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
        020332                          70$:
  1839                                  .SBTTL  TYPE PROGRAM NAME
                                        ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
        020332  005227  177777                  INC     #-1             ;;FIRST TIME?
        020336  001046                          BNE     71$             ;;BRANCH IF NO
        020340  022737  032742  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
        020346  001442                          BEQ     71$             ;;BRANCH IF YES
        020350  104401  020416                  TYPE    ,72$            ;;TYPE ASCIZ STRING
                                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
        020354  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
        020360  001012                          BNE     73$             ;;BRANCH IF YES
        020362  123727  001244  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
        020370  001406                          BEQ     73$             ;;BRANCH IF YES
        020372  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
        020400  001005                          BNE     74$             ;;BRANCH IF NO
        020402  104407                          GTSWR                   ;;GET SOFT-SWR SETTINGS
        020404  000403                          BR      74$
        020406  112737  000001  001134  73$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
        020414                          74$:
        020414  000417                          BR      71$             ;;GET OVER THE ASCIZ
                                        ;;72$:  .ASCIZ  <CRLF>#CKKTAB 11/44 MEM MGMT PRT A#<CRLF>
        020454                          71$:
  1840  020454                          LOOP:
  1841  020454  012706  001100                  MOV     #STACK,KSP      ;INITIALIZE THE STACK POINTER
  1842  020460  012737  003232  000004          MOV     #TIMERR,ERRVEC  ;LOAD CPU SERVICE ROUTINE INTO TRAP VECTOR
  1843  020466  012737  000340  000006          MOV     #340,ERRVEC+2   ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
  1844  020474  012737  003330  000250          MOV     #MGMERR,MMVEC   ;LOAD MEMORY MANAGENT ROUTINE INTO VECTOR
  1845  020502  012737  000340  000252          MOV     #340,MMVEC+2    ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
  1846  020510  012700  177777                  MOV     #-1,R0          ;PUT -1 INTO R0 TO INITIALIZE FLAGS
  1847  020514  010037  003234                  MOV     R0,TIMFLG       ;INITIALIZE CPU ERROR FLAG
  1848  020520  010037  003332                  MOV     R0,MGMFLG       ;INITIALIZE MEMORY MANAGEMENT ERROR FLAG
  1849  020524  012737  000340  001272          MOV     #340,TBITPS     ;INITIALIZE LOG THAT HOLDS T-BIT PSW
  1850  020532  005037  177572                  CLR     MMR0            ;BE SURE MEM. MGMT IS OFF TO START WITH
  1851  020536  005037  172516                  CLR     MMR3            ;MAKE SURE ALL MAPPING IS OFF
  1852  020542  005037  177766                  CLR     CPUERR          ;MAKE SURE CPU ERROR REG. IS CLEAR
  1853  020546  052737  000200  002512          BIS     #BIT7,$KT11     ;SET M.M. FLAG FOR SIZING ROUTINE
  1854  020554  004737  002454                  JSR     PC,$SIZE        ;RUN SIZING ROUTINE
  1855  020560  005037  177766                  CLR     CPUERR          ;CLEAR CPU ERROR REG. AFTER SIZING
```

```
                        .SBTTL  ADDRESS AND DATA PATHS TESTS
                ;;******************************************************************
                ;       GROUP 1         ADDRESS AND DATA PATHS TESTS
                ;;******************************************************************
```

TEST # 1 - PSW PRIORITY BIT TEST

```
1866                                    .SBTTL  TEST # 1 - PSW PRIORITY BIT TEST
                                        ;;*****************************************************************
                                        ;*TEST 1        PSW PRIORITY BIT TEST
                                        ;*
                                        ;*      THIS TEST READS AND WRITES THE PROCESSOR STATUS WORD <7:5> 'PRIORITY BITS'
                                        ;*      TO SEE THAT SOME OF THE BASIC 'DATA PATH' LOGIC IS WORKING.
                                        ;*
                                        ;*****************************************************************
     020564  000004                     TST1:   SCOPE
1867 020566  012737  020576  001110     1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1868 020574  005000                             CLR     R0              ;INITIALIZE R0 WITH PRIORITY=0 DATA
1869 020576  005001                     2$:     CLR     R1              ;PREPARE R1 TO ACCEPT DATA READ
1870 020600  010037  177776                     MOV     R0,PSW          ;WRITE PRIORITY BITS IN THE PSW
1871 020604  013701  177776                     MOV     PSW,R1          ;READ BACK THE LOW BYTE OF PSW
1872 020610  042701  177437                     BIC     #177437,R1      ;MASK OFF EVERYTHING EXCEPT PRIORITY BITS
1873 020614  020001                             CMP     R0,R1           ;WAS CORRECT PRIORITY SET IN THE PSW?
1874 020616  001401                             BEQ     3$              ;BRANCH IF YES
1875 020620  104003                             ERROR   +3              ;PRIORITY BITS SET WRONG IN PSW
1876                                                                    ;FOR TIGHTER SCOPE LOOP
1877                                                                    ;REPLACE ERROR CALL WITH
1878                                                                    ;'BR 2$' = 000770
1879 020622  062700  000040             3$:     ADD     #40,R0          ;CHANGE DATA TO NEXT PRIORITY
1880 020626  022700  000400                     CMP     #400,R0         ;HAVE PRIORITIES 0-7 ALL BEEN CHECKED?
1881 020632  001361                             BNE     2$              ;BRANCH IF NO
1882 020634  012737  020566  001110             MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
```

TEST # 2 - PSW MODE BIT TEST

```
                                        .SBTTL  TEST # 2 - PSW MODE BIT TEST
                                        ;;*****************************************************************
                                        ;*TEST 2         PSW MODE BIT TEST
                                        ;*      THIS TEST READS AND WRITES THE PROCESSOR STATUS WORD <15:12> 'MODE BITS''
                                        ;*      TO FURTHER CHECK THE BASIC CPU DATA PATHS
                                        ;*
                                        ;;*****************************************************************
 020642  000004                         TST2:   SCOPE
1889 020644  012737  020654  001110     1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1890 020652  005000                             CLR     R0              ;INITIALIZE R0 WITH MODE BITS = 0000
1891 020654  005037  177776             2$:     CLR     PSW             ;INITIALIZE PSW
1892 020660  050037  177776                     BIS     R0,PSW          ;BIT SET THE PSW MODE BITS WITH R0
1893 020664  013701  177776                     MOV     PSW,R1          ;READ BACK THE CONTENTS OF THE PSW
1894 020670  042701  007777                     BIC     #007777,R1      ;MASK OFF EVERYTHING EXCEPT THE MODE BITS
1895 020674  020001                             CMP     R0,R1           ;WERE THE MODE BITS SET CORRECTLY?
1896 020676  001403                             BEQ     3$              ;BRANCH IF YES
1897 020700  005037  177776                     CLR     PSW             ;CLEAR PSW FOR ERROR REPORT
1898 020704  104004                             ERROR   +4              ;MODE BITS SET WRONG IN PSW
1899                                                                     ;FOR TIGHTER SCOPE LOOP
1900                                                                     ;REPLACE ERROR CALL WITH
1901                                                                     ;'BR 2$'' = 000763
1902 020706  062700  010000             3$:     ADD     #10000,R0       ;CHANGE MODE BIT DATA
1903 020712  001360                             BNE     2$              ;BRANCH IF STILL MORE COMBINATIONS
1904 020714  012737  020644  001110             MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1905 020722  005037  177776                     CLR     PSW             ;RESET PSW BEFORE LEAVING
```

TEST # 3 - BYTE ADDRESSING TEST FOR PSW

```
                                        .SBTTL  TEST # 3 - BYTE ADDRESSING TEST FOR PSW
                                        ;;*****************************************************************
                                        ;*TEST 3        BYTE ADDRESSING TEST FOR PSW
                                        ;*
                                        ;*      THIS TEST WRITES THE HIGH AND LOW BYTES OF THE PROCESSOR STATUS WORD
                                        ;*      AND READS THEM BACK TO BE SURE THEY CAN BE WRITTEN INDEPENDENTLY.
                                        ;*      THIS CHECKS THE PSW PORTION OF THE ADDRESS DETECTION LOGIC.
                                        ;*
                                        ;;*****************************************************************
     020726  000004                     TST3:   SCOPE
1914 020730  012737  020736  001110     1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1915 020736  005037  177776             2$:     CLR     PSW             ;CLEAR THE PSW
1916 020742  012700  000360                     MOV     #360,R0         ;PUT THE HIGH BYTE DATA INTO R0
1917 020746  110037  177777                     MOVB    R0,PSW+1        ;WRITE THE HIGH BYTE OF THE PSW
1918 020752  013701  177776                     MOV     PSW,R1          ;READ BACK THE ENTIRE PSW
1919 020756  042701  007437                     BIC     #007437,R1      ;MASK OFF THE T & CC BITS
1920 020762  000300                             SWAB    R0              ;GET DATA WRITTEN IN HIGH BYTE OF R0
1921 020764  020001                             CMP     R0,R1           ;WAS THE PSW WRITTEN TO CORRECTLY
1922 020766  001403                             BEQ     3$              ;BRANCH IF YES
1923 020770  005037  177776                     CLR     PSW             ;CLEAR PSW FOR ERROR REPORT
1924 020774  104005                             ERROR   +5              ;LOW BYTE EFFECTED BY WRITE TO HIGH BYTE OF PSW
1925                                                                    ;FOR TIGHTER SCOPE LOOP
1926                                                                    ;REPLACE ERROR CALL WITH
1927                                                                    ;'BR 2$'' = 000760
1928 020776  012737  021004  001110     3$:     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
1929 021004  005037  177776             4$:     CLR     PSW             ;CLEAR THE PSW
1930 021010  012700  000340                     MOV     #340,R0         ;PUT THE LOW BYTE DATA INTO R0
1931 021014  110037  177776                     MOVB    R0,PSW          ;WRITE THE LOW BYTE OF THE PSW
1932 021020  013701  177776                     MOV     PSW,R1          ;READ BACK THE ENTIRE PSW
1933 021024  042701  007437                     BIC     #007437,R1      ;MASK OFF THE T&CC BITS
1934 021030  020001                             CMP     R0,R1           ;WAS PSW WRITTEN TO CORRECTLY
1935 021032  001403                             BEQ     5$              ;BRANCH IF YES
1936 021034  005037  177776                     CLR     PSW             ;CLEAR PSW FOR ERROR REPORT
1937 021040  104005                             ERROR   +5              ;HIGH BYTE EFFECTED BY WRITE TO LOW BYTE OF PSW
1938                                                                    ;FOR TIGHTER SCOPE LOOP
1939                                                                    ;REPLACE ERROR CALL WITH
1940                                                                    ;'BR 2$'' = 000736
1941 021042  012737  020730  001110     5$:     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
```

```
                                .SBTTL  TEST # 4 - TEST AND SETUP OF STACK POINTERS
                                ;*****************************************************************
                                ;*TEST 4         TEST AND SETUP OF STACK POINTERS
                                ;*
                                ;*      THIS TEST SETS THE USER AND KERNEL STACK POINTERS FOR THE
                                ;*      REST OF THE PROGRAM AND MAKES SURE THEY ARE INDEPENDENT OF
                                ;*      EACH OTHER.  KERNEL R6 IS SET TO 1100,SUPERVISOR R6 IS SET TO 700,
                                ;*      USER R6 IS SET TO 600, THEN KERNEL R6 IS READ TO BE SURE
                                ;*      IT'S STILL 1100.  THE SECOND PART OF THE TEST CHECKS TO SEE
                                ;*      THAT THE ILLEGAL MODE("10") STACK POINTER IS MAPPED TO THE
                                ;*      USER STACK POINTER, WITH MEMORY MANAGEMENT OFF.
                                ;*
                                ;*****************************************************************
    021050  000004              TST4:   SCOPE
1954 021052  005037  177572             CLR     MMR0            ;MAKE SURE M.M. IS OFF
1955 021056  005037  177776             CLR     PSW             ;GO TO KERNEL MODE
1956 021062  012706  001100             MOV     #KERSTK,KSP     ;SET KERNEL STACK POINTER TO 1100
1957 021066  012737  040000  177776     MOV     #40000, PSW     ;GO TO SUPERVISOR MODE
1958 021074  012706  000700             MOV     #SUPSTK,SSP     ;SET SUPERVISOR STACK POINTER TO 700
1959 021100  012737  140000  177776     MOV     #140000,PSW     ;GO TO USER MODE
1960 021106  012706  000600             MOV     #USESTK,USP     ;SET USER STACK POINTER TO 600
1961 021112  005037  177776             CLR     PSW             ;BACK TO KERNEL MODE
1962 021116  022706  001100             CMP     #KERSTK,KSP     ;IS KERNEL R6 STILL 1100?
1963 021122  000404                     BR      1$              ;BRANCH TO NEXT PART OF TEST
1964 021124  012700  001100             MOV     #KERSTK,R0      ;SAVE DATA WRITTEN FOR ERROR REPORT
1965 021130  010601                     MOV     KSP,R1          ;SAVE DATA READ AFTER USER R6 WAS WRITTEN
1966 021132  104006                     ERROR   +6              ;KERNEL R6 CHANGED BY WRITING USER R6
1967                                                            ;FOR TIGHTER SCOPE LOOP
1968                                                            ;REPLACE ERROR CALL WITH
1969                                                            ;000756
1970 021134  012737  021134  001110 1$:     MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
1971 021142  005037  177776             CLR     PSW             ;GO TO KERNAL MODE
1972 021146  012746  177777             MOV     #-1,-(KSP)      ;PUSH A -1 ONTO STACK
1973 021152  012737  040000  177776     MOV     #40000,PSW      ;GO TO SUPERVISOR MODE
1974 021160  012746  000001             MOV     #1,-(SSP)       ;PUSH A 1 ONTO THE STACK
1975 021164  012737  140000  177776     MOV     #140000,PSW     ;GO TO USER MODE
1976 021172  005046                     CLR     -(USP)          ;PUSH A ZERO ONTO THE STACK
1977 021174  012737  100000  177776     MOV     #100000,PSW     ;PUT ILLEGAL MODE IN PSW
1978 021202  011600                     MOV     (SP),R0         ;PUT TOP OF STACK INTO R0
1979 021204  001401                     BEQ     2$              ;WE'RE OK-GO TO NEXT TEST, JUMP OVER ERROR PRINT OUT
1980 021206  104040                     ERROR   +40             ;ILLEGAL MODE NOT MAPPED TO USER MODE
1981 021210  005037  177776         2$:     CLR     PSW             ;RESET PSW TO KERNEL BEFORE LEAVING
1982                                ;*****************************************************************
1983                                ;*
1984                                ;*      THE NEXT SEVEN (7) TESTS WILL TRY TO ADDRESS ALL OF THE
1985                                ;*      MEMORY MANAGEMENT REGISTERS (SR0->SR3; I&D SPACE KERNEL,
1986                                ;*      SUPERVISOR & USER PAR/PDR'S).
1987                                ;*      EVERY TIME A REGISTER TIMES OUT ITS ADDRESS WILL BE REPORTED.
1988                                ;*      AT THE END OF EACH TEST A SUMMARY OF THE ADDRESSES THAT TIMED
1989                                ;*      OUT DURING THAT TEST IS GIVEN.  THE RESULTS OF "AND-ING" AND "OR-ING"
1990                                ;*      THEIR ADDRESSES IS GIVEN TO SHOW WHICH ADDRESS LINES MAY BE
1991                                ;*      STUCK AT 0 OR 1.  THE PAR/PDR ADDRESS AND KT MUX'S ARE THE
1992                                ;*      THINGS BEING CHECKED.
1993                                ;*
1994                                ;*****************************************************************
```

TEST # 5 - SR0,SR1,SR2,SR3 TIMEOUT TEST

```
2002                                    .SBTTL  TEST # 5 - SR0,SR1,SR2,SR3 TIMEOUT TEST
                                        ;;*****************************************************************
                                        ;*TEST 5        SR0,SR1,SR2,SR3 TIMEOUT TEST
                                        ;*
                                        ;*      THIS TEST ADDRESSES THE MEMORY MANAGEMENT STATUS REGISTERS
                                        ;*      0,1,2, AND 3. DATA WILL BE WRITTEN OR READ FROM THESE REGISTERS
                                        ;*      IN LATER TESTS, THIS TEST JUST CHECKS FOR A RESPONSE.
                                        ;*
                                        ;*****************************************************************
     021214  000004                     TST5:   SCOPE
2003 021216  005037  177776                     CLR     PSW             ;MAKE SURE KERNAL MODE IS SELECTED
2004 021222  012737  021264  001110     1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
2005 021230  012737  021330  000004             MOV     #6$,4           ;SET TIMEOUT VECTOR TO 6$
2006 021236  012700  177572                     MOV     #SR0,R0         ;LOAD R0 WITH ADDRESS OF FIRST REG.
2007 021242  012701  000003                     MOV     #3,R1           ;LOAD R1 WITH THE LOOP COUNT
2008 021246  012737  177777  001320             MOV     #-1,ADRAND      ;INITIALIZE ''AND'' OF ADDRS. LOC.
2009 021254  005037  001316                     CLR     ADDROR          ;INITIALIZE ''OR'' OF ADDRS. LOC.
2010 021260  005037  001274                     CLR     TONUM           ;INITIALIZE ''TIMEOUTS'' COUNTER
2011 021264  005710                     2$:    TST     (R0)            ;TRY ADDRESSING A STATUS REGISTER
2012                                                                    ;IF IT TIMES OUT GO TO 6$
2013 021266  062700  000002             3$:    ADD     #2,R0           ;PUT NEXT ADDRESS IN R0
2014 021272  077104                             SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
2015 021274  012700  172516                     MOV     #SR3,R0         ;LOAD R0 WITH THE ADDRESS OF SR3
2016 021300  005710                             TST     (R0)            ;TRY ADDRESSING SR3
2017 021302  012737  021222  001110     4$:    MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2018 021310  005737  001274                     TST     TONUM           ;DID ANY OF THE STATUS REG.S TIMEOUT?
2019 021314  001401                             BEQ     5$              ;BRANCH IF NO
2020 021316  104010                             ERROR   +10             ;SUMMARY OF STATUS REG. TIMEOUTS
2021 021320  012737  003232  000004     5$:    MOV     #TIMERR,4       ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
2022 021326  000417                             BR      TST6            ;;GO TO NEXT TEST
2023 021330  062706  000004             6$:    ADD     #4,KSP          ;CLEAN UP THE STACK
2024 021334  104007                             ERROR   +7              ;ONE OF THE STATUS REGS. TIMED OUT
2025                                                                    ;FOR TIGHTER SCOPE LOOP
2026                                                                    ;REPLACE ERROR CALL WITH
2027                                                                    ;''BR 2$'' = 000756
2028 021336  010002                             MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
2029 021340  050237  001316                     BIS     R2,ADDROR       ;''OR'' IT WITH OTHER ADDRS. THAT TIMED OUT
2030 021344  005102                             COM     R2              ;''AND'' IT WITH OTHER ADDRS. THAT TIMED OUT
2031 021346  040237  001320                     BIC     R2,ADRAND
2032 021352  005237  001274                     INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
2033 021356  032700  172516                     BIT     #SR3,R0         ;TEST FOR LAST REGISTER
2034 021362  001347                             BNE     4$              ;SR3 IS LAST;GO TO FINAL ERROR REPORT
2035 021364  000740                             BR      3$              ;BRANCH BACK TO TEST THE NEXT ADDR.
```

TEST # 6 - KERNEL I&D SPACE PAR'S TIMEOUT TEST

```
2039                                    .SBTTL  TEST # 6 - KERNEL I&D SPACE PAR'S TIMEOUT TEST
                                        ;;*****************************************************************
                                        ;*TEST 6        KERNEL I&D SPACE PAR'S TIMEOUT TEST
                                        ;*      THIS TEST ADDRESSES THE SIXTEEN (16) KERNEL PAGE ADDRESS
                                        ;*      REGISTERS (KIPAR0-KIPAR7 AND KDPAR0-KDPAR7)
                                        ;*      AND CHECKS THAT SOMETHING RESPONDS TO THEIR ADDRESSES.
                                        ;;*****************************************************************
     021366  000004                     TST6:   SCOPE
2040 021370  004737  003024             1$:     JSR     PC,TIMTST       ;GO DO THE TEST ON PAGE OF THIS LISTING
2041 021374  172340                             .WORD   KIPAR0          ;PARAMETER USED FOR SUBROUTINE
2042 021376  104007                             ERROR   +7              ;RETURN IS HERE FOR 1ST ERROR - ONE OF THE REGISTERS
2043                                                                    ;TIMED OUT.  FOR TIGHTER SCOPE LOOP, REPLACE THE
2044                                                                    ;'MOV #1,$TMP4' INSTRUCTION IN THE SUBROUTINE WITH 000756
2045 021400  000773                             BR      1$              ;RETURN TO TEST
2046 021402  104010                             ERROR   +10             ;RETURN IS HERE FOR 2ND ERROR - SUMMARY OF REG TIMEOUTS
```

```
                                .SBTTL  TEST # 7 - KERNEL I&D SPACE PDR'S TIMEOUT TEST
                                ;;*****************************************************************
                                ;*TEST 7        KERNEL I&D SPACE PDR'S TIMEOUT TEST
                                ;*      THIS TEST ADDRESSES THE SIXTEEN (16) KERNEL PAGE DFSCRIPTOR
                                ;*      REGISTERS (KIPAR0-KIPAR7 AND KDPAR0-KDPAR7)
                                ;*      AND CHECKS THAT SOMETHING RESPONDS TO THEIR ADDRESSES.
                                ;;*****************************************************************
     021404  000004             TST7:   SCOPE
2051 021406  004737  003024     1$:     JSR     PC,TIMTST       ;GO DO THE TEST ON PAGE OF THIS LISTING
2052 021412  172300             .WORD   KIPDR0                  ;PARAMETER USED FOR SUBROUTINE
2053 021414  104007             ERROR   +7                      ;RETURN IS HERE FOR 1ST ERROR - ONE OF THE REGISTERS
2054                                                            ;TIMED OUT.  FOR TIHGTER SCOPE LOOP, REPLACE THE
2055                                                            ;'MOV #1,$TMP4' INSTRUCTION IN THE SUBROUTINE WITH 000756
2056 021416  000773             BR      1$                      ;RETURN TO TEST
2057 021420  104010             ERROR   +10                     ;RETURN IS HERE FOR 2ND ERROR - SUMMARY OF REG TIMEOUTS
```

```
2061                                    .SBTTL  TEST # 10 - SUPERVISOR I&D SPACE PAR'S TIMEOUT TEST
                                        ;;*****************************************************************
                                        ;*TEST 10       SUPERVISOR I&D SPACE PAR'S TIMEOUT TEST
                                        ;*      THIS TEST ADDRESSES THE SIXTEEN (16) SUPERVISOR PAGE ADDRESS
                                        ;*      REGISTERS (SIPAR0-SIPAR7 AND SDPAR0-SDPAR7)
                                        ;*      AND CHECKS THAT SOMETHING RESPONDS TO THEIR ADDRESSES.
                                        ;;*****************************************************************
     021422  000004                     TST10:  SCOPE
2062 021424  004737  003024             1$:     JSR     PC,TIMTST       ;GO DO THE TEST ON PAGE OF THIS LISTING
2063 021430  172240                             .WORD   SIPAR0          ;PARAMETER USED FOR SUBROUTINE
2064 021432  104007                             ERROR   +7              ;RETURN IS HERE FOR 1ST ERROR - ONE OF THE REGISTERS
2065                                                                    ;TIMED OUT.  FOR TIHGTER SCOPE LOOP, REPLACE THE
2066                                                                    ;'MOV #1,$TMP4' INSTRUCTION IN THE SUBROUTINE WITH 000756
2067 021434  000773                             BR      1$              ;RETURN TO TEST
2068 021436  104010                             ERROR   +10             ;RETURN IS HERE FOR 2ND ERROR - SUMMARY OF REG TIMEOUTS
```

```
2072                                    .SBTTL  TEST # 11 - SUPERVISOR I&D SPACE PDR'S TIMEOUT TEST
                                        ;;*****************************************************************
                                        ;*TEST 11       SUPERVISOR I&D SPACE PDR'S TIMEOUT TEST
                                        ;*      THIS TEST ADDRESSES THE SIXTEEN (16) SUPERVISOR PAGE DESCRIPTOR
                                        ;*      REGISTERS (SIPAR0-SIPAR7 AND SDPAR0-SDPAR7)
                                        ;*      AND CHECKS THAT SOMETHING RESPONDS TO THEIR ADDRESSES.
                                        ;;*****************************************************************
     021440  000004                     TST11:  SCOPE
2073 021442  004737  003024             1$:     JSR     PC,TIMTST       ;GO DO THE TEST ON PAGE OF THIS LISTING
2074 021446  172200                             .WORD   SIPDR0          ;PARAMETER USED FOR SUBROUTINE
2075 021450  104007                             ERROR   +7              ;RETURN IS HERE FOR 1ST ERROR - ONE OF THE REGISTERS
2076                                                                    ;TIMED OUT.  FOR TIGHTER SCOPE LOOP, REPLACE THE
2077                                                                    ;'MOV #1,$TMP4' INSTRUCTION IN THE SUBROUTINE WITH 000756
2078 021452  000773                             BR      1$              ;RETURN TO TEST
2079 021454  104010                             ERROR   +10             ;RETURN IS HERE FOR 2ND ERROR - SUMMARY OF REG TIMEOUTS
```

```
2083                                    .SBTTL  TEST # 12 - USER I&D SPACE PAR'S TIMEOUT TEST
                                        ;;*****************************************************************
                                        ;*TEST 12       USER I&D SPACE PAR'S TIMEOUT TEST
                                        ;*      THIS TEST ADDRESSES THE SIXTEEN (16) USER PAGE ADDRESS
                                        ;*      REGISTERS (UIPAR0-UIPAR7 AND UDPAR0-UDPAR7)
                                        ;*      AND CHECKS THAT SOMETHING RESPONDS TO THEIR ADDRESSES.
                                        ;;*****************************************************************
    021456  000004                      TST12:  SCOPE
2084 021460  004737  003024             1$:     JSR     PC,TIMTST       ;GO DO THE TEST ON PAGE OF THIS LISTING
2085 021464  177640                             .WORD   UIPAR0          ;PARAMETER USED FOR SUBROUTINE
2086 021466  104007                             ERROR   +7              ;RETURN IS HERE FOR 1ST ERROR - ONE OF THE REGISTERS
2087                                                                    ;TIMED OUT.  FOR TIHGTER SCOPE LOOP, REPLACE THE
2088                                                                    ;'MOV #1,$TMP4' INSTRUCTION IN THE SUBROUTINE WITH 000756
2089 021470  000773                             BR      1$              ;RETURN TO TEST
2090 021472  104010                             ERROR   +10             ;RETURN IS HERE FOR 2ND ERROR - SUMMARY OF REG TIMEOUTS
```

```
                                .SBTTL  TEST # 13 - USER I&D SPACE PDR'S TIMEOUT TEST
                                ;;*****************************************************************
                                ;*TEST 13       USER I&D SPACE PDR'S TIMEOUT TEST
                                ;*      THIS TEST ADDRESSES THE SIXTEEN (16) USER PAGE DESCRIPTOR
                                ;*      REGISTERS (UIPAR0-UIPAR7 AND UDPAR0-UDPAR7)
                                ;*      AND CHECKS THAT SOMETHING RESPONDS TO THEIR ADDRESSES.
                                ;;*****************************************************************
021474  000004                TST13:  SCOPE
2095 021476  004737  003024    1$:     JSR     PC,TIMTST       ;GO DO THE TEST ON PAGE OF THIS LISTING
2096 021502  177600                    .WORD   UIPDR0          ;PARAMETER USED FOR SUBROUTINE
2097 021504  104007                    ERROR   +7              ;RETURN IS HERE FOR 1ST ERROR - ONE OF THE REGISTERS
2098                                                            ;TIMED OUT.  FOR TIGHTER SCOPE LOOP, REPLACE THE
2099                                                            ;'MOV #2,$TMP4' INSTRUCTION IN THE SUBROUTINE WITH 000756
2100 021506  000773                    BR      1$              ;RETURN TO TEST
2101 021510  104010                    ERROR   +10             ;RETURN IS HERE FOR 2ND ERROR - SUMMARY OF REG TIMEOUTS
```

TEST # 14 - MMR0(15:13) BIT TEST & MMR2 TEST

```
                                .SBTTL  TEST # 14 - MMR0(15:13) BIT TEST & MMR2 TEST
                                ;;*****************************************************************
                                ;*TEST 14       MMR0(15:13) BIT TEST & MMR2 TEST
                                ;*
                                ;*      THIS TEST CHECKS BITS <15:13> OF MEMORY MANAGEMENT
                                ;*      REGISTER 0 TO SEE THAT EACH CAN BE SET AND CLEARED
                                ;*      AND THAT A 'RESET' WILL CLEAR ALL OF THEM.  A TEST
                                ;*      OF THESE THREE ERROR BITS CHECKS PART OF SR0, THE
                                ;*      SR0 MUX AND THE KTMUX.  THE REST OF THE BITS IN
                                ;*      SR0 WILL BE CHECKED LATER.
                                ;*      ALSO CHECK THAT SR2 IS TRACKING WITH MEM. MGMT.
                                ;*      OFF BUT LOCKS UP WHEN ANY OF SR0 ERROR BITS SET.
                                ;*
                                ;;*****************************************************************
     021512  000004             TST14:  SCOPE
2115 021514  012700  177572     1$:     MOV     #SR0,R0         ;LOAD ADDRESS OF SR0 INTO R0
2116 021520  012710  160000             MOV     #160000,(R0)    ;SET BITS <15:13> IN SR0 (ERROR BITS)
2117 021524  000005                     RESET                   ;ISSUE AND "INIT" SIGNAL
2118 021526  011001                     MOV     (R0),R1         ;READ SR0 INTO R1 TO SEE IF CLEAR
2119 021530  001404                     BEQ     2$              ;BRANCH IF SR0<15:13> CLEARED BY "INIT"
2120 021532  104011                     ERROR   +11             ;SR0<15:13> NOT CLEARED BY A 'RESET"
2121                                                             ;FOR TIGHTER SCOPE LOOP
2122                                                             ;REPLACE ERROR CALL WITH
2123                                                             ;"BR 1$" = 000770
2124 021534  012737  021542  001110         MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
2125 021542  013737  177576  001270 2$:     MOV     SR2,WASSR2      ;READ CONTENTS OF SR2
2126 021550  012701  021542             MOV     #2$,R1          ;LOAD EXPECTED CONTENTS INTO R1
2127 021554  020137  001270             CMP     R1,WASSR2       ;IS SR2 TRACKING?
2128 021560  001401                     BEQ     3$              ;BRANCH IF YES
2129 021562  104021                     ERROR   +21             ;SR2 NOT "TRACKING" VIRTUAL ADDRESSES
2130                                                             ;FOR TIGHTER SCOPE LOOP
2131                                                             ;REPLACE ERROR CALL WITH
2132                                                             ;"BR 2$" = 000767
2133 021564  012737  021602  001110 3$:     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2134 021572  012701  100000             MOV     #BIT15,R1       ;PUT DATA TO BE WRITTEN IN R1
2135 021576  012703  000003             MOV     #3,R3           ;SETUP R3 AS A LOOP COUNTER
2136 021602  005010                 4$: CLR     (R0)            ;CLEAR SR0
2137 021604  050110                 5$: BIS     R1,(R0)         ;SET ONE OF THE ERROR BITS IN SR0
2138 021606  011002                     MOV     (R0),R2         ;READ SR0 INTO R2
2139 021610  020102                     CMP     R1,R2           ;DID RIGHT ERROR BIT GET SET?
2140 021612  001401                     BEQ     6$              ;BRANCH IF YES
2141 021614  104012                     ERROR   +12             ;BITS WERE SET WRONG IN SR0
2142                                                             ;FOR TIGHTER SCOPE LOOP
2143                                                             ;REPLACE ERROR CALL WITH
2144                                                             ;"BR 4$" = 000772
2145 021616  012704  021604         6$: MOV     #5$,R4          ;LOAD EXPECTED CONTENTS OF SR2 IN R4
2146 021622  013737  177576  001270     MOV     SR2,WASSR2      ;READ SR2
2147 021630  020437  001270             CMP     R4,WASSR2       ;DID SR2 LOCK UP WHEN ERROR
2148                                                             ;BIT SET IN SR1?
2149 021634  001401                     BEQ     7$              ;BRANCH IF YES
2150 021636  104027                     ERROR   +27             ;SR2 DID NOT LOCK UP
2151                                                             ;FOR TIGHTER SCOPE LOOP
2152                                                             ;REPLACE ERROR CALL WITH
2153                                                             ;"BR 4$" = 000761
2154 021640  006001                 7$: ROR     R1              ;CHANGE DATA TO CHECK NEXT ERROR BIT
2155 021642  077321                     SOB     R3,4$           ;LOOP BACK UNTIL <15:13> ALL TESTED
2156 021644  005010                     CLR     (R0)            ;CLEAR SR0 BEFORE LEAVING
```

TEST # 14 - MMR0(15:13) BIT TEST & MMR2 TEST

```
   2157 021646  012737  021514  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
```

```
2167                                    .SBTTL  TEST # 15 - SR0 & PSW DUAL ADDRESSING TEST
                                        ;*****************************************************************
                                        ;*TEST 15       SR0 & PSW DUAL ADDRESSING TEST
                                        ;*
                                        ;*      THIS TEST CHECKS MORE OF THE ADDRESS DETECTION LOGIC BY
                                        ;*      VERIFYING THAT STATUS REGISTER 0 IS NOT EFFECTED BY WRITING
                                        ;*      TO THE PSW AND THAT THE LOW BYTE OF STATUS REGISTER 0
                                        ;*      IS NOT EFFECTED BY WRITING TO ITS HIGH BYTE.  THIS IS TO
                                        ;*      SEE IF ADJACENT OUTPUTS ARE SHORTED ON THE ADDRESS DET. LOGIC.
                                        ;*
                                        ;*****************************************************************
     021654  000004                     TST15:  SCOPE
2168 021656  005037  177776             1$:     CLR     PSW             ;CLEAR THE PSW
2169 021662  005037  177572                     CLR     SR0             ;CLEAR STATUS REGISTER 0
2170 021666  012737  000340  177776             MOV     #340,PSW        ;SET PRIORITY 7 IN LOW BYTE OF PSW
2171 021674  013700  177572                     MOV     SR0,R0          ;READ STATUS REGISTER 0
2172 021700  001401                             BEQ     2$              ;BRANCH IF IT WAS STILL 0
2173 021702  104013                             ERROR   +13             ;SR0 EFFECTED BY A WRITE TO THE PSW
2174                                                                     ;FOR TIGHTER SCOPE LOOP
2175                                                                     ;REPLACE ERROR CALL WITH
2176                                                                     ;'BR 1$'' = 000767
2177 021704  005037  177572             2$:     CLR     SR0             ;BE SURE SR0 IS 0 BEFORE LEAVING
2178 021710  005037  177776                     CLR     PSW             ;BE SURE PSW IS 0 BEFORE LEAVING
```

```
2191                                    .SBTTL  TEST # 16 - BIT TEST OF MEMORY MANAGMENT REGISTER 1
                                        ;;*****************************************************************
                                        ;*TEST 16       BIT TEST OF MEMORY MANAGMENT REGISTER 1
                                        ;*THIS TEST WILL CAUSE BITS IN MMR1 TO BE LOCKED BY SETTING BITS <15:13>
                                        ;*IN MMR0.  THE REGISTER ONLY GETS CLOCKED ON AN INSTRUCTION THAT AUTO
                                        ;*INCREMENTS OR AUTO DECREMENTS A REGISTER.  THE LOWER BYTE IS ALWAYS CLOCKED
                                        ;*FIRST AND THE UPPER BYTE IS ONLY CLOCKED IF BOTH SOURCE AND DESTINATION
                                        ;*AUTO INCREMENT OR DECREMENT A REGISTER.
                                        ;*ALL COUNTS (+1,-1,+2,-2) THAT CAN BE GENERATED ARE CLOCKED INTO THE HIGH
                                        ;*AND LOW BYTES. ALL REGISTER NUMBERS ARE GENERATED, INCLUDING ALL THREE
                                        ;*R6'S, AND ALL THE BITS THAT HOLD THE REGISTER NUMBER IN BOTH BYTES
                                        ;*ARE TESTED;  HOWEVER, ALL REGISTER NUMBERS ARE CLOCKED INTO BOTH HIGH AND
                                        ;*LOW BYTES, BUT ENOUGH ARE USED TO TEST THE LOGIC.
                                        ;;*****************************************************************
     021714  000004                     TST16:  SCOPE
2192 021716  012700  177574             20$:    MOV     #MMR1,R0        ;PUT ADDRESS OF MMR1 INTO R0
2193 021722  012704  020000                     MOV     #BIT13,R4       ;SET READ ONLY BIT IN R4
2194 021726  012737  021734  001110             MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
2195 021734  012737  100000  177572     11$:    MOV     #BIT15,MMR0     ;LOCK UP MMR1 LOW BYTE 027,HIGH BYTE 027
2196                                                                     ;WORD-013427
2197 021742  012703  013427                     MOV     #013427,R3      ;PUT EXPECTED DATA IN R3
2198 021746  011001                             MOV     (R0),R1         ;READ MMR1 INTO R1
2199 021750  020103                             CMP     R1,R3           ;SEE IF DATA MATCHES
2200 021752  001401                             BEQ     10$             ;BRANCH IF DATA MATCHES
2201 021754  104014                             ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2202 021756  012737  021764  001110     10$:    MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
2203 021764  000005                     12$:    RESET                   ;ISSUE INIT
2204 021766  011001                             MOV     (R0),R1         ;SEE IF MMR1 IS CLEARED
2205 021770  001401                             BEQ     1$              ;BRANCH IF MMR1 IS ZERO
2206 021772  104011                             ERROR   +11             ;CAN'T CLEAR MMR1
2207 021774  012737  022002  001110     1$:     MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2208 022002  012702  177572             13$:    MOV     #MMR0,R2        ;PUT ADDRESS OF MMR0 INTO R2
2209 022006  012722  040000                     MOV     #BIT14,(R2)+    ;LOCK UP MMR1-LOWER BYTE 027
2210                                                                     ;UPPER BYTE 022-WORD 011027
2211 022012  011001                             MOV     (R0),R1         ;READ MMR1
2212 022014  012703  011027                     MOV     #011027,R3      ;PUT EXPECTED DATA IN R3
2213 022020  020103                             CMP     R1,R3           ;SEE IF DATA MATCHES
2214 022022  001401                             BEQ     2$              ;BRANCH IF DATA MATCHES
2215 022024  104014                             ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2216 022026  005037  177572             2$:     CLR     MMR0            ;CLEAR MMR0
2217 022032  012737  022040  001110             MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
2218 022040  012702  177574             14$:    MOV     #MMR0+2,R2      ;PUT ADDRESS OF MMR0 PLUS 2 IN R2
2219 022044  010442                             MOV     R4,-(R2)        ;LOCK UP MMR1-LOWER BYTE 000
2220                                                                     ;UPPER BYTE 362-WORD 171000
2221 022046  011001                             MOV     (R0),R1         ;READ MMR1
2222 022050  012703  171000                     MOV     #171000,R3      ;PUT EXPECTED DATA IN R3
2223 022054  020103                             CMP     R1,R3           ;SEE IF DATA MATCHES
2224 022056  001401                             BEQ     3$              ;BRANCH IF DATA MATCHES
2225 022060  104014                             ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2226 022062  005012                     3$:     CLR     (R2)            ;CLEAR MMR0
2227 022064  012737  022072  001110             MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
2228 022072  012705  177573             15$:    MOV     #MMR0+1,R5      ;PUT ADDRESS OF MMR0'S UPPER BYTE IN R5
2229 022076  012701  001343                     MOV     #READON+1,R1    ;PUT ADDRESS OF READ ONLY BIT <13> IN R1
2230 022102  112125                             MOVB    (R1)+,(R5)+     ;LOCK UP MMR1-LOWER BYTE 011
2231                                                                     ;UPPER BYTE 015-WORD 006411
2232 022104  011001                             MOV     (R0),R1         ;READ MMR1
2233 022106  012703  006411                     MOV     #006411,R3      ;PUT EXPECTED DATA IN R3
```

```
2234 022112  020103                        CMP     R1,R3           ;SEE IF DATA MATCHES
2235 022114  001401                        BEQ     4$              ;BRANCH IF DATA MATCHES
2236 022116  104014                        ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2237 022120  005012                 4$:    CLR     (R2)            ;CLEAR MMR0
2238 022122  012737  022130  001110        MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2239 022130  012701  177574         16$:   MOV     #MMR0+2,R1      ;PUT ADDRESS OF MMR0'S UPPER BYTE
2240                                                                ;PLUS 1 IN R1
2241 022134  012705  001344                MOV     #READON+2,R5    ;PUT ADDRESS OF READ ONLY BIT <13>
2242                                                                ;PLUS 2 IN R5
2243 022140  114541                        MOVB    -(R5),-(R1)     ;LOCK UP MMR1-LOWER BYTE 375
2244                                                                ;UPPER BYTE 371-WORD 174775
2245 022142  011001                        MOV     (R0),R1         ;READ MMR1
2246 022144  012703  174775                MOV     #174775,R3      ;PUT EXPECTED DATA IN R3
2247 022150  020103                        CMP     R1,R3           ;SEE IF DATA MATCHES
2248 022152  001401                        BEQ     5$              ;BRANCH IF DATA MATCHES
2249 022154  104014                        ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2250 022156  005012                 5$:    CLR     (R2)            ;CLEAR MMR0
2251 022160  012737  022200  001110        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2252 022166  012737  040000  177776        MOV     #40000,PSW      ;SET SUPERVISOR MODE
2253 022174  010637  001176                MOV     SSP,$TMP0       ;SAVE SUPERVISOR STACK POINTER
2254 022200  012706  177574         17$:   MOV     #MMR0+2,SSP     ;PUT ADDRESS OF MMR0+2 IN SSP
2255 022204  012746  040000                MOV     #40000,-(SSP)   ;LOCK UP MMR1-LOWER BYTE 027
2256                                                                ;UPPER BYTE 366-WORD 173027
2257 022210  011001                        MOV     (R0),R1         ;READ MMR1
2258 022212  012703  173027                MOV     #173027,R3      ;PUT EXPECTED DATA IN R3
2259 022216  020103                        CMP     R1,R3           ;SEE IF DATA MATCHES
2260 022220  001401                        BEQ     6$              ;BRANCH IF DATA MATCHES
2261 022222  104014                        ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2262 022224  013706  001176         6$:    MOV     $TMP0,SSP       ;RESTORE THE SUPERVISOR STACK POINTER
2263 022230  005012                        CLR     (R2)            ;CLEAR MMR0
2264 022232  012737  022252  001110        MOV     #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
2265 022240  012737  140000  177776        MOV     #140000,PSW     ;SET USER MODE
2266 022246  010637  001176                MOV     USP,$TMP0       ;SAVE USER STACK POINTER
2267 022252  012706  177572         18$:   MOV     #MMR0,USP       ;PUT ADDRESS OF MMR0 IN USP
2268 022256  012726  100000                MOV     #100000,(USP)+  ;LOCK UP MMR1-LOWER BYTE 027
2269                                                                ;UPPER BYTE 026-WORD 013027
2270 022262  011001                        MOV     (R0),R1         ;READ MMR1
2271 022264  012703  013027                MOV     #013027,R3      ;PUT EXPECTED DATA IN R3
2272 022270  020103                        CMP     R1,R3           ;SEE IF DATA MATCHES
2273 022272  001401                        BEQ     7$              ;BRANCH IF DATA MATCHES
2274 022274  104014                        ERROR   +14             ;MMR1 DID NOT TRACK PROPERLY
2275 022276  013706  001176         7$:    MOV     $TMP0,USP       ;RESTORE THE USER STACK POINTER
2276 022302  005037  177776                CLR     PSW             ;GO BACK TO KERNAL MODE
2277 022306  005037  177572                CLR     MMR0            ;LET ALL MEM MGT REG'S TRACK
2278 022312  012737  021716  001110        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
```

TEST # 17 - BIT TEST OF MEMORY MANAGEMENT REGISTER 3

```
                                .SBTTL  TEST # 17 - BIT TEST OF MEMORY MANAGEMENT REGISTER 3
                                ;;*****************************************************************
                                ;*TEST 17       BIT TEST OF MEMORY MANAGEMENT REGISTER 3
                                ;*       THIS TEST SETS AND CLEARS BITS <05:04> AND <02:00> OF MMR3. IT DOES
                                ;*       NOT TEST THAT THE BITS FUNCTION PROPERLY SINCE THAT REQUIRES MORE
                                ;*       LOGIC;  HOWEVER, IT TESTS THE REGISTER AND THE DATA PATH TO AND FROM
                                ;*       THE REGISTER.  THE PROPER FUNCTIONING OF THESE BITS IS TESTED LATER
                                ;*       IN SEVERAL TESTS.
                                ;;*****************************************************************
 022320  000004                TST17:  SCOPE
2287 022322  012700  172516    20$:    MOV     #MMR3,R0        ;PUT ADDRESS OF MMR3 IN R0
2288 022326  012702  000001            MOV     #1,R2           ;SET BIT TO FLOAT THRU MMR3
2289 022332  005010                    CLR     (R0)            ;CLEAR MMR3
2290 022334  111001                    MOVB    (R0),R1         ;READ MMR3 INTO R1
2291 022336  001401                    BEQ     5$              ;BRANCH IF ZERO
2292 022340  104011                    ERROR   +11             ;CAN'T CLEAR MMR3
2293 022342  012703  000006    5$.     MOV     #6,R3           ;SET UP LOOP COUNT
2294 022346  012737  022354  001110    MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2295 022354  010210            1$:     MOV     R2,(R0)         ;LOAD MMR3
2296 022356  011001                    MOV     (R0),R1         ;READ MMR3 INTO R1
2297 022360  120201                    CMPB    R2,R1           ;DOES DATA MATCH PATTERN?
2298 022362  001401                    BEQ     2$              ;BRANCH IF IT MATCHES
2299 022364  104015                    ERROR   +15             ;MMR3 HAS WRONG DATA
2300 022366  006302            2$:     ASL     R2              ;LEFT SHIFT DATA PATTERN
2301 022370  077307                    SOB     R3,1$           ;BRANCH BACK IF R3 NOT 0
2302 022372  012702  000077            MOV     #77,R2          ;PUT DATA PATTERN IN R2
2303 022376  012737  022404  001110    MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
2304 022404  010210            12$:    MOV     R2,(R0)         ;TRY TO SET ALL BITS IN MMR3
2305 022406  011001                    MOV     (R0),R1         ;READ MMR3 INTO R1
2306 022410  120201                    CMPB    R2,R1           ;SEE IF ALL BITS GOT SET
2307 022412  001401                    BEQ     3$              ;BRANCH IF ALL WERE SET
2308 022414  104015                    ERROR   +15             ;MMR3 HAS WRONG DATA
2309 022416  012737  022424  001110    MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
2310 022424  000005            13$:    RESET                   ;ISSUE AN INIT
2311 022426  111002                    MOVB    (R0),R2         ;READ MMR3 INTO R2
2312 022430  001401                    BEQ     4$              ;BRANCH IF MMR3 CLEARED
2313 022432  104011                    ERROR   +11             ;CAN'T CLEAR MMR3
2314 022434  012737  022322  001110    MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
```

```
                        .SBTTL  PAR AND PDR TESTS
                        ;;*****************************************************************
                        ;       GROUP 2  PAR AND PDR TESTS
                        ;;*****************************************************************
```

```
                                        .SBTTL  TEST # 20 - DUAL ADDRESS KERNAL PAR'S,ON LOADING
                                        ;;*****************************************************************
                                        ;*TEST 20       DUAL ADDRESS KERNAL PAR'S,ON LOADING
                                        ;*
                                        ;*THIS TEST FIRST CLEARS ALL THE KERNAL PAGE ADDRESS REGISTERS,
                                        ;*AND CHECKS TO SEE THAT THEY EACH HOLD ZERO.  THEN, STARTING
                                        ;*WITH I-SPACE ADDRESS REGISTER ZERO, ONE REGISTER AT A TIME IS
                                        ;*LOADED WITH A NEGATIVE ONE.  ALL KERNAL ADDRESS REGISTERS ARE
                                        ;*NOW READ TO SEE THAT ONLY THE ONE UNDER TEST IS NON-ZERO.
                                        ;*INDIVIDUAL ERRORS ARE REPORTED AND A SUMMARY OF THEM IS GIVEN
                                        ;*AT THE END OF THIS TEST.
                                        ;;*****************************************************************
022442  000004                          TST20:  SCOPE
2333 022444  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE THE ERROR LOCATIONS
     022450  012737  022476  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     022456  012705  172340                     MOV     #KIPAR0,R5      ;PUT ADDRESS OF FIRST PAR IN R5
     022462  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     022466  012700  172340                     MOV     #KIPAR0,R0      ;PUT ADDRESS OF FIRST PAR IN R0
     022472  012701  000020                     MOV     #20,R1          ;BRANCH COUNT IS 16 DECIMAL
     022476  011002                  1$:        MOV     (R0),R2         ;READ PAR TO R2
     022500  001401                             BEQ     2$              ;BRANCH IF PAR IS 0
     022502  104030                             ERROR   +30             ;PAR NOT ZERO
     022504  062700  000002          2$:        ADD     #2,R0           ;POINT TO NEXT REGISTER
     022510  077106                             SOB     R1,1$           ;BRANCH BACK TO 1$ 15 TIMES
                                        ;NOW START DUAL ADDRESSING TEST BY LOADING -1 INTO ONE REGISTER AND
                                        ;READING THE REST TO SEE ONLY THAT REGISTER IS NON ZERO. (ANY
                                        ;DROPPED BITS WILL BE FOUND IN THE NEXT TEST).
     022512  012737  0225[illegible]  001110         MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     022520  012700  172340                     MOV     #KIPAR0,R0      ;PUT ADDRESS OF FIRST PAR IN R0
     022524  012705  172340          3$:        MOV     #KIPAR0,R5      ;LOAD STARTING ADDRESS INTO R5
     022530  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     022534  012701  172376                     MOV     #KDPAR7,R1      ;PUT KDPAR7 ADDRESS INTO R1
     022540  012710  177777                     MOV     #-1,(R0)        ;LOAD REGISTER UNDER TEST
     022544  005037  001176          4$:        CLR     $TMP0           ;FLAG TO INDICATE THERE WAS A MATCH
     022550  011102                             MOV     (R1),R2         ;READ ALL REGISTERS
     022552  001406                             BEQ     6$              ;BRANCH IF REGISTER IS 0
     022554  020001                             CMP     R0,R1           ;IS THE ADDRESS OF NON-ZERO REGISTER THE SAME
                                                                        ;AS THE REGISTER UNDER TEST?
     022556  001402                             BEQ     5$              ;BRANCH IF ADDRESSES MATCH
     022560  004737  002334                     JSR     PC,DUALADR      ;LOG AND REPORT ERRORS
     022564  005237  001176          5$:        INC     $TMP0           ;SET FLAG WHEN ADDRESSES MATCH
     022570  162701  000002          6$:        SUB     #2,R1           ;POINT TO NEXT REGISTER
     022574  022701  172340                     CMP     #KIPAR0,R1      ;SEE IF ALL REGISTERS HAVE BEEN READ
     022600  101761                             BLOS    4$              ;BRANCH IF MORE TO READ
     022602  062700  000002                     ADD     #2,R0           ;NOW LOAD THE NEXT REGISTER
     022606  022700  172376                     CMP     #KDPAR7,R0      ;SEE IF THERE ARE MORE REGISTERS TO TEST
     022612  103344                             BHIS    3$              ;BRANCH IF MORE REGISTERS TO TEST
     022614  012737  022444  001110             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
     022622  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     022626  000404                             BR      TST21           ;;BRANCH TO NEXT TEST IF NO ERRORS
     022630  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR PAR OUT
     022636  104031                             ERROR   +31             ;;SUMMARY OF DUAL ADDRESS TEST
```

TEST # 21 - DUAL ADDRESS SUPERVISOR PAR'S,ON LOADING

```
2337                                    .SBTTL  TEST # 21 - DUAL ADDRESS SUPERVISOR PAR'S,ON LOADING
                                        ;;*****************************************************************
                                        ;*TEST 21       DUAL ADDRESS SUPERVISOR PAR'S,ON LOADING
                                        ;*
                                        ;*THIS TEST FIRST CLEARS ALL THE SUPERVISOR PAGE ADDRESS REGISTERS,
                                        ;*AND CHECKS TO SEE THAT THEY EACH HOLD ZERO.  THEN, STARTING
                                        ;*WITH I-SPACE ADDRESS REGISTER ZERO, ONE REGISTER AT A TIME IS
                                        ;*LOADED WITH A NEGATIVE ONE.  ALL SUPERVISOR ADDRESS REGISTERS ARE
                                        ;*NOW READ TO SEE THAT ONLY THE ONE UNDER TEST IS NON-ZERO.
                                        ;*INDIVIDUAL ERRORS ARE REPORTED AND A SUMMARY OF THEM IS GIVEN
                                        ;*AT THE END OF THIS TEST.
                                        ;;*****************************************************************
 022640  000004                         TST21:  SCOPE
2338 022642  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE THE ERROR LOCATIONS
 022646  012737  022674  001110                 MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
 022654  012705  172240                         MOV     #SIPAR0,R5      ;PUT ADDRESS OF FIRST PAR IN R5
 022660  004737  002260                         JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
 022664  012700  172240                         MOV     #SIPAR0,R0      ;PUT ADDRESS OF FIRST PAR IN R0
 0226 0  012701  000020                         MOV     #20,R1          ;BRANCH COUNT IS 16 DECIMAL
 022674  011002                         1$:     MOV     (R0),R2         ;READ PAR TO R2
 022676  001401                                 BEQ     2$              ;BRANCH IF PAR IS 0
 022700  104030                                 ERROR   +30             ;PAR NOT ZERO
 022702  062700  000002                 2$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
 022706  077106                                 SOB     R1,1$           ;BRANCH BACK TO 1$ 15 TIMES
                                        ;NOW START DUAL ADDRESSING TEST BY LOADING -1 INTO ONE REGISTER AND
                                        ;READING THE REST TO SEE ONLY THAT REGISTER IS NON ZERO. (ANY
                                        ;DROPPED BITS WILL BE FOUND IN THE NEXT TEST).
 022710  012737  022722  001110                 MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
 022716  012700  172240                         MOV     #SIPAR0,R0      ;PUT ADDRESS OF FIRST PAR IN R0
 022722  012705  172240                 3$:     MOV     #SIPAR0,R5      ;LOAD STARTING ADDRESS INTO R5
 022726  004737  002260                         JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
 022732  012701  172276                         MOV     #SDPAR7,R1      ;PUT SDPAR7 ADDRESS INTO R1
 022736  012710  177777                         MOV     #-1,(R0)        ;LOAD REGISTER UNDER TEST
 022742  005037  001176                 4$:     CLR     $TMP0           ;FLAG TO INDICATE THERE WAS A MATCH
 022746  011102                                 MOV     (R1),R2         ;READ ALL REGISTERS .
 022750  001406                                 BEQ     6$              ;BRANCH IF REGISTER IS 0
 022752  020001                                 CMP     R0,R1           ;IS THE ADDRESS OF NON-ZERO REGISTER THE SAME
                                                                        ;AS THE REGISTER UNDER TEST?
 022754  001402                                 BEQ     5$              ;BRANCH IF ADDRESSES MATCH
 022756  004737  002334                         JSR     PC,DUALADR      ;LOG AND REPORT ERRORS
 022762  005237  001176                 5$:     INC     $TMP0           ;SET FLAG WHEN ADDRESSES MATCH
 022766  162701  000002                 6$:     SUB     #2,R1           ;POINT TO NEXT REGISTER
 022772  022701  172240                         CMP     #SIPAR0,R1      ;SEE IF ALL REGISTERS HAVE BEEN READ
 022776  101761                                 BLOS    4$              ;BRANCH IF MORE TO READ
 023000  062700  000002                         ADD     #2,R0           ;NOW LOAD THE NEXT REGISTER
 023004  022700  172276                         CMP     #SDPAR7,R0      ;SEE IF THERE ARE MORE REGISTERS TO TEST
 023010  103344                                 BHIS    3$              ;BRANCH IF MORE REGISTERS TO TEST
 023012  012737  022642  001110                 MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
 023020  005737  001322                         TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
 023024  000404                                 BR      TST22           ;;BRANCH TO NEXT TEST IF NO ERRORS
 023026  013737  001322  001210                 MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR PAR OUT
 023034  104031                                 ERROR   +31             ;;SUMMARY OF DUAL ADDRESS TEST
```

```
                                        .SBTTL  TEST # 22 - DUAL ADDRESS USER PAR'S,ON LOADING
                                        ;;*****************************************************************
                                        ;*TEST 22       DUAL ADDRESS USER PAR'S,ON LOADING
                                        ;*
                                        ;*THIS TEST FIRST CLEARS ALL THE USER PAGE ADDRESS REGISTERS,
                                        ;*AND CHECKS TO SEE THAT THEY EACH HOLD ZERO.  THEN, STARTING
                                        ;*WITH I-SPACE ADDRESS REGISTER ZERO, ONE REGISTER AT A TIME IS
                                        ;*LOADED WITH A NEGATIVE ONE.  ALL USER ADDRESS REGISTERS ARE
                                        ;*NOW READ TO SEE THAT ONLY THE ONE UNDER TEST IS NON-ZERO.
                                        ;*INDIVIDUAL ERRORS ARE REPORTED AND A SUMMARY OF THEM IS GIVEN
                                        ;*AT THE END OF THIS TEST.
                                        ;;*****************************************************************
023036  000004                          TST22:  SCOPE
2343 023040  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE THE ERROR LOCATIONS
     023044  012737  023072  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     023052  012705  177640                     MOV     #UIPAR0,R5      ;PUT ADDRESS OF FIRST PAR IN R5
     023056  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023062  012700  177640                     MOV     #UIPAR0,R0      ;PUT ADDRESS OF FIRST PAR IN R0
     023066  012701  000020                     MOV     #20,R1          ;BRANCH COUNT IS 16 DECIMAL
     023072  011002                  1$:        MOV     (R0),R2         ;READ PAR TO R2
     023074  001401                             BEQ     2$              ;BRANCH IF PAR IS 0
     023076  104030                             ERROR   +30             ;PAR NOT ZERO
     023100  062700  000002          2$:        ADD     #2,R0           ;POINT TO NEXT REGISTER
     023104  077106                             SOB     R1,1$           ;BRANCH BACK TO 1$ 15 TIMES
                                        ;NOW START DUAL ADDRESSING TEST BY LOADING -1 INTO ONE REGISTER AND
                                        ;READING THE REST TO SEE ONLY THAT REGISTER IS NON ZERO. (ANY
                                        ;DROPPED BITS WILL BE FOUND IN THE NEXT TEST).
     023106  012737  023120  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     023114  012700  177640                     MOV     #UIPAR0,R0      ;PUT ADDRESS OF FIRST PAR IN R0
     023120  012705  177640          3$:        MOV     #UIPAR0,R5      ;LOAD STARTING ADDRESS INTO R5
     023124  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023130  012701  177676                     MOV     #UDPAR7,R1      ;PUT UDPAR7 ADDRESS INTO R1
     023134  012710  177777                     MOV     #-1,(R0)        ;LOAD REGISTER UNDER TEST
     023140  005037  001176          4$:        CLR     $TMP0           ;FLAG TO INDICATE THERE WAS A MATCH
     023144  011102                             MOV     (R1),R2         ;READ ALL REGISTERS
     023146  001406                             BEQ     6$              ;BRANCH IF REGISTER IS 0
     023150  020001                             CMP     R0,R1           ;IS THE ADDRESS OF NON-ZERO REGISTER THE SAME
                                                                        ;AS THE REGISTER UNDER TEST?
     023152  001402                             BEQ     5$              ;BRANCH IF ADDRESSES MATCH
     023154  004737  002334                     JSR     PC,DUALADR      ;LOG AND REPORT ERRORS
     023160  005237  001176          5$:        INC     $TMP0           ;SET FLAG WHEN ADDRESSES MATCH
     023164  162701  000002          6$:        SUB     #2,R1           ;POINT TO NEXT REGISTER
     023170  022701  177640                     CMP     #UIPAR0,R1      ;SEE IF ALL REGISTERS HAVE BEEN READ
     023174  101761                             BLOS    4$              ;BRANCH IF MORE TO READ
     023176  062700  000002                     ADD     #2,R0           ;NOW LOAD THE NEXT REGISTER
     023202  022700  177676                     CMP     #UDPAR7,R0      ;SEE IF THERE ARE MORE REGISTERS TO TEST
     023206  103344                             BHIS    3$              ;BRANCH IF MORE REGISTERS TO TEST
     023210  012737  023040  001110             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
     023216  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     023222  000404                             BR      TST23           ;;BRANCH TO NEXT TEST IF NO ERRORS
     023224  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR PAR OUT
     023232  104031                             ERROR   +31             ;;SUMMARY OF DUAL ADDRESS TEST
```

TEST # 23 - DUAL ADDRESS KERNAL PDR'S,ON LOADING

```
2347                                    .SBTTL  TEST # 23 - DUAL ADDRESS KERNAL PDR'S,ON LOADING
                                        ;;*****************************************************************
                                        ;*TEST 23       DUAL ADDRESS KERNAL PDR'S,ON LOADING
                                        ;*
                                        ;*THIS TEST FIRST CLEARS ALL THE KERNEL PAGE DESCRIPTOR REGISTERS,
                                        ;*AND CHECKS TO SEE THAT THEY EACH HOLD ZERO.  THEN, STARTING
                                        ;*WITH I-SPACE DESCRIPTOR REGISTER ZERO, ONE REGISTER AT A TIME IS
                                        ;*LOADED WITH A NEGATIVE ONE.  ALL KERNEL DESCRIPTOR REGISTERS ARE
                                        ;*NOW READ TO SEE THAT ONLY THE ONE UNDER TEST IS NON-ZERO.
                                        ;*INDIVIDUAL ERRORS ARE REPORTED AND A SUMMARY OF THEM IS GIVEN
                                        ;*AT THE END OF THIS TEST.
                                        ;;*****************************************************************
023234  000004                          TST23:  SCOPE
2348 023236  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE THE ERROR LOCATIONS
     023242  012737  023270  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     023250  012705  172300                     MOV     #KIPDR0,R5      ;PUT ADDRESS OF FIRST PDR IN R5
     023254  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023260  012700  172300                     MOV     #KIPDR0,R0      ;PUT ADDRESS OF FIRST PDR IN R0
     023264  012701  000020                     MOV     #20,R1          ;BRANCH COUNT IS 16 DECIMAL
     023270  011002                     1$:     MOV     (R0),R2         ;READ PDR TO R2
     023272  001401                             BEQ     2$              ;BRANCH IF PDR IS 0
     023274  104030                             ERROR   +30             ;PDR NOT ZERO
     023276  062700  000002             2$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
     023302  077106                             SOB     R1,1$           ;BRANCH BACK TO 1$ 15 TIMES
                                        ;NOW START DUAL ADDRESSING TEST BY LOADING -1 INTO ONE REGISTER AND
                                        ;READING THE REST TO SEE ONLY THAT REGISTER IS NON ZERO. (ANY
                                        ;DROPPED BITS WILL BE FOUND IN THE NEXT TEST).
     023304  012737  023316  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     023312  012700  172300                     MOV     #KIPDR0,R0      ;PUT ADDRESS OF FIRST PDR IN R0
     023316  012705  172300             3$:     MOV     #KIPDR0,R5      ;LOAD STARTING ADDRESS INTO R5
     023322  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023326  012701  172336                     MOV     #KDPDR7,R1      ;PUT KDPDR7 ADDRESS INTO R1
     023332  012710  177777                     MOV     #-1,(R0)        ;LOAD REGISTER UNDER TEST
     023336  005037  001176             4$:     CLR     $TMP0           ;FLAG TO INDICATE THERE WAS A MATCH
     023342  011102                             MOV     (R1),R2         ;READ ALL REGISTERS
     023344  001406                             BEQ     6$              ;BRANCH IF REGISTER IS 0
     023346  020001                             CMP     R0,R1           ;IS THE ADDRESS OF NON-ZERO REGISTER THE SAME
                                                                         ;AS THE REGISTER UNDER TEST?
     023350  001402                             BEQ     5$              ;BRANCH IF ADDRESSES MATCH
     023352  004737  002334                     JSR     PC,DUALADR      ;LOG AND REPORT ERRORS
     023356  005237  001176             5$:     INC     $TMP0           ;SET FLAG WHEN ADDRESSES MATCH
     023362  162701  000002             6$:     SUB     #2,R1           ;POINT TO NEXT REGISTER
     023366  022701  172300                     CMP     #KIPDR0,R1      ;SEE IF ALL REGISTERS HAVE BEEN READ
     023372  101761                             BLOS    4$              ;BRANCH IF MORE TO READ
     023374  062700  000002                     ADD     #2,R0           ;NOW LOAD THE NEXT REGISTER
     023400  022700  172336                     CMP     #KDPDR7,R0      ;SEE IF THERE ARE MORE REGISTERS TO TEST
     023404  103344                             BHIS    3$              ;BRANCH IF MORE REGISTERS TO TEST
     023406  012737  023236  001110             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
     023414  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     023420  000404                             BR      TST24           ;;BRANCH TO NEXT TEST IF NO ERRORS
     023422  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR PDR OUT
     023430  104031                             ERROR   +31             ;;SUMMARY OF DUAL ADDRESS TEST
```

TEST # 24 - DUAL ADDRESS SUPERVISOR PDR'S,ON LOADING

```
2352                                    .SBTTL  TEST # 24 - DUAL ADDRESS SUPERVISOR PDR'S,ON LOADING
                                        ;;*****************************************************************
                                        ;*TEST 24       DUAL ADDRESS SUPERVISOR PDR'S,ON LOADING
                                        ;*
                                        ;*THIS TEST FIRST CLEARS ALL THE SUPERVISOR PAGE DESCRIPTOR REGISTERS,
                                        ;*AND CHECKS TO SEE THAT THEY EACH HOLD ZERO.  THEN, STARTING
                                        ;*WITH I-SPACE DESCRIPTOR REGISTER ZERO, ONE REGISTER AT A TIME IS
                                        ;*LOADED WITH A NEGATIVE ONE.  ALL SUPERVISOR DESCRIPTOR REGISTERS ARE
                                        ;*NOW READ TO SEE THAT ONLY THE ONE UNDER TEST IS NON-ZERO.
                                        ;*INDIVIDUAL ERRORS ARE REPORTED AND A SUMMARY OF THEM IS GIVEN
                                        ;*AT THE END OF THIS TEST.
                                        ;;*****************************************************************
     023432  000004                     TST24:  SCOPE
2353 023434  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE THE ERROR LOCATIONS
     023440  012737  023466  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     023446  012705  172200                     MOV     #SIPDR0,R5      ;PUT ADDRESS OF FIRST PDR IN R5
     023452  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023456  012700  172200                     MOV     #SIPDR0,R0      ;PUT ADDRESS OF FIRST PDR IN R0
     023462  012701  000020                     MOV     #20,R1          ;BRANCH COUNT IS 16 DECIMAL
     023466  011002                     1$:     MOV     (R0),R2         ;READ PDR TO R2
     023470  001401                             BEQ     2$              ;BRANCH IF PDR IS 0
     023472  104030                             ERROR   +30             ;PDR NOT ZERO
     023474  062700  000002             2$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
     023500  077106                             SOB     R1,1$           ;BRANCH BACK TO 1$ 15 TIMES
                                        ;NOW START DUAL ADDRESSING TEST BY LOADING -1 INTO ONE REGISTER AND
                                        ;READING THE REST TO SEE ONLY THAT REGISTER IS NON ZERO. (ANY
                                        ;DROPPED BITS WILL BE FOUND IN THE NEXT TEST).
     023502  012737  023514  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     023510  012700  172200                     MOV     #SIPDR0,R0      ;PUT ADDRESS OF FIRST PDR IN R0
     023514  012705  172200             3$:     MOV     #SIPDR0,R5      ;LOAD STARTING ADDRESS INTO R5
     023520  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023524  012701  172236                     MOV     #SDPDR7,R1      ;PUT SDPDR7 ADDRESS INTO R1
     023530  012710  177777                     MOV     #-1,(R0)        ;LOAD REGISTER UNDER TEST
     023534  005037  001176             4$:     CLR     $TMP0           ;FLAG TO INDICATE THERE WAS A MATCH
     023540  011102                             MOV     (R1),R2         ;READ ALL REGISTERS
     023542  001406                             BEQ     6$              ;BRANCH IF REGISTER IS 0
     023544  020001                             CMP     R0,R1           ;IS THE ADDRESS OF NON-ZERO REGISTER THE SAME
                                                                        ;AS THE REGISTER UNDER TEST?
     023546  001402                             BEQ     5$              ;BRANCH IF ADDRESSES MATCH
     023550  004737  002334                     JSR     PC,DUALADR      ;LOG AND REPORT ERRORS
     023554  005237  001176             5$:     INC     $TMP0           ;SET FLAG WHEN ADDRESSES MATCH
     023560  162701  000002             6$:     SUB     #2,R1           ;POINT TO NEXT REGISTER
     023564  022701  172200                     CMP     #SIPDR0,R1      ;SEE IF ALL REGISTERS HAVE BEEN READ
     023570  101761                             BLOS    4$              ;BRANCH IF MORE TO READ
     023572  062700  000002                     ADD     #2,R0           ;NOW LOAD THE NEXT REGISTER
     023576  022700  172236                     CMP     #SDPDR7,R0      ;SEE IF THERE ARE MORE REGISTERS TO TEST
     023602  103344                             BHIS    3$              ;BRANCH IF MORE REGISTERS TO TEST
     023604  012737  023434  001110             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
     023612  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     023616  000404                             BR      TST25           ;;BRANCH TO NEXT TEST IF NO ERRORS
     023620  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR PDR OUT
     023626  104031                             ERROR   +31             ;;SUMMARY OF DUAL ADDRESS TEST
```

TEST # 25 - DUAL ADDRESS USER PDR'S,ON LOADING

```
2357                                    .SBTTL  TEST # 25 - DUAL ADDRESS USER PDR'S,ON LOADING
                                        ;;*****************************************************************
                                        ;*TEST 25       DUAL ADDRESS USER PDR'S,ON LOADING
                                        ;*
                                        ;*THIS TEST FIRST CLEARS ALL THE USER PAGE DESCRIPTOR REGISTERS,
                                        ;*AND CHECKS TO SEE THAT THEY EACH HOLD ZERO.  THEN, STARTING
                                        ;*WITH I-SPACE DESCRIPTOR REGISTER ZERO, ONE REGISTER AT A TIME IS
                                        ;*LOADED WITH A NEGATIVE ONE.  ALL USER DESCRIPTOR REGISTERS ARE
                                        ;*NOW READ TO SEE THAT ONLY THE ONE UNDER TEST IS NON-ZERO.
                                        ;*INDIVIDUAL ERRORS ARE REPORTED AND A SUMMARY OF THEM IS GIVEN
                                        ;*AT THE END OF THIS TEST.
                                        ;;*****************************************************************
023630  000004                          TST25:  SCOPE
2358 023632  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE THE ERROR LOCATIONS
     023636  012737  023664  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     023644  012705  177600                     MOV     #UIPDR0,R5      ;PUT ADDRESS OF FIRST PDR IN R5
     023650  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023654  012700  177600                     MOV     #UIPDR0,R0      ;PUT ADDRESS OF FIRST PDR IN R0
     023660  012701  000020                     MOV     #20,R1          ;BRANCH COUNT IS 16 DECIMAL
     023664  011002                  1$:        MOV     (R0),R2         ;READ PDR TO R2
     023666  001401                             BEQ     2$              ;BRANCH IF PDR IS 0
     023670  104030                             ERROR   +30             ;PDR NOT ZERO
     023672  062700  000002          2$:        ADD     #2,R0           ;POINT TO NEXT REGISTER
     023676  077106                             SOB     R1,1$           ;BRANCH BACK TO 1$ 15 TIMES
                                        ;NOW START DUAL ADDRESSING TEST BY LOADING -1 INTO ONE REGISTER AND
                                        ;READING THE REST TO SEE ONLY THAT REGISTER IS NON ZERO. (ANY
                                        ;DROPPED BITS WILL BE FOUND IN THE NEXT TEST).
     023700  012737  023712  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     023706  012700  177600                     MOV     #UIPDR0,R0      ;PUT ADDRESS OF FIRST PDR IN R0
     023712  012705  177600          3$:        MOV     #UIPDR0,R5      ;LOAD STARTING ADDRESS INTO R5
     023716  004737  002260                     JSR     PC,CLRREG       ;CLEAR 16 REGISTERS POINTED TO BY R5
     023722  012701  177636                     MOV     #UDPDR7,R1      ;PUT UDPDR7 ADDRESS INTO R1
     023726  012710  177777                     MOV     #-1,(R0)        ;LOAD REGISTER UNDER TEST
     023732  005037  001176          4$:        CLR     $TMP0           ;FLAG TO INDICATE THERE WAS A MATCH
     023736  011102                             MOV     (R1),R2         ;READ ALL REGISTERS
     023740  001406                             BEQ     6$              ;BRANCH IF REGISTER IS 0
     023742  020001                             CMP     R0,R1           ;IS THE ADDRESS OF NON-ZERO REGISTER THE SAME
                                                                        ;AS THE REGISTER UNDER TEST?
     023744  001402                             BEQ     5$              ;BRANCH IF ADDRESSES MATCH
     023746  004737  002334                     JSR     PC,DUALADR      ;LOG AND REPORT ERRORS
     023752  005237  001176          5$:        INC     $TMP0           ;SET FLAG WHEN ADDRESSES MATCH
     023756  162701  000002          6$:        SUB     #2,R1           ;POINT TO NEXT RFGISTER
     023762  022701  177600                     CMP     #UIPDR0,R1      ;SEE IF ALL REGISTERS HAVE BEEN READ
     023766  101761                             BLOS    4$              ;BRANCH IF MORE TO READ
     023770  062700  000002                     ADD     #2,R0           ;NOW LOAD THE NEXT REGISTER
     023774  022700  177636                     CMP     #UDPDR7,R0      ;SEE IF THERE ARE MORE REGISTERS TO TEST
     024000  103344                             BHIS    3$              ;BRANCH IF MORE REGISTERS TO TEST
     024002  012737  023632  001110             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
     024010  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     024014  000404                             BR      TST26           ;;BRANCH TO NEXT TEST IF NO ERRORS
     024016  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR PDR OUT
     024024  104031                             ERROR   +31             ;;SUMMARY OF DUAL ADDRESS TEST
```

TEST # 26 - COUNT PATTERN IN KERNAL PAR'S

```
                                .SBTTL  TEST # 26 - COUNT PATTERN IN KERNAL PAR'S
                                ;;*****************************************************************
                                ;*TEST 26        COUNT PATTERN IN KERNAL PAR'S
                                ;*
                                ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE KERNAL PAGE ADDRESS REGISTERS.
                                ;*IF THE COUNT PATTERN DOES NOT MATCH THE DATA RECEVIED, THE REGISTER ADDRESS,
                                ;*DATA PATTERN, AND BAD DATA ARE REPORTED.  AT THE END OF THE TEST A SUMMARY
                                ;*OF ERRORS IS GIVEN.
                                ;;*****************************************************************
 024026  000004                 TST26:  SCOPE
2375 024030  004737  002276     20$:    JSR     PC,CLEANUP      ;INITIALIZE ERROR LOCATIONS
 024034  012737  024044  001110         MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
 024042  005001                        CLR     R1              ;CLEAR REGISTER TO HOLD COUNT PATTERN
 024044  012700  172340         1$:     MOV     #KIPAR0,R0      ;PUT ADDRESS OF FIRST REGISTER INTO R0
 024050  010110                 2$:     MOV     R1,(R0)         ;LOAD COUNT INTO REGISTER
 024052  011002                         MOV     (R0),R2         ;READ REGISTER BACK TO R2
 024054  010104                         MOV     R1,R4           ;PUT PATTERN IN R4
 024056  020402                         CMP     R4,R2           ;SEE IF DATA MATCHES PATTERN
 024060  001402                         BEQ     3$              ;BRANCH IF DATA IS GOOD
 024062  004737  002400                 JSR     PC,PARCOUNT     ;LOG AND REPORT COUNT ERROR
 024066  062700  000002         3$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
 024072  022700  172376                 CMP     #KDPAR7,R0      ;SEE IF YOU PASSED THE KDPAR7 PAR
 024076  103364                         BHIS    2$              ;BRANCH IF MORE TEST
 024100  022701  177777                 CMP     #177777,R1      ;SEE IF COUNT HAS REACHED 177777
 024104  001403                         BEQ     4$              ;BRANCH IF SO
 024106  062701  000401                 ADD     #401,R1         ;INCREASE COUNT PATTERN
 024112  000754                         BR      1$              ;BRANCH TO CONTINUE TEST
 024114  012737  024030  001110 4$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
 024122  005737  001322                 TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
 024126  000404                         BR      TST27           ;;BRANCH TO NEXT TEST IF NO ERRORS
 024130  013737  001322  001210        MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR TYPEOUT
 024136  104032                         ERROR   +32             ;SUMMARY OF COUNT PATTERN FAILURES
```

```
                                .SBTTL  TEST # 27 - COUNT PATTERN IN SUPERVISOR PAR'S
                                ;*****************************************************************
                                ;*TEST 27        COUNT PATTERN IN SUPERVISOR PAR'S
                                ;*
                                ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE SUPERVISOR PAGE ADDRESS REGISTERS.
                                ;*IF THE COUNT PATTERN DOES NOT MATCH THE DATA RECEVIED, THE REGISTER ADDRESS,
                                ;*DATA PATTERN, AND BAD DATA ARE REPORTED.  AT THE END OF THE TEST A SUMMARY
                                ;*OF ERRORS IS GIVEN.
                                ;*****************************************************************
 024140  000004                 TST27:  SCOPE
2380 024142  004737  002276     20$:    JSR     PC,CLEANUP      ;INITIALIZE ERROR LOCATIONS
     024146  012737  024156  001110     MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     024154  005001                     CLR     R1              ;CLEAR REGISTER TO HOLD COUNT PATTERN
     024156  012700  172240     1$:     MOV     #SIPAR0,R0      ;PUT ADDRESS OF FIRST REGISTER INTO R0
     024162  010110             2$:     MOV     R1,(R0)         ;LOAD COUNT INTO REGISTER
     024164  011002                     MOV     (R0),R2         ;READ REGISTER BACK TO R2
     024166  010104                     MOV     R1,R4           ;PUT PATTERN IN R4
     024170  020402                     CMP     R4,R2           ;SEE IF DATA MATCHES PATTERN
     024172  001402                     BEQ     3$              ;BRANCH IF DATA IS GOOD
     024174  004737  002400             JSR     PC,PARCOUNT     ;LOG AND REPORT COUNT ERROR
     024200  062700  000002     3$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
     024204  022700  172276             CMP     #SDPAR7,R0      ;SEE IF YOU PASSED THE SDPAR7 PAR
     024210  103364                     BHIS    2$              ;BRANCH IF MORE TEST
     024212  022701  177777             CMP     #177777,R1      ;SEE IF COUNT HAS REACHED 177777
     024216  001403                     BEQ     4$              ;BRANCH IF SO
     024220  062701  000401             ADD     #401,R1         ;INCREASE COUNT PATTERN
     024224  000754                     BR      1$              ;BRANCH TO CONTINUE TEST
     024226  012737  024142  001110 4$: MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
     024234  005737  001322             TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     024240  000404                     BR      TST30           ;;BRANCH TO NEXT TEST IF NO ERRORS
     024242  013737  001322  001210     MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR TYPEOUT
     024250  104032                     ERROR   +32             ;SUMMARY OF COUNT PATTERN FAILURES
```

TEST # 30 - COUNT PATTERN IN USER PAR'S

```
                                        .SBTTL  TEST # 30 - COUNT PATTERN IN USER PAR'S
                                        ;;**********************************************************************
                                        ;*TEST 30        COUNT PATTERN IN USER PAR'S
                                        ;*
                                        ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE USER PAGE ADDRESS REGISTERS.
                                        ;*IF THE COUNT PATTERN DOES NOT MATCH THE DATA RECEVIED, THE REGISTER ADDRESS,
                                        ;*DATA PATTERN, AND BAD DATA ARE REPORTED.  AT THE END OF THE TEST A SUMMARY
                                        ;*OF ERRORS IS GIVEN.
                                        ;;**********************************************************************
                                        TST30:  SCOPE
2385  024254  004737  002276            20$:    JSR     PC,CLEANUP      ;INITIALIZE ERROR LOCATIONS
      024260  012737  024270  001110            MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
      024266  005001                            CLR     R1              ;CLEAR REGISTER TO HOLD COUNT PATTERN
      024270  012700  172340            1$:     MOV     #KIPAR0,R0      ;PUT ADDRESS OF FIRST REGISTER INTO R0
      024274  010110                    2$:     MOV     R1,(R0)         ;LOAD COUNT INTO REGISTER
      024276  011002                            MOV     (R0),R2         ;READ REGISTER BACK TO R2
      024300  010104                            MOV     R1,R4           ;PUT PATTERN IN R4
      024302  020402                            CMP     R4,R2           ;SEE IF DATA MATCHES PATTERN
      024304  001402                            BEQ     3$              ;BRANCH IF DATA IS GOOD
      024306  004737  002400                    JSR     PC,PARCOUNT     ;LOG AND REPORT COUNT ERROR
      024312  062700  000002            3$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
      024316  022700  172376                    CMP     #KDPAR7,R0      ;SEE IF YOU PASSED THE KDPAR7 PAR
      024322  103364                            BHIS    2$              ;BRANCH IF MORE TEST
      024324  022701  177777                    CMP     #177777,R1      ;SEE IF COUNT HAS REACHED 177777
      024330  001403                            BEQ     4$              ;BRANCH IF SO
      024332  062701  000401                    ADD     #401,R1         ;INCREASE COUNT PATTERN
      024336  000754                            BR      1$              ;BRANCH TO CONTINUE TEST
      024340  012737  024254  001110    4$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
      024346  005737  001322                    TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
      024352  000404                            BR      TST31           ;;BRANCH TO NEXT TEST IF NO ERRORS
      024354  013737  001322  001210            MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR TYPEOUT
      024362  104032                            ERROR   +32             ;SUMMARY OF COUNT PATTERN FAILURES
```

```
                                        .SBTTL  TEST # 31 - COUNT PATTERN IN KERNAL PDR'S
                                        ;;*****************************************************************
                                        ;*TEST 31        COUNT PATTERN IN KERNAL PDR'S
                                        ;*
                                        ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE KERNAL PAGE DESCRIPTOR REGISTERS.
                                        ;*SINCE BITS <05:04> AND <0> ARE NOT INPLEMENTED, AND BITS <07:06>
                                        ;*CANNOT BE SET BY DIRECT LOAD, THEY ARE MASKED OUT OF THE DATA COMPARE.
                                        ;*THESE BITS ARE STILL SENT TO THE DESCRIPTOR REGISTER TO FIND BAD ETCHES.
                                        ;*IF THE COUNT PATTERN DOES NOT MATCH THE DATA RECEVIED, THE REGISTER ADDRESS,
                                        ;*DATA PATTERN, AND BAD DATA ARE REPORTED.  AT THE END OF THE TEST A SUMMARY
                                        ;*OF ERRORS IS GIVEN.
                                        ;;*****************************************************************
024364  000004                          TST31:  SCOPE
2390 024366  004737  002276            20$:    JSR     PC,CLEANUP      ;INITIALIZE ERROR LOCATIONS
     024372  012737  024402  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     024400  005001                             CLR     R1              ;CLEAR REGISTER TO HOLD COUNT PATTERN
     024402  012700  172300             1$:     MOV     #KIPDR0,R0      ;PUT ADDRESS OF FIRST REGISTER INTO R0
     024406  010110                     2$:     MOV     R1,(R0)         ;LOAD COUNT INTO REGISTER
     024410  011002                             MOV     (R0),R2         ;READ REGISTER BACK TO R2
     024412  010104                             MOV     R1,R4           ;PUT PATTERN IN R4
     024414  042704  000361                     BIC     #000361,R4      ;CLEAR BITS NOT FOUND IN REGISTER
     024420  020402                             CMP     R4,R2           ;SEE IF DATA MATCHES PATTERN
     024422  001402                             BEQ     3$              ;BRANCH IF DATA IS GOOD
     024424  004737  002400                     JSR     PC,PARCOUNT     ;LOG AND REPORT COUNT ERROR
     024430  062700  000002             3$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
     024434  022700  172336                     CMP     #KDPDR7,R0      ;SEE IF YOU PASSED THE KDPDR7 PDR
     024440  103362                             BHIS    2$              ;BRANCH IF MORE TEST
     024442  022701  177777                     CMP     #177777,R1      ;SEE IF COUNT HAS REACHED 177777
     024446  001403                             BEQ     4$              ;BRANCH IF SO
     024450  062701  000401                     ADD     #401,R1         ;INCREASE COUNT PATTERN
     024454  000752                             BR      1$              ;BRANCH TO CONTINUE TEST
     024456  012737  024366  001110  4$:       MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
     024464  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     024470  000404                             BR      TST32           ;;BRANCH TO NEXT TEST IF NO ERRORS
     024472  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR TYPEOUT
     024500  104032                             ERROR   +32             ;SUMMARY OF COUNT PATTERN FAILURES
```

TEST # 32 - COUNT PATTERN IN SUPERVISOR PDR'S

```
                                        .SBTTL  TEST # 32 - COUNT PATTERN IN SUPERVISOR PDR'S
                                        ;;*****************************************************************
                                        ;*TEST 32       COUNT PATTERN IN SUPERVISOR PDR'S
                                        ;*
                                        ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE SUPERVISOR PAGE DESCRIPTOR REGISTERS.
                                        ;*SINCE BITS <05:04> AND <0> ARE NOT INPLEMENTED, AND BITS <07:06>
                                        ;*CANNOT BE SET BY DIRECT LOAD, THEY ARE MASKED OUT OF THE DATA COMPARE.
                                        ;*THESE BITS ARE STILL SENT TO THE DESCRIPTOR REGISTER TO FIND BAD ETCHES.
                                        ;*IF THE COUNT PATTERN DOES NOT MATCH THE DATA RECEVIED, THE REGISTER ADDRESS,
                                        ;*DATA PATTERN, AND BAD DATA ARE REPORTED.  AT THE END OF THE TEST A SUMMARY
                                        ;*OF ERRORS IS GIVEN.
                                        ;;*****************************************************************
 024502  000004                         TST32:  SCOPE
2395 024504  004737  002276             20$:    JSR     PC,CLEANUP      ;INITIALIZE ERROR LOCATIONS
 024510  012737  024520  001110                 MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
 024516  005001                                 CLR     R1              ;CLEAR REGISTER TO HOLD COUNT PATTERN
 024520  012700  172200             1$:     MOV     #SIPDR0,R0      ;PUT ADDRESS OF FIRST REGISTER INTO R0
 024524  010110                     2$:     MOV     R1,(R0)         ;LOAD COUNT INTO REGISTER
 024526  011002                             MOV     (R0),R2         ;READ REGISTER BACK TO R2
 024530  010104                             MOV     R1,R4           ;PUT PATTERN IN R4
 024532  042704  000361                     BIC     #000361,R4      ;CLEAR BITS NOT FOUND IN REGISTER
 024536  020402                             CMP     R4,R2           ;SEE IF DATA MATCHES PATTERN
 024540  001402                             BEQ     3$              ;BRANCH IF DATA IS GOOD
 024542  004737  002400                     JSR     PC,PARCOUNT     ;LOG AND REPORT COUNT ERROR
 024546  062700  000002             3$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
 024552  022700  172236                     CMP     #SDPDR7,R0      ;SEE IF YOU PASSED THE SDPDR7 PDR
 024556  103362                             BHIS    2$              ;BRANCH IF MORE TEST
 024560  022701  177777                     CMP     #177777,R1      ;SEE IF COUNT HAS REACHED 177777
 024564  001403                             BEQ     4$              ;BRANCH IF SO
 024566  062701  000401                     ADD     #401,R1         ;INCREASE COUNT PATTERN
 024572  000752                             BR      1$              ;BRANCH TO CONTINUE TEST
 024574  012737  024504  001110  4$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
 024602  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
 024606  000404                             BR      TST33           ;;BRANCH TO NEXT TEST IF NO ERRORS
 024610  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR TYPEOUT
 024616  104032                             ERROR   +32             ;SUMMARY OF COUNT PATTERN FAILURES
```

TEST # 33 - COUNT PATTERN IN USER PDR'S

```
                                        .SBTTL  TEST # 33 - COUNT PATTERN IN USER PDR'S
                                        ;;*********************************************************************
                                        ;*TEST 33        COUNT PATTERN IN USER PDR'S
                                        ;*
                                        ;*THIS TEST RUNS A COUNT PATTERN THROUGH THE USER PAGE ADDRESS REGISTERS.
                                        ;*SINCE BITS <05:04> AND <0> ARE NOT INPLEMENTED, AND BITS <07:06>
                                        ;*CANNOT BE SET BY DIRECT LOAD, THEY ARE MASKED OUT OF THE DATA COMPARE.
                                        ;*THESE BITS ARE STILL SENT TO THE DESCRIPTOR REGISTER TO FIND BAD ETCHES.
                                        ;*IF THE COUNT PATTERN DOES NOT MATCH THE DATA RECEVIED, THE REGISTER ADDRESS,
                                        ;*DATA PATTERN, AND BAD DATA ARE REPORTED.  AT THE END OF THE TEST A SUMMARY
                                        ;*OF ERRORS IS GIVEN.
                                        ;;*********************************************************************
 024620  000004                        TST33:  SCOPE
2400 024622  004737  002276            20$:    JSR     PC,CLEANUP      ;INITIALIZE ERROR LOCATIONS
     024626  012737  024636  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
     024634  005001                             CLR     R1              ;CLEAR REGISTER TO HOLD COUNT PATTERN
     024636  012700  177600            1$:     MOV     #UIPDR0,R0      ;PUT ADDRESS OF FIRST REGISTER INTO R0
     024642  010110                    2$:     MOV     R1,(R0)         ;LOAD COUNT INTO REGISTER
     024644  011002                             MOV     (R0),R2         ;READ REGISTER BACK TO R2
     024646  010104                             MOV     R1,R4           ;PUT PATTERN IN R4
     024650  042704  000361                     BIC     #000361,R4      ;CLEAR BITS NOT FOUND IN REGISTER
     024654  020402                             CMP     R4,R2           ;SEE IF DATA MATCHES PATTERN
     024656  001402                             BEQ     3$              ;BRANCH IF DATA IS GOOD
     024660  004737  002400                     JSR     PC,PARCOUNT     ;LOG AND REPORT COUNT ERROR
     024664  062700  000002            3$:     ADD     #2,R0           ;POINT TO NEXT REGISTER
     024670  022700  177636                     CMP     #UDPDR7,R0      ;SEE IF YOU PASSED THE UDPDR7 PDR
     024674  103362                             BHIS    2$              ;BRANCH IF MORE TEST
     024676  022701  177777                     CMP     #177777,R1      ;SEE IF COUNT HAS REACHED 177777
     024702  001403                             BEQ     4$              ;BRANCH IF SO
     024704  062701  000401                     ADD     #401,R1         ;INCREASE COUNT PATTERN
     024710  000752                             BR      1$              ;BRANCH TO CONTINUE TEST
     024712  012737  024622  001110    4$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
     024720  005737  001322                     TST     ERRCNT          ;SEE IF THERE WERE ANY ERRORS
     024724  000404                             BR      TST34           ;;BRANCH TO NEXT TEST IF NO ERRORS
     024726  013737  001322  001210             MOV     ERRCNT,$TMP5    ;SAVE # OF ERRORS FOR TYPEOUT
     024734  104032                             ERROR   +32             ;SUMMARY OF COUNT PATTERN FAILURES
```

```
                                .SBTTL  TEST # 34 - BYTE ADDRESSING OF KERNAL PAR'S
                                ;*********************************************************************
                                ;*TEST 34       BYTE ADDRESSING OF KERNAL PAR'S
                                ;*
                                ;*      THIS TEST CHECK THE LOGIC ASSOCIATED WITH BYTE ADDRESSING
                                ;*      OF KERNAL PAGE ADDRESS REGISTERS.  IT CAN BE ASSUMED THAT IF
                                ;*      ONE REGISTER WORKS, THEY ALL WORK BECAUSE THE REGISTERS
                                ;*      HAVE ALL BEEN TESTED.
                                ;*********************************************************************
    024736  000004              TST34:  SCOPE
2412 024740  012737  024756  001110  20$:    MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
    024746  012702  000014              MOV     #14,R2          ;PUT EXPECTED DATA IN R2
    024752  012700  172340              MOV     #KIPAR0,R0      ;PUT ADDRESS OF REGISTER IN R0
    024756  005037  172340      11$:    CLR     KIPAR0          ;CLEAR THE REGISTER UNDER TEST
    024762  112710  172014              MOVB    #172014,(R0)    ;LOAD LOWER BYTE OF REGISTER
    024766  013701  172340              MOV     KIPAR0,R1       ;READ REGISTER INTO R1
    024772  020102                      CMP     R1,R2           ;SEE IF ONLY LOWER BYTE WAS WRITTEN
    024774  001401                      BEQ     1$              ;BRANCH IF DATA MATCHES
    024776  104033                      ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
    025000  012737  025016  001110  1$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
    025006  012700  172341              MOV     #KIPAR0+1,R0    ;POINT TO UPPER BYTE OF REGISTER
    025012  012702  052014              MOV     #52014,R2       ;LOAD EXPECTED DATA INTO R2
    025016  112710  000124      12$:    MOVB    #124,(R0)       ;WRITE UPPER BYTE OF REGISTER
    025022  013701  172340              MOV     KIPAR0,R1       ;READ REGISTER INTO R1
    025026  020102                      CMP     R1,R2           ;SEE IF ONLY UPPER BYTE WAS WRITTEN
    025030  001401                      BEQ     2$              ;BRANCH TO EXIT IF CORRECT
    025032  104033                      ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
    025034  012737  024740  001110  2$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
```

```
                                        .SBTTL  TEST # 35 - BYTE ADDRESSING OF SUPERVISOR PAR'S
                                        ;*****************************************************************
                                        ;*TEST 35       BYTE ADDRESSING OF SUPERVISOR PAR'S
                                        ;*
                                        ;*      THIS TEST CHECK THE LOGIC ASSOCIATED WITH BYTE ADDRESSING
                                        ;*      OF SUPERVISOR PAGE ADDRESS REGISTERS.  IT CAN BE ASSUMED THAT IF
                                        ;*      ONE REGISTER WORKS, THEY ALL WORK BECAUSE THE REGISTERS
                                        ;*      HAVE ALL BEEN TESTED.
                                        ;*****************************************************************
 025042  000004                        TST35:  SCOPE
2417 025044  012737  025062  001110    20$:    MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
 025052  012702  000014                         MOV     #14,R2          ;PUT EXPECTED DATA IN R2
 025056  012700  172240                         MOV     #SIPAR0,R0      ;PUT ADDRESS OF REGISTER IN R0
 025062  005037  172240                 11$:    CLR     SIPAR0          ;CLEAR THE REGISTER UNDER TEST
 025066  112710  172014                         MOVB    #172014,(R0)    ;LOAD LOWER BYTE OF REGISTER
 025072  013701  172240                         MOV     SIPAR0,R1       ;READ REGISTER INTO R1
 025076  020102                                 CMP     R1,R2           ;SEE IF ONLY LOWER BYTE WAS WRITTEN
 025100  001401                                 BEQ     1$              ;BRANCH IF DATA MATCHES
 025102  104033                                 ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
 025104  012737  025122  001110    1$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
 025112  012700  172241                         MOV     #SIPAR0+1,R0    ;POINT TO UPPER BYTE OF REGISTER
 025116  012702  052014                         MOV     #52014,R2       ;LOAD EXPECTED DATA INTO R2
 025122  112710  000124                 12$:    MOVB    #124,(R0)       ;WRITE UPPER BYTE OF REGISTER
 025126  013701  172240                         MOV     SIPAR0,R1       ;READ REGISTER INTO R1
 025132  020102                                 CMP     R1,R2           ;SEE IF ONLY UPPER BYTE WAS WRITTEN
 025134  001401                                 BEQ     2$              ;BRANCH TO EXIT IF CORRECT
 025136  104033                                 ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
 025140  012737  025044  001110    2$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
```

TEST # 36 - BYTE ADDRESSING OF USER PAR'S

```
                                        .SBTTL  TEST # 36 - BYTE ADDRESSING OF USER PAR'S
                                        ;;*****************************************************************
                                        ;*TEST 36       BYTE ADDRESSING OF USER PAR'S
                                        ;*
                                        ;*      THIS TEST CHECK THE LOGIC ASSOCIATED WITH BYTE ADDRESSING
                                        ;*      OF USER PAGE ADDRESS REGISTERS.  IT CAN BE ASSUMED THAT IF
                                        ;*      ONE REGISTER WORKS, THEY ALL WORK BECAUSE THE REGISTERS
                                        ;*      HAVE ALL BEEN TESTED.
                                        ;;*****************************************************************
 025146  000004                         TST36:  SCOPE
2422 025150  012737  025166  001110     20$:    MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
     025156  012702  000014                     MOV     #14,R2          ;PUT EXPECTED DATA IN R2
     025162  012700  177640                     MOV     #UIPAR0,R0      ;PUT ADDRESS OF REGISTER IN R0
     025166  005037  177640             11$:    CLR     UIPAR0          ;CLEAR THE REGISTER UNDER TEST
     025172  112710  172014                     MOVB    #172014,(R0)    ;LOAD LOWER BYTE OF REGISTER
     025176  013701  177640                     MOV     UIPAR0,R1       ;READ REGISTER INTO R1
     025202  020102                             CMP     R1,R2           ;SEE IF ONLY LOWER BYTE WAS WRITTEN
     025204  001401                             BEQ     1$              ;BRANCH IF DATA MATCHES
     025206  104033                             ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
     025210  012737  025226  001110     1$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
     025216  012700  177641                     MOV     #UIPAR0+1,R0    ;POINT TO UPPER BYTE OF REGISTER
     025222  012702  052014                     MOV     #52014,R2       ;LOAD EXPECTED DATA INTO R2
     025226  112710  000124             12$:    MOVB    #124,(R0)       ;WRITE UPPER BYTE OF REGISTER
     025232  013701  177640                     MOV     UIPAR0,R1       ;READ REGISTER INTO R1
     025236  020102                             CMP     R1,R2           ;SEE IF ONLY UPPER BYTE WAS WRITTEN
     025240  001401                             BEQ     2$              ;BRANCH TO EXIT IF CORRECT
     025242  104033                             ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
     025244  012737  025150  001110     2$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
```

```
                                .SBTTL  TEST # 37 - BYTE ADDRESSING OF KERNAL PDR'S
                                ;;*****************************************************************
                                ;*TEST 37       BYTE ADDRESSING OF KERNAL PDR'S
                                ;*
                                ;*      THIS TEST CHECK THE LOGIC ASSOCIATED WITH BYTE ADDRESSING
                                ;*      OF KERNAL PAGE DESCRIPTOR REGISTERS.  IT CAN BE ASSUMED THAT IF
                                ;*      ONE REGISTER WORKS, THEY ALL WORK BECAUSE THE REGISTERS
                                ;*      HAVE ALL BEEN TESTED.
                                ;;*****************************************************************
     025252  000004             TST37:  SCOPE
2427 025254  012737  025272  001110  20$:    MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
     025262  012702  000014             MOV     #14,R2          ;PUT EXPECTED DATA IN R2
     025266  012700  172300             MOV     #KIPDR0,R0      ;PUT ADDRESS OF REGISTER IN R0
     025272  005037  172300     11$:    CLR     KIPDR0          ;CLEAR THE REGISTER UNDER TEST
     025276  112710  172014             MOVB    #172014,(R0)    ;LOAD LOWER BYTE OF REGISTER
     025302  013701  172300             MOV     KIPDR0,R1       ;READ REGISTER INTO R1
     025306  020102                     CMP     R1,R2           ;SEE IF ONLY LOWER BYTE WAS WRITTEN
     025310  001401                     BEQ     1$              ;BRANCH IF DATA MATCHES
     025312  104033                     ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
     025314  012737  025332  001110  1$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
     025322  012700  172301             MOV     #KIPDR0+1,R0    ;POINT TO UPPER BYTE OF REGISTER
     025326  012702  052014             MOV     #52014,R2       ;LOAD EXPECTED DATA INTO R2
     025332  112710  000124     12$:    MOVB    #124,(R0)       ;WRITE UPPER BYTE OF REGISTER
     025336  013701  172300             MOV     KIPDR0,R1       ;READ REGISTER INTO R1
     025342  020102                     CMP     R1,R2           ;SEE IF ONLY UPPER BYTE WAS WRITTEN
     025344  001401                     BEQ     2$              ;BRANCH TO EXIT IF CORPECT
     025346  104033                     ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
     025350  012737  025254  001110  2$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
```

```
2431                                    .SBTTL  TEST # 40 - BYTE ADDRESSING OF SUPERVISOR PDR'S
                                        ;;*****************************************************************
                                        ;*TEST 40       BYTE ADDRESSING OF SUPERVISOR PDR'S
                                        ;*
                                        ;*      THIS TEST CHECK THE LOGIC ASSOCIATED WITH BYTE ADDRESSING
                                        ;*      OF KERNAL PAGE DESCRIPTOR REGISTERS.  IT CAN BE ASSUMED THAT IF
                                        ;*      ONE REGISTER WORKS, THEY ALL WORK BECAUSE THE REGISTERS
                                        ;*      HAVE ALL BEEN TESTED.
                                        ;;*****************************************************************
     025356  000004                     TST40:  SCOPE
2432 025360  012737  025376  001110     20$:    MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
     025366  012702  000014             MOV     #14,R2          ;PUT EXPECTED DATA IN R2
     025372  012700  172200             MOV     #SIPDR0,R0      ;PUT ADDRESS OF REGISTER IN R0
     025376  005037  172200             11$:    CLR     SIPDR0          ;CLEAR THE REGISTER UNDER TEST
     025402  112710  172014             MOVB    #172014,(R0)    ;LOAD LOWER BYTE OF REGISTER
     025406  013701  172200             MOV     SIPDR0,R1       ;READ REGISTER INTO R1
     025412  020102                     CMP     R1,R2           ;SEE IF ONLY LOWER BYTE WAS WRITTEN
     025414  001401                     BEQ     1$              ;BRANCH IF DATA MATCHES
     025416  104033                     ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
     025420  012737  025436  001110     1$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
     025426  012700  172201             MOV     #SIPDR0+1,R0    ;POINT TO UPPER BYTE OF REGISTER
     025432  012702  052014             MOV     #52014,R2       ;LOAD EXPECTED DATA INTO R2
     025436  112710  000124             12$:    MOVB    #124,(R0)       ;WRITE UPPER BYTE OF REGISTER
     025442  013701  172200             MOV     SIPDR0,R1       ;READ REGISTER INTO R1
     025446  020102                     CMP     R1,R2           ;SEE IF ONLY UPPER BYTE WAS WRITTEN
     025450  001401                     BEQ     2$              ;BRANCH TO EXIT IF CORRECT
     025452  104033                     ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
     025454  012737  025360  001110     2$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
```

```
                                        .SBTTL  TEST # 41 - BYTE ADDRESSING OF USER PDR'S
                                        ;*****************************************************************
                                        ;*TEST 41       BYTE ADDRESSING OF USER PDR'S
                                        ;*
                                        ;*      THIS TEST CHECK THE LOGIC ASSOCIATED WITH BYTE ADDRESSING
                                        ;*      OF USER PAGE DESCRIPTOR REGISTERS.  IT CAN BE ASSUMED THAT IF
                                        ;*      ONE REGISTER WORKS, THEY ALL WORK BECAUSE THE REGISTERS
                                        ;*      HAVE ALL BEEN TESTED.
                                        ;*****************************************************************
 025462  000004                         TST41:  SCOPE
2437 025464  012737  025502  001110     20$:    MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
 025472  012702  000014                         MOV     #14,R2          ;PUT EXPECTED DATA IN R2
 025476  012700  177600                         MOV     #UIPDR0,R0      ;PUT ADDRESS OF REGISTER IN R0
 025502  005037  177600                 11$:    CLR     UIPDR0          ;CLEAR THE REGISTER UNDER TEST
 025506  112710  172014                         MOVB    #172014,(R0)    ;LOAD LOWER BYTE OF REGISTER
 025512  013701  177600                         MOV     UIPDR0,R1       ;READ REGISTER INTO R1
 025516  020102                                 CMP     R1,R2           ;SEE IF ONLY LOWER BYTE WAS WRITTEN
 025520  001401                                 BEQ     1$              ;BRANCH IF DATA MATCHES
 025522  104033                                 ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
 025524  012737  025542  001110     1$:     MOV     #12$,$LPERR     ;SET LOOP ON ERROR POINTER TO 12$
 025532  012700  177601                         MOV     #UIPDR0+1,R0    ;POINT TO UPPER BYTE OF REGISTER
 025536  012702  052014                         MOV     #52014,R2       ;LOAD EXPECTED DATA INTO R2
 025542  112710  000124                 12$:    MOVB    #124,(R0)       ;WRITE UPPER BYTE OF REGISTER
 025546  013701  177600                         MOV     UIPDR0,R1       ;READ REGISTER INTO R1
 025552  020102                                 CMP     R1,R2           ;SEE IF ONLY UPPER BYTE WAS WRITTEN
 025554  001401                                 BEQ     2$              ;BRANCH TO EXIT IF CORRECT
 025556  104033                                 ERROR   +33             ;DIDN'T LOAD CORRECT BYTE
 025560  012737  025464  001110     2$:     MOV     #20$,$LPERR     ;SET LOOP POINTER TO START OF TEST
```

```
                                .SBTTL  TEST # 42 - DUAL ADDRESSING FOR ALL PAR'S & PDR'S
                                ;*****************************************************************
                                ;*TEST 42       DUAL ADDRESSING FOR ALL PAR'S & PDR'S
                                ;*
                                ;*      THIS TEST WILL ENSURE THAT THERE IS NO DUAL ADDRESSING
                                ;*      BETWEEN GROUPS OF PAR'S AND PDR'S.  THAT IS, WHEN YOU
                                ;*      REFERENCE A KERNAL I-SPACE PAR YOU ARE REALLY REFERENCING
                                ;*      THAT PAR. FIRST EACH I-SPACE PAR0 OR PDR0 IS LOADED WITH
                                ;*      A UNIQUE NUMBER 0-12 AND THEN THEY ARE EACH CHECKED FOR
                                ;*      THE CORRECT DATA.
                                ;*      EACH GROUP HAS ALREADY BEEN TESTED FOR DUAL ADDRESSING
                                ;*      WITHIN ITS OWN GROUP, SO ONLY ONE REGISTER FROM EACH
                                ;*      GROUP NEEDS TO BE TESTED.
                                ;*
                                ;*****************************************************************
     025566  000004             TST42:  SCOPE
2452 025570  012737  025604  001110 20$:    MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2453 025576  005000                        CLR     R0              ;THIS WILL HOLD THE INDEX OF EACH
2454                                                               ;REGISTER, AND THE COUNT LOADED.
2455 025600  012704  000006               MOV     #6,R4           ;NUMBER OF TIMES TO DO THE LOOP
2456 025604  010070  001356        1$:     MOV     R0,@PARTAB(R0)  ;LOAD PAR OR PDR WITH INDEX NUMBER
2457 025610  062700  000002               ADD     #2,R0           ;CHANGE INDEX TO POINT TO NEXT REGISTER
2458 025614  077405                        SOB     R4,1$           ;BRANCH BACK 5 TIMES
2459 025616  012704  000006               MOV     #6,R4           ;DO NEXT LOOP 6 TIMES
2460 025622  013737  025634  001110        MOV     10$,$LPERR      ;SET LOOP ON ERROR POINTER TO 10$
2461 025630  162700  000002        2$:     SUB     #2,R0           ;ADJUST INDEX FOR REGISTER DESIRED
2462 025634  017001  001356        10$:    MOV     @PARTAB(R0),R1  ;READ PAR OR PDR INTO R1
2463 025640  020001                        CMP     R0,R1           ;SEE IF INDEX EQUALS DATA
2464 025642  001403                        BEQ     3$              ;BRANCH IF INCORRECT REGISTER WAS READ
2465 025644  016002  001356               MOV     PARTAB(R0),R2   ;SAVE ADDRESS OF BAD REGISTER
2466 025650  104016                        ERROR   +16             ;DUAL ADDRESSING ERROR
2467 025652  077412                3$:     SOB     R4,2$           ;BRANCH BACK 5 TIMES
2468 025654  012737  025570  001110        MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
```

TEST # 43 - TEST THAT PAR-PDR'S NOT AFFECTED BY RESET

```
2478                                    .SBTTL  TEST # 43 - TEST THAT PAR-PDR'S NOT AFFECTED BY RESET
                                        ;;*****************************************************************
                                        ;*TEST 43       TEST THAT PAR-PDR'S NOT AFFECTED BY RESET
                                        ;*
                                        ;*      THIS TEST CHECKS TO SEE THAT THE KERNEL,SUPERVISOR OR USER
                                        ;*      PAR/PDR'S ARE NOT AFFECTED BY THE EXECUTION OF A 'RESET'
                                        ;*      INSTRUCTION. ALL WRITEABLE BITS ARE SET TO A '1' IN THE
                                        ;*      PAR/PDR'S; THEY ARE THEN READ TO SEE THAT THEY REMAINED
                                        ;*      UNCHANGED.
                                        ;*
                                        ;;*****************************************************************
    025662  000004                      TST43:  SCOPE
2479 025664  012703  000020             1$:     MOV     #20,R3          ;LOAD LOOP COUNTER WITH A 16
2480 025670  012701  172300                     MOV     #KIPDR0,R1      ;LOAD FIRST ADDRESS OF PDR INTO R1
2481 025674  012702  172340                     MOV     #KIPAR0,R2      ;LOAD FIRST ADDRESS OF PAR INTO R2
2482 025700  012721  177777             21$:    MOV     #-1,(R1)+       ;SET BITS IN PDR TO 1'S
2483 025704  012722  177777                     MOV     #-1,(R2)+       ;SET BITS IN PAR'S TO 1'S
2484 025710  077305                             SOB     R3,21$          ;LOOP UNTIL ALL KERNAL PAR/PDR'S LOADED
2485 025712  012703  000020                     MOV     #20,R3          ;LOAD LOOP COUNTER WITH A 16
2486 025716  012701  172200                     MOV     #SIPDR0,R1      ;LOAD FIRST ADDRESS OF PDR INTO R1
2487 025722  012702  172240                     MOV     #SIPAR0,R2      ;LOAD FIRST ADDRESS OF PAR INTO R2
2488 025726  012721  177777             22$:    MOV     #-1,(R1)+       ;SET BITS IN PDR TO 1'S
2489 025732  012722  177777                     MOV     #-1,(R2)+       ;SET BITS IN PAR'S TO 1'S
2490 025736  077305                             SOB     R3,22$          ;LOOP UNTIL ALL SUPERVISOR PAR/PDR'S LOADED
2491 025740  012703  000020                     MOV     #20,R3          ;LOAD LOOP COUNTER WITH A 16
2492 025744  012701  177600                     MOV     #UIPDR0,R1      ;LOAD FIRST ADDRESS OF PDR INTO R1
2493 025750  012702  177640                     MOV     #UIPAR0,R2      ;LOAD FIRST ADDRESS OF PAR INTO R2
2494 025754  012721  177777             23$:    MOV     #-1,(R1)+       ;SET BITS IN PDR TO 1'S
2495 025760  012722  177777                     MOV     #-1,(R2)+       ;SET BITS IN PAR'S TO 1'S
2496 025764  077305                             SOB     R3,23$          ;LOOP UNTIL ALL USER PAR/PDR'S LOADED
2497 025766  000005                             RESET                   ;ISSUE AN "INIT" BY EXECUTING A RESET
2498 025770  012700  172300                     MOV     #KIPDR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PDR IN R0
2499 025774  012704  000020                     MOV     #20,R4          ;LOAD LOOP COUNTER WITH A 16
2500 026000  011001                     2$:     MOV     (R0),R1         ;READ A KERNEL PDR INTO R1
2501 026002  022701  177416                     CMP     #177416,R1      ;ARE ALL THE BITS STILL SET?
2502 026006  001401                             BEQ     3$              ;BRANCH IF YES
2503 026010  104023                             ERROR   +23             ;KERNEL PDR AFFECTED BY A RESET
2504                                                                    ;FOR TIGHTER SCOPE LOOP
2505                                                                    ;REPLACE ERROR CALL WITH
2506                                                                    ;'BR 2$" = 000773
2507 026012  062700  000002             3$:     ADD     #2,R0           ;FORM ADDRESS OF NEXT KERNEL PDR
2508 026016  077410                             SOB     R4,2$           ;LOOP TO 2$ UNTIL ALL KERNEL PDR'S CHECKED
2509 026020  012700  172340                     MOV     #KIPAR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PAR IN R0
2510 026024  012704  000020                     MOV     #20,R4          ;LOAD LOOP COUNTER WITH A 16
2511 026030  011001                     4$:     MOV     (R0),R1         ;READ A KERNEL PAR INTO R1
2512 026032  022701  177777                     CMP     #177777,R1      ;ARE ALL THE BITS STILL SET?
2513 026036  001401                             BEQ     5$              ;BRANCH IF YES
2514 026040  104023                             ERROR   +23             ;KERNEL PAR AFFECTED BY A RESET
2515                                                                    ;FOR TIGHTER SCOPE LOOP
2516                                                                    ;REPLACE ERROR CALL WITH
2517                                                                    ;'BR 4$" = 000773
2518 026042  062700  000002             5$:     ADD     #2,R0           ;FORM ADDRESS OF NEXT KERNEL PAR
2519 026046  077410                             SOB     R4,4$           ;LOOP TO 4$ UNTIL ALL KERNEL PAR'S CHECKED
2520 026050  012700  172200                     MOV     #SIPDR0,R0      ;LOAD ADDRESS OF FIRST SUPERVISOR PDR IN R0
2521 026054  012704  000020                     MOV     #20,R4          ;LOAD LOOP COUNTER WITH A 16
2522 026060  011001                     6$:     MOV     (R0),R1         ;READ A SUPERVISOR PDR INTO R1
2523 026062  022701  177416                     CMP     #177416,R1      ;ARE ALL THE BITS STILL SET?
```

TEST # 43 - TEST THAT PAR-PDR'S NOT AFFECTED BY RESET

```
2524 026066  001401                    BEQ     7$              ;BRANCH IF YES
2525 026070  104023                    ERROR   +23             ;SUPERVISOR PDR AFFECTED BY A RESET
2526                                                           ;FOR TIGHTER SCOPE LOOP
2527                                                           ;REPLACE ERROR CALL WITH
2528                                                           ;'BR 6$'' = 000773
2529 026072  062700  000002      7$:   ADD     #2,R0           ;FORM ADDRESS OF NEXT SUPERVISOR PDR
2530 026076  077410                    SOB     R4,6$           ;LOOP TO 6$ UNTIL ALL SUPERVISOR PDR'S CHECKED
2531 026100  012700  172240            MOV     #SIPAR0,R0      ;LOAD ADDRESS OF FIRST SUPERVISOR PAR IN R0
2532 026104  012704  000020            MOV     #20,R4          ;LOAD LOOP COUNTER WITH A 16
2533 026110  011001              8$:   MOV     (R0),R1         ;READ A SUPERVISOR PAR INTO R1
2534 026112  022701  177777            CMP     #177777,R1      ;ARE ALL THE BITS STILL SET?
2535 026116  001401                    BEQ     9$              ;BRANCH IF YES
2536 026120  104023                    ERROR   +23             ;SUPERVISOR PAR AFFECTED BY A RESET
2537                                                           ;FOR TIGHTER SCOPE LOOP
2538                                                           ;REPLACE ERROR CALL WITH
2539                                                           ;'BR 8$'' = 000773
2540 026122  062700  000002      9$:   ADD     #2,R0           ;FORM ADDRESS OF NEXT SUPERVISOR PAR
2541 026126  077410                    SOB     R4,8$           ;LOOP TO 8$ UNTIL ALL SUPERVISOR PAR'S CHECKED
2542 026130  012700  177600            MOV     #UIPDR0,R0      ;LOAD ADDRESS OF FIRST USER PDR WITH R0
2543 026134  012704  000020            MOV     #20,R4          ;LOAD LOOP COUNTER WITH A 16
2544 026140  011001             10$:   MOV     (R0),R1         ;READ A USER PDR INTO R1
2545 026142  022701  177416            CMP     #177416,R1      ;ARE ALL THE BITS STILL SET?
2546 026146  001401                    BEQ     11$             ;BRANCH IF YES
2547 026150  104023                    ERROR   +23             ;USER PDR AFFECTED BY A RESET
2548                                                           ;FOR TIGHTER SCOPE LOOP
2549                                                           ;REPLACE ERROR CALL WITH
2550                                                           ;'BR 10$'' = 000773
2551 026152  062700  000002     11$:   ADD     #2,R0           ;FORM ADDRESS OF NEXT USER PDR
2552 026156  077410                    SOB     R4,10$          ;LOOP TO 10$ UNTIL ALL USER PDR'S CHECKED
2553 026160  012700  177640            MOV     #UIPAR0,R0      ;LOAD ADDRESS OF FIRST USER PAR IN R0
2554 026164  012704  000020            MOV     #20,R4          ;LOAD LOOP COUNTER WITH A 16
2555 026170  011001             12$:   MOV     (R0),R1         ;READ A USER PAR INTO R1
2556 026172  022701  177777            CMP     #177777,R1      ;ARE ALL THE BITS STILL SET?
2557 026176  001401                    BEQ     13$             ;BRANCH IF YES
2558 026200  104023                    ERROR   +23             ;USER PAR AFFECTED BY A RESET
2559                                                           ;FOR TIGHTER SCOPE LOOP
2560                                                           ;REPLACE ERROR CALL WITH
2561                                                           ;'BR 12$'' = 000773
2562 026202  062700  000002     13$:   ADD     #2,R0           ;FORM ADDRESS OF NEXT USER PAR
2563 026206  077410                    SOB     R4,12$          ;LOOP TO 12$ UNTIL ALL USER PAR'S CHECKED
```

```
2576                                    .SBTTL  TEST # 44 - INST. FETCH NOT RELOCATED IN MAINT. MODE
                                        ;*****************************************************************
                                        ;*TEST 44       INST. FETCH NOT RELOCATED IN MAINT. MODE
                                        ;*
                                        ;*      THIS TEST CHECKS TO SEE THAT WHEN MEMORY MANAGEMENT IS IN
                                        ;*      MAINTENANCE MODE (DESTINATION-ONLY-RELOCATION), AN INSTRUCTION
                                        ;*      FETCH IS NOT RELOCATED AND A RESET CLEARS THE MAINTENANCE BIT
                                        ;*      (BIT 08) IN SR0.  IF THE 'FETCH' IS RELOCATED, A PG.LENGTH ABORT
                                        ;*      SHOULD OCCUR, CAUSING A HALT SINCE TRAP CATCHER IS PLACED IN VECTOR 250
                                        ;*
                                        ;*
                                        ;*      NOTE:   A HALT MAY OCCUR IF MAINT. MODE NOT DISABLED BY RESET
                                        ;*
                                        ;*****************************************************************
     026210  000004                     TST44:  SCOPE
2577 026212  004737  002172             1$:     JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
2578 026216  012700  172300                     MOV     #KIPDR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PDR INTO R0
2579 026222  012704  000010                     MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
2580 026226  005020                     2$:     CLR     (R0)+           ;CLEAR PDR - MAPPING PAGE NON-RES, 0 BLKS.
2581 026230  077402                             SOB     R4,2$           ;LOOP TO 2$ UNTIL ALL KERNEL PDR'S CLEARED
2582 026232  012737  000252  000250             MOV     #MMVEC+2,MMVEC  ;LOAD TRAP CATCHER INTO MEM MGM. VECTOR
2583 026240  005037  000252                     CLR     MMVEC+2         ;
2584                                                                     ;A HALT WILL OCCUR IF RESET FAILS
2585                                                                     ;TO DISABLE DEST.-ONLY RELOCATION
2586 026244  012737  001006  172300             MOV     #1006,KIPDR0    ;MAP KERNEL PG 0 R/W, 3 BLOCKS LONG.
2587 026252  012737  026260  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2588 026260  012737  000400  177572  3$:       MOV     #BIT8,SR0       ;TURN ON DEST-ONLY-RELOCATION
2589 026266  000005                             RESET                   ;SHOULD CLEAR MAINT. BIT - WILL ABORT IF RELOCATED
2590 026270  032737  000400  177572             BIT     #BIT8,SR0       ;WAS MAINT. BIT (BIT 8) OF SR0 CLEARED?
2591 026276  001403                             BEQ     4$              ;BRANCH IF YES
2592 026300  005037  177572                     CLR     SR0             ;CLEAR SR0 SO ERROR CAN BE REPORTED
2593 026304  104024                             ERROR   +24             ;MAINT. MODE NOT DISABLED BY A RESET
2594                                                                     ;FOR A TIGHTER SCOPE LOOP
2595                                                                     ;REPLACE ERROR CALL WITH
2596                                                                     ;'BR 3$'' = 000765
2597 026306  012706  001100             4$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER
2598 026312  005037  177572                     CLR     SR0             ;BE SURE SR0 IS CLEAR
2599 026316  012737  003330  000250             MOV     #MGMERR,MMVEC   ;RESTORE MEM. MGMT. TRAP VECTOR
2600 026324  012737  000340  000252             MOV     #340,MMVEC+2    ;RESTORE MEM. MGMT VECTOR+2
2601 026332  012737  026212  001110             MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2602 026340  004737  002226                     JSR     PC,TON          ;TURN T-BIT TRAPPING BACK ON
```

```
2616                                    .SBTTL  TEST # 45 - TEST THAT SOURCE NOT RELOCATED IN MAINT. MODE
                                        ;;*****************************************************************
                                        ;*TEST 45       TEST THAT SOURCE NOT RELOCATED IN MAINT. MODE
                                        ;*
                                        ;*      THIS TEST CHECKS TO SEE THAT WHEN MEMORY MANAGEMENT IS IN
                                        ;*      MAINTENANCE MODE, THE SOURCE IS NOT RELOCATED;  ONLY THE
                                        ;*      DESTINATION IS RELOCATED.  KERNEL PAR'S 3 & 4 ARE MAPPED TO
                                        ;*      PHYSICAL ADDRESS 60000-77776.  PDR4 IS SET TO ALLOW FULL
                                        ;*      READ/WRITE BUT PDR3 IS CLEAR ALLOWING NO ACCESS.  VIRTUAL
                                        ;*      ADDRESSES REFERENCING PAR/PDR'S 4 & 3 ARE USED AS
                                        ;*      DESTINATION AND SOURCE RESPECTIVELY. IF THE SOURCE IS
                                        ;*      RELOCATED IN MAINTENANCE MODE A MEM. MGMT. TRAP WILL OCCUR
                                        ;*      AND THE ERROR WILL BE REPORTED.  KERNEL PG. 7 IS MAPPED R/W.
                                        ;*
                                        ;;*****************************************************************
    026344  000004                      TST45:  SCOPE
26 7 026346  004737  002172             1$:     JSR     PC,TOFF         ;TURN OFF T-BIT TRAPPING FOR THIS TEST
2618 026352  012737  026442  001110             MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
2619 026360  012737  000600  172346             MOV     #600,KIPAR3     ;MAP KERNAL PAGE 3 TO 12-16K
2620 026366  012737  000600  172350             MOV     #600,KIPAR4     ;MAP KERNAL PAGE 4 TO 12-16K
2621 026374  012737  007600  172356             MOV     #7600,KIPAR7    ;MAP KERNAL PAGE 7 TO THE I/O PAGE
2622 026402  005037  172306                     CLR     KIPDR3          ;MAP KERNAL PAGE 3 'NO ACCESS''
2623 026406  012737  077406  172310             MOV     #77406,KIPDR4   ;MAP KERNAL PAGE 4 R/W, 128 BLKS
2624 026414  012737  077406  172316             MOV     #77406,KIPDR7   ;MAP KERNAL PAGE 7 R/W, 128 BLKS
2625 026422  012737  026522  000250             MOV     #4$,MMVEC       ;SET M.M. VECTOR TO 4$ IN CASE OF ABORT
2626 026430  012737  000377  060000             MOV     #377,60000      ;LOAD ALL 1'S IN LOW BYTE OF TEST LOC.
2627 026436  012700  177777                     MOV     #-1,R0          ;LOAD EXPECTED CONTENTS OF TEST LOC. IN R0
2628 026442  052737  000400  177572  2$:       BIS     #BIT8,SR0       ;TURN ON DEST.-ONLY-RELOCATION
2629 026450  113737  060000  100001             MOVB    60000,100001    ;LOAD HI BYTE OF TEST LOC.-ABORT IF SOURCE RELOCATED
2630 026456  000005                             RESET                   ;TURN OFF DEST.-ONLY-RELOCATION
2631 026460  013701  060000                     MOV     60000,R1        ;READ CONTENTS OF TEST LOC.
2632 026464  020001                             CMP     R0,R1           ;WAS TEST LOCATION LOADED PROPERLY?
2633 026466  001401                             BEQ     3$              ;BRANCH IF YES
2634 026470  104025                             ERROR   +25             ;TEST LOC. NOT LOADED - INST. WAS ABORTED
2635                                                                     ;WHEN SOURCE WAS RELOCATED
2636                                                                     ;FOR TIGHTER SCOPE LOOP REPLACE
2637                                                                     ;ERROR CALL WITH
2638                                                                     ;'BR 2$'' = 000764
2639 026472  012737  003330  000250  3$:       MOV     #MGMERR,MMVEC   ;RESTORE MEM. MGMT. VECTOR
2640 026500  012737  077406  172306             MOV     #77406,KIPDR3   ;MAP KERNAL PAGE 3 R/W, 128 BLKS
2641 026506  012737  026346  001110             MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2642 026514  004737  002226                     JSR     PC,TON          ;TURN T-BIT TRAPPING BACK ON
2643 026520  000430                             BR      TST46           ;;SKIP TO NEXT TEST
2644                                    ;*  IF THE PROGRAM TRIES TO RELOCATE THE SOURCE, IT SHOULD TRAP TO 4$
2645 026522  042737  000400  177572  4$:       BIC     #BIT8,SR0       ;TURN OFF DEST.-ONLY-RELOCATION THRU PAR/PDR 7
2646 026530  013737  177572  001264             MOV     SR0,WASSR0      ;SAVE REST OF SR0 CONTENTS
2647 026536  013737  177576  001270             MOV     SR2,WASSR2      ;SAVE CONTENTS OF SR2
2648 026544  010637  001256                     MOV     SP,WASR6        ;SAVE VALUE OF THE STACK POINTER
2649 026550  012637  001260                     MOV     (SP)+,TRAPPC    ;SAVE PC OF TRAP
2650 026554  012637  001262                     MOV     (SP)+,TRAPPS    ;SAVE PSW OF TRAP
2651 026560  042737  160000  177572             BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
2652 026566  104026                             ERROR   +26             ;SOURCE APPARENTLY RELOCATED IN MAINT. MODE
2653                                                                     ;FOR TIGHTER SCOPE LOOP
2654                                                                     ;REPLACE ERROR CALL WITH A
2655                                                                     ;'NOP'' = 000240
2656 026570  013746  001262                     MOV     TRAPPS,-(SP)    ;PUT PSW OF TRAP BACK ON THE STACK
2657 026574  013746  001260                     MOV     TRAPPC,-(SP)    ;PUT PC OF TRAP BACK ON THE STACK
```

```
2658 02o600  000002                    RTI                    ;RETURN TO TEST
```

```
                        .SBTTL  ADDER TESTS
                        ;;**********************************************************************
                        ;       GROUP 3             ADDER TESTS
                        ;;**********************************************************************
```

```
                                        .SBTTL  TEST # 46 - 18-BIT MAPPING ADDER TEST
                                        ;*****************************************************************
                                        ;*TEST 46       18-BIT MAPPING ADDER TEST
                                        ;*
                                        ;*      THIS TEST  USES 'DESTINATION ONLY'  RELOCATION TO CHECK THE
                                        ;*      FULL ADD  PROPERTIES OF  THE RELOCATION ADDER. TWELVE PAIRS
                                        ;*      OF NUMBERS ARE ADDED, GENERTING PHYSICAL ADDRESSES FROM 12K
                                        ;*      TO ABOVE 16K.
                                        ;*
                                        ;*      NOTE - PART OF THIS TEST WILL NOT BE RUN IF THERE IS LESS
                                        ;*             THAN 16K OF MEMORY ON THE SYSTEM.
                                        ;*
                                        ;*****************************************************************
026602  000004                        TST46:  SCOPE
2675                                    ;       THE FOLLOWING CODE CLEARS ALL THE PAR'S AND PDR'S SO THAT
2676                                    ;       THE RELOCATION ADDERS CAN BE CHECKED. ONLY THE KERNAL
2677                                    ;       I-SPACE PAR'S AND PDR'S WILL BE MAPPED RESIDENT AND R/W.
2678 026604  012705  172200                    MOV     #SIPDR0,R5      ;PUT ADDRESS OF 1ST OF 100 PR'S TO CLEAR TO R5
2679 026610  012704  000100                    MOV     #100,R4         ;CLEAR 100 LOCATIONS
2680 026614  005025                    1$:     CLR     (R5)+           ;CLEAR THE LOCATION
2681 026616  077402                            SOB     R4,1$           ;SUBTRACT 1 AND BRANCH IF NOT ZERO
2682 026620  012705  177600                    MOV     #UIPDR0,R5      ;PUT ADDRESS OF REMAINING 40 PR'S TO CLEAR TO R5
2683 026624  012704  000040                    MOV     #40,R4          ;CLEAR 40 LOCATIONS
2684 026630  005025                    2$:     CLR     (R5)+           ;CLEAR THE LOCATION
2685 026632  077402                            SOB     R4,2$           ;SUBTRACT 1 AND BRANCH IF NOT ZERO
2686 026634  012702  000010              3$:     MOV     #10,R2          ;SET COUNTER TO LOAD 8 ADDRESSES
2687 026640  012701  172300                    MOV     #KIPDR0,R1      ;PUT ADDRESS OF FIRST PDR IN R1
2688 026644  012721  077406              4$:     MOV     #77406,(R1)+    ;LOAD 77406 INTO PDR ADDRESSED BY R1
2689 026650  077203                            SOB     R2,4$           ;BRANCH BACK TO 4$ IF R2 IS NOT ZERO
2690 026652  012737  000200  172342            MOV     #200,KIPAR1     ;MAP PAGE 1 TO 4K->8K (PAGE 0 IS ALREADY MAPPED TO 0->4K)
2691 026660  012737  000400  172344            MOV     #400,KIPAR2     ;MAP PAGE 2 TO 8K->12K
2692 026666  012737  000600  172346            MOV     #600,KIPAR3     ;MAP PAGE 3 TO 12K->16K
2693 026674  012737  177600  172356            MOV     #177600,KIPAR7  ;MAP PAGE 7 TO I/O PAGE
2694 026702  005003                            CLR     R3              ;CLEAR R3, THE POINTER USED TO INDEX TO THE TABLE
2695 026704  012704  000004                    MOV     #4,R4           ;EXECUTE ROUTINE UNTIL R3=4
2696 026710  012705  027024                    MOV     #PATRNS,R5      ;MOVE ADDRESS OF THE PATTERN SET (ON NEXT PAGE) TO R5
2697 026714  012737  026740  001110            MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2698 026722  005203                    5$:     INC     R3              ;INCREMENT THE TABLE POINTER
2699 026724  012537  172350                    MOV     (R5)+,KIPAR4    ;LOAD PAR4 WITH VALUE IN TABLE, IDENTIFIED BY R3 VALUE
2700 026730  012500                            MOV     (R5)+,R0        ;PUT VIRTUAL ADDRESS IN R0
2701 026732  013537  001176                    MOV     @(R5)+,$TMP0    ;SAVE DATA AT TEST LOCATION
2702 026736  012501                            MOV     (R5)+,R1        ;PUT DATA PATTERN INTO R1
2703 026740  052737  000400  177572    6$:     BIS     #BIT8,MMR0      ;TURN ON DESTINATION ONLY RELOCATION
2704 026746  010110                            MOV     R1,(R0)         ;TRY TO LOAD DATA PATTERN INTO LOCATION IN TABLE
2705 026750  017502  177774                    MOV     @-4(R5),R2      ;READ LOCATION INTO R2
2706 026754  005037  177572                    CLR     MMR0            ;CLEAR MMR0
2707 026760  020102                            CMP     R1,R2           ;SEE IF DATA MATCHES PATTERN
2708 026762  001401                            BEQ     7$              ;BRANCH IF DATA MATCHES
2709 026764  104017                            ERROR   +17             ;RELOCATION FAILED
2710 026766  013775  001176  177774    7$:     MOV     $TMP0,@-4(R5)   ;RESTORE ORIGINAL DATA TO TEST LOCATION
2711 026774  020304                            CMP     R3,R4           ;SEE IF WE ARE AT END OF THIS SET
2712 026776  001351                            BNE     5$              ;BRANCH BACK IF NOT
2713 027000  022704  000020                    CMP     #20,R4          ;SEE IF 2ND BATCH OF DATA IS NOW DONE
2714 027004  001507                            BEQ     APTTST          ;BRANCH IF SO
2715 027006  023727  003022  001000            CMP     $LSTBK,#1000    ;DO WE HAVE OVER 16K ON THIS SYSTEM?
2716 027014  003503                            BLE     APTTST          ;BRANCH IF WE DO NOT
2717 027016  012704  000020                    MOV     #20,R4          ;EXECUTE ROUTINE UNTIL R3=20
```

```
   2718 027022  000737                          BR      5$              ;GO BACK TO THE ROUTINE
```

```
2719 027024  000600  100000  060000  PATRNS: .WORD   0600,100000,060000,125200       ;R3=1 DATA
2720 027034  000625  105276  067776          .WORD   0625,105276,067776,125201       ;R3=2 DATA
2721 027044  000633  105500  071000          .WORD   0633,105500,071000,125202       ;R3=3 DATA
2722 027054  000604  111476  072076          .WORD   0604,111476,072076,125203       ;R3=4 DATA
2723 027064  001000  100000  100000          .WORD   1000,100000,100000,125204       ;R3=5 DATA
2724 027074  001252  112576  137776          .WORD   1252,112576,137776,125205       ;R3=6 DATA
2725 027104  001125  105276  117776          .WORD   1125,105276,117776,125206       ;R3=7 DATA
2726 027114  001010  101000  102000          .WORD   1010,101000,102000,125207       ;R3=10 DATA
2727 027124  001314  110400  142000          .WORD   1314,110400,142000,125210       ;R3=11 DATA
2728 027134  001104  111400  122000          .WORD   1104,111400,122000,125211       ;R3=12 DATA
2729 027144  001356  104200  142000          .WORD   1356,104200,142000,125212       ;R3=13 DATA
2730 027154  001242  115600  142000          .WORD   1242,115600,142000,125213       ;R3=14 DATA
2731 027164  001377  102100  142000          .WORD   1377,102100,142000,125214       ;R3=15 DATA
2732 027174  001221  117700  142000          .WORD   1221,117700,142000,125215       ;R3=16 DATA
2733 027204  001377  100100  140000          .WORD   1377,100100,140000,125216       ;R3=17 DATA
2734 027214  001370  101000  140000          .WORD   1370,101000,140000,125217       ;R3=20 DATA
2735
2736                                ;*************************************************************
2737                                ;* THIS PIECE OF CODE CHECKS TO SEE IF THE PROGRAM IS RUNNING UNDER
2738                                ;* APT, AND THEN LOOKS FOR THE APT SPECIAL ADDRESSING HARDWARE. IF
2739                                ;* THE HARDWARE IS FOUND, THE NEXT TWO TESTS OPERATE AS IF THERE
2740                                ;* WERE A FULL COMPLEMENT OF MEMORY ON THE SYSTEM.
2741                                ;*************************************************************
2742 027224  005037  001340  APTTST: CLR     HDWFLAG         ;RESET THE HARDWARE PRESENT FLAG
2743 027230  105737  001244          TSTB    $ENV            ;ARE WE UNDER APT?
2744 027234  001420                  BEQ     TST47           ;;BRANCH TO NEXT TEST IF NOT
2745 027236  032737  000200  001250  BIT     #BIT7,$USWR     ;IS THE HARDWARE SUPPOSED TO BE THERE?
2746 027244  001414                  BEQ     TST47           ;;BRANCH TO NEXT TEST IF FALSE
2747 027246  012737  027262  000004  MOV     #1$,ERRVEC      ;TRAPS TO 4 GO TO 1$
2748 027254  005737  177770          TST     RMIREG          ;SPECIAL HARDWARE PRESENT?
2749 027260  000404                  BR      2$              ;IF WE GOT HERE, THE HARDWARE IS THERE
2750 027262  062706  000004  1$:     ADD     #4,SP           ;CLEAN UP STACK AFTER INTERRUPT
2751 027266  104060                  ERROR   +60             ;APT SPECIAL HARDWARE NOT FOUND
2752 027270  000402                  BR      TST47           ;;GO TO NEXT TEST
2753 027272  005237  001340  2$:     INC     HDWFLAG         ;SET SPECIAL HARDWARE PRESENT FLAG
```

```
2768                                    .SBTTL  TEST # 47 - 18-BIT MAPPING CARRY PROPAGATION
                                        ;**************************************************************
                                        ;*TEST 47       18-BIT MAPPING CARRY PROPAGATION
                                        ;*
                                        ;*      THIS TEST USES FULL 18-BIT RELOCATION TO CHECK THE CARRY
                                        ;*      PROPAGATION OF THE RELOCATION ADDER.  SINCE THIS TEST SCANS
                                        ;*      MEMORY FROM 00100000 TO 00740000 ON 8K BOUNDARIES, IT WILL
                                        ;*      REPORT ANY HOLES THAT IT FINDS IN MEMORY UP TO THE LAST
                                        ;*      BLOCK.  THE INFORMATION GIVEN WILL BE THE ADDRESS WHERE
                                        ;*      THE HOLE WAS DISCOVERED AND THE FIRST GOOD ADDRESS AFTER
                                        ;*      THE HOLE.
                                        ;*
                                        ;*      NOTE - PART OF THIS TEST WILL NOT BE RUN IF THE SYSTEM
                                        ;*             MEMORY SIZE IS LESS THAN 16K WORDS.
                                        ;*
                                        ;**************************************************************
     027276  000004                     TST47:  SCOPE
2769 027300  012700  100100                     MOV     #100100,R0      ;LOAD VIRTUAL ADDR FOR PAR4 INTO R0
2770 027304  012737  000001  177572             MOV     #1,MMR0         ;TURN ON 18-BIT MAPPING
2771 027312  005737  001340                     TST     HDWFLAG         ;SPECIAL HARDWARE?
2772 027316  001004                             BNE     20$             ;BRANCH IF TRUE
2773 027320  023727  003022  001000             CMP     $LSTBK,#1000    ;IS THERE AT LEAST 16K ON THE SYSTEM?
2774 027326  002510                             BLT     4$              ;BRANCH IF LESS THAN 16K TO 4$
2775 027330  005037  001336             20$:    CLR     HOLFLG          ;MAKE SURE HOLE FLAG STARTS AT ZERO
2776 027334  012737  027772  000004             MOV     #10$,ERRVEC     ;SET ERROR VECTOR POINTER TO 10$
2777 027342  012737  000777  172350             MOV     #777,KIPAR4     ;LOAD PAR4 WITH STARTING BASE
2778 027350  012737  001000  172352             MOV     #1000,KIPAR5    ;START ADDRESSING WITH 16K
2779 027356  012701  120000                     MOV     #120000,R1      ;LOAD VIRTUAL ADDR FOR PAR5 INTO R1
2780 027362  012702  000375                     MOV     #375,R2         ;LOAD DATA PATTERN INTO R2
2781 027366  012737  027374  001110             MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2782 027374  005037  001332             1$:     CLR     PCPUER          ;CLEAR CPU ERROR FLAG
2783 027400  005737  001340                     TST     HDWFLAG         ;SPECIAL HARDWARE?
2784 027404  001404                             BEQ     2$              ;BRANCH IF FALSE
2785 027406  023737  172352  003022             CMP     KIPAR5,$LSTBK   ;ARE WE OUT OF EXISTING MEMORY?
2786 027414  003023                             BGT     21$             ;BRANCH IF TRUE
2787 027416  011137  001176             2$:     MOV     (R1),$TMP0      ;SAVE DATA AT TEST LOCATION
2788 027422  005737  001332                     TST     PCPUER          ;SEE IF THERE WAS A CPU TRAP
2789 027426  001014                             BNE     3$              ;BRANCH IF TRAP OCCURRED
2790 027430  005737  001336                     TST     HOLFLG          ;SEE IF HOLE WAS FOUND IN MEMORY
2791 027434  001411                             BEQ     3$              ;BRANCH IF NO HOLE WAS FOUND
2792 027436  013737  172352  001202             MOV     KIPAR5,$TMP2    ;SAVE PAR THAT POINTS TO END OF HOLE
2793 027444  012737  027330  001110             MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
2794 027452  104041                             ERROR   +41             ;HOLE IN MEMORY FROM $TMP1 TO $TMP2
2795 027454  005037  001336                     CLR     HOLFLG          ;CLEAR HOLE FLAG IN CASE THERE ARE MORE
2796 027460  010210                     3$:     MOV     R2,(R0)         ;LOAD TEST PATTERN INTO TEST LOCATION
2797 027462  000405                             BR      23$             ;BRANCH OVER NEXT INSTRUCTIONS
2798 027464  010204                     21$:    MOV     R2,R4           ;GET COPY OF DATA
2799 027466  052704  000400                     BIS     #BIT8,R4        ;ADD SPECIAL HARDWARE ENABLE BIT
2800 027472  010437  177770                     MOV     R4,MIREG        ;PUT DATA IN SPECIAL HARDWARE
2801 027476  011103                     23$:    MOV     (R1),R3         ;READ TEST LOCATION VIA DIFFERENT VIRT. ADDR.
2802 027500  020203                             CMP     R2,R3           ;SEE IF THE CORRECT LOCATION WAS REFERENCED
2803 027502  001401                             BEQ     22$             ;BRANCH IF CORRECT DATA WAS OBTAINED
2804 027504  104042                             ERROR   +42             ;BAD RELOCATION
2805 027506  011176  001176             22$:    MOV     $TMP0,(R1)      ;RESTORE ORIGINAL DATA TO TEST LOCATION
2806 027512  062737  000400  172350             ADD     #400,KIPAR4     ;CHANGE BASE ADDRESS
2807 027520  062737  000400  172352             ADD     #400,KIPAR5     ;CHANGE BASE ADDRESS
2808 027526  005302                             DEC     R2              ;CHANGE DATA PATTERN
```

```
2809 027530  022737  007400  172352          CMP     #7400,KIPAR5    ;SEE IF PAST LAST ADDRESS
2810 027536  103316                          BHIS    1$              ;BRANCH IF NOT PAST LAST ADDRESS
2811 027540  005737  001336                  TST     HOLFLG          ;SEE IF YOU ARE IN MIDDLE OF HOLE
2812 027544  001401                          BEQ     4$              ;BRANCH IF NOT IN MIDDLE OF HOLE
2813 027546  104043                          ERROR   +43             ;IN MIDDLE OF HOLE IN MEMORY
2814                                                                 ;HOLFLG HAS NUMBER OF TIMEOUTS
2815                                                                 ;$TMP1 HAS PAR OF FIRST TIMEOUT
2816                                 ;*
2817                                 ;*      ADDRESS 760000 IS GENERATED BY CARRY PROPAGATION WHILE THE
2818                                 ;*      PROGRAM IS EXPECTING A TIME OUT.  (760000 IS THE FIRST I/O
2819                                 ;*      PAGE ADDRESS).  KIPAR4 WILL CONTAIN 007577 AND R0 HAS 100100
2820                                 ;*      (WHICH SELECTS KIPAR4 AND GENERATES ADDRESS 760000).  IF THE
2821                                 ;*      WRONG BIT IN THE CPU ERROR REGISTER IS SET, OR IF NO TRAP
2822                                 ;*      TO 'ERRVEC' OCCURS AN ERROR IS REPORTED.
2823                                 ;*
2824 027550  005737  001340          4$:     TST     HDWFLAG         ;SPECIAL HARDWARE?
2825 027554  001402                          BEQ     45$             ;BRANCH IF NOT
2826 027556  005037  177770                  CLR     RMIREG          ;MAKE SURE SPECIAL HARDWAE IS OFF
2827 027562  012737  003232  000004  45$:    MOV     #TIMERR,ERRVEC  ;RESTORE NORMAL ROUTINE FOR TRAPS THRU 4
2828 027570  012737  027622  001110          MOV     #40$,$LPERR     ;SET LOOP ON ERROR POINTER TO 40$
2829 027576  012737  007577  172350          MOV     #7577,KIPAR4    ;LOAD KIPAR4 WITH 007577
2830 027604  012702  007600                  MOV     #7600,R2        ;LOAD DATA PATTERN INTO R2
2831 027610  012737  000020  001334          MOV     #20,CPUEXP      ;EXPECTING UNIBUS TIMEOUT
2832 027616  005037  001332                  CLR     PCPUER          ;CLEAR CPU TRAP FLAG
2833 027622  010210                  40$:    MOV     R2,(R0)         ;LOAD 760000 THRU PAGE 4
2834                                                                 ;THIS INSTRUCTION SHOULD TIMEOUT
2835                                                                 ;OVER THE UNIBUS.
2836 027624  005737  001332                  TST     PCPUER          ;SEE IF TRAP OCCURRED
2837 027630  001001                          BNE     6$              ;BRANCH IF TRAP
2838 027632  104044                          ERROR   +44             ;NO CPU TRAP
2839                                 ;*
2840                                 ;*      ADDRESS 000000 IS GENERATED BY CARRY PROPAGATION.  THEN, IF
2841                                 ;*      THERE IS LESS THAN 120K OF MEMORY ON THE SYSTEM, THE LAST
2842                                 ;*      BLOCK ($LSTBK) IS USED AS A PAR AND A CARRY IS PROPAGATED TO
2843                                 ;*      CAUSE AN 18-BIT OVERFLOW.
2844                                 ;*
2845 027634  012737  027660  001110  6$:     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2846 027642  005037  001334                  CLR     CPUEXP          ;NO TRAPS THRU ERRVEC EXPECTED HERE
2847 027646  012737  007777  172350          MOV     #7777,KIPAR4    ;LOAD PAR4 WITH HIGHEST VALUE POSSIBLE
2848 027654  005037  000000                  CLR     0               ;CLEAR ADDRESS ZERO
2849 027660  013701  100100          16$:    MOV     100100,R1       ;THIS SHOULD READ ADDRESS ZERO INTO R1
2850 027664  005701                          TST     R1              ;SEE IF YOU READ ADDRESS ZERO
2851 027666  001401                          BEQ     7$              ;BRANCH IF ADDRESS ZERO WAS READ
2852 027670  104045                          ERROR   +45             ;DIDN'T READ ADDRESS ZERO
2853 027672  012737  027736  001110  7$:     MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2854 027700  022737  007377  003022          CMP     #7377,$LSTBK    ;IS MEMORY BLOCK SIZE < 7377
2855 027706  101423                          BLOS    8$              ;BRANCH IF MORE THAT 120K ON SYSTEM
2856 027710  012737  000040  001334          MOV     #40,CPUEXP      ;EXPECTING NON-EXISTANT MEMORY ERROR
2857 027716  005037  001332                  CLR     PCPUER          ;CLEAR TRAP THRU ERRVEC FLAG
2858 027722  013737  003022  172350          MOV     $LSTBK,KIPAR4   ;GET READY TO GENERATE NON-EXISTANT ADDR.
2859 027730  062737  000100  172350          ADD     #100,KIPAR4     ;MAKE SURE WE'RE IN NON-EXISTANT MEMORY.
2860 027736  013701  100100          17$:    MOV     100100,R1       ;READ FROM NON-EXISTANT ADDRESS
2861 027742  005737  001332                  TST     PCPUER          ;SEE IF TRAP THRU ERRVEC OCCURRED
2862 027746  001003                          BNE     8$              ;BRANCH TO EXIT IF TRAP OCCURED
2863 027750  012700  100100                  MOV     #100100,R0      ;SAVE VIRTUAL ADDRESS FOR ERROR TYPEOUT
2864 027754  104046                          ERROR   +46             ;NO TRAP THRU ERRVEC
2865 027756  005037  001334          8$:     CLR     CPUEXP          ;NO CPU TRAPS EXPECTED
```

```
2866 027762  012737  027330  001110          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
2867 027770  000462                          BR      TST50           ;;BRANCH TO NEXT TEST
2868                              ;************ TRAP TO HERE THRU ERRVEC *****************
2869 027772  012637  001326      10$:        MOV     (KSP)+,OLDPC    ;SAVE RETURN ADDRESS
2870 027776  012637  001330                  MOV     (KSP)+,OLDPS    ;SAVE RETURN PSW
2871 030002  013737  177766  001332          MOV     CPUERR,PCPUER   ;SAVE CPU ERROR REGISTER FOR TYPING
2872 030010  022737  000040  001332          CMP     #40,PCPUER      ;WAS TRAP NON-EXISTANT MEMORY
2873 030016  001012                          BNE     12$             ;BRANCH IF MEMORY EXISTS
2874 030020  023737  172350  003022          CMP     KIPAR4,$LSTBK   ;SEE IF PAR4 MATCHES LAST BLOCK IN MEMORY
2875 030026  002404                          BLT     11$             ;BRANCH IF NO MATCH-ERROR IN COMPARE CIRCUITS
2876 030030  012737  027550  001326          MOV     #4$,OLDPC       ;CHANGE RETURN ADDRESS IF AT TOP OF MEMORY
2877 030036  000430                          BR      14$             ;BRANCH TO EXIT
2878 030040  104047              11$:        ERROR   +47             ;PREMATURE END OF MEMORY FOUND
2879 030042  000426                          BR      14$             ;BRANCH TO EXIT
2880 030044  022737  000020  001332  12$:    CMP     #20,PCPUER      ;SEE IF ADDRESS TIMED OUT
2881 030052  001011                          BNE     13$             ;BRANCH IF NO TIME OUT,UNEXPECTED ERROR
2882 030054  005737  001336                  TST     HOLFLG          ;HAS THIS HAPPENED BEFORE?
2883 030060  001003                          BNE     15$             ;BRANCH IF NOT FIRST TIMEOUT
2884 030062  013737  172352  001200          MOV     KIPAR5,$TMP1    ;SAVE PAR WHERE HOLE FIRST DISCOVERED
2885 030070  005237  001336      15$.        INC     HOLFLG          ;KEEP COUNT OF SUCCESSIVE TIMEOUTS
2886 030074  000411                          BR      14$             ;BRANCH TO EXIT
2887 030076  013737  001326  001324  13$:    MOV     OLDPC,BADPC     ;MOVE PC OF UNEXPECTED ERROR FOR TYPEOUT
2888 030104  104001                          ERROR   +1              ;UNEXPECTED TRAP THROUGH ERRVEC
2889 030106  013737  001106  001326          MOV     $LPADR,OLDPC    ;RETURN TO BEGINNING OF TEST
2890 030114  005037  001336                  CLR     HOLFLG          ;CLEAR FLAG IN CASE IT WAS SET
2891 030120  005037  177766      14$:        CLR     CPUERR          ;CLEAR CPU ERROR REGISTER
2892 030124  013746  001330                  MOV     OLDPS,-(KSP)    ;PUSH OLD PSW ONTO STACK
2893 030130  013746  001326                  MOV     OLDPC,-(KSP)    ;PUSH RETURN ADDRESS ONTO STACK
2894 030134  000002                          RTI                     ;RETURN TO TEST AND CONTINUE
```

TEST # 50 - 22-BIT MAPPING CARRY PROPAGATION

```
2908                                    .SBTTL  TEST # 50 - 22-BIT MAPPING CARRY PROPAGATION
                                        ;*****************************************************************
                                        ;*TEST 50       22-BIT MAPPING CARRY PROPAGATION
                                        ;*
                                        ;*      THIS TEST USES FULL 22-BIT RELOCATION TO CHECK THE CARRY
                                        ;*      PROPAGATION THAT PERTAINS TO 22 BIT ADDRESSES. THIS TEST
                                        ;*      SCANS MEMORY FROM 00740000 TO 16740000 OR THE LAST BLOCK,
                                        ;*      ON 8K BOUNDARIES. IF ANY HOLES ARE FOUND, THE ADDRESS
                                        ;*      WHERE THE HOLE WAS DISCOVERED AND THE FIRST GOOD ADDRESS
                                        ;*      AFTER THE HOLE WILL BE REPORTED.
                                        ;*
                                        ;*      NOTE - PART OF THIS TEST WILL NOT BE RUN IF THERE IS LESS
                                        ;*             THAN 120K ON THE SYSTEM.
                                        ;*
                                        ;*****************************************************************
    030136  000004                      TST50:  SCOPE
2909 030140  012700  100100             MOV     #100100,R0      ;LOAD VIRTUAL ADDR FOR PAR4 INTO R0
2910 030144  012701  120000             MOV     #120000,R1      ;LOAD VIRTUAL ADDR FOR PAR5 INTO R1
2911 030150  012737  000020  172516     MOV     #BIT4,MMR3      ;ENABLE 22 BIT MAPPING
2912 030156  005737  001340             TST     HDWFLAG         ;IS THERE SPECIAL HARDWARE?
2913 030162  001004                     BNE     20$             ;BRANCH IF THERE IS
2914 030164  022737  007377  003022     CMP     #7377,$LSTBK    ;IS THERE AT LEAST 120K ON THE SYSTEM?
2915 030172  003112                     BGT     4$              ;BRANCH IF LESS THAN 120K
2916 030174  012737  030654  000004  20$:MOV     #10$,ERRVEC     ;SET ERROR VECTOR POINTER TO 10$
2917 030202  005037  001336             CLR     HOLFLG          ;MAKE SURE HOLE FLAG STARTS AT ZERO
2918 030206  012737  007377  172350     MOV     #7377,KIPAR4    ;LOAD PAR4 WITH STARTING BASE
2919 030214  012737  007400  172352     MOV     #7400,KIPAR5    ;LOAD BASE ADDRESS +100 INTO KIPAR5
2920 030222  012702  000360             MOV     #360,R2         ;LOAD DATA PATTERN INTO R2
2921 030226  012737  030234  001110  1$:MOV     #21$,$LPERR     ;SET LOOP ON ERROR POINTER TO 21$
2922 030234  005737  001340         21$:TST     HDWFLAG         ;IS THERE SPECIAL HARDWARE?
2923 030240  001404                     BEQ     22$             ;BRANCH IF NOT
2924 030242  023737  172352  003022     CMP     KIPAR5,$LSTBK   ;ARE WE OUT OF MEMORY SPACE?
2925 030250  003025                     BGT     23$             ;BRANCH IF WE ARE
2926 030252  005037  001332         22$:CLR     PCPUER          ;CLEAR CPU ERROR FLAG
2927 030256  011137  001176             MOV     (R1),$TMP0      ;SAVE DATA AT TEST LOCATION
2928 030262  005737  001332             TST     PCPUER          ;SEE IF THERE WAS A CPU TRAP
2929 030266  001014                     BNE     2$              ;BRANCH IF TRAP OCCURRED
2930 030270  005737  001336             TST     HOLFLG          ;SEE IF HOLE WAS FOUND IN MEMORY
2931 030274  001411                     BEQ     2$              ;BRANCH IF NO HOLE WAS FOUND
2932 030276  013737  172352  001202     MOV     KIPAR5,$TMP2    ;SAVE PAR THAT POINTS TO END OF HOLE
2933 030304  012737  030174  001110     MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO 20$
2934 030312  104050                     ERROR   +50             ;HOLE IN MEMORY FROM $TMP1 TO $TMP2
2935 030314  005037  001336             CLR     HOLFLG          ;CLEAR HOLE FLAG IN CASE THERE ARE MORE
2936 030320  010210                 2$: MOV     R2,(R0)         ;LOAD TEST PATTERN INTO TEST LOCATION
2937 030322  000405                     BR      24$             ;BRANCH OVER NEXT FEW INSTRUCTIONS
2938 030324  010204                 23$:MOV     R2,R4           ;GET CURRENT DATA VALUE
2939 030326  052704  000400             BIS     #BIT8,R4        ;SET SPECIAL HARDWARE ENABLE BIT
2940 030332  010437  177770             MOV     R4,MMIREG       ;SETUP SPECIAL HARDWARE
2941 030336  011103                 24$:MOV     (R1),R3         ;READ TEST LOCATION VIA DIFFERENT VIRT. ADDR.
2942 030340  020203                     CMP     R2,R3           ;SEE IF THE CORRECT LOCATION WAS REFERENCED
2943 030342  001401                     BEQ     3$              ;BRANCH IF CORRECT DATA WAS OBTAINED
2944 030344  104051                     ERROR   +51             ;BAD RELOCATION 22-BIT MAPPING
2945 030346  013711  001176         3$: MOV     $TMP0,(R1)      ;RESTORE ORIGINAL DATA TO TEST LOCATION
2946 030352  062737  000400  172350     ADD     #400,KIPAR4     ;CHANGE BASE ADDRESS
2947 030360  062737  000400  172352     ADD     #400,KIPAR5     ;CHANGE BASE ADDRESS
2948 030366  005302                     DEC     R2              ;CHANGE DATA PATTERN
2949 030370  023737  172350  003022     CMP     KIPAR4,$LSTBK   ;IS THE PAR ABOVE THE LAST BLOCK OF MEMORY
```

```
2950 030376  003010                          BGT     4$              ;BRANCH IF ABOVE LAST MEM. LOC.
2951 030400  022737  167400  172352          CMP     #167400,KIPAR5  ;MAKE SURE YOU DON'T GO ON THE UNIBUS
2952 030406  103307                          BHIS    1$              ;BRANCH IF NOT PAST LAST ADDRESS
2953 030410  005737  001336                  TST     HOLFLG          ;SEE IF MEMORY ENDS WITH A HOLE
2954 030414  001401                          BEQ     4$              ;BRANCH IF NO HOLE AT END OF MEMORY
2955 030416  104052                          ERROR   +52             ;HOLE AT END OF MEMORY
2956                                 ;*
2957                                 ;*      UNIBUS ADDRESS 000000 IS GENERATED BY CARRY PROPAGATION
2958                                 ;*      SINCE THE MAP IS DISABLED, THIS SHOULD REFERENCE PHYSICAL
2959                                 ;*      ADDRESS 000000.
2960                                 ;*
2961 030420  012737  000020  172516  4$:     MOV     #BIT4,MMR3      ;ENABLE 22-BIT MAPPING
2962 030426  012737  003232  000004          MOV     #TIMERR,ERRVEC  ;RESTORE NORMAL ROUTINE FOR TRAPS THRU 4
2963 030434  012737  167777  172350          MOV     #167777,KIPAR4  ;GET READY TO TEST U.B. ADDRESS 0
2964 030442  012737  000000  172352          MOV     #000000,KIPAR5  ;SHOULD GO TO PHYSICAL ADDRESS 0
2965 030450  012702  017000                  MOV     #17000,R2       ;LOAD DATA PATTERN INTO R2
2966 030454  012737  030474  001110          MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2967 030462  012737  000020  001334          MOV     #20,CPUEXP      ;EXPECTING UNIBUS TIMEOUT
2968 030470  011037  001176                  MOV     (R0),$TMP0      ;SAVE DATA IN LOCATION 0 USING PAGE 4
2969 030474  010210                  5$:     MOV     R2,(R0)         ;LOAD DATA PATTERN INTO TEST LOCATION
2970 030476  011103                          MOV     (R1),R3         ;READ TEST LOCATION VIA DIFFERENT VIRT ADDR
2971 030500  013710  001176                  MOV     $TMP0,(R0)      ;RESTORE ORIGINAL DATA USING PAGE 4
2972 030504  020203                          CMP     R2,R3           ;SEE IF DATA MATCHES
2973 030506  001401                          BEQ     6$              ;BRANCH IF TRAP
2974 030510  104053                          ERROR   +53             ;BAD RELOCATION,UNISUS ADDRESS
2975                                 ;*
2976                                 ;*      ADDRESS 000000 IS GENERATED BY CARRY PROPAGATION.  THEN, IF
2977                                 ;*      THERE IS LESS THAN 120K OF MEMORY ON THE SYSTEM, THE LAST
2978                                 ;*      BLOCK ($LSTBK) IS USED AS A PAR AND A CARRY IS PROPAGATED TO
2979                                 ;*      CAUSE A 22-BIT OVERFLOW.
2980                                 ;*
2981 030512  012737  030536  001110  6$:     MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
2982 030520  005037  001334                  CLR     CPUEXP          ;NO TRAPS THRU ERRVEC EXPECTED HERE
2983 030524  012737  177777  172350          MOV     #177777,KIPAR4  ;LOAD PAR4 WITH HIGHEST VALUE POSSIBLE
2984 030532  005037  000000                  CLR     0               ;CLEAR ADDRESS ZERO
2985 030536  013701  100100          16$:    MOV     100100,R1       ;THIS SHOULD READ ADDRESS ZERO INTO R1
2986 030542  005701                          TST     R1              ;SEE IF YOU READ ADDRESS ZERO
2987 030544  001401                          BEQ     7$              ;BRANCH IF ADDRESS ZERO WAS READ
2988 030546  104045                          ERROR   +45             ;DIDN'T READ ADDRESS ZERO
2989 030550  012737  030614  001110  7$:     MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
2990 030556  022737  167777  003022          CMP     #167777,$LSTBK  ;IS MEMORY BLOCK SIZE < 167777
2991 030564  101423                          BLOS    8$              ;BRANCH IF MORE THAT 120K ON SYSTEM
2992 030566  012737  000040  001334          MOV     #40,CPUEXP      ;EXPECTING NON-EXISTANT MEMORY ERROR
2993 030574  005037  001332                  CLR     PCPUER          ;CLEAR TRAP THRU ERRVEC FLAG
2994 030600  013737  003022  172350          MOV     $LSTBK,KIPAR4   ;GET READY TO GENERATE NON-EXISTANT ADDR.
2995 030606  062737  000100  172350          ADD     #100,KIPAR4     ;MAKE SURE WE ARE IN NON-EXISTANT MEMORY
2996 030614  013701  100100          17$:    MOV     100100,R1       ;READ FROM NON-EXISTANT ADDRESS
2997 030620  005737  001332                  TST     PCPUER          ;SEE IF TRAP THRU ERRVEC OCCURRED
2998 030624  001003                          BNE     8$              ;BRANCH TO EXIT IF TRAP OCCURED
2999 030626  012700  100100                  MOV     #100100,R0      ;SAVE VIRTUAL ADDRESS FOR ERROR TYPEOUT
3000 030632  104046                          ERROR   +46             ;NO TRAP THRU ERRVEC
3001 030634  005037  001334          8$:     CLR     CPUEXP          ;NO CPU TRAPS EXPECTED
3002 030640  012737  030174  001110          MOV     #20$,$LPERR     ;SET LOOP ON ERROR POINTER TO START OF TEST
3003 030646  005037  172516                  CLR     MMR3            ;RETURN TO 18-BIT MAPPING
3004 030652  000462                          BR      TST51           ;;BRANCH TO NEXT TEST
3005                                 ;************ TRAP TO HERE THRU ERRVEC *****************
3006 030654  012637  001326          10$:    MOV     (KSP)+,OLDPC    ;SAVE RETURN ADDRESS
```

TEST # 50 - 22-BIT MAPPING CARRY PROPAGATION

```
3007 030660  012637  001330                    MOV     (KSP)+,OLDPS    ;SAVE RETURN PSW
3008 030664  013737  177766  001332            MOV     CPUERR,PCPUER   ;SAVE CPU ERROR REGISTER FOR TYPING
3009 030672  022737  000040  001332            CMP     #40,PCPUER      ;WAS TRAP NON-EXISTANT MEMORY
3010 030700  001012                            BNE     12$             ;BRANCH IF MEMORY EXISTS
3011 030702  023737  172350  003022            CMP     KIPAR4,$LSTBK   ;SEE IF PAR4 MATCHES LAST BLOCK IN MEMORY
3012 030710  002404                            BLT     11$             ;BRANCH IF NO MATCH-ERROR IN COMPARE CIRCUITS
3013 030712  012737  030420  001326            MOV     #4$,OLDPC       ;CHANGE RETURN ADDRESS IF AT TOP OF MEMORY
3014 030720  000430                            BR      14$             ;BRANCH TO EXIT
3015 030722  104047                    11$:    ERROR   +47             ;PREMATURE END OF MEMORY FOUND
3016 030724  000426                            BR      14$             ;BRANCH TO EXIT
3017 030726  022737  000020  001332    12$:    CMP     #20,PCPUER      ;SEE IF ADDRESS TIMED OUT
3018 030734  001011                            BNE     13$             ;BRANCH IF NO TIME OUT,UNEXPECTED ERROR
3019 030736  005737  001336                    TST     HOLFLG          ;HAS THIS HAPPENED BEFORE?
3020 030742  001003                            BNE     15$             ;BRANCH IF NOT FIRST TIMEOUT
3021 030744  013737  172352  001200            MOV     KIPAR5,$TMP1    ;SAVE PAR WHERE HOLE FIRST DISCOVERED
3022 030752  005237  001336            15$:    INC     HOLFLG          ;KEEP COUNT OF SUCCESSIVE TIMEOUTS
3023 030756  000411                            BR      14$             ;BRANCH TO EXIT
3024 030760  013737  001326  001324    13$:    MOV     OLDPC,BADPC     ;MOVE PC OF UNEXPECTED ERROR FOR TYPEOUT
3025 030766  104001                            ERROR   +1              ;UNEXPECTED TRAP THROUGH ERRVEC
3026 030770  013737  001106  001326            MOV     $LPADR,OLDPC    ;RETURN TO BEGINNING OF TEST
3027 030776  005037  001336                    CLR     HOLFLG          ;CLEAR FLAG IN CASE IT WAS SET
3028 031002  005037  177766            14$:    CLR     CPUERR          ;CLEAR CPU ERROR REGISTER
3029 031006  013746  001330                    MOV     OLDPS,-(KSP)    ;PUSH OLD PSW ONTO STACK
3030 031012  013746  001326                    MOV     OLDPC,-(KSP)    ;PUSH RETURN ADDRESS ONTO STACK
3031 031016  000002                            RTI                     ;RETURN TO TEST AND CONTINUE
```

TEST # 51 - READ AND WRITE WHILE IN RELOCATE MODE

```
3052                                    .SBTTL  TEST # 51 - READ AND WRITE WHILE IN RELOCATE MODE
                                        ;;*****************************************************************
                                        ;*TEST 51       READ AND WRITE WHILE IN RELOCATE MODE
                                        ;*
                                        ;*      THE FOLLOWING TEST TURNS ON MEMORY MANAGEMENT AND THEN
                                        ;*      READS AND WRITES LOCATIONS BETWEEN PHYSICAL ADDRESSES
                                        ;*      060000-067600.  ONE LOCATION IN EVERY BLOCK (32. WORDS)
                                        ;*      IS WRITTEN USING PAR4 AND READ USING PAR5.  THIS IS
                                        ;*      DONE IN BOTH USER AND KERNEL MODES. THE 'MODE'' INPUT TO
                                        ;*      THE PAR/PDR ADDRESS MUX IS CHECKED BY READING AND WRITING
                                        ;*      IN USER MODE.  REMEMBER ALSO, THAT SINCE MEMORY MANAGEMENT
                                        ;*      IS ON (IN RELOCATE MODE) THE PROGRAM ITSELF IS USING ITS
                                        ;*      VIRTUAL ADDRESSES AND THE PAR/PDR'S TO EXECUTE.
                                        ;*
                                        ;*      WHILE TESTING IN KERNEL MODE, USER PAGES 4 & 5 ARE MAPPED
                                        ;*      NON-RESIDENT WITH DIFFERENT PAR VALUES THAN THE KERNEL
                                        ;*      PAR'S TO BE SURE THAT THE KERNEL PAR'S AND PDR'S ARE BEING
                                        ;*      USED WHEN IN KERNEL MODE (AND VICE VERSA WHILE TESTING IN
                                        ;*      USER MODE).  IF A MEM. MGMT. TRAP OCCURS, THE PROGRAM GOES
                                        ;*      TO 8$ WHERE THE TRAP IS REPORTED.
                                        ;*
                                        ;*****************************************************************
    031020  000004                      TST51:  SCOPE
3053 031022  005037  177776             1$:     CLR     PSW             ;START IN KERNEL MODE
3054 031026  012704  000577                     MOV     #577,R4         ;LOAD R4 WITH VALUE FOR PAR4
3055 031032  012705  000600                     MOV     #600,R5         ;LOAD R5 WITH VALUE FOR PAR5
3056 031036  010437  172350                     MOV     R4,KIPAR4       ;LOAD KERNEL PAR4
3057 031042  010537  172352                     MOV     R5,KIPAR5       ;LOAD KERNEL PAR5
3058 031046  012700  177640                     MOV     #UIPAR0,R0      ;LOAD ADDRESS OF FIRST USER PAR IN R0
3059 031052  012703  172240                     MOV     #SIPAR0,R3      ;LOAD ADDRESS OF FIRST SUPERVISOR PAR IN R3
3060 031056  005001                             CLR     R1              ;CLEAR R1
3061 031060  012702  000007                     MOV     #7,R2           ;LOAD LOOP COUNTER WITH A 7
3062 031064  010120                     2$:     MOV     R1,(R0)+        ;MAP USER PAR'S TO PAGES 0-6 (4K EACH)
3063 031066  010123                             MOV     R1,(R3)+        ;MAP SUPERVISOR PAR'S TO PAGES 0-6 (4K EACH)
3064 031070  062701  000200                     ADD     #200,R1
3065 031074  077205                             SOB     R2,2$           ;LOOP UNTIL UIPAR0-UIPAR6 ARE LOADED
3066 031076  012710  007600                     MOV     #7600,(R0)      ;MAP USER PAR7 TO THE I/O PAGE
3067 031102  012713  007600                     MOV     #7600,(R3)      ;MAP SUPERVISOR PAR7 TO THE I/O PAGE
3068 031106  012700  177600                     MOV     #UIPDR0,R0      ;LOAD ADDRESS OF FIRST USER PDR IN R0
3069 031112  012703  172200                     MOV     #SIPDR0,R3      ;LOAD ADDRESS OF FIRST SUPERVISOR PDR IN R3
3070 031116  012701  077406                     MOV     #77406,R1       ;LOAD PDR DATA INTO R1
3071 031122  012702  000010                     MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
3072 031126  010120                     3$:     MOV     R1,(R0)+        ;MAP ALL 8 PAGES 128 BLOCKS, UPWARD
3073 031130  010123                             MOV     R1,(R3)+        ;       EXPANDABLE,READ/WRITE FOR
3074 031132  077203                             SOB     R2,3$           ;       USER AND SUPERVISOR MODES.
3075 031134  105037  177610                     CLRB    UIPDR4          ;MAP USER SPACE NON-RESIDENT WHILE
3076 031140  105037  177612                     CLRB    UIPDR5          ;       TESTING KERNEL SPACE
3077 031144  105037  172210                     CLRB    SIPDR4          ;MAP SUPERVISOR SPACE NON-RESIDENT WHILE
3078 031150  105037  172212                     CLRB    SIPDR5          ;       TESTING KERNEL SPACE
3079 031154  010537  177650                     MOV     R5,UIPAR4       ;MAP USER PAR'S OPPOSITE OF KIPAR'S
3080 031160  010437  177652                     MOV     R4,UIPAR5
3081 031164  010537  172250                     MOV     R5,SIPAR4       ;MAP SUPERVISOR PAR'S OPPOSITE OF KIPAR'S
3082 031170  010437  172252                     MOV     R4,SIPAR5
3083 031174  012737  000001  177572             MOV     #1,SR0          ;TURN ON MEMORY MANAGEMENT (RELOCATE MODE)
3084 031202  012737  031234  001110             MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
3085 031210  012737  031556  000250             MOV     #8$,MMVEC       ;SET M. M. TRAP VECTOR TO 8$
3086 031216  013737  177776  001176     4$:     MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
```

```
3087 031224  012700  100100          MOV   #100100,R0     ;PUT VIRTUAL ADDR. THAT USES PAR4 IN R0
3088 031230  012701  120000          MOV   #120000,R1     ;PUT VIRTUAL ADDR. THAT USES PAR5 IN R1
3089 031234  010010            5$:   MOV   R0,(R0)        ;WRITE TO TEST LOC. USING PAR4
3090 031236  011102                  MOV   (R1),R2        ;READ THE SAME LOC., BUT USING PAR5
3091 031240  020002                  CMP   R0,R2          ;DID WE READ WHAT WE WROTE?
3092 031242  001411                  BEQ   6$             ;BRANCH IF YES
3093 031244  010137  001300          MOV   R1,VIRT2       ;SAVE VIRTUAL ADDR. THAT SELECTED PAR5
3094 031250  010037  001276          MOV   R0,VIRT1       ;SAVE VIRTUAL ADDR. THAT SELECTED PAR4
3095 031254  004737  003426          JSR   PC,FORMPA      ;GO FORM PHYSICAL ADDRESS  BEING USED
3096 031260  104020                  ERROR +20            ;READING LOC. USING PAR5 AND A VIRT.
3097                                                      ;ADDR. DID NOT FIND DATA WRITTEN WHEN USING
3098                                                      ;PAR4 AND VIRT. ADDRESS.
3099                                                      ;  OF TIGHTER SCOPE LOOP
3100                                                      ;N PLACE ERROR CALL WITH
3101                                                      ;'BR 5$' = 000765
3102 031262  013700  001276          MOV   VIRT1,R0       ;RESTORE VBA IN R0
3103 031266  062700  000100    6$:   ADD   #100,R0        ;CHANGE VIRTUAL ADDRS. TO POINT TO NEXT BLOCK
3104 031272  062701  000100          ADD   #100,R1
3105 031276  020127  127700          CMP   R1,#127700     ;WERE BLOCKS FROM 60000-67600 ALL TRIED?
3106 031302  001354                  BNE   5$             ;BRANCH IF NO
3107 031304  032737  140000  177776  BIT   #140000,PSW    ;HAVE WE DONE TEST IN USER MODE YET?
3108 031312  001026                  BNE   7$             ;BRANCH IF YES
3109 031314  010437  177650          MOV   R4,UIPAR4      ;LOAD USER PAR4
3110 031320  010537  177652          MOV   R5,UIPAR5      ;LOAD USER PAR5
3111 031324  112737  000006  177610  MOVB  #6,UIPDR4      ;MAP USER SPACE R/W TO TEST IT
3112 031332  112737  000006  177612  MOVB  #6,UIPDR5
3113 031340  105037  172310          CLRB  KIPDR4         ;MAP  KERNEL SPACE NON-RESIDENT WHILE
3114 031344  105037  172312          CLRB  KIPDR5         ;       TESTING USER SPACE
3115 031350  010537  172350          MOV   R5,KIPAR4      ;MAP KERNEL PAR'S OPPOSITE UIPAR'S
3116 031354  010437  172352          MOV   R4,KIPAR5
3117 031360  012737  140000  177776  MOV   #140000,PSW    ;GO TO USER MODE
3118 031366  000713                  BR    4$             ;GO BACK AND READ/WRITE IN USER MODE
3119 031370  032737  040000  177776  7$:   BIT   #40000,PSW     ;HAVE WE DONE TEST IN SUPERVISOR MODE YET?
3120 031376  001026                  BNE   10$            ;BRANCH IF YES
3121 031400  010437  172250          MOV   R4,SIPAR4      ;LOAD SUPERVISOR PAR4
3122 031404  010537  172252          MOV   R5,SIPAR5      ;LOAD SUPERVISOR PAR5
3123 031410  112737  000006  172210  MOVB  #6,SIPDR4      ;MAP SUPERVISOR SPACE R/W TO TEST IT
3124 031416  112737  000006  172212  MOVB  #6,SIPDR5
3125 031424  105037  177610          CLRB  UIPDR4         ;MAP USER SPACE NON-RESIDENT WHILE
3126 031430  105037  177612          CLRB  UIPDR5         ;       TESTING USER SPACE
3127 031434  010537  177650          MOV   R5,UIPAR4      ;MAP USER PAR'S OPPOSITE SIPAR'S
3128 031440  010437  177652          MOV   R4,UIPAR5
3129 031444  012737  040000  177776  MOV   #40000,PSW     ;GO TO SUPERVISOR MODE
3130 031452  000661                  BR    4$             ;GO BACK AND READ/WRITE IN SUPERVISOR MODE
3131 031454  005037  177776    10$:  CLR   PSW            ;GO BACK TO KERNEL MODE BEFORE LEAVING
3132 031460  012737  077406  172310  MOV   #77406,KIPDR4  ;REMAP KERNEL PAGES READ/WRITE
3133 031466  012737  077406  172312  MOV   #77406,KIPDR5
3134 031474  012737  077406  177610  MOV   #77406,UIPDR4  ;REMAP USER PAGES READ/WRITE
3135 031502  012737  077406  177612  MOV   #77406,UIPDR5
3136 031510  010537  172350          MOV   R5,KIPAR4      ;MAP KERNEL, SUPERVISOR AND USER PAR'S 4 & 5
3137 031514  010537  172352          MOV   R5,KIPAR5      ;  BACK TO 12-16K
3138 031520  010537  177650          MOV   R5,UIPAR4
3139 031524  010537  177652          MOV   R5,UIPAR5
3140 031530  010537  172250          MOV   R5,SIPAR4
3141 031534  010537  172252          MOV   R5,SIPAR5
3142 031540  012737  003330  000250  MOV   #MGMERR,MMVEC  ;RESTORE ADDR. OF NORMAL M.M. TRAP ROUTINE
3143 031546  012737  031022  001110  MOV   #1$,$LPERR     ;RESET LOOP ON ERROR POINTER TO 1$
```

```
3144 031554  000427                          BR      TST52           ;;BRANCH TO NEXT TEST
3145                                 ;**********   TRAP TO HERE THRU ERRVEC     **********
3146 031556  012637  001260          8$:     MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3147 031562  012637  001262                  MOV     (KSP)+,TRAPPS
3148                                                                 ;PROGRAM WILL TRAP TO HERE IF TRY
3149                                                                 ;TO USE USER/SUPERVISOR PDR'S WHEN IN KERNEL MODE
3150                                                                 ;OR KERNEL PDR'S WHEN IN USER/SUPERVISOR MODE
3151 031566  010037  001276                  MOV     R0,VIRT1        ;SAVE VIRTUAL ADDRESS FOR ERROR REPORT
3152 031572  004737  003426                  JSR     PC,FORMPA       ;GO FORM THE PHYSICAL ADDRESS  BEING USED
3153 031576  013737  177572  001264          MOV     SR0,WASSR0      ;SAVE SR0 & SR2  FOR ERROR REPORT
3154 031604  013737  177576  001270          MOV     SR2,WASSR2
3155 031612  042737  160000  177572          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
3156 031620  104022                          ERROR   +22             ;M.M. TRAP WHILE IN RELOCATE MODE -
3157                                                                 ;REFERENCED WRONG SET OF PDR'S
3158                                                                 ;FOR TIGHTER SCOPE LOOP
3159                                                                 ;REPLACE ERROR CALL WITH
3160                                                                 ;A 'NOP' = 000240
3161 031622  013746  001262                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3162 031626  013746  001260                  MOV     TRAPPC,-(KSP)
3163 031632  000002                          RTI                     ;RETURN TO TEST
```

```
                        .SBTTL  W-BIT TESTS
                ;;**************************************************************
                ;       GROUP 4  W-BIT TESTS
                ;;**************************************************************
```

```
3171                                    .SBTTL  TEST # 52 - W-BIT LOGIC TEST, KERNEL PDR'S
                                        ;;*****************************************************************
                                        ;*TEST 52       W-BIT LOGIC TEST, KERNEL PDR'S
                                        ;*      THIS TEST WRITES TO EIGHT (8) DIFFERENT VIRTUAL ADDRESSES
                                        ;*      (VBA'S = 17776,37776,57776,77776,117776,137776,157776 & 177776
                                        ;*      & PBA'S CONSTRUCTED = 17776, 37776, 57776, 77776, 77776,
                                        ;*      77776, 77776, & 77776 RESPECTIVELY).
                                        ;*      WHICH SHOULD CAUSE THE 'W-BIT'' TO SET IN EACH OF THE
                                        ;*      EIGHT (8) KERNEL PAGE DESCRIPTOR REGISTERS.  THE PDR'S
                                        ;*      ARE CHECKED TO SEE THAT IT'S W-BIT DOES SET WHEN THE
                                        ;*      PAGE IT IS MAPPED TO IS WRITTEN TO AND THAT THE W-BIT
                                        ;*      DOES NOT SET IN ANY OF THE OTHER PDR'S.  KERNEL PDR'S 3,4,5 & 6
                                        ;*      ARE MAPPED TO 12-16K FOR THIS TEST.  ALSO THE W-BIT
                                        ;*      SHOULD BE CLEARED WHEN THE PDR IS WRITTEN TO.  THE
                                        ;*      W-BIT PORTION OF THE PDR'S AND THE PAR/PDR ADRS MUX
                                        ;*      ARE BEING CHECKED.
                                        ;;*****************************************************************
    031634  000004                      TST52:  SCOPE
3172 031636                             1$:
    031636  004737  002172                      JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
    031642  012702  000004                      MOV     #4,R2           ;SET LOOP COUNTER TO 4
    031646  012700  172346                      MOV     #KIPAR3,R0      ;LOAD ADDRESS OF KIPAR3 INTO R0
    031652  012701  000600                      MOV     #600,R1         ;LOAD ''12-16K'' PAR VALUE INTO R1
    031656  010120                      2$:     MOV     R1,(R0)+        ;MAP PARS 3-6 TO 12-16K
    031660  077202                              SOB     R2,2$           ;LOOP UNTIL ALL 4 OF THEM ARE LOADED
    031662  012705  172300                      MOV     #KIPDR0,R5      ;LOAD ADDRESS OF FIRST PDR TO BF TESTED IN R5
    031666  012704  000010                      MOV     #8.,R4          ;SET LOOP COUNTER TO 8
    031672  012703  017776                      MOV     #17776,R3       ;INITIALIZE VIRTUAL ADDRESS TO BE IN R3
    031676  012737  031704  001110              MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
    031704  012700  172300              3$:     MOV     #KIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE SETUP IN R0
    031710  012702  000010                      MOV     #8.,R2          ;SET LOOP CONTER TO 8
    031714  012701  077406                      MOV     #77406,R1       ;PUT ''W-BIT OFF DATA'' INTO R1
    031720  010120                      4$:     MOV     R1,(R0)+        ;CLEAR ALL W-BITS BY WRITING TO ALL PDRS
    031722  077202                              SOB     R2,4$           ;LOOP UNTIL ALL OF THEM ARE SET UP
    031724  011313                              MOV     (R3),(R3)       ;DO ''DATO'' TO VIRTUAL ADDR.-SETTING A W-BIT
    031726  031527  000100                      BIT     (R5),#WBIT      ;DID THAT CAUSE W-BIT TO BE SET?
    031732  001002                              BNE     5$              ;BRANCH IF YES
    031734  104054                              ERROR   +54             ;W-BIT DID NOT GET SET IN PDR
                                                                        ;FOR TIGHTER SCOPE LOOP, REPLACE ERROR
                                                                        ;CALL WITH ''BR 3$'' = 000763
    031736  000422                              BR      8$              ;SKIP CHECKING OTHER PDR'S-ERROR WILL SET W-BITS
    031740  012702  000010              5$:     MOV     #8.,R2          ;SET LOOP COUNTER TO 8
    031744  012700  172300                      MOV     #KIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE CHECKED IN R0
    031750  031027  000100              6$:     BIT     (R0),#WBIT      ;DID W-BIT IN OTHER PDRS REMAIN CLEAR?
    031754  001403                              BEQ     7$              ;BRANCH IF YES
    031756  020500                              CMP     R5,R0           ;IF W-BIT SET, THEN WAS IT PDR UNDER TEST?
    031760  001401                              BEQ     7$              ;BRANCH IF YES
    031762  104055                              ERROR   +55             ;W-BIT GOT SET IN MORE THAN ONE PDR
                                                                        ;FOR TGHTE SCOPE LOOP, REPLACE ERROR
                                                                        ;CALL WITH ''BR 3$'' = 000750
    031764  062700  000002              7$:     ADD     #2,R0           ;POINT R0 TO NEXT PDR TO BE CHECKED
    031770  077211                              SOB     R2,6$           ;LOOP UNTIL ALL 8 CHECKED FOR CLEAR W-BIT
    031772  010115                              MOV     R1,(R5)         ;WRITE TO THE PDR TESTED TO CLEAR W-BIT
    031774  031527  000100                      BIT     (R5),#WBIT      ;DID WRITING PDR CLEAR THE W-BIT?
    032000  001401                              BEQ     8$              ;BRANCH IF YES
    032002  104056                              ERROR   +56             ;W-BIT DID NOT CLEAR BY WRITNG THE PDR
                                                                        ;FOR TIGHTER SCOPE LOOP, REPLACE ERROR CALL
```

```
                                                                ;WITH 'BR 3$'' = 000740
032004  062705  000002          8$:   ADD     #2,R5             ;POINT R5 TO THE NEXT PDR TO BE TESTED
032010  062703  020000                ADD     #20000,R3         ;CHANGE VIRT. ADDR TO REF. NEXT PDR
032014  077445                       SOB     R4,3$             ;LOOP BACK TO 3$ UNTIL ALL 8 PDR'S TESTED
032016  012737  031636  001110        MOV     #1$,$LPERR        ;RESET LOOP ON ERROR POINTER TO 1$
032024  004737  002226                JSR     PC,TON            ;TURN T-BIT BACK ON FOR NEXT TEST
```

```
3176                                    .SBTTL  TEST # 53 - W-BIT LOGIC TEST, SUPERVISOR PDR'S
                                        ;*********************************************************************
                                        ;*TEST 53       W-BIT LOGIC TEST, SUPERVISOR PDR'S
                                        ;*      THIS TEST WRITES TO EIGHT (8) DIFFERENT VIRTUAL ADDRESSES
                                        ;*      (VBA'S = 17776,37776,57776,77776,117776,137776,157776 & 177776
                                        ;*      & PBA'S CONSTRUCTED = 17776, 37776, 57776, 77776, 77776,
                                        ;*      77776, 77776, & 77776 RESPECTIVELY).
                                        ;*      WHICH SHOULD CAUSE THE "W-BIT" TO SET IN EACH OF THE
                                        ;*      EIGHT (8) SUPERVISOR PAGE DESCRIPTOR REGISTERS.  THE PDR'S
                                        ;*      ARE CHECKED TO SEE THAT IT'S W-BIT DOES SET WHEN THE
                                        ;*      PAGE IT IS MAPPED TO IS WRITTEN TO AND THAT THE W-BIT
                                        ;*      DOES NOT SET IN ANY OF THE OTHER PDR'S.  SUPERVISOR PDR'S 3,4,5 & 6
                                        ;*      ARE MAPPED TO 12-16K FOR THIS TEST.  ALSO THE W-BIT
                                        ;*      SHOULD BE CLEARED WHEN THE PDR IS WRITTEN TO.  THE
                                        ;*      W-BIT PORTION OF THE PDR'S AND THE PAR/PDR ADRS MUX
                                        ;*      ARE BEING CHECKED.
                                        ;*********************************************************************
     032030  000004                     TST53:  SCOPE
3177 032032  012737  040000  177776     1$:     MOV     #40000,PSW      ;GO TO SUPERVISOR MODE FOR THIS TEST
3178 032040  004737  002172             JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
     032044  012702  000004             MOV     #4,R2           ;SET LOOP COUNTER TO 4
     032050  012700  172246             MOV     #SIPAR3,R0      ;LOAD ADDRESS OF SIPAR3 INTO R0
     032054  012701  000600             MOV     #600,R1         ;LOAD "12-16K" PAR VALUE INTO R1
     032060  010120                     2$:     MOV     R1,(R0)+        ;MAP PARS 3-6 TO 12-16K
     032062  077202                             SOB     R2,2$           ;LOOP UNTIL ALL 4 OF THEM ARE LOADED
     032064  012705  172200                     MOV     #SIPDR0,R5      ;LOAD ADDRESS OF FIRST PDR TO BE TESTED IN R5
     032070  012704  000010                     MOV     #8.,R4          ;SET LOOP COUNTER TO 8
     032074  012703  017776                     MOV     #17776,R3       ;INITIALIZE VIRTUAL ADDRESS TO BE IN R3
     032100  012737  032106  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     032106  012700  172200             3$:     MOV     #SIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE SETUP IN R0
     032112  012702  000010                     MOV     #8.,R2          ;SET LOOP CONTER TO 8
     032116  012701  077406                     MOV     #77406,R1       ;PUT "W-BIT OFF DATA" INTO R1
     032122  010120                     4$:     MOV     R1,(R0)+        ;CLEAR ALL W-BITS BY WRITING TO ALL PDRS
     032124  077202                             SOB     R2,4$           ;LOOP UNTIL ALL OF THEM ARE SET UP
     032126  011313                             MOV     (R3),(R3)       ;DO "DATO" TO VIRTUAL ADDR.-SETTING A W-BIT
     032130  031527  000100                     BIT     (R5),#WBIT      ;DID THAT CAUSE W-BIT TO BE SET?
     032134  001002                             BNE     5$              ;BRANCH IF YES
     032136  104054                             ERROR   +54             ;W-BIT DID NOT GET SET IN PDR
                                                                        ;FOR TIGHTER SCOPE LOOP, REPLACE ERROR
                                                                        ;CALL WITH "BR 3$" = 000763
     032140  000422                             BR      8$              ;SKIP CHECKING OTHER PDR'S-ERROR WILL SET W-BITS
     032142  012702  000010             5$:     MOV     #8.,R2          ;SET LOOP COUNTER TO 8
     032146  012700  172200                     MOV     #SIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE CHECKED IN R0
     032152  031027  000100             6$:     BIT     (R0),#WBIT      ;DID W-BIT IN OTHER PDRS REMAIN CLEAR?
     032156  001403                             BEQ     7$              ;BRANCH IF YES
     032160  020500                             CMP     R5,R0           ;IF W-BIT SET, THEN WAS IT PDR UNDER TEST?
     032162  001401                             BEQ     7$              ;BRANCH IF YES
     032164  104055                             ERROR   +55             ;W-BIT GOT SET IN MORE THAN ONE PDR
                                                                        ;FOR TGHTE SCOPE LOOP, REPLACE ERROR
                                                                        ;CALL WITH "BR 3$" = 000750
     032166  062700  000002             7$:     ADD     #2,R0           ;POINT R0 TO NEXT PDR TO BE CHECKED
     032172  077211                             SOB     R2,6$           ;LOOP UNTIL ALL 8 CHECKED FOR CLEAR W-BIT
     032174  010115                             MOV     R1,(R5)         ;WRITE TO THE PDR TESTED TO CLEAR W-BIT
     032176  031527  000100                     BIT     (R5),#WBIT      ;DID WRITING PDR CLEAR THE W-BIT?
     032202  001401                             BEQ     8$              ;BRANCH IF YES
     032204  104056                             ERROR   +56             ;W-BIT DID NOT CLEAR BY WRITNG THE PDR
                                                                        ;FOR TIGHTER SCOPE LOOP, REPLACE ERROR CALL
```

TEST # 53 - W-BIT LOGIC TEST, SUPERVISOR PDR'S

```
                                                                ;WITH 'BR 3$'' = 000740
        032206  062705  000002          8$:     ADD     #2,R5         ;POINT R5 TO THE NEXT PDR TO BE TESTED
        032212  062703  020000                  ADD     #20000,R3     ;CHANGE VIRT. ADDR TO REF. NEXT PDR
        032216  077445                          SOB     R4,3$         ;LOOP BACK TO 3$ UNTIL ALL 8 PDR'S TESTED
        032220  012737  032032  001110          MOV     #1$,$LPERR    ;RESET LOOP ON ERROR POINTER TO 1$
        032226  004737  002226                  JSR     PC,TON        ;TURN T-BIT BACK ON FOR NEXT TEST
   3179 032232  005037  177776                  CLR     PSW           ;BACK TO KERNAL MODE BEFORE LEAVING
```

TEST # 54 - W-BIT LOGIC TEST, USER PDR'S

```
3183                                    .SBTTL  TEST # 54 - W-BIT LOGIC TEST, USER PDR'S
                                        ;;*****************************************************************
                                        ;*TEST 54       W-BIT LOGIC TEST, USER PDR'S
                                        ;*      THIS TEST WRITES TO EIGHT (8) DIFFERENT VIRTUAL ADDRESSES
                                        ;*      (VBA'S = 17776,37776,57776,77776,117776,137776,157776 & 177776
                                        ;*      & PBA'S CONSTRUCTED = 17776, 37776, 57776, 77776, 77776,
                                        ;*      77776, 77776, & 77776 RESPECTIVELY).
                                        ;*      WHICH SHOULD CAUSE THE 'W-BIT" TO SET IN EACH OF THE
                                        ;*      EIGHT (8) USER PAGE DESCRIPTOR REGISTERS.  THE PDR'S
                                        ;*      ARE CHECKED TO SEE THAT IT'S W-BIT DOES SET WHEN THE
                                        ;*      PAGE IT IS MAPPED TO IS WRITTEN TO AND THAT THE W-BIT
                                        ;*      DOES NOT SET IN ANY OF THE OTHER PDR'S.  USER PDR'S 3,4,5 & 6
                                        ;*      ARE MAPPED TO 12-16K FOR THIS TEST.  ALSO THE W-BIT
                                        ;*      SHOULD BE CLEARED WHEN THE PDR IS WRITTEN TO.  THE
                                        ;*      W-BIT PORTION OF THE PDR'S AND THE PAR/PDR ADRS MUX
                                        ;*      ARE BEING CHECKED.
                                        ;;*****************************************************************
     032236  000004                     TST54:  SCOPE
3184 032240  012737  140000  177776     1$:     MOV     #140000,PSW     ;GO TO USER MODE FOR THIS TEST
3185 032246  004737  002172             JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
     032252  012702  000004             MOV     #4,R2           ;SET LOOP COUNTER TO 4
     032256  012700  177646             MOV     #UIPAR3,R0      ;LOAD ADDRESS OF UIPAR3 INTO R0
     032262  012701  000600             MOV     #600,R1         ;LOAD "12-16K" PAR VALUE INTO R1
     032266  010120                     2$:     MOV     R1,(R0)+        ;MAP PARS 3-6 TO 12-16K
     032270  077202                             SOB     R2,2$           ;LOOP UNTIL ALL 4 OF THEM ARE LOADED
     032272  012705  177600                     MOV     #UIPDR0,R5      ;LOAD ADDRESS OF FIRST PDR TO BE TESTED IN R5
     032276  012704  000010                     MOV     #8.,R4          ;SET LOOP COUNTER TO 8
     032302  012703  017776                     MOV     #17776,R3       ;INITIALIZE VIRTUAL ADDRESS TO BE IN R3
     032306  012737  032314  001110             MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
     032314  012700  177600             3$:     MOV     #UIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE SETUP IN R0
     032320  012702  000010                     MOV     #8.,R2          ;SET LOOP CONTER TO 8
     032324  012701  077406                     MOV     #77406,R1       ;PUT "W-BIT OFF DATA" INTO R1
     032330  010120                     4$:     MOV     R1,(R0)+        ;CLEAR ALL W-BITS BY WRITING TO ALL PDRS
     032332  077202                             SOB     R2,4$           ;LOOP UNTIL ALL OF THEM ARE SET UP
     032334  011313                             MOV     (R3),(R3)       ;DO "DATO" TO VIRTUAL ADDR.-SETTING A W-BIT
     032336  031527  000100                     BIT     (R5),#WBIT      ;DID THAT CAUSE W-BIT TO BE SET?
     032342  001002                             BNE     5$              ;BRANCH IF YES
     032344  104054                             ERROR   +54             ;W-BIT DID NOT GET SET IN PDR
                                                                         ;FOR TIGHTER SCOPE LOOP, REPLACE ERROR
                                                                         ;CALL WITH "BR 3$" = 000763
     032346  000422                             BR      8$              ;SKIP CHECKING OTHER PDR'S-ERROR WILL SET W-BITS
     032350  012702  000010             5$:     MOV     #8.,R2          ;SET LOOP COUNTER TO 8
     032354  012700  177600                     MOV     #UIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE CHECKED IN R0
     032360  031027  000100             6$:     BIT     (R0),#WBIT      ;DID W-BIT IN OTHER PDRS REMAIN CLEAR?
     032364  001403                             BEQ     7$              ;BRANCH IF YES
     032366  020500                             CMP     R5,R0           ;IF W-BIT SET, THEN WAS IT PDR UNDER TEST?
     032370  001401                             BEQ     7$              ;BRANCH IF YES
     032372  104055                             ERROR   +55             ;W-BIT GOT SET IN MORE THAN ONE PDR
                                                                         ;FOR TGHTE SCOPE LOOP, REPLACE ERROR
                                                                         ;CALL WITH "BR 3$" = 000750
     032374  062700  000002             7$:     ADD     #2,R0           ;POINT R0 TO NEXT PDR TO BE CHECKED
     032400  077211                             SOB     R2,6$           ;LOOP UNTIL ALL 8 CHECKED FOR CLEAR W-BIT
     032402  010115                             MOV     R1,(R5)         ;WRITE TO THE PDR TESTED TO CLEAR W-BIT
     032404  031527  000100                     BIT     (R5),#WBIT      ;DID WRITING PDR CLEAR THE W-BIT?
     032410  001401                             BEQ     8$              ;BRANCH IF YES
     032412  104056                             ERROR   +56             ;W-BIT DID NOT CLEAR BY WRITNG THE PDR
                                                                         ;FOR TIGHTER SCOPE LOOP, REPLACE ERROR CALL
```

```
                                                                    ;WITH 'BR 3$'' = 000740
        032414  062705  000002          8$:     ADD     #2,R5       ;POINT R5 TO THE NEXT PDR TO BE TESTED
        032420  062703  020000                  ADD     #20000,R3   ;CHANGE VIRT. ADDR TO REF. NEXT PDR
        032424  077445                          SOB     R4,3$       ;LOOP BACK TO 3$ UNTIL ALL 8 PDR'S TESTED
        032426  012737  032240  001110          MOV     #1$,$LPERR  ;RESET LOOP ON ERROR POINTER TO 1$
        032434  004737  002226                  JSR     PC,TON      ;TURN T-BIT BACK ON FOR NEXT  EST
   3186 032440  005037  177776                  CLR     PSW         ;BACK TO KERNEL MODE BEFORE LEAVING
```

TEST # 55 - TEST 'W-BIT NOT SET'' CASES

```
3197                                    .SBTTL  TEST # 55 - TEST 'W-BIT NOT SET'' CASES
                                        ;*********************************************************************
                                        ;*TEST 55       TEST 'W-BIT NOT SET'' CASES
                                        ;*
                                        ;*      THIS TEST CHECKS TWO SPECIAL CASES WHERE THE W-BIT DOES
                                        ;*      NOT GET SET ON A WRITE.  FIRST CASE IS THAT THE W-BIT
                                        ;*      SHOULD NOT SET IN PAGE DESCRIPTOR REG. 7 WHEN WRITING TO
                                        ;*      STATUS REG SR0 (KERNEL PDR 7 IS USED).  SECOND CASE IS THAT
                                        ;*      THE W-BIT IS NOT SET IF THE 'DATO'' IS ABORTED DUE TO AN
                                        ;*      ODD ADDRESS ERROR (KERNEL PDR3 & VIRTUAL ADDR 60001 ARE USED).
                                        ;*
                                        ;*********************************************************************
    032444  000004                      TST55:  SCOPE
3198 032446  004737  002172             1$:     JSR     PC,TOFF         ;TURN OFF T-BIT TRAPPING FOR THIS TEST
3199 032452  012701  077406                     MOV     #77406,R1       ;PUT 'W-BIT OFF'' VALUE FOR PDR IN R1
3200 032456  012737  032456  001110     2$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
3201 032464  010137  172306                     MOV     R1,KIPDR3       ;LOAD KERNEL PDR3 WITH 77406 TO CLEAR W-BIT
3202 032470  012737  032502  000004             MOV     #3$,ERRVEC      ;SET UP LOC. 4 TO 3$ FOR ODD ADDR. ABORT
3203 032476  005237  060001                     INC     60001           ;CAUSE ODD ADDRESS ABORT THRU LOC. 4
3204 032502  012706  001100             3$:     MOV     #KERSTK,KSP     ;RESTORE THE STACK POINTER
3205 032506  013702  172306                     MOV     KIPDR3,R2       ;READ KIPDR3 INTO R2
3206 032512  020102                             CMP     R1,R2           ;WAS W-BIT LEFT CLEARED?
3207 032514  001401                             BEQ     4$              ;BRANCH IF YES
3208 032516  104057                             ERROR   +57             ;W-BIT GOT SET DURING AN ODD ADDR. ABORT
3209                                                                     ;FOR TIGHTER SCOPE LOOP
3210                                                                     ;REPLACE ERROR CALL WITH
3211                                                                     ;'BR 2$'' = 000757
3212 032520  012737  003232  000004     4$:     MOV     #TIMERR,ERRVEC  ;RESTORE NORMAL CPU TRAP ROUTINE TO LOC.4
3213 032526  012737  032446  001110             MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
3214 032534  004737  002226                     JSR     PC,TON          ;TURN T-BIT TRAPPING BACK ON
```

END OF PASS ROUTINE

```
3215                                    .SBTTL  END OF PASS ROUTINE
                                        ;;*****************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*TYPE 'END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYY''
                                        ;*WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
                                        ;*IF SW12=1 INHIBIT TRACE TRAP
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO LOOP
032540                                  $EOP:
032540  000004                                SCOPE
032542  005037  001102                        CLR     $TSTNM          ;;ZERO THE TEST NUMBER
032546  005237  001232                        INC     $PASS           ;;INCREMENT THE PASS NUMBER
032552  042737  100000  001232              BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
032560  005327                              DEC     (PC)+           ;;LOOP?
032562  000001                  $EOPCT: .WORD   1
032564  003072                          BGT     $DOAGN          ;;YES
032566  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
032570  000001                  $ENDCT: .WORD   1
032572  032562                          $EOPCT
032574  104401  032602                  TYPE    ,65$            ;;TYPE ASCIZ STRING
032600  000407                          BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$:  .ASCIZ  <12><15>/END PASS #/
032620                                  64$:
032620  013746  001232                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                                                ;;TYPE PASS NUMBER
032624  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
032626  104401  032634                  TYPE    ,67$            ;;TYPE ASCIZ STRING
032632  000421                          BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  /  TOTAL ERRORS SINCE LAST REPORT /
032676                                  66$:
032676  013746  001112                  MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
                                                                ;;TOTAL NUMBER OF ERRORS
032702  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
032704  104401  001221                  TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
032710  005037  001112                  CLR     $ERTTL          ;;CLEAR ERROR TOTAL
032714  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
032720  001414                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
032722  005046                          CLR     -(SP)           ;;INSURE THE 'T' BIT IS CLEAR
032724  012746  032732                  MOV     #$CLR.T,-(SP)   ;;SETUP FOR AN RTI OR RTT
032730  000426                          BR      $RTRN           ;;GO DO AN RTI OR RTT TO LOAD THE PSW
                                                                ;;WITH A CLEARED 'T' BIT
032732                                  $CLR.T:
032732  013700  000042                  MOV     @#42,R0         ;;INSURE R0 CONTAINS THE MONITORS
032736  001405                          BEQ     $DOAGN          ;;RETURN ADDRESS
032740  000005                          RESET                   ;;CLEAR THE WORLD
032742  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
032744  000240                          NOP                     ;;SAVE ROOM
032746  000240                          NOP                     ;;FOR
032750  000240                          NOP                     ;;ACT11
032752                                  $DOAGN:
032752  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
032754  042716  000020                  BIC     #20,(SP)        ;;CLEAR THE 'T' BIT
032760  032777  010000  146152          BIT     #BIT12,@SWR     ;;RUN WITH TRACE TRAP?
032766  001005                          BNE     1$              ;;BR IF NO
032770  005137  001346                  COM     $TBIT           ;;IS IT TIME FOR TRACE TRAP
032774  100402                          BMI     1$              ;;BR IF NO
032776  052716  000020                  BIS     #20,(SP)        ;;SET TRACE TRAP
```

END OF PASS ROUTINE

```
033002  012746  033010          1$:     MOV     #$LOOP,-(SP)    ;;JUMP TO START OF TEST
033006  000002                  $RTRN:  RTI                     ;;RETURN--THIS IS CHANGED TO
                                                                ;;AN 'RTT' IF 'RTT' IS A LEGAL
                                                                ;;INSTRUCTION
033010                          $LOOP:
033010  000137                          JMP     @(PC)+          ;;RETURN
033012  020454                  $RTNAD: .WORD   LOOP
033014     377      377     000 $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
                                        .EVEN
```

```
3217                                    .SBTTL  SCOPE HANDLER ROUTINE

                                        ;;**********************************************************************
                                        ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
                                        ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
                                        ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW14=1         LOOP ON TEST
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*SW08=1         LOOP ON TEST IN SWR<7:0>
                                        ;*CALL
                                        ;*      SCOPE             ;;SCOPE=IOT

033020                                  $SCOPE:
033020  104410                          1$:     CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
033022  032777  040000  146110          2$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
033030  001077                          3$:     BNE     $OVER           ;;YES IF SW14=1
                                        ;#####START OF CODE FOR THE XOR TESTER#####
033032  000416                          $XTSTR: BR      6$              ;;IF RUNNING ON THE 'XOR' TESTER CHANGE
                                                                        ;;THIS INSTRUCTION TO A 'NOP' (NOP=240)
033034  013746  000004                          MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
033040  012737  033060  000004                  MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
033046  005737  177060                          TST     @#177060        ;;TIME OUT ON XOR?
033052  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
033056  000446                                  BR      $SVLAD          ;;GO TO THE NEXT TEST
033060  022626                          5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
033062  012637  000004                          MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
033066  000434                                  BR      7$              ;;LOOP ON THE PRESENT TEST
033070                                  6$:;#####END OF CODE FOR THE XOR TESTER#####
033070  032777  000400  146042                  BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
033076  001404                                  BEQ     2$              ;;BR IF NO
033100  127737  146034  001102                  CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
033106  001450                                  BEQ     $OVER           ;;BR IF YES
033110  013737  177766  033244  2$:     MOV     177766,CPSAVE   ;MOVE CPU ERR REG VALUE TO LOC FOR TST  ;DPM001
033116  032737  000001  033244          BIT     #BIT00,CPSAVE   ;SEE IF THE POWER MONITOR BIT IS ON     ;DPM001
033124  001406                          BEQ     2000$           ;BRANCH TO CONTINUE ROUTINE IF CLEAR    ;DPM001
033126  042737  000001  177766          BIC     #BIT00,177766   ;CLEAR THE BIT FOUND TO BE SET          ;DPM001
033134  104177                          EMT     +177            ;CALL SPECIAL POWER FAIL BIT ERROR CALL ;DPM001
033136  105037  001103                  CLRB    $ERFLG          ;CLEAR THE FLAG FOR THE NEXT CHECK      ;DPM001
033142  105737  001103          2000$:  TSTB    $ERFLG          ;DID AN ERROR OCCUR?
033146  001412                          BEQ     $SVLAD          ;;BR IF NO
033150  032777  001000  145762          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
033156  001404                          BEQ     4$              ;;BR IF NO
033160  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
033166  000420                          BR      $OVER
033170  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
033174  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
033200  113737  001102  001230          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
033206  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
033212  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
033216  005037  001212                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
033222  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
033230  013777  001102  145704  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
033236  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
033242  000002                          RTI                     ;;FIXES PS
033244  000000                  CPSAVE: .WORD   0               ;LOCATION TO SAVE CPU ERR REG CONTENTS  ;DPM001
```

ERROR HANDLER ROUTINE

```
3219                                    .SBTTL  ERROR HANDLER ROUTINE

                                        ;;**********************************************************************
                                        ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
                                        ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
                                        ;*AND GO TO ERRTYP ON ERROR
                                        ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                        ;*SW15=1         HALT ON ERROR
                                        ;*SW13=1         INHIBIT ERROR TYPEOUTS
                                        ;*SW10=1         BELL ON ERROR
                                        ;*SW09=1         LOOP ON ERROR
                                        ;*CALL
                                        ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER

033246  105037  033624          $ERROR: CLRB    IBSAVE          ;CLEAR THE ITEM BYTE SAVE LOCATION      ;DPM001
033252  104410                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
033254  010037  001162                  MOV     R0,$REG0        ;SAVE THE CONTENTS OF R0
033260  010137  001164                  MOV     R1,$REG1        ;SAVE THE CONTENTS OF R1
033264  010237  001166                  MOV     R2,$REG2        ;SAVE THE CONTENTS OF R2
033270  010337  001170                  MOV     R3,$REG3        ;SAVE THE CONTENTS OF R3
033274  010437  001172                  MOV     R4,$REG4        ;SAVE THE CONTENTS OF R4
033300  010537  001174                  MOV     R5,$REG5        ;SAVE THE CONTENTS OF R5
033304  113737  001102  001254          MOVB    $TSTNM,TESTNO   ;SAVE THE TEST NUMBER
033312  105237  001103          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
033316  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
033320  013777  001102  145614          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
033326  032777  002000  145604          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
033334  001402                          BEQ     1$              ;;NO - SKIP
033336  104401  001214                  TYPE    ,$BELL          ;;RING BELL
033342  005237  001112          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
033346  011637  001116                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
033352  162737  000002  001116          SUB     #2,$ERRPC
033360  117737  145532  001114          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
033366  122737  000177  001114          CMPB    #177,$ITEMB     ;SEE IF THIS IS THE POWER FAIL CALL      ;DPM001
033374  001426                          BEQ     1001$           ;BRANCH AROUND ROUTINE IF IT IS         ;DPM001
033376  105737  033624                  TSTB    IBSAVE          ;SEE IF THIS IS THE 2ND ERROR CALL       ;DPM001
033402  001021                          BNE     1000$           ;BRANCH IF SO                           ;DPM001
033404  013737  177766  033244          MOV     177766,CPSAVE   ;MOVE CPU ERR REG TO CPSAVE FOR TEST     ;DPM001
033412  032737  000001  033244          BIT     #BIT00,CPSAVE   ;SEE IF POWER MONITOR BIT IS SET         ;DPM001
033420  001414                          BEQ     1001$           ;BRANCH IF OK                           ;DPM001
033422  042737  000001  177766          BIC     #BIT00,177766   ;CLEAR THE BIT FOUND SET                 ;DPM001
033430  113737  001114  033624          MOVB    $ITEMB,IBSAVE   ;MAKE IBSAVE NON-ZERO FOR DUAL CALL      ;DPM001
033436  112737  000177  001114          MOVB    #177,$ITEMB     ;SET $ITEMB TO SPECIAL POWER FAIL PNTR   ;DPM001
033444  000402                          BR      1001$           ;BRANCH OVER IBSAVE CLEARING            ;DPM001
033446  105037  033624          1000$:  CLRB    IBSAVE          ;CLEAR IBSAVE SO AFTER 2ND ERROR, EXIT   ;DPM001
033452                          1001$:
033452  032777  020000  145460          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
033460  001004                          BNE     20$             ;;SKIP TYPEOUTS
033462  004737  033626                  JSR     PC,ERRTYP       ;;GO TO USER ERROR ROUTINE
033466  104401  001221                  TYPE    ,$CRLF
033472                          20$:
033472  122737  000001  001244          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
033500  001007                          BNE     2$              ;;NO,SKIP APT ERROR REPORT
033502  113737  001114  033514          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
033510  004737  035752                  JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
033514     000          21$:    .BYTE   0
033515     000                  .BYTE   0
```

ERROR HANDLER ROUTINE

```
033516  000777                  22$:    BR      22$             ;;APT ERROR LOOP
033520  105737  033624          2$:     TSTB    IBSAVE          ;SEE IF POWER FAIL ERROR CALL           ;DPM001
033524  001005                          BNE     3$              ;BRANCH IF NOT - HALT NOT ALLOWED       ;DPM001
033526  005777  145406                  TST     @SWR            ;;HALT ON ERROR
033532  100002                          BPL     3$              ;;SKIP IF CONTINUE
033534  000000                          HALT                    ;;HALT ON ERROR!
033536  104410                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
033540  032777  001000  145372  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
033546  001405                          BEQ     4$              ;;BR IF NO
033550  105737  033624                  TSTB    IBSAVE          ;SEE IF THIS ERROR CALL IS PWR MON ERR  ;DPM001
033554  001256                          BNE     7$              ;BRANCH BACK IF SO - DON'T ALLOW FUDGING;DPM001
033556  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
033562  005737  001212          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
033566  001405                          BEQ     5$              ;;BR IF NONE
033570  105737  033624                  TSTB    IBSAVE          ;SEE IF THIS ERROR CALL IS PWR MON ERR  ;DPM001
033574  001246                          BNE     7$              ;BRANCH BACK IF SO - DON'T ALLOW FUDGING;DPM001
033576  013716  001212                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
033602                          5$:
033602  022737  032742  000042          CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
033610  001001                          BNE     6$              ;;BRANCH IF NO
033612  000000                          HALT                    ;;YES
033614                          6$:
033614  105737  033624                  TSTB    IBSAVE          ;SEE IF THIS IS THE PWR FAIL ERROR CALL ;DPM001
033620  001234                          BNE     7$              ;BRANCH BACK TO CALL ORIGINAL ERR IF SO ;DPM001
033622  000002                          RTI                     ;;RETURN
033624  000000                  IBSAVE: .WORD   0               ;LOC'N TO HOLD $ITEMB DURING DUAL ERR   ;DPM001
```

```
3221 033626  104401  001221          ERRTYP: TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
3222 033632  010046                          MOV     R0,-(KSP)       ;SAVE R0.
3223 033634  005000                          CLR     R0              ;PICKUP THE ITEM INDEX
3224 033636  153700  001114                  BISB    $ITEMB,R0
3225 033642  001004                          BNE     1$              ;IF ITEM NUMBER IS ZERO, JUST
3226                                                                 ;TYPE THE PC OF THE ERROR
3227 033644  013746  001116                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
3228                                                                 ;;ERROR ADDRESS
3229 033650  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3230 033652  000530                          BR      13$             ;GET OUT
3231 033654  122700  000177          1$:     CMPB    #177,R0         ;SEE IF THIS ERROR CALL IS THE POWER MONITOR BIT CALL
3232 033660  001003                          BNE     100$            ;BRANCH IF NOT
3233 033662  012700  034150                  MOV     #PFECWS,R0      ;MOVE ADDRESS OF POWER MONITOR BIT ERROR TO R0
3234 033666  000406                          BR      110$            ;BRANCH TO CALL THE ERROR
3235 033670                          100$:
3236 033670  005300                          DEC     R0              ;ADJUST THE INDEX SO THAT IT WILL
3237 033672  006300                          ASL     R0              ;WORK FOR THE ERROR TABLE.
3238 033674  006300                          ASL     R0
3239 033676  006300                          ASL     R0
3240 033700  062700  001372                  ADD     #$ERRTB,R0      ;FORM TABLE POINTER
3241 033704  012037  033714          110$:   MOV     (R0)+,2$        ;PICKUP 'ERROR MESSAGE'' POINTER
3242 033710  001404                          BEQ     3$              ;SKIP TYPEOUT IF NO POINTER
3243 033712  104401                          TYPE                    ;TYPE THE 'ERROR MESSAGE''
3244 033714  000000                  2$:     .WORD   0               ;'ERROR MESSAGE'' POINTER GOES HERE
3245 033716  104401  001221                  TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
3246 033722  012037  033732          3$:     MOV     (R0)+,4$        ;PICKUP 'DATA HEADER'' POINTER
3247 033726  001404                          BEQ     5$              ;SKIP TYPEOUT IF 0
3248 033730  104401                          TYPE                    ;TYPE THE 'DATA HEADER''
3249 033732  000000                  4$:     .WORD   0               ;'DATA HEADER'' POINTER GOES HERE
3250 033734  104401  001221                  TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
3251 033740  010146                  5$:     MOV     R1,-(KSP)       ;SAVE R1
3252 033742  012001                          MOV     (R0)+,R1        ;PICKUP 'DATA TABLE'' POINTER
3253 033744  001472                          BEQ     12$             ;BR IF NO DATA TO BE TYPED
3254 033746  012000                          MOV     (R0)+,R0        ;PICKUP 'DATA FORMAT'' POINTER
3255 033750  105710                  6$:     TSTB    (R0)            ;IS IT FORMAT 0?
3256 033752  001003                          BNE     7$              ;BR IF NO
3257                                  ;*THIS CODE IS FOR OCTAL (16-BIT) FORMAT (DF=0)
3258 033754  013146                          MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FPR TYPEOUT
3259 033756  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3260 033760  000456                          BR      11$
3261                                  ;*THIS CODE IS FOR DECIMAL FORMAT (DF=1)
3262 033762  121027  000001          7$:     CMPB    (R0),#1         ;IS IT FORMAT 1?
3263 033766  001003                          BNE     8$              ;BRANCH IF NO
3264 033770  013146                          MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
3265 033772  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
3266 033774  000450                          BR      11$
3267                                  ;*THIS CODE IS FOR BINARY FORMAT (DF=2)
3268 033776  121027  000002          8$:     CMPB    (R0),#2         ;IS IT FORMAT 2
3269 034002  001003                          BNE     9$              ;BRANCH IF NO
3270 034004  013146                          MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
3271 034006  104406                          TYPBN                   ;;GO TYPE--BINARY ASCII
3272 034010  000442                          BR      11$
3273                                  ;*THIS CODE IS FOR OCTAL (22-BIT) FORMAT (DF=3)
3274 034012  121027  000003          9$:     CMPB    (R0),#3         ;IS IT FORMAT 3?
3275 034016  001011                          BNE     15$             ;BRANCH IF NO
3276 034020  012146                          MOV     (R1)+,-(KSP)    ;PUT ADDRESS OF FIRST LOC. ON STACK
3277 034022  004737  037024                  JSR     PC,$DB2O        ;CONVERT TWO LOCS. TO AN ASCII STRING
                                                                                                        ;
```

```
3278 034026  062716  000003            ADD     #3,(KSP)          ;ONLY NEED 8 CHARACTERS NOT 11
3279 034032  012637  034040            MOV     (KSP)+,10$        ;PUT ADDRESS OF ASCII CHARS. AT 10$
3280 034036  104401                    TYPE                      ;TYPE OCTAL VALUE OF 22-BIT BINARY NO.
3281 034040  000000            10$:    .WORD   0
3282                           ;*THIS CODE IS FOR OCTAL (22-BIT) FORMAT FOR A PAR LEFT SHIFTED 6 (DF=4)
3283 034042  010246            15$:    MOV     R2,-(KSP)         ;SAVE R2 ON STACK
3284 034044  010346                    MOV     R3,-(KSP)         ;SAVE R3 ON STACK
3285 034046  013103                    MOV     @(R1)+,R3         ;LOAD DATA WORD INTO R3
3286 034050  005002                    CLR     R2                ;R2 HOLDS UPPER SIX BITS OF NUMBER
3287 034052  073227  000006            ASHC    #6,R2             ;SHIFT VALUE LEFT 6 TIMES
3288 034056  010237  001206            MOV     R2,$TMP4          ;HOLDS LOWER 16 BITS OF ADDRESS
3289 034062  010337  001210            MOV     R3,$TMP5          ;HOLDS UPPER 6 BITS OF ADDRESS
3290 034066  012746  001206            MOV     #$TMP4,-(KSP)     ;PUT ADDRESS OF LOWER BITS ONTO STACK
3291 034072  004737  037024            JSR     PC,$DB2O          ;CONVERT TWO LOCS. TO AN ASCII STRING
3292 034076  062716  000003            ADD     #3,(KSP)          ;ONLY NEED 8 CHARACTERS NOT 11
3293 034102  012637  034110            MOV     (KSP)+,16$        ;PUT ADDRESS OF ASCII CHARS. AT 16$
3294 034106  104401                    TYPE                      ;TYPE OCTAL VALUE OF 22-BIT BINARY NO.
3295 034110  000000            16$:    .WORD   0
3296 034112  012603                    MOV     (KSP)+,R3         ;RESTORE R3
3297 034114  012602                    MOV     (KSP)+,R2         ;RESTORE R2
3298 034116  005711            11$:    TST     (R1)              ;IS THERE ANOTHER NUMBER?
3299 034120  001404                    BEQ     12$               ;BR IF NO
3300 034122  104401  034144            TYPE    ,14$              ;TYPE TWO(2) SPACES
3301 034126  105720                    TSTB    (R0)+             ;POINT TO NEW 'DATA FORMAT''
3302 034130  000707                    BR      6$                ;LOOP
3303 034132  012601            12$:    MOV     (KSP)+,R1         ;RESTORE R1
3304 034134  012600            13$:    MOV     (KSP)+,R0         ;RESTORE R0
3305 034136  104401  001221            TYPE    ,$CRLF            ;''CARRIAGE RETURN'' & 'LINE FEED''
3306 034142  000207                    RTS     PC                ;RETURN
3307 034144     040     040     000    14$:    .ASCIZ  / /               ;TWO(2) SPACES
3308                                   .EVEN
3309 034150  034160  034220  034250    PFECWS: .WORD   PFECEM,PFECDH,PFECDT,PFECDF
3310 034160     120     117     127    PFECEM: .ASCIZ  ?POWER MONITOR BIT WAS FOUND SET?
3311 034220     124     105     123    PFECDH: .ASCIZ  ?TESTNO  ERR PC  CPUERR?
3312                                   .EVEN
3313 034250  001230  001116  033244    PFECDT: .WORD   $TESTN,$ERRPC,CPSAVE,0
3314 034260     000     000     000    PFECDF: .BYTE   0,0,0,0
```

```
3315                                    .SBTTL  TTY INPUT ROUTINE
                                        ;;**********************************************************************
                                        .ENABL  LSB
                                        ;;**********************************************************************
                                        ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
                                        ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
                                        ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
                                        ;*WHEN OPERATING IN TTY FLAG MODE.
034264  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
034272  001114                        BNE     15$             ;;BRANCH IF NO
034274  105777  144644                TSTB    @$TKS           ;;CHAR THERE?
034300  100111                        BPL     15$             ;;IF NO, DON'T WAIT AROUND
034302  117746  144640                MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
034306  042716  177600                BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
034312  022726  000007                CMP     #7,(SP)+        ;;IS IT A CONTROL G?
034316  001102                        BNE     15$             ;;NO, RETURN TO USER
034320  123727  001134  000001        CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
034326  001476                        BEQ     15$             ;;BRANCH IF YES
034330  104401  035231                TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
034334  104401  035236        $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
034340  013746  000176                MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
034344  104402                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
034346  104401  035247                TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
034352  005046                19$:    CLR     -(SP)           ;;CLEAR COUNTER
034354  005046                        CLR     -(SP)           ;;THE NEW SWR
034356  105777  144562        7$:     TSTB    @$TKS           ;;CHAR THERE?
034362  100375                        BPL     7$              ;;IF NOT TRY AGAIN
034364  117746  144556                MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
034370  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
034374  021627  000003                CMP     (SP),#3         ;;IS IT A CONTROL-C?
034400  001015                        BNE     9$              ;;BRANCH IF NOT
034402  104401  001350                TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
034406  062706  000006    --          ADD     #6,SP           ;;CLEAN UP STACK
034412  123727  001135  000001        CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
034420  001003                        BNE     8$              ;;BRANCH IF NO
034422  012777  000100  144514        MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
034430  000137  035260        8$:     JMP     CNTRLC          ;;CONTROL-C RESTART
034434  021627  000025        9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
034440  001005                        BNE     10$             ;;BRANCH IF NOT
034442  104401  035224                TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
034446  062706  000006        20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
034452  000737                        BR      19$             ;;LET'S TRY IT AGAIN
034454  021627  000015        10$:    CMP     (SP),#15        ;;IS IT A <CR>?
034460  001022                        BNE     16$             ;;BRANCH IF NO
034462  005766  000004                TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
034466  001403                        BEQ     11$             ;;BRANCH IF YES
034470  016677  000002  144442        MOV     2(SP),@SWR      ;;SAVE NEW SWR
034476  062706  000006        11$:    ADD     #6,SP           ;;CLEAR UP STACK
034502  104401  001221        14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
034506  123727  001135  000001        CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
034514  001003                        BNE     15$             ;;BRANCH IF NOT
034516  012777  000100  144420        MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
034524  000002                15$:    RTI                     ;;RETURN
034526  004737  035602        16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
034532  021627  000060                CMP     (SP),#60        ;;CHAR < 0?
034536  002420                        BLT     18$             ;;BRANCH IF YES
034540  021627  000067                CMP     (SP),#67        ;;CHAR > 7?
```

```
034544  003015                          BGT     18$             ;;BRANCH IF YES
034546  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
034552  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
034556  001403                          BEQ     17$             ;;BRANCH IF YES
034560  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
034562  006316                          ASL     (SP)            ;;   CHAR OVER TO MAKE
034564  006316                          ASL     (SP)            ;;   ROOM FOR NEW ONE.
034566  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
034572  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
034576  000667                          BR      7$              ;;GET THE NEXT ONE
034600  104401  001220          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
034604  000720                          BR      20$             ;;SIMULATE CONTROL-U
                                .DSABL  LSB
                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                                ;*CALL:
                                ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
                                ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                                ;*                              ;;WITH PARITY BIT STRIPPED OFF
                                ;
034606  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
034610  016666  000004  000002  MOV     4(SP),2(SP)     ;;SAVE THE PS
034616  105777  144322          1$:     TSTB    @$TKS           ;;WAIT FOR
034622  100375                  BPL     1$              ;;A CHARACTER
034624  117766  144316  000004  MOVB    @$TKB,4(SP)     ;;READ THE TTY
034632  042766  177600  000004  BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
034640  026627  000004  000023  CMP     4(SP),#23       ;;IS IT A CONTROL-S?
034646  001013                  BNE     3$              ;;BRANCH IF NO
034650  105777  144270          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
034654  100375                  BPL     2$              ;;LOOP UNTIL ITS THERE
034656  117746  144264          MOVB    @$TKB,-(SP)     ;;GET CHARACTER
034662  042716  177600          BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
034666  022627  000021          CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
034672  001366                  BNE     2$              ;;IF NOT DISCARD IT
034674  000750                  BR      1$              ;;YES, RESUME
034676  026627  000004  000021  3$:     CMP     4(SP),#$XON     ;;IS IT A RANDOM XON?                   ;RAN001
034704  001744                  BEQ     1$              ;;BRANCH IF YES                         ;RAN001
034706  026627  000004  000140  CMP     4(SP),#140      ;;IS IT UPPER CASE?
034714  002407                  BLT     4$              ;;BRANCH IF YES
034716  026627  000004  000175  CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
034724  003003                  BGT     4$              ;;BRANCH IF YES
034726  042766  000040  000004  BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
034734  000002          4$:     RTI                     ;;GO BACK TO USER
                                ;;*****************************************************************
                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                ;*CALL:
                                ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
034736  010346          $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
034740  005046                  CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
034742  012703  035214  1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
034746  022703  035224  2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
034752  101467                  BLOS    4$              ;;BR IF YES
034754  104411                  RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
034756  112613                  MOVB    (SP)+,(R3)      ;;GET CHARACTER
034760  122713  000003          CMPB    #3,(R3)         ;;IS IT A CONTROL-C?
```

```
034764  001006                          BNE     10$             ;;BRANCH IF NO
034766  104401  001350                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
034772  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY OFF OF THE STACK
034774  012603                          MOV     (SP)+,R3        ;;RESTORE R3
034776  000137  035260                  JMP     CNTRLC          ;;GOTO CONTROL-C RESTART
035002  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
035006  001022                          BNE     5$              ;;BR IF NO
035010  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
035012  001007                          BNE     6$              ;;BR IF NO
035014  112737  000134  035212          MOVB    #'\,9$          ;;TYPE A BACK SLASH
035022  104401  035212                  TYPE    ,9$
035026  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
035032  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
035034  020327  035214                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
035040  103434                          BLO     4$              ;;BR IF YES
035042  111337  035212                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
035046  104401  035212                  TYPE    ,9$             ;;GO TYPE
035052  000735                          BR      2$              ;;GO READ ANOTHER CHAR.
035054  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
035056  001406                          BEQ     7$              ;;BR IF NO
035060  112737  000134  035212          MOVB    #'\,9$          ;;TYPE A BACK SLASH
035066  104401  035212                  TYPE    ,9$
035072  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
035074  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
035100  001003                          BNE     8$              ;;BR IF NO
035102  104401  035224                  TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U'
035106  000715                          BR      1$              ;;GO START OVER
035110  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A '^R'?
035114  001011                          BNE     3$              ;;BRANCH IF NO
035116  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
035120  104401  001221                  TYPE    ,$CRLF          ;;TYPE A 'CR' & 'LF'
035124  104401  035214                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
035130  000706                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
035132  104401  001220          4$:     TYPE    ,$QUES          ;;TYPE A '?'
035136  000701                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
035140  111337  035212          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
035144  104401  035212                  TYPE    ,9$
035150  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
035154  001274                          BNE     2$              ;;LOOP IF NOT RETURN
035156  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
035162  104401  001222                  TYPE    ,$LF            ;;TYPE A LINE FEED
035166  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
035170  012603                          MOV     (SP)+,R3        ;;RESTORE R3
035172  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
035174  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
035202  012766  035214  000004          MOV     #$TTYIN,4(SP)
035210  000002                          RTI                     ;;RETURN
035212     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
035213     000                          .BYTE   0               ;;TERMINATOR
035214                          $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
035224     136     125     015  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U'
035231     136     107     015  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL 'G'
035236     015     012     123  $MSWR:  .ASCIZ  <15><12>/SWR = /
035247     040     040     116  $MNEW:  .ASCIZ  /  NEW = /
```

CONTROL-C SERVICING ROUTINE

```
3317                                    .SBTTL  CONTROL-C SERVICING ROUTINE
3318 035260  013737  001232  001210  CNTRLC: MOV     $PASS,$TMP5     ;GET THE VALUE OF '$PASS'
3319 035266  005237  001210                  INC     $TMP5           ;FORM CURRENT PASS #
3320 035272  104401  035337                  TYPE    ,CMSG           ;TYPE THE TEST STOPS HERE
3321 035276  113737  001102  035332          MOVB    $TSTNM,1$       ;SAVE TEST NUMBER
3322 035304  013746  035332                  MOV     1$,-(SP)        ;SAVE 1$ FO TYPEOUT
3323 035310  104402                          TYPOC
3324 035312  104401  035334                  TYPE    ,2$
3325 035316  013746  001210                  MOV     $TMP5,-(SP)     ;SAVE $TMP5 FOR TYPEOUT
3326 035322  104405                          TYPDS                   ;TYPE ASCII DECIMAL WITH SIGN
3327 035324  104407                          GTSWR                   ;ASK FOR NEW SWR VALUE
3328 035326  000137  032542                  JMP     $EOP+2          ;JUMP TO END OF PASS + 2
3329 035332  000000                  1$:     .WORD   0               ;TEST # BUFFER
3330 035334     040     040     000  2$:     .ASCIZ  /  /            ;2 SPACES & STOP MESSAGE
3331 035337     112     125     115  CMSG:   .ASCII  /JUMPING TO END OF PASS/<15><12>
3332 035367     000                  .BYTE   0
```

```
3333                                    .SBTTL  TYPE ROUTINE
                                        ;;*****************************************************************
                                        ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                        ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                        ;*NOTE1:         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
                                        ;*NOTE2:         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                        ;*NOTE3:         $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                        ;*
                                        ;*CALL:
                                        ;*1) USING A TRAP INSTRUCTION
                                        ;*       TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                        ;*OR
                                        ;*       TYPE
                                        ;*       MESADR
                                        ;*
035370  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
035374  100002                          BPL     1$              ;;BR IF YES
035376  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
035400  000430                          BR      3$              ;;LEAVE
035402  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
035404  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
035410  122737  000001  001244          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
035416  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
035420  132737  000100  001245          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
035426  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
035430  010037  035440                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
035434  004737  035742                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
035440  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
035442  132737  000040  001245  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
035450  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
035452  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
035454  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
035456  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
035460  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
035462  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
035466  000002                          RTI                     ;;RETURN
035470  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
035474  001430                          BEQ     8$
035476  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
035502  001006                          BNE     5$
035504  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
035506  104401                          TYPE                    ;;TYPE A CR AND LF
035510  001221                          $CRLF
035512  105037  035730                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
035516  000755                          BR      2$              ;;GET NEXT CHARACTER
035520  004737  035602          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
035524  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
035530  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
035532  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;,AND THE NULL CHAR.
035536  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
035542  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
035544  004737  035602                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
035550  105337  035730                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
035554  000770                          BR      7$              ;;LOOP
                                        ;HORIZONTAL TAB PROCESSOR
035556  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
```

```
035562  004737  035602          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
035566  132737  000007  035730          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
035574  001372                          BNE     9$              ;;TAB STOP
035576  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
035600  000724                          BR      2$              ;;GET NEXT CHARACTER
035602                          $TYPEC:
035602  105777  143336                  TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?          ;MJD001
035606  100022                          BPL     10$             ;;BR IF NOT                     ;MJD001
035610  017746  143332                  MOV     @$TKB,-(SP)     ;;GET CHAR                      ;MJD001
035614  042716  177600                  BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS         ;MJD001
035620  122716  000023                  CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                 ;MJD001
035624  001012                          BNE     102$            ;;BR IF NOT                     ;MJD001
035626                          101$:                                                           ;MJD001
035626  105777  143312                  TSTB    @$TKS           ;;WAIT FOR CHAR                 ;MJD001
035632  100375                          BPL     101$                                            ;MJD001
035634  117716  143306                  MOVB    @$TKB,(SP)      ;;GET CHAR                      ;MJD001
035640  042716  177600                  BIC     #177600,(SP)    ;;STRIP IT                      ;MJD001
035644  122716  000021                  CMPB    #$XON,(SP)      ;;WAS IT XON?                   ;MJD001
035650  001366                          BNE     101$            ;;BR IF NOT                     ;MJD001
035652                          102$:                                                           ;MJD001
035652  005726                          TST     (SP)+           ;;FIX STACK                     ;MJD001
035654                          10$:                                                            ;MJD001
035654  105777  143270                  TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
035660  100375                          BPL     10$                                             ;MJD001
035662  126627  000002  000021          CMPB    2(SP),#$XON     ;;IS CHARACTER A RANDOM XON?    ;RAN001
035670  001420                          BEQ     $TYPEX          ;;BRANCH IF YES                 ;RAN001
035672  116677  000002  143252          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
035700  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
035706  001003                          BNE     1$              ;;BRANCH IF NO
035710  105037  035730                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
035714  000406                          BR      $TYPEX          ;;EXIT
035716  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
035724  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
035726  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
035730  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
035732  000207          $TYPEX: RTS     PC
```

```
3335                                    .SBTTL  APT COMMUNICATIONS ROUTINE
                                        ;;**********************************************************************
035734  112737  000001  036200  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
035742  112737  000001  036176  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
035750  000403                         BR      $ATYC
035752  112737  000001  036200  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
035760                         $ATYC:
035760  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
035762  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
035764  105737  036176                 TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
035770  001450                         BEQ     5$              ;;IF NOT:  BR
035772  122737  000001  001244         CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
036000  001031                         BNE     3$              ;;IF NOT:  BR
036002  132737  000100  001245         BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
036010  001425                         BEQ     3$              ;;IF NOT:  BR
036012  017600  000004                 MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
036016  062766  000002  000004         ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
036024  005737  001224         1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
036030  001375                         BNE     1$              ;;IF NOT:  WAIT
036032  010037  001240                 MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
036036  105720                 2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
036040  001376                         BNE     2$
036042  163700  001240                 SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
036046  006200                         ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
036050  010037  001242                 MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
036054  012737  000004  001224         MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
036062  000413                         BR      5$
036064  017637  000004  036110  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
036072  062766  000002  000004         ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
036100  013746  177776                 MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
036104  004737  035370                 JSR     PC,$TYPE        ;;CALL TYPE MACRO
036110  000000                 4$:     .WORD   0
036112                         5$:
036112  105737  036200         10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
036116  001416                         BEQ     12$             ;;IF NOT:  BR
036120  005737  001244                 TST     $ENV            ;;RUNNING UNDER APT?
036124  001413                         BEQ     12$             ;;IF NOT:  BR
036126  005737  001224         11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
036132  001375                         BNE     11$             ;;IF NOT:  WAIT
036134  017637  000004  001226         MOV     @4(SP),$FATAL   ;;GET ERROR #
036142  062766  000002  000004         ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
036150  005237  001224                 INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
036154  105037  036200         12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
036160  105037  036177                 CLRB    $LFLG           ;;CLEAR LOG FLAG
036164  105037  036176                 CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
036170  012601                         MOV     (SP)+,R1        ;;POP STACK INTO R1
036172  012600                         MOV     (SP)+,R0        ;;POP STACK INTO R0
036174  000207                         RTS     PC              ;;RETURN
036176     000                 $MFLG:  .BYTE   0               ;;MESSG. FLAG
036177     000                 $LFLG:  .BYTE   0               ;;LOG FLAG
036200     000                 $FFLG:  .BYTE   0               ;;FATAL FLAG
                                       .EVEN
            000200                     APTSIZE=200
            000001                     APTENV=001
            000100                     APTSPOOL=100
            000040                     APTCSUP=040
```

```
3337                                    .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
                                        ;;**************************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
                                        ;*BINARY-ASCII NUMBER AND TYPE IT.
                                        ;*CALL:
                                        ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
                                        ;*      TYPBN                   ;;TYPE IT
036202  010146                 $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
036204  016601  000006                 MOV     6(SP),R1        ;;GET THE INPUT NUMBER
036210  000261                         SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
036212  112737  000060  036254  1$:    MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII '0'.
036220  006101                         ROL     R1              ;;GET THIS BIT
036222  001406                         BEQ     2$              ;;DONE?
036224  105537  036254                 ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
036230  104401  036254                 TYPE    ,$BIN           ;;GO TYPE THIS BIT
036234  000241                         CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
036236  000765                         BR      1$              ;;GO DO THE NEXT BIT
036240  012601                 2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
036242  016666  000002  000004         MOV     2(SP),4(SP)     ;;ADJUST THE STACK
036250  012616                         MOV     (SP)+,(SP)
036252  000002                         RTI                     ;;RETURN TO USER
036254     000     000         $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
```

```
3339                                    .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
                                        ;;**********************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                        ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                        ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                        ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                        ;*      .BYTE   M               ;;M=1 OR 0
                                        ;*                                      ;;1=TYPE LEADING ZEROS
                                        ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                        ;*
                                        ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                        ;*$TYPOS OR $TYPOC
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPON                   ;;CALL FOR TYPEOUT
                                        ;*
                                        ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   ;;CALL FOR TYPEOUT
036256  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
036262  116637  000001  036501          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
036270  112637  036503                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
036274  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
036300  000406                          BR      $TYPON
036302  11.737  000001  036501  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
036310  112737  000006  036503          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
036316  112737  000005  036500  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
036324  010346                          MOV     R3,-(SP)        ;;SAVE R3
036326  010446                          MOV     R4,-(SP)        ;;SAVE R4
036330  010546                          MOV     R5,-(SP)        ;;SAVE R5
036332  113704  036503                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
036336  005404                          NEG     R4
036340  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
036344  110437  036502                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
036350  113704  036501                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
036354  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
036360  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
036362  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
036364  000404                          BR      3$              ;;GO DO MSB
036366  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
036370  006105                          ROL     R5
036372  006105                          ROL     R5
036374  010503                          MOV     R5,R3
036376  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
036400  105337  036502                  DECB    $OMODE          ;;TYPE THIS DIGIT?
036404  100016                          BPL     7$              ;;BR IF NO
036406  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
036412  001002                          BNE     4$              ;;TEST FOR 0
036414  005704                          TST     R4              ;;SUPPRESS THIS 0?
036416  001403                          BEQ     5$              ;;BR IF YES
036420  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
036422  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
036426  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
```

BINARY TO OCTAL (ASCII) AND TYPE

```
036432  110337  036476                  MOVB    R3,8$           ;;SAVE FOR TYPING
036436  104401  036476                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
036442  105337  036500          7$:     DECB    $OCNT           ;;COUNT BY 1
036446  003347                          BGT     2$              ;;BR IF MORE TO DO
036450  002402                          BLT     6$              ;;BR IF DONE
036452  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
036454  000744                          BR      2$              ;;GO DO THE LAST DIGIT
036456  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
036460  012604                          MOV     (SP)+,R4        ;;RESTORE R4
036462  012603                          MOV     (SP)+,R3        ;;RESTORE R3
036464  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
036472  012616                          MOV     (SP)+,(SP)
036474  000002                          RTI                     ;;RETURN
036476     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
036477     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
036500     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
036501     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
036502  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
3341                                    .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
                                        ;;*****************************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                                        ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                                        ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                                        ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                                        ;*REPLACED WITH SPACES.
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                                        ;*      TYPDS                   ;;GO TO THE ROUTINE
036504                                  $TYPDS:
036504  010046                                MOV     R0,-(SP)        ;;PUSH R0 ON STACK
036506  010146                                MOV     R1,-(SP)        ;;PUSH R1 ON STACK
036510  010246                                MOV     R2,-(SP)        ;;PUSH R2 ON STACK
036512  010346                                MOV     R3,-(SP)        ;;PUSH R3 ON STACK
036514  010546                                MOV     R5,-(SP)        ;;PUSH R5 ON STACK
036516  012746  020200                        MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
036522  016605  000020                        MOV     20(SP),R5       ;;GET THE INPUT NUMBER
036526  100004                                BPL     1$              ;;BR IF INPUT IS POS.
036530  005405                                NEG     R5              ;;MAKE THE BINARY NUMBER POS.
036532  112766  000055  000001                MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
036540  005000                          1$:   CLR     R0              ;;ZERO THE CONSTANTS INDEX
036542  012703  036720                        MOV     #$DBLK,R3       ;;SETUP THF OUTPUT POINTER
036546  112723  000040                        MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
036552  005002                          2$:   CLR     R2              ;;CLEAR THE BCD NUMBER
036554  016001  036710                        MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
036560  160105                          3$:   SUB     R1,R5           ;;FORM THIS BCD DIGIT
036562  002402                                BLT     4$              ;;BR IF DONE
036564  005202                                INC     R2              ;;INCREASE THE BCD DIGIT BY 1
036566  000774                                BR      3$
036570  060105                          4$:   ADD     R1,R5           ;;ADD BACK THE CONSTANT
036572  005702                                TST     R2              ;;CHECK IF BCD DIGIT=0
036574  001002                                BNE     5$              ;;FALL THROUGH IF 0
036576  105716                                TSTB    (SP)            ;;STILL DOING LEADING 0'S?
036600  100407                                BMI     7$              ;;BR IF YES
036602  106316                          5$:   ASLB    (SP)            ;;MSD?
036604  103003                                BCC     6$              ;;BR IF NO
036606  116663  000001  177777                MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
036614  052702  000060                  6$:   BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
036620  052702  000040                  7$:   BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
036624  110223                                MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
036626  005720                                TST     (R0)+           ;;JUST INCREMENTING
036630  020027  000010                        CMP     R0,#10          ;;CHECK THE TABLE INDEX
036634  002746                                BLT     2$              ;;GO DO THE NEXT DIGIT
036636  003002                                BGT     8$              ;;GO TO EXIT
036640  010502                                MOV     R5,R2           ;;GET THE LSD
036642  000764                                BR      6$              ;;GO CHANGE TO ASCII
036644  105726                          8$:   TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
036646  100003                                BPL     9$              ;;BR IF NO
036650  116663  177777  177776                MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
036656  105013                          9$:   CLRB    (R3)            ;;SET THE TERMINATOR
036660  012605                                MOV     (SP)+,R5        ;;POP STACK INTO R5
036662  012603                                MOV     (SP)+,R3        ;;POP STACK INTO R3
036664  012602                                MOV     (SP)+,R2        ;;POP STACK INTO R2
036666  012601                                MOV     (SP)+,R1        ;;POP STACK INTO R1
036670  012600                                MOV     (SP)+,R0        ;;POP STACK INTO R0
036672  104401  036720                        TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
```

CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

```
036676  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
036704  C12616                          MOV     (SP)+,(SP)
036706  000002                          RTI                     ;;RETURN TO USER
036710  023420                  $DTBL:  10000.
036712  001750                          1000.
036714  000144                          100.
036716  000012                          10.
036720                          $DBLK:  .BLKW   4
```

SAVE AND RESTORE R0-R5 ROUTINES

```
3343                                    .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
                                        ;;*****************************************************************
                                        ;*SAVE R0-R5
                                        ;*CALL:
                                        ;*      SAVREG
                                        ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE.
                                        ;*
                                        ;*TOP---(+16)
                                        ;* +2---(+18)
                                        ;* +4---R5
                                        ;* +6---R4
                                        ;* +8---R3
                                        ;*+10---R2
                                        ;*+12---R1
                                        ;*+14---R0
036730                                  $SAVREG:
036730  010046                                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
036732  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
036734  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
036736  010346                                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
036740  010446                                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
036742  010546                                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
036744  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
036750  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
036754  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
036760  016646  000022                         MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
036764  000002                                  RTI
                                        ;*RESTORE R0-R5
                                        ;*CALL:
                                        ;*      RESREG
036766                                  $RESREG:
036766  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
036772  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
036776  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
037002  012666  000022                         MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
037006  012605                                  MOV     (SP)+,R5        ;;POP STACK INTO R5
037010  012604                                  MOV     (SP)+,R4        ;;POP STACK INTO R4
037012  012603                                  MOV     (SP)+,R3        ;;POP STACK INTO R3
037014  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
037016  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
037020  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0
037022  000002                                  RTI
```

DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE

```
3345                                    .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE
                                        ;;*****************************************************************
                                        ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
                                        ;*UNSIGNED OCTAL ASCIZ NUMBER.
                                        ;*CALL
                                        ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                        ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
                                        ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK
037024  104413                  $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
037026  016601  000002                  MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
037032  012705  037143                  MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
037036  012704  000014                  MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
037042  012703  177770                  MOV     #^C7,R3         ;;MASK
037046  012100                          MOV     (R1)+,R0        ;;LOWER WORD
037050  012101                          MOV     (R1)+,R1        ;;HIGH WORD
037052  005002                          CLR     R2              ;;TERMINATOR
037054  110245                  1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
037056  010002                          MOV     R0,R2           ;;GET THIS DIGIT
037060  005304                          DEC     R4              ;;COUNT THIS CHARACTER
037062  003007                          BGT     3$              ;;BR IF NOT THE LAST DIGIT
037064  001405                          BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
037066  005205                          INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
037070  010566  000002                  MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
037074  104414                          RESREG                  ;;RESTORE ALL REGISTERS
037076  000207                          RTS     PC              ;;RETURN TO USER
037100  006203                  2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
037102  006001                  3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
037104  006000                          ROR     R0              ;;      THE NEXT OCTAL DIGIT
037106  006001                          ROR     R1
037110  006000                          ROR     R0
037112  006001                          ROR     R1
037114  006000                          ROR     R0
037116  040302                          BIC     R3,R2           ;;MASK OUT ALL JUNK
037120  062702  000060                  ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
037124  000753                          BR      1$              ;;GO PUT IT IN THE DATA TABLE
037126                          $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
```

TRAP DECODER

```
3347                                    .SBTTL  TRAP DECODER
                                        ;:**********************************************************************
                                        ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE 'TRAP' INSTRUCTION
                                        ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                        ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                        ;*GO TO THAT ROUTINE.
037144  010046                          $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
037146  016600  000002                          MOV     2(SP),R0        ;;GET TRAP ADDRESS
037152  005740                          $TRAP:  TST     -(R0)           ;;BACKUP BY 2
037154  111000                          $TRAP:  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
037156  006300                          $TRAP:  ASL     R0              ;;POSITION FOR INDEXING
037160  016000  037200                          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
037164  000200                          $TRAP:  RTS     R0              ;;GO TO ROUTINE
                                        ;;THIS IS USE TO HANDLE THE ''GETPRI'' MACRO
037166  011646                          $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
037170  016666  000004  000002                  MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
037176  000002                                  RTI                     ;;RESTORE THE PSW
                                        .SBTTL  TRAP TABLE
                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE ''TRAP'' INSTRUCTION.
                                        ;       ROUTINE
                                        ;       -------
037200  037166                          $TRPAD: .WORD   $TRAP2
037202  035370                                  $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
037204  036302                                  $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
037206  036256                                  $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
037210  036316                                  $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
037212  036504                                  $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
037214  036202                                  $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
037216  034334                                  $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING
037220  034264                                  $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
037222  034606                                  $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
037224  034736                                  $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
037226  036730                                  $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
037230  036766                                  $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
```

```
3349                                    .SBTTL  POWER DOWN AND UP ROUTINES
                                        ;;*****************************************************************
                                        ;POWER DOWN ROUTINE
037232  012737  037410  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
037240  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
037246  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
037250  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
037252  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
037254  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
037256  010446                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
037260  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
037262  017746  141652                MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
037266  010637  037414                MOV     SP,$SAVR6       ;;SAVE SP
037272  012737  037304  000024        MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
037300  000000                        HALT
037302  000776                        BR      .-2             ;;HANG UP
                                        ;;*****************************************************************
                                        ;POWER UP ROUTINE
037304  012737  037410  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
037312  013706  037414                MOV     $SAVR6,SP       ;;GET SP
037316  005037  037414                CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
037322  005237  037414        1$:     INC     $SAVR6          ;;WAIT FOR THE INC
037326  001375                        BNE     1$              ;;OF  WORD
037330  012677  141604                MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
037334  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
037336  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
037340  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
037342  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
037344  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
037346  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
037350  012737  037232  000024        MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
037356  012737  000340  000026        MOV     #340,@#PWRVEC+2 ;;PRIO:7
037364  104401                        TYPE                    ;;REPORT THE POWER FAILURE
037366  037416          $PWRMG: .WORD   PWRMSG          ;;POWER FAIL MESSAGE POINTER
037370  012716                        MOV     (PC)+,(SP)      ;;RESTART AT START
037372  020000          $PWRAD: .WORD   START           ;;RESTART ADDRESS
037374  042766  000020  000002        BIC     #20,2(SP)       ;;CLEAR 'T' BIT
037402  005037  001346                CLR     $TBIT           ;;CLEAR THE 'T' BIT FLAG
037406  000002                        RTI
037410  000000          $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
037412  000776                        BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
037414  000000          $SAVR6: 0                       ;;PUT THE SP HERE
3350 037416     012     015     040  PWRMSG: .ASCIZ  <12><15>? POWER FAILURE - RESTARTING ?<12><15>
3351                                    .EVEN
```

ERROR MESSAGES

```
3352                                        .SBTTL  ERROR MESSAGES
3353 037460   125   116   105  EM1:    .ASCIZ  /UNEXPECTED CPU TRAP TO LOC. 004/
3354 037520   125   116   105  EM2:    .ASCIZ  /UNEXPECTED MEM. MGMT. TRAP TO LOC. 250/
3355 037567   120   122   111  EM3:    .ASCIZ  /PRIORITY BITS SET WRONG IN PSW/
3356 037626   115   117   104  EM4:    .ASCIZ  /MODE BITS SET WRONG IN PSW/
3357 037661   104   125   101  EM5:    .ASCIZ  /DUAL ADDRESSING BETWEEN HI&LO BYTES OF PSW/
3358 037734   113   105   122  EM6:    .ASCIZ  /KERNEL R6 CHANGED BY WRITING SUPERVISOR OR USER R6/
3359 040017   101   040   115  EM7:    .ASCIZ  /A MEMORY MGMT. REG. TIMED OUT/
3360 040055   123   125   115  EM10:   .ASCIZ  /SUMMARY OF MEM. MGMT. REG. TIMEOUTS/
3361 040121   115   105   115  EM11:   .ASCIZ  /MEM. MGMT. REG. WOULD NOT CLEAR/
3362 040161   115   105   115  EM12:   .ASCIZ  /MEM. MGMT. REG. BITS NOT SET CORRECTLY/
3363 040230   123   122   060  EM13:   .ASCIZ  /SR0 EFFECTED BY WRITE TO PSW/
3364 040265   115   115   122  EM14:   .ASCIZ  /MMR1 DID NOT TRACK PROPERLY/
3365 040321   115   115   122  EM15:   .ASCIZ  /MMR3 IS HOLDING THE WRONG DATA/
3366 040360   104   125   101  EM16:   .ASCIZ  /DUAL ADDRESSING BETWEEN PAR-PDR GROUPS/
3367 040427   102   101   104  EM17:   .ASCIZ  /BAD RELOCATION,ON STORING DATA 18-BIT MAPPING/
3368 040505   120   110   131  EM20:   .ASCIZ  /PHYS. ADDR. FORMED WRONG IN RELOCATE MODE/
3369 040557   123   122   062  EM21:   .ASCIZ  /SR2 NOT TRACKING CORRECTLY/
3370 040612   127   122   117  EM22:   .ASCIZ  /WRONG PDR'S REFERENCED WHILE IN RELOCATE MODE/
3371 040670   120   101   122  EM23:   .ASCIZ  /PAR OR PDR CHANGED BY A RESET/
3372 040726   115   101   111  EM24:   .ASCIZ  /MAINT. MODE (SR0 <8>) NOT DISABLED BY A RESET/
3373 041004   104   101   124  EM25:   .ASCIZ  /DATA INCORRECT AFTER A MAINT. MODE WRITE/
3374 041055   123   117   125  EM26:   .ASCIZ  /SOURCE RELOCATED IN MAINT. MODE/
3375 041115   123   122   062  EM27:   .ASCIZ  /SR2 DID NOT LOCK UP CORRECT VIRTUAL ADDRESS/
3376 041171   106   117   114  EM30:   .ASCIZ  /FOLLOWING PAR-PDR WILL NOT ZERO/
3377 041231   123   125   115  EM31:   .ASCIZ  /SUMMARY OF DUAL ADDRESSING ERRORS/
3378 041273   123   125   115  EM32:   .ASCIZ  /SUMMARY OF COUNT PATTERN FAILURES/
3379 041335   105   122   122  EM33:   .ASCIZ  /ERROR IN BYTE ADDRESSING OF PAR-PDR/
3380 041401   124   110   105  EM34:   .ASCIZ  /THE FOLLOWING ARE DUAL ADDRESSING ERRORS FOR PAR'S-PDR'S/
3381 041472   124   110   105  EM36:   .ASCIZ  /THE FOLLOWING ARE COUNT PATTERN ERRORS FOR PAR'S-PDR'S/
3382 041561   111   114   114  EM40:   .ASCIZ  /ILLEGAL (MODE 10) STACK POINTER NOT MAPPED TO USER/
3383 041644   061   070   055  EM41:   .ASCIZ  /18-BIT MAPPING POSSIBLE HOLE IN MAIN MEMORY FROM/
3384 041725   106   101   125  EM42:   .ASCIZ  /FAULTY CARRY PROPAGATION 18-BIT MAPPING/
3385 041775   061   070   055  EM43:   .ASCIZ  /18-BIT MAPPING POSSIBLE HOLE AT TOP OF MEMORY/
3386 042053   116   117   040  EM44:   .ASCIZ  /NO TRAP THRU ERRVEC,AT 18-BIT ADDR. 760000/
3387 042126   104   111   104  EM45:   .ASCIZ  /DIDN'T GET WRAP AROUND TO ADDRESS ZERO/
3388 042175   116   117   040  EM46:   .ASCIZ  /NO TRAP THRU ERRVEC, ON NON-EXISTANT ADDR./
3389 042250   120   122   105  EM47:   .ASCIZ  /PREMATURE END OF MEMORY FOUND/
3390 042306   062   062   055  EM50:   .ASCIZ  /22-BIT MAPPING POSSIBLE HOLE IN MAIN MEMORY FROM/
3391 042367   102   101   104  EM51:   .ASCIZ  /BAD RELOCATION,CARRY PROPAGATION 22-BIT MAPPING/
3392 042447   062   062   055  EM52:   .ASCIZ  /22-BIT MAPPING POSSIBLE HOLE AT TOP OF MEMORY/
3393 042525   104   111   104  EM53:   .ASCIZ  /DID NOT GET UNIBUS ADDRESS/
3394 042560   127   055   102  EM54:   .ASCIZ  /W-BIT DID NOT GET SET IN PDR/
3395 042615   127   055   102  EM55:   .ASCIZ  /W-BIT SET IN MORE THAN ONE PDR/
3396 042654   127   055   102  EM56:   .ASCIZ  /W-BIT NOT CLEARED BY WRITING TO PDR/
3397 042720   127   055   102  EM57:   .ASCIZ  /W-BIT GOT SET DURING ODD ADDR. ABORT/
3398 042765   116   117   040  EM60:   .ASCIZ  /NO APT SPECIAL HARDWARE FOUND/
```

DATA HEADERS

```
3399                                        .SBTTL  DATA HEADERS
3400 043023  117  114  104  DH1:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  CPUERR  TESTNO  ERRORPC/
3401 043103  117  114  104  DH2:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  SR0     SR1     SR2     TESTNO  ERRORPC/
3402 043202  127  122  117  DH3:    .ASCIZ  /WROTE   READ    TESTNO  ERRORPC/
3403 043242  101  104  104  DH7:    .ASCIZ  /ADDRESS TESTNO  ERRORPC/
3404 043272  122  105  107  DH10:   .ASCII  /REGISTER-ADDRS  NUM  OF/<CRLF>
3405 043322  101  116  104          .ASCIZ  /AND-ED  OR-ED   TIMOUTS TESTNO  ERRORPC/
3406 043372  122  105  107  DH11:   .ASCII  /REGISTR READ    READ-(BINARY)/<CRLF>
3407 043430  101  104  104          .ASCIZ  /ADDRESS (OCTAL) 5432109876543210  TESTNO  ERRORPC/
3408 043512  122  105  107  DH12:   .ASCII  /REGISTR WROTE   READ    READ-(BINARY)/<CRLF>
3409 043560  101  104  104          .ASCIZ  /ADDRESS (OCTAL) (OCTAL) 5432109876543210  TESTNO  ERRORPC/
3410 043652  122  105  101  DH13:   .ASCIZ  /READ    TESTNO  ERRORPC/
3411 043702  105  130  120  DH14:   .ASCIZ  /EXPECTD (MMR1)  TESTNO  ERRORPC/
3412 043742  114  117  101  DH15:   .ASCIZ  /LOADED  (MMR3)  TESTNO  ERRORPC/
3413 044002  111  116  104  DH16:   .ASCII  /INDEX   INDEX   PAR-PDR/<CRLF>
3414 044032  105  130  120          .ASCIZ  /EXPECTD RECEIVD ADDRREAD TESTNO  ERRORPC/
3415 044103  126  111  122  DH17:   .ASCIZ  /VIR ADDR KIPAR4  GDDATA  BADDATA TESTNO  ERRORPC/
3416 044164  120  110  131  DH20:   .ASCII  /PHYSICL PAR 4   PAR 5/<CRLF>
3417 044212  101  104  104          .ASCIZ  /ADDRESS VBA     VBA     PAR 4   PAR 5   PSW     TESTNO  ERRORPC/
3418 044312  123  122  062  DH21:   .ASCIZ  /SR2 WAS EXPECTD TESTNO  ERRORPC/
3419 044352  120  110  131  DH22:   .ASCII  /PHYSICL PAR 4/<CRLF>
3420 044370  101  104  104          .ASCIZ  /ADDRESS V.B.A.  PAR 4   SR0 WAS SR2 WAS PSW     TESTNO  ERRORPC/
3421 044470  124  105  123  DH24:   .ASCIZ  /TESTNO  ERRORPC/
3422 044510  101  104  104  DH30:   .ASCIZ  /ADDRESS DATA    TESTNO  ERRORPC/
3423 044550  101  104  104  DH31:   .ASCII  /ADDROR  ADDRAND ADDROR  ADDRAND/<CRLF>
3424 044610  114  117  101          .ASCIZ  /LOADED  LOADED ENABLED ENABLED TESTNO  #ERRORS/
3425 044667  101  104  104  DH32:   .ASCIZ  /ADDROR  ADDRAND PATRNOR PATRNAD DATAOR  DATAAND TESTNO  #ERRORS/
3426 044767  101  104  104  DH33:   .ASCIZ  /ADDRESS EXPECTD RECEIVD TESTNO  ERRORPC/
3427 045037  101  104  104  DH34:   .ASCIZ  /ADDRESS ADDRESS/
3428 045057  101  104  104  DH36:   .ASCIZ  /ADDRESS DATARED PATTERN COUNT   TESTNO/
3429 045126  122  105  101  DH40:   .ASCII  /READOFF TESTNO  ERRORPC/<CRLF>
3430 045156  123  124  101          .ASCIZ  /STACK/
3431 045164  123  124  101  DH41:   .ASCIZ  /STARTBK FINISHBK TESTNO  ERRORPC/
3432 045225  120  101  124  DH42:   .ASCII  /PATTERN DATA    ADDRESS/<CRLF>
3433 045255  114  117  101          .ASCIZ  /LOADED  FETCHED INTENDED  TESTNO  ERRORPC/
3434 045327  123  124  101  DH43:   .ASCIZ  /STARTBK TESTNO  ERRORPC/
3435 045357  104  101  124  DH45:   .ASCIZ  /DATA    TESTNO  ERRORPC/
3436 045407  116  105  101  DH46:   .ASCIZ  /NEADDR TESTNO  ERRORPC/
3437 045436  113  111  120  DH47:   .ASCIZ  /KIPAR4    LASTBLOCK TESTNO  ERRORPC/
3438 045502  120  104  122  DH54:   .ASCII  /PDR     VIRTUAL/<CRLF>
3439 045522  124  105  123          .ASCIZ  /TESTED  ADDRESS TESTNO  ERRORPC/
3440 045562  120  104  122  DH55:   .ASCII  /PDR IN  PDR     VIRTUAL/<CRLF>
3441 045612  105  122  122          .ASCIZ  /ERROR   TESTED  ADDRESS TESTNO  ERRORPC/
3442 045662  120  104  122  DH56:   .ASCIZ  /PDR     TESTNO  ERRORPC/
3443 045712  120  104  122  DH57:   .ASCIZ  /PDR WAS EXPECTD TESTNO  ERRORPC/
3444 045752  105  122  122  DH60:   .ASCIZ  /ERRORPC/
3445                                        .EVEN
```

DATA TABLES

```
3446                                                    .SBTTL  DATA TABLES
3447 045762  001260  001262  001256  DT1:      .WORD   TRAPPC,TRAPPS,WASR6,CPUERR,TESTNO,$ERRPC,0
3448 046000  001260  001262  001256  DT2:      .WORD   TRAPPC,TRAPPS,WASR6,WASSR0,WASSR1,WASSR2,TESTNO,$ERRPC,0
3449 046022  001162  001164  001254  DT3:      .WORD   $REG0,$REG1,TESTNO,$ERRPC,0
3450 046034  001162  001254  001116  DT7:      .WORD   $REG0,TESTNO,$ERRPC,0
3451 046044  001320  001316  001274  DT10:     .WORD   ADRAND,ADDROR,TONUM,TESTNO,$ERRPC,0
3452 046060  001162  001164  001164  DT11:     .WORD   $REG0,$REG1,$REG1,TESTNO,$ERRPC,0
3453 046074  001162  001164  001166  DT12:     .WORD   $REG0,$REG1,$REG2,$REG2,TESTNO,$ERRPC,0
3454 046112  001170  001164  001254  DT14:     .WORD   $REG3,$REG1,TESTNO,$ERRPC,0
3455 046124  001166  001164  001254  DT15:     .WORD   $REG2,$REG1,TESTNO,$ERRPC,0
3456 046136  001162  001164  001166  DT16:     .WORD   $REG0,$REG1,$REG2,TESTNO,$ERRPC,0
3457 046152  001162  172350  001164  DT17:     .WORD   $REG0,KIPAR4,$REG1,$REG2,TESTNO,$ERRPC,0
3458 046170  001302  001276  001300  DT20:     .WORD   PBALO,VIRT1,VIRT2,$REG4,$REG5,$TMP0,TESTNO,$ERRPC,0
3459 046212  001270  001164  001254  DT21:     .WORD   WASSR2,$REG1,TESTNO,$ERRPC,0
3460 046224  001302  001276  001172  DT22:     .WORD   PBALO,VIRT1,$REG4,WASSR0,WASSR2,$TMP0,TESTNO,$ERRPC,0
3461 046246  001254  001116  000000  DT24:     .WORD   TESTNO,$ERRPC,0
3462 046254  001164  001166  001254  DT25:     .WORD   $REG1,$REG2,TESTNO,$ERRPC,0
3463 046266  001270  001172  001254  DT27:     .WORD   WASSR2,$REG4,TESTNO,$ERRPC,0
3464 046300  001162  001166  001254  DT30:     .WORD   $REG0,$REG2,TESTNO,ERRCNT,0
3465 046312  001316  001320  001306  DT31:     .WORD   ADDROR,ADRAND,DATAOR,DATAND,TESTNO,ERRCNT,0
3466 046330  001316  001320  001312  DT32:     .WORD   ADDROR,ADRAND,PATTOR,PATAND,DATAOR,DATAND,TESTNO,ERRCNT,0
3467 046352  001162  001166  001164  DT33:     .WORD   $REG0,$REG2,$REG1,TESTNO,$ERRPC,0
3468 046366  001162  001164  001254  DT35:     .WORD   $REG0,$REG1,TESTNO,0
3469 046376  001162  001166  001172  DT37:     .WORD   $REG0,$REG2,$REG4,$REG1,TESTNO,0
3470 046412  001200  001202  001254  DT41:     .WORD   $TMP1,$TMP2,TESTNO,$ERRPC,0
3471 046424  001166  001170  001162  DT42:     .WORD   $REG2,$REG3,$REG0,TESTNO,$ERRPC,0
3472 046440  001200  001254  001116  DT43:     .WORD   $TMP1,TESTNO,$ERRPC,0
3473 046450  001164  001254  001116  DT45:     .WORD   $REG1,TESTNO,$ERRPC,0
3474 046460  172350  003022  001254  DT47:     .WORD   KIPAR4,$LSTBK,TESTNO,$ERRPC,0
3475 046472  001174  001170  001254  DT54:     .WORD   $REG5,$REG3,TESTNO,$ERRPC,0
3476 046504  001162  001174  001170  DT55:     .WORD   $REG0,$REG5,$REG3,TESTNO,$ERRPC,0
3477 046520  001174  001254  001116  DT56:     .WORD   $REG5,TESTNO,$ERRPC,0
3478 046530  001116  000000          DT60:     .WORD   $ERRPC,0
```

```
3479                                                    .SBTTL  DATA FORMATS
3480 046534      000       000       000   DF1:        .BYTE   0,0,0,0,0
3481 046541      000       000       000   DF2:        .BYTE   0,0,0,0,0,0,0,0
3482 046551      000       000       000   DF3:        .BYTE   0,0,0,0
3483 046555      000       000       000   DF7:        .BYTE   0,0,0
3484 046560      000       000       001   DF10:       .BYTE   0,0,1,0,0
3485 046565      000       000       002   DF11:       .BYTE   0,0,2,0,0
3486 046572      000       000       000   DF12:       .BYTE   0,0,0,2,0,0
3487 046600      000       000       000   DF16:       .BYTE   0,0,0,0,0,0
3488 046606      003       000       000   DF20:       .BYTE   3,0,0,0,0,0,0,0
3489 046616      000       000             DF24:       .BYTE   0,0
3490 046620      000       000       000   DF32:       .BYTE   0,0,0,0,0,1
3491 046626      000       000       000   DF33:       .BYTE   0,0,0,0,0,0,0,1
3492 046636      004       000       000   DF43:       .BYTE   4,0,0
3493          000001                                    .END
```

SYMBOL TABLE

```
ABASE = 000000        BIT00 = 000001        DH14  043702        DT45  046450        ERRTYP  033626
ACDW1 = 000000        BIT01 = 000002        DH15  043742        DT47  046460        ERRVEC= 000004
ACDW2 = 000000        BIT02 = 000004        DH16  044002        DT54  046472        FORMPA  003426
ACPUOP= 000000        BIT03 = 000010        DH17  044103        DT55  046504        GTSWR = 104407
ADDROR  001316        BIT04 = 000020        DH2   043103        DT56  046520        HDWFLA  001340
ADDW0 = 000000        BIT05 = 000040        DH20  044164        DT60  046530        HOLFLG  001336
ADDW1 = 000000        BIT06 = 000100        DH21  044312        DT7   046034        HT    = 000011
ADDW10= 000000        BIT07 = 000200        DH22  044352        DUALAD  002334      IBSAVE  033624
ADDW11= 000000        BIT08 = 000400        DH24  044470        EMTVEC= 000030      IOTVEC= 000020
ADDW12= 000000        BIT09 = 001000        DH3   043202        EM1   037460        KDPAR0= 172360
ADDW13= 000000        BIT1  = 000002        DH30  044510        EM10  040055        KDPAR1= 172362
ADDW14= 000000        BIT10 = 002000        DH31  044550        EM11  040121        KDPAR2= 172364
ADDW15= 000000        BIT11 = 004000        DH32  044667        EM12  040161        KDPAR3= 172366
ADDW2 = 000000        BIT12 = 010000        DH33  044767        EM13  040230        KDPAR4= 172370
ADDW3 = 000000        BIT13 = 020000        DH34  045037        EM14  040265        KDPAR5= 172372
ADDW4 = 000000        BIT14 = 040000        DH36  045057        EM15  040321        KDPAR6= 172374
ADDW5 = 000000        BIT15 = 100000        DH40  045126        EM16  040360        KDPAR7= 172376
ADDW6 = 000000        BIT2  = 000004        DH41  045164        EM17  040427        KDPDR0= 172320
ADDW7 = 000000        BIT3  = 000010        DH42  045225        EM2   037520        KDPDR1= 172322
ADDW8 = 000000        BIT4  = 000020        DH43  045327        EM20  040505        KDPDR2= 172324
ADDW9 = 000000        BIT5  = 000040        DH45  045357        EM21  040557        KDPDR3= 172326
ADEVCT= 000000        BIT6  = 000100        DH46  045407        EM22  040612        KDPDR4= 172330
ADEVM = 000000        BIT7  = 000200        DH47  045436        EM23  040670        KDPDR5= 172332
ADRAND  001320        BIT8  = 000400        DH54  045502        EM24  040726        KDPDR6= 172334
AENV  = 000000        BIT9  = 001000        DH55  045562        EM25  041004        KDPDR7= 172336
AENVM = 000000        BPTVEC= 000014        DH56  045662        EM26  041055        KERSTK= 001100
AFATAL= 000000        CKSWR = 104410        DH57  045712        EM27  041115        KIPAR0= 172340
AMADR1= 000000        CLEANU  002276        DH60  045752        EM3   037567        KIPAR1= 172342
AMADR2= 000000        CLRREG  002260        DH7   043242        EM30  041171        KIPAR2= 172344
AMADR3= 000000        CMSG    035337        DISPLA  001142      EM31  041231        KIPAR3= 172346
AMADR4= 000000        CNTRLC  035260        DISPRE  000174      EM32  041273        KIPAR4= 172350
AMAMS1= 000000        CPSAVE  033244        DSWR  = 177570      EM33  041335        KIPAR5= 172352
AMAMS2= 000000        CPUERR= 177766        DT1   045762        EM34  041401        KIPAR6= 172354
AMAMS3= 000000        CPUEXP  001334        DT10  046044        EM36  041472        KIPAR7= 172356
AMAMS4= 000000        CR    = 000015        DT11  046060        EM4   037626        KIPDR0= 172300
AMSGAD= 000000        CRLF  = 000200        DT12  046074        EM40  041561        KIPDR1= 172302
AMSGLG= 000000        DATAND  001310        DT14  046112        EM41  041644        KIPDR2= 172304
AMSGTY= 000000        DATAOR  001306        DT15  046124        EM42  041725        KIPDR3= 172306
AMTYP1= 000000        DDISP = 177570        DT16  046136        EM43  041775        KIPDR4= 172310
AMTYP2= 000000        DF1   046534          DT17  046152        EM44  042053        KIPDR5= 172312
AMTYP3= 000000        DF10  046560          DT2   046000        EM45  042126        KIPDR6= 172314
AMTYP4= 000000        DF11  046565          DT20  046170        EM46  042175        KIPDR7= 172316
APASS = 000000        DF12  046572          DT21  046212        EM47  042250        KSP   =%000006
APRIOR= 000000        DF16  046600          DT22  046224        EM5   037661        LF    = 000012
APTCSU= 000040        DF2   046541          DT24  046246        EM50  042306        LOOP    020454
APTENV= 000001        DF20  046606          DT25  046254        EM51  042367        MGMERR  003330
APTSIZ= 000200        DF24  046616          DT27  046266        EM52  042447        MGMFLG  003332
APTSPO= 000100        DF3   046551          DT3   046022        EM53  042525        MMR0  = 177572
APTTST  027224        DF32  046620          DT30  046300        EM54  042560        MMR1  = 177574
ASWREG= 000000        DF33  046626          DT31  046312        EM55  042615        MMR2  = 177576
ATESTN= 000000        DF43  046636          DT32  046330        EM56  042654        MMR3  = 172516
AUNIT = 000000        DF7   046555          DT33  046352        EM57  042720        MMVEC = 000250
AUSWR = 000000        DH1   043023          DT35  046366        EM6   037734        OLDPC   001326
AVECT1= 000000        DH10  043272          DT37  046376        EM60  042765        OLDPS   001330
AVECT2= 000000        DH11  043372          DT41  046412        EM7   040017        PARCOU  002400
BADPC   001324        DH12  043512          DT42  046424        ERRCNT  001322      PARTAB  001356
BIT0  = 000001        DH13  043652          DT43  046440        ERROR = 104000      PATAND  001314
```

SYMBOL TABLE

```
PATRNS  027024          SIPAR7= 172256          TPVEC = 000064          UDPAR1= 177662          $CM4  = 000006
PATTOR  001312          SIPDR0= 172200          TRAPPC  001260          UDPAR2= 177664          $CNTLC  001350
PBAHI   001304          SIPDR1= 172202          TRAPPS  001262          UDPAR3= 177666          $CNTLG  035231
PBALO   001302          SIPDR2= 172204          TRAPVE= 000034          UDPAR4= 177670          $CNTLU  035224
PCPUER  001332          SIPDR3= 172206          TRTVEC= 000014          UDPAR5= 177672          $CORE   002676
PFECDF  034260          SIPDR4= 172210          TST1    020564          UDPAR6= 177674          $CPUOP  001252
PFECDH  034220          SIPDR5= 172212          TST10   021422          UDPAR7= 177676          $CRLF   001221
PFECDT  034250          SIPDR6= 172214          TST11   021440          UDPDR0= 177620          $CROUT  002726
PFECEM  034160          SIPDR7= 172216          TST12   021456          UDPDR1= 177622          $DBLK   036720
PFECWS  034150          SR0   = 177572          TST13   021474          UDPDR2= 177624          $DB20   037024
PIRQ  = 177772          SR1   = 177574          TST14   021512          UDPDR3= 177626          $DEVCT  001234
PIRQVE= 000240          SR2   = 177576          TST15   021654          UDPDR4= 177630          $DOAGN  032752
PR0   = 000000          SR3   = 172516          TST16   021714          UDPDR5= 177632          $DTBL   036710
PR1   = 000040          SSP   =%000006          TST17   022320          UDPDR6= 177634          $ENDAD  032742
PR2   = 000100          STACK = 001100          TST2    020642          UDPDR7= 177636          $ENDCT  032570
PR3   = 000140          START = 020000          TST20   022442          UIPAR0= 177640          $ENULL  033014
PR4   = 000200          STKLMT= 177774          TST21   022640          UIPAR1= 177642          $ENV    001244
PR5   = 000240          SUPSTK= 000700          TST22   023036          UIPAR2= 177644          $ENVM   001245
PR6   = 000300          SWR     001140          TST23   023234          UIPAR3= 177646          $EOP    032540
PR7   = 000340          SWREG   000176          TST24   023432          UIPAR4= 177650          $EOPCT  032562
PS    = 177776          SW0   = 000001          TST25   023630          UIPAR5= 177652          $ERFLG  001103
PSW   = 177776          SW00  = 000001          TST26   024026          UIPAR6= 177654          $ERMAX  001115
PWRMSG  037416          SW01  = 000002          TST27   024140          UIPAR7= 177656          $ERROR  033246
PWRVEC= 000024          SW02  = 000004          TST3    020726          UIPDR0= 177600          $ERRPC  001116
RDCHR = 104411          SW03  = 000010          TST30   024252          UIPDR1= 177602          $ERRTB  001372
RDLIN = 104412          SW04  = 000020          TST31   024364          UIPDR2= 177604          $ERTTL  001112
READON  001342          SW05  = 000040          TST32   024502          UIPDR3= 177606          $ESCAP  001212
RESREG= 104414          SW06  = 000100          TST33   024620          UIPDR4= 177610          $ETABL  001244
RESVEC= 000010          SW07  = 000200          TST34   024736          UIPDR5= 177612          $ETEND  001254
RMIREG= 177770          SW08  = 000400          TST35   025042          UIPDR6= 177614          $FATAL  001226
R6    =%000006          SW09  = 001000          TST36   025146          UIPDR7= 177616          $FFLG   036200
R7    =%000007          SW1   = 000002          TST37   025252          USESTK= 000600          $FILLC  001156
SAVREG= 104413          SW10  = 002000          TST4    021050          USP   =%000006          $FILLS  001155
SCOPE = 000004          SW11  = 004000          TST40   025356          VIRT1   001276          $GDADR  001120
SDPAR0= 172260          SW12  = 010000          TST41   025462          VIRT2   001300          $GDDAT  001124
SDPAR1= 172262          SW13  = 020000          TST42   025566          WASR6   001256          $GET42  032714
SDPAR2= 172264          SW14  = 040000          TST43   025662          WASSR0  001264          $GTSWR  034334
SDPAR3= 172266          SW15  = 100000          TST44   026210          WASSR1  001266          $HD   = 000000
SDPAR4= 172270          SW2   = 000004          TST45   026344          WASSR2  001270          $HIBTS  000204
SDPAR5= 172272          SW3   = 000010          TST46   026602          WBIT  = 000100          $ICNT   001104
SDPAR6= 172274          SW4   = 000020          TST47   027276          $APTHD  000204          $ILLUP  037410
SDPAR7= 172276          SW5   = 000040          TST5    021214          $ATYC   035760          $INTAG  001135
SDPDR0= 172220          SW6   = 000100          TST50   030136          $ATY1   035734          $ITEMB  001114
SDPDR1= 172222          SW7   = 000200          TST51   031020          $ATY3   035742          $KTNEX  002670
SDPDR2= 172224          SW8   = 000400          TST52   031634          $ATY4   035752          $KTOUT  002660
SDPDR3= 172226          SW9   = 001000          TST53   032030          $AUTOB  001134          $KT11   002512
SDPDR4= 172230          TBIT  = 000020          TST54   032236          $BDADR  001122          $LF     001222
SDPDR5= 172232          TBITPS  001272          TST55   032444          $BDDAT  001126          $LFLG   036177
SDPDR6= 172234          TBITVE= 000014          TST6    021366          $BELL   001214          $LOOP   033010
SDPDR7= 172236          TESTNO  001254          TST7    021404          $BIN    036254          $LPADR  001106
SIPAR0= 172240          TIMERR  003232          TYPBN = 104406          $CHARC  035730          $LPERR  001110
SIPAR1= 172242          TIMFLG  003234          TYPDS = 104405          $CKSWR  034264          $LSTAD  003020
SIPAR2= 172244          TIMTST  003024          TYPE  = 104401          $CLR.T  032732          $LSTBK  003022
SIPAR3= 172246          TKVEC = 000060          TYPOC = 104402          $CMTAG  001100          $MAIL   001224
SIPAR4= 172250          TOFF    002172          TYPON = 104404          $CM1  = 000006          $MBADR  000206
SIPAR5= 172252          TON     002226          TYPOS = 104403          $CM2  = 000014          $MFLG   036176
SIPAR6= 172254          TONUM   001274          UDPAR0= 177660          $CM3  = 000006          $MNEW   035247
```

SYMBOL TABLE

```
$MSGAD  001240          $QUES   001220          $SCOPE  033020          $TMP2   001202          $TYPDS  036504
$MSGLG  001242          $RDCHR  034606          $SETUP= 000137          $TMP3   001204          $TYPE   035370
$MSGTY  001224          $RDLIN  034736          $SIZE   002454          $TMP4   001206          $TYPEC  035602
$MSWR   035236          $RDSZ = 000010          $SIZEX  002732          $TMP5   001210          $TYPEX  035732
$MXCNT  001344          $REGAD  001160          $STUP = 177777          $TN   = 000056          $TYPOC  036302
$NULL   001154          $REG0   001162          $SVLAD  033174          $TPB    001152          $TYPON  036316
$NWTST= 000001          $REG1   001164          $SVPC = 000204          $TPFLG  001157          $TYPOS  036256
$OCNT   036500          $REG2   001166          $SWR  = 173400          $TPS    001150          $UNIT   001236
$OCTVL  037126          $REG3   001170          $SWREG  001246          $TRAP   037144          $UNITM  000214
$OMODE  036502          $REG4   001172          $SWRMK= 000000          $TRAP2  037166          $USWR   001250
$OVER   033230          $REG5   001174          $TBIT   001346          $TRP  = 000015          $XOFF = 000023
$PASS   001232          $RESRE  036766          $TESTN  001230          $TRPAD  037200          $XON  = 000021
$PASTM  000212          $RTNAD  033012          $TKB    001146          $TSTM   000210          $XTSTR  033032
$PWRAD  037372          $RTRN   033006          $TKS    001144          $TSTNM  001102          $$GET4= 000001
$PWRDN  037232          $SAVRE  036730          $TMP0   001176          $TTYIN  035214          $OFILL  036501
$PWRMG  037366          $SAVR6  037414          $TMP1   001200          $TYPBN  036202          .$X   = 000204
$PWRUP  037304

. ABS.  046641      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  59464 WORDS  ( 233 PAGES)
DYNAMIC MEMORY:  20034 WORDS  ( 77 PAGES)
ELAPSED TIME:  00:06:06
CKKTAB.BIN,CKKTAB/CR/-SP/NL:TOC-CKKTAB.MLB/ML,CKKTAB.P11
```

CKKTAB CREATED BY MACRO ON 23-APR-81 AT 13:35 PAGE 1
SEQUENCE 137
CREF V01

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES
ABASE	= 000000	16-1276
ACDW1	= 000000	16-1276
ACDW2	= 000000	16-1276
ACPUOP	- 000000	16-1276 16-1276
ADDROR	001316	#16-1276 *26-1637 *27-1655 *28-1677 *29-1701 *29-1720 *39-2009 *39-2029 102-3451 102-3465 102-3466
ADDW0	= 000000	16-1276
ADDW1	= 000000	16-1276
ADDW10	- 000000	16-1276
ADDW11	- 000000	16-1276
ADDW12	= 000000	16-1276
ADDW13	= 000000	16-1276
ADDW14	- 000000	16-1276
ADDW15	- 000000	16-1276
ADDW2	= 000000	16-1276
ADDW3	= 000000	16-1276
ADDW4	= 000000	16-1276
ADDW5	- 000000	16-1276
ADDW6	- 000000	16-1276
ADDW7	= 000000	16-1276
ADDW8	= 000000	16-1276
ADDW9	= 000000	16-1276
ADEVCT	- 000000	16-1276 16-1276
ADEVM	= 000000	16-1276
ADRAND	001320	#16-1276 *26-1641 27-1656 28-1678 *29-1700 *29-1722 *39-2008 *39-2031 102-3451 102-3465 102-3466
AENV	- 000000	16-1276 16-1276
AENVM	= 000000	16-1276 16-1276
AFATAL	= 000000	16-1276 16-1276
AMADR1	= 000000	16-1276
AMADR2	= 000000	16-1276
AMADR3	- 000000	16-1276
AMADR4	= 000000	16-1276
AMAMS1	= 000000	16-1276
AMAMS2	= 000000	16-1276
AMAMS3	= 000000	16-1276
AMAMS4	= 000000	16-1276
AMSGAD	= 000000	16-1276 16-1276
AMSGLG	= 000000	16-1276 16-1276
AMSGTY	= 000000	16-1276 16-1276
AMTYP1	= 000000	16-1276
AMTYP2	= 000000	16-1276
AMTYP3	= 000000	16-1276
AMTYP4	= 000000	16-1276
APASS	= 000000	16-1276 16-1276
APRIOR	= 000000	16-1276
APTCSU	= 000040	91-3333 #92-3335
APTENV	= 000001	86-3219 91-3333 92-3335 #92-3335
APTSIZ	= 000200	33-1838 #92-3335
APTSPO	= 000100	91-3333 92-3335 #92-3335
APTTST	027224	74-2714 74-2716 #75-2742
ASWREG	= 000000	16-1276 16-1276

SYMBOL CROSS REFERENCE
CREF VOL

SYMBOL		VALUE	REFERENCES								
ATESTN	=	000000	16-1276	16-1276							
AUNIT	=	000000	16-1276	16-1276							
AUSWR	=	000000	16-1276	16-1276							
AVECT1	=	000000	16-1276								
AVECT2	=	000000	16-1276								
BADPC		001324	#16-1276	*76-2887	*77-3024						
BIT0	=	000001	#15-1199								
BIT00	=	000001	#15-1199	15-1199	85-3217	85-3217	86-3219	86-3219			
BIT01	=	000002	#15-1199	15-1199							
BIT02	=	000004	#15-1199	15-1199							
BIT03	=	000010	#15-1199	15-1199							
BIT04	=	000020	#15-1199	15-1199							
BIT05	=	000040	#15-1199	15-1199							
BIT06	=	000100	#15-1199	15-1199							
BIT07	=	000200	#15-1199	15-1199							
BIT08	=	000400	#15-1199	15-1199	85-3217						
BIT09	=	001000	#15-1199	15-1199	85-3217	86-3219					
BIT1	=	000002	#15-1199								
BIT10	=	002000	#15-1199	86-3219							
BIT11	=	004000	#15-1199								
BIT12	=	010000	#15-1199	84-3215							
BIT13	=	020000	#15-1199	48-2193	86-3219						
BIT14	=	040000	#15-1199	48-2209	85-3217						
BIT15	=	100000	#15-1199	46-2134	48-2195						
BIT2	=	000004	#15-1199								
BIT3	=	000010	#15-1199								
BIT4	=	000020	#15-1199	15-1210	77-2911	77-2961					
BIT5	=	000040	#15-1199								
BIT6	=	000100	#15-1199	15-1211							
BIT7	=	000200	#15-1199	33-1853	75-2745						
BIT8	=	000400	#15-1199	71-2588	71-2590	72-2628	72-2645	74-2703	76-2799	77-2939	
BIT9	=	001000	#15-1199								
BPTVEC	=	000014	#15-1199								
CKSWR	=	104410	85-3217	86-3219	86-3219	#98-3347					
CLEANU		002276	#26-1635	51-2333	52-2338	53-2343	54-2348	55-2353	56-2358	57-2375	58-2380
			59-2385	60-2390	61-2395	62-2400					
CLRREG		002260	#25-1622	51-2333	51-2333	52-2338	52-2338	53-2343	53-2343	54-2348	54-2348
			55-2353	55-2353	56-2358	56-2358					
CMSG		035337	90-3320	#90-3331							
CNTRLC		035260	89-3315	89-3315	#90-3318						
CPSAVE		033244	*85-3217	85-3217	#85-3217	*86-3219	86-3219	88-3313			
CPUERR	=	177766	#15-1215	*28-1689	30-1750	*30-1757	*33-1852	*33-1855	76-2871	*76-2891	77-3008
			*77-3028	102-3447							
CPUEXP		001334	#16-1276	30-1752	30-1754	*76-2831	*76-2846	*76-2856	*76-2865	*77-2967	*77-2982
			*77-2992	*77-3001							
CR	=	000015	#15-1199	91-3333	91-3333						
CRLF	=	000200	#15-1199	33-1839	33-1839	91-3333	91-3333	101-3404	101-3406	101-3408	101-3413
			101-3416	101-3419	101-3423	101-3429	101-3432	101-3438	101-3440		
DATAND		001310	#16-1276	*26-1640	27-1658	28-1682	102-3465	102-3466			
DATAOR		001306	#16-1276	*26-1636	*27-1657	*28-1681	102-3465	102-3466			
DDISP	-	177570	#15-1199	16-1276	33-1838						
DF1		046534	17-1282	18-1363	20-1456	22-1556	22-1574	#103-3480			

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
DF10	046560	18-1324	#103-3484							
DF11	046565	18-1331	19-1395	#103-3485						
DF12	046572	18-1338	#103-3486							
DF16	046600	#103-3487								
DF2	046541	17-1288	18-1369	19-1413	20-1481	20-1488	21-1517	21-1523	21-1530	21-1536
		21-1543	#103-3481							
DF20	046606	18-1376	19-1388	#103-3488						
DF24	046616	19-1401	21-1499	#103-3489						
DF3	046551	17-1294	17-1300	17-1306	17-1312	18-1350	18-1356	19-1381	19-1407	19-1419
		19-1425	19-1432	22-1549	22-1568	#103-3482				
DF32	046620	20-1437	#103-3490							
DF33	046626	20-1443	#103-3491							
DF43	046636	21-1493	#103-3492							
DF7	046555	18-1317	18-1344	20-1468	20-1475	21-1505	21-1511	22-1562	#103-3483	
DH1	043023	17-1280	#101-3400							
DH10	043272	18-1321	#101-3404							
DH11	043372	18-1328	19-1392	#101-3406						
DH12	043512	18-1335	#101-3408							
DH13	043652	18-1342	#101-3410							
DH14	043702	18-1348	#101-3411							
DH15	043742	18-1354	#101-3412							
DH16	044002	18-1360	#101-3413							
DH17	044103	18-1367	#101-3415							
DH2	043103	17-1286	19-1411	#101-3401						
DH20	044164	18-1373	#101-3416							
DH21	044312	19-1379	19-1417	#101-3418						
DH22	044352	19-1385	#101-3419							
DH24	044470	19-1399	21-1497	#101-3421						
DH3	043202	17-1292	17-1298	17-1304	17-1310	19-1405	#101-3402			
DH30	044510	19-1423	#101-3422							
DH31	044550	19-1429	#101-3423							
DH32	044667	20-1435	#101-3425							
DH33	044767	20-1441	#101-3426							
DH34	045037	20-1447	#101-3427							
DH36	045057	20-1460	#101-3428							
DH40	045126	20-1472	#101-3429							
DH41	045164	20-1479	21-1521	#101-3431						
DH42	045225	20-1485	21-1527	21-1540	#101-3432					
DH43	045327	21-1491	21-1534	#101-3434						
DH45	045357	21-1503	#101-3435							
DH46	045407	21-1509	#101-3436							
DH47	045436	21-1515	#101-3437							
DH54	045502	22-1546	#101-3438							
DH55	045562	22-1553	#101-3440							
DH56	045662	22-1560	#101-3442							
DH57	045712	22-1566	#101-3443							
DH60	045752	22-1572	#101-3444							
DH7	043242	18-1315	#101-3403							
DISPLA	001142	#16-1276	*33-1838	*33-1838	85-3217	86-3219				
DISPRE	000174	#15-1273	33-1838							
DSWR =	177570	#15-1199	16-1276	33-1838						
DT1	045762	17-1281	#102-3447							

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES						
DT1C	046044	18-1323	#102-3451					
DT11	046060	18-1330	19-1394	#102-3452				
DT12	046074	18-1337	#102-3453					
DT14	046112	18-1349	#102-3454					
DT15	046124	18-1355	22-1567	#102-3455				
DT16	046136	18-1362	#102-3456					
DT17	046152	18-1368	#102-3457					
DT2	046000	17-1287	19-1412	#102-3448				
DT20	046170	18-1375	#102-3458					
DT21	046212	19-1380	#102-3459					
DT22	046224	19-1387	#102-3460					
DT24	046246	19-1400	21-1498	#102-3461				
DT25	046254	19-1406	#102-3462					
DT27	046266	19-1418	#102-3463					
DT3	046022	17-1293	17-1299	17-1305	17-1311	#102-3449		
DT30	046300	19-1424	#102-3464					
DT31	046312	19-1431	#102-3465					
DT32	046330	20-1436	#102-3466					
DT33	046352	20-1442	#102-3467					
DT35	046366	20-1455	#102-3468					
DT37	046376	20-1467	#102-3469					
DT41	046412	20-1480	21-1522	#102-3470				
DT42	046424	20-1487	21-1529	21-1542	#102-3471			
DT43	046440	21-1492	21-1535	#102-3472				
DT45	046450	21-1504	#102-3473					
DT47	046460	21-1516	#102-3474					
DT54	046472	22-1548	#102-3475					
DT55	046504	22-1555	#102-3476					
DT56	046520	22-1561	#102-3477					
DT60	046530	22-1573	#102-3478					
DT7	046034	18-1316	18-1343	20-1474	21-1510	#102-3450		
DUALAD	002334	#27-1653	51-2333	52-2338	53-2343	54-2348	55-2353	56-2358
EMTVEC =	000030	#15-1199	*33-1838	*33-1838				
EM1	037460	17-1279	#100-3353					
EM10	040055	18-1320	#100-3360					
EM11	040121	18-1327	#100-3361					
EM12	040161	18-1334	#100-3362					
EM13	040230	18-1341	#100-3363					
EM14	040265	18-1347	#100-3364					
EM15	040321	18-1353	#100-3365					
EM16	040360	18-1359	#100-3366					
EM17	040427	18-1366	#100-3367					
EM2	037520	17-1285	#100-3354					
EM20	040505	18-1372	#100-3368					
EM21	040557	19-1378	#100-3369					
EM22	040612	19-1384	#100-3370					
EM23	040670	19-1391	#100-3371					
EM24	040726	19-1398	#100-3372					
EM25	041004	19-1404	#100-3373					
EM26	041055	19-1410	#100-3374					
EM27	041115	19-1416	#100-3375					
EM3	037567	17-1291	#100-3355					

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES							
EM30	041171	19-1422	#100-3376						
EM31	041231	19-1428	#100-3377						
EM32	041273	20-1434	#100-3378						
EM33	041335	20-1440	#100-3379						
EM34	041401	20-1446	#100-3380						
EM36	041472	20-1459	#100-3381						
EM4	037626	17-1297	#100-3356						
EM40	041561	20-1471	#100-3382						
EM41	041644	20-1478	#100-3383						
EM42	041725	20-1484	#100-3384						
EM43	041775	21-1490	#100-3385						
EM44	042053	21-1496	#100-3386						
EM45	042126	21-1502	#100-3387						
EM46	042175	21-1508	#100-3388						
EM47	042250	21-1514	#100-3389						
EM5	037661	17-1303	#100-3357						
EM50	042306	21-1520	#100-3390						
EM51	042367	21-1526	#100-3391						
EM52	042447	21-1533	#100-3392						
EM53	042525	21-1539	#100-3393						
EM54	042560	22-1545	#100-3394						
EM55	042615	22-1552	#100-3395						
EM56	042654	22-1559	#100-3396						
EM57	042720	22-1565	#100-3397						
EM6	037734	17-1309	#100-3358						
EM60	042765	22-1571	#100-3398						
EM7	040017	18-1314	#100-3359						
ERRCNT	001322	#16-1276	51-2333	51-2333	52-2338	52-2338	53-2343	53-2343	54-2348	54-2348
		55-2353	55-2353	56-2358	56-2358	57-2375	57-2375	58-2380	58-2380	59-2385
		59-2385	60-2390	60-2390	61-2395	61-2395	62-2400	62-2400	102-3464	102-3465
		102-3466								
ERROR =	104000	#15-1199	27-1661	27-1663	28-1685	28-1687	30-1756	31-1786	35-1875	36-1898
		37-1924	37-1937	38-1966	38-1980	39-2020	39-2024	40-2042	40-2046	41-2053
		41-2057	42-2064	42-2068	43-2075	43-2079	44-2086	44-2090	45-2097	45-2101
		46-2120	46-2129	46-2141	46-2150	47-2173	48-2201	48-2206	48-2215	48-2225
		48-2236	48-2249	48-2261	48-2274	49-2292	49-2299	49-2308	49-2313	51-2333
		51-2333	52-2338	52-2338	53-2343	53-2343	54-2348	54-2348	55-2353	55-2353
		56-2358	56-2358	57-2375	58-2380	59-2385	60-2390	61-2395	62-2400	63-2412
		63-2412	64-2417	64-2417	65-2422	65-2422	66-2427	66-2427	67-2432	67-2432
		68-2437	68-2437	69-2466	70-2503	70-2514	70-2525	70-2536	70-2547	70-2558
		71-2593	72-2634	72-2652	74-2709	75-2751	76-2794	76-2804	76-2813	76-2838
		76-2852	76-2864	76-2878	76-2888	77-2934	77-2944	77-2955	77-2974	77-2988
		77-3000	77-3015	77-3025	78-3096	78-3156	80-3172	80-3172	80-3172	81-3178
		81-3178	81-3178	82-3185	82-3185	82-3185	83-3208			
ERRTYP	033626	86-3219	#88-3221							
ERRVEC =	000004	#15-1199	28-1689	28-1689	*28-1689	*28-1689	*28-1689	*28-1689	*28-1689	*28-1689
		*28-1689	*28-1689	33-1838	*33-1838	*33-1838	*33-1842	*33-1843	*75-2747	*76-2776
		*76-2827	*77-2916	*77-2962	*83-3202	*83-3212	85-3217	*85-3217	*85-3217	*85-3217
FORMPA	003426	#32-1808	78-3095	78-3152						
GNS =	******	15-1273	15-1273	33-1839	84-3215	84-3215	98-3347	98-3347	98-3347	98-3347
		98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347
		98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
		98-3347	98-3347							
GTSWR	= 104407	33-1839	90-3327	#98-3347						
HDWFLA	001340	#16-1276	*75-2742	*75-2753	76-2771	76-2783	76-2824	77-2912	77-2922	
HOLFLG	001336	#16-1276	*76-2775	76-2790	*76-2795	76-2811	76-2882	*76-2885	*76-2890	*77-2917
		77-2930	*77-2935	77-2953	77-3019	*77-3022	*77-3027			
HT	= 000011	#15-1199	91-3333	91-3333						
IBSAVE	033624	*86-3219	86-3219	*86-3219	*86-3219	86-3219	86-3219	86-3219	86-3219	#86-3219
IOTVEC	= 000020	#15-1199	*33-1838	*33-1838						
KDPAR0	= 172360	#15-1200								
KDPAR1	= 172362	#15-1200								
KDPAR2	= 172364	#15-1200								
KDPAR3	= 172366	#15-1200								
KDPAR4	= 172370	#15-1200								
KDPAR5	= 172372	#15-1200								
KDPAR6	= 172374	#15-1200								
KDPAR7	= 172376	#15-1200	51-2333	51-2333	57-2375	59-2385				
KDPDR0	= 172320	#15-1200								
KDPDR1	= 172322	#15-1200								
KDPDR2	= 172324	#15-1200								
KDPDR3	= 172326	#15-1200								
KDPDR4	= 172330	#15-1200								
KDPDR5	= 172332	#15-1200								
KDPDR6	= 172334	#15-1200								
KDPDR7	= 172336	#15-1200	54-2348	54-2348	60-2390					
KERSTK	= 001100	#15-1212	38-1956	38-1962	38-1964	71-2597	83-3204			
KIPAR0	= 172340	#15-1200	28-1689	32-1808	40-2041	51-2333	51-2333	51-2333	51-2333	51-2333
		57-2375	59-2385	63-2412	*63-2412	63-2412	63-2412	63-2412	70-2481	70-2509
KIPAR1	= 172342	#15-1200	*74-2690							
KIPAR2	= 172344	#15-1200	*74-2691							
KIPAR3	= 172346	#15-1200	*72-2619	*74-2692	80-3172					
KIPAR4	= 172350	#15-1200	*72-2620	*74-2699	*76-2777	*76-2806	*76-2829	*76-2847	*76-2858	*76-2859
		76-2874	*77-2918	*77-2946	77-2949	*77-2963	*77-2983	*77-2994	*77-2995	77-3011
		*78-3056	*78-3115	*78-3136	102-3457	102-3474				
KIPAR5	= 172352	#15-1200	*76-2778	76-2785	76-2792	*76-2807	76-2809	76-2884	*77-2919	77-2924
		77-2932	*77-2947	77-2951	*77-2964	77-3021	*78-3057	*78-3116	*78-3137	
KIPAR6	= 172354	#15-1200								
KIPAR7	= 172356	#15-1200	28-1689	*72-2621	*74-2693					
KIPDR0	= 172300	#15-1200	41-2052	54-2348	54-2348	54-2348	54-2348	54-2348	60-2390	66-2427
		*66-2427	66-2427	66-2427	66-2427	70-2480	70-2498	71-2578	*71-2586	74-2687
		80-3172	80-3172	80-3172						
KIPDR1	= 172302	#15-1200								
KIPDR2	= 172304	#15-1200								
KIPDR3	= 172306	#15-1200	*72-2622	*72-2640	*83-3201	83-3205				
KIPDR4	= 172310	#15-1200	*72-2623	*78-3113	*78-3132					
KIPDR5	= 172312	#15-1200	*78-3114	*78-3133						
KIPDR6	= 172314	#15-1200								
KIPDR7	= 172316	#15-1200	*72-2624							
KSP	=%000006	#15-1207	*25-1622	*25-1626	*27-1654	*28-1676	*29-1713	*30-1748	*30-1749	30-1751
		*30-1759	*30-1760	*31-1779	*31-1780	31-1781	*31-1788	*31-1789	*33-1841	*38-1956
		38-1962	38-1965	*38-1972	*39-2023	*71-2597	*76-2869	*76-2870	*76-2892	*76-2893
		*77-3006	*77-3007	*77-3029	*77-3030	*78-3146	*78-3147	*78-3161	*78-3162	*83-3204
		*88-3222	*88-3251	*88-3276	88-3278	*88-3279	*88-3283	*88-3284	*88-3290	88-3292

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
		*88-3293	*88-3296	*88-3297	*88-3303	*88-3304				
LF	= 000012	#15-1199	91-3333	91-3333						
LOOP	020454	#33-1840	84-3215							
MGMERR	003330	28-1689	#31-1771	33-1844	71-2599	72-2639	78-3142			
MGMFLG	003332	#31-1772	*31-1787	*33-1848						
MMR0	= 177572	#15-1203	*33-1850	*38-1954	*48-2195	48-2208	*48-2216	48-2218	48-2228	48-2239
		48-2254	48-2267	*48-2277	*74-2703	*74-2706	*76-2770			
MMR1	= 177574	#15-1204	48-2192							
MMR2	= 177576	#15-1205								
MMR3	= 172516	#15-1206	*33-1851	49-2287	*77-2911	*77-2961	*77-3003			
MMVEC	= 000250	#15-1200	*28-1689	*28-1689	*33-1844	*33-1845	71-2582	*71-2582	*71-2583	*71-2599
		*71-2600	*72-2625	*72-2639	*78-3085	*78-3142				
OLDPC	001326	#16-1276	*27-1654	27-1664	*28-1676	28-1688	*76-2869	*76-2876	76-2887	*76-2889
		76-2893	*77-3006	*77-3013	77-3024	*77-3026	77-3030			
OLDPS	001330	#16-1276	*76-2870	76-2892	*77-3007	77-3029				
PARCOU	002400	#28-1675	57-2375	58-2380	59-2385	60-2390	61-2395	62-2400		
PARTAB	001356	#16-1276	69-2456	69-2462	69-2465					
PATAND	001314	#16-1276	*26-1642	28-1680	102-3466					
PATRNS	027024	74-2696	#75-2719							
PATTOR	001312	#16-1276	*26-1638	*28-1679	102-3466					
PBAHI	001304	#16-1276	*32-1831							
PBALO	001302	#16-1276	*32-1822	*32-1823	*32-1828	102-3458	102-3460			
PCPUER	001332	#16-1276	*30-1750	30-1754	*76-2782	76-2788	*76-2832	76-2836	*76-2857	76-2861
		*76-2871	76-2872	76-2880	*77-2926	77-2928	*77-2993	77-2997	*77-3008	77-3009
		77-3017								
PFECDF	034260	88-3309	#88-3314							
PFECDH	034220	88-3309	#88-3311							
PFECDT	034250	88-3309	#88-3313							
PFECEM	034160	88-3309	#88-3310							
PFECWS	034150	88-3233	#88-3309							
PIRQ	= 177772	#15-1199								
PIRQVE	= 000240	#15-1199								
PR0	= 000000	#15-1199								
PR1	= 000040	#15-1199								
PR2	= 000100	#15-1199								
PR3	= 000140	#15-1199								
PR4	= 000200	#15-1199								
PR5	= 000240	#15-1199								
PR6	= 000300	#15-1199								
PR7	= 000340	#15-1199								
PS	= 177776	#15-1199	15-1199							
PSW	= 177776	#15-1199	23-1586	23-1588	32-1809	32-1813	*35-1870	35-1871	*36-1891	*36-1892
		36-1893	*36-1897	*36-1905	*37-1915	*37-1917	37-1918	*37-1923	*37-1929	*37-1931
		37-1932	*37-1936	*38-1955	*38-1957	*38-1959	*38-1961	*38-1971	*38-1973	*38-1975
		*38-1977	*38-1981	*39-2003	*47-2168	*47-2170	*47-2178	*48-2252	*48-2265	*48-2276
		*78-3053	78-3086	78-3107	*78-3117	78-3119	*78-3129	*78-3131	*81-3177	*81-3179
		*82-3184	*82-3186							
PWRMSG	037416	99-3349	#99-3350							
PWRVEC	= 000024	#15-1199	*33-1838	*33-1838	*99-3349	*99-3349	*99-3349	*99-3349	*99-3349	*99-3349
RDCHR	= 104411	89-3315	#98-3347							
RDLIN	= 104412	#98-3347								
READON	001342	#16-1276	48-2229	48-2241						

SYMBOL	CROSS REFERENCE VALUE	REFERENCES							
RESREG	= 104414	97-3345	#98-3347						
RESVEC	= 000010	#15-1199	*33-1838	33-1838	*33-1838				
RMIREG	= 177770	#15-1216	75-2748	*76-2800	*76-2826	*77-2940			
R6	=%000006	#15-1199	*33-1838	*33-1838	33-1838				
R7	=%000007	#15-1199							
SAVREG	= 104413	97-3345	#98-3347						
SCOPE	= 000004	#15-1199	35-1866	36-1888	37-1913	38-1953	39-2002	40-2039	41-2050	42-2061
		43-2072	44-2083	45-2094	46-2114	47-2167	48-2191	49-2286	51-2332	52-2337
		53-2342	54-2347	55-2352	56-2357	57-2374	58-2379	59-2384	60-2389	61-2394
		62-2399	63-2411	64-2416	65-2421	66-2426	67-2431	68-2436	69-2451	70-2478
		71-2576	72-2616	74-2674	76-2768	77-2908	78-3052	80-3171	81-3176	82-3183
		83-3197	84-3215							
SDPAR0	= 172260	#15-1200								
SDPAR1	= 172262	#15-1200								
SDPAR2	= 172264	#15-1200								
SDPAR3	= 172266	#15-1200								
SDPAR4	= 172270	#15-1200								
SDPAR5	= 172272	#15-1200								
SDPAR6	= 172274	#15-1200								
SDPAR7	= 172276	#15-1200	52-2338	52-2338	58-2380					
SDPDR0	= 172220	#15-1200								
SDPDR1	= 172222	#15-1200								
SDPDR2	= 172224	#15-1200								
SDPDR3	= 172226	#15-1200								
SDPDR4	= 172230	#15-1200								
SDPDR5	= 172232	#15-1200								
SDPDR6	= 172234	#15-1200								
SDPDR7	= 172236	#15-1200	55-2353	55-2353	61-2395					
SIPAR0	= 172240	#15-1200	32-1815	42-2063	52-2338	52-2338	52-2338	52-2338	52-2338	58-2380
		64-2417	*64-2417	64-2417	64-2417	64-2417	70-2487	70-2531	78-3059	
SIPAR1	= 172242	#15-1200								
SIPAR2	= 172244	#15-1200								
SIPAR3	= 172246	#15-1200	81-3178							
SIPAR4	= 172250	#15-1200	*78-3081	*78-3121	*78-3140					
SIPAR5	= 172252	#15-1200	*78-3082	*78-3122	*78-3141					
SIPAR6	= 172254	#15-1200								
SIPAR7	= 172256	#15-1200								
SIPDR0	= 172200	#15-1200	43-2074	55-2353	55-2353	55-2353	55-2353	55-2353	61-2395	67-2432
		*67-2432	67-2432	67-2432	67-2432	70-2486	70-2520	74-2678	78-3069	81-3178
		81-3178	81-3178							
SIPDR1	= 172202	#15-1200								
SIPDR2	= 172204	#15-1200								
SIPDR3	= 172206	#15-1200								
SIPDR4	= 172210	#15-1200	*78-3077	*78-3123						
SIPDR5	= 172212	#15-1200	*78-3078	*78-3124						
SIPDR6	= 172214	#15-1200								
SIPDR7	= 172216	#15-1200								
SR0	= 177572	#15-1200	15-1203	28-1689	*28-1689	*28-1689	31-1782	*31-1785	39-2006	46-2115
		*47-2169	47-2171	*47-2177	*71-2588	71-2590	*71-2592	*71-2598	*72-2628	*72-2645
		72-2646	*72-2651	*78-3083	78-3153	*78-3155				
SR1	= 177574	#15-1200	15-1204	31-1783						
SR2	= 177576	#15-1200	15-1205	31-1784	46-2125	46-2146	72-2647	78-3154		

SYMBOL CROSS REFERENCE

SYMBOL		VALUE	REFERENCES								
SR3	=	172516	#15-1200	15-1206	*28-1689	39-2015	39-2033				
SSP	=	%000006	#15-1208	*38-1958	*38-1974	48-2253	*48-2254	*48-2255	*48-2262		
STACK	=	001100	#15-1199	15-1212	15-1213	15-1214	33-1838	33-1841			
START		020000	15-1273	#33-1838	99-3349						
STKLMT	=	177774	#15-1199								
SUPSTK	=	000700	#15-1213	38-1958							
SWR		001140	#16-1276	33-1838	*33-1838	33-1838	*33-1838	*33-1838	33-1839	84-3215	85-3217
			85-3217	85-3217	85-3217	86-3219	86-3219	86-3219	86-3219	89-3315	89-3315
			99-3349	99-3349							
SWREG		000176	#15-1273	33-1838	33-1839	89-3315	89-3315				
SW0	=	000001	#15-1199								
SW00	=	000001	#15-1199	15-1199							
SW01	=	000002	#15-1199	15-1199							
SW02	=	000004	#15-1199	15-1199							
SW03	=	000010	#15-1199	15-1199							
SW04	=	000020	#15-1199	15-1199							
SW05	=	000040	#15-1199	15-1199							
SW06	=	000100	#15-1199	15-1199							
SW07	=	000200	#15-1199	15-1199							
SW08	=	000400	#15-1199	15-1199							
SW09	=	001000	#15-1199	15-1199							
SW1	=	000002	#15-1199								
SW10	=	002000	#15-1199								
SW11	=	004000	#15-1199								
SW12	=	010000	#15-1199								
SW13	=	020000	#15-1199								
SW14	=	040000	#15-1199								
SW15	=	100000	#15-1199								
SW2	=	000004	#15-1199								
SW3	=	000010	#15-1199								
SW4	=	000020	#15-1199								
SW5	=	000040	#15-1199								
SW6	=	000100	#15-1199								
SW7	=	000200	#15-1199								
SW8	=	000400	#15-1199								
SW9	=	001000	#15-1199								
TBIT	=	000020	#15-1210	23-1586	23-1591	24-1603					
TBITPS		001272	#16-1276	*23-1589	24-1603	24-1605	*24-1606	*33-1849			
TBITVE	=	000014	#15-1199	*33-1838	*33-1838						
TESTNO		001254	#16-1276	*86-3219	102-3447	102-3448	102-3449	102-3450	102-3451	102-3452	102-3453
			102-3454	102-3455	102-3456	102-3457	102-3458	102-3459	102-3460	102-3461	102-3462
			102-3463	102-3464	102-3465	102-3466	102-3467	102-3468	102-3469	102-3470	102-3471
			102-3472	102-3473	102-3474	102-3475	102-3476	102-3477			
TIMERR		003232	29-1726	#30-1740	33-1842	39-2021	76-2827	77-2962	83-3212		
TIMFLG		003234	#30-1741	*30-1758	*33-1847						
TIMTST		003024	#29-1691	29-1706	40-2040	41-2051	42-2062	43-2073	44-2084	45-2095	
TKVEC	=	000060	#15-1199								
TOFF		002172	#23-1586	71-2577	72-2617	80-3172	81-3178	82-3185	83-3198		
TON		002226	#24-1603	71-2602	72-2642	80-3172	81-3178	82-3185	83-3214		
TONUM		001274	#16-1276	*29-1702	29-1707	*29-1723	*39-2010	39-2018	*39-2032	102-3451	
TPVEC	=	000064	#15-1199								
TRAPPC		001260	#16-1276	*30-1748	30-1760	*31-1779	31-1789	*72-2649	72-2657	*78-3146	78-3162

SYMBOL CROSS REFERENCE

SYMBOL		VALUE	REFERENCES							
			102-3447	102-3448						
TRAPPS		001262	#16-1276	*30-1749	30-1759	*31-1780	31-1788	*72-2650	72-2656	*78-3147	78-3161
			102-3447	102-3448						
TRAPVE	=	000034	#15-1199	*33-1838	*33-1838					
TRTVEC	=	000014	#15-1199							
TST1		020564	#35-1866							
TST10		021422	#42-2061							
TST11		021440	#43-2072							
TST12		021456	#44-2083							
TST13		021474	#45-2094							
TST14		021512	#46-2114							
TST15		021654	#47-2167							
TST16		021714	#48-2191							
TST17		022320	#49-2286							
TST2		020642	#36-1888							
TST20		022442	#51-2332							
TST21		022640	51-2333	#52-2337						
TST22		023036	52-2338	#53-2342						
TST23		023234	53-2343	#54-2347						
TST24		023432	54-2348	#55-2352						
TST25		023630	55-2353	#56-2357						
TST26		024026	56-2358	#57-2374						
TST27		024140	57-2375	#58-2379						
TST3		020726	#37-1913							
TST30		024252	58-2380	#59-2384						
TST31		024364	59-2385	#60-2389						
TST32		024502	60-2390	#61-2394						
TST33		024620	61-2395	#62-2399						
TST34		024736	62-2400	#63-2411						
TST35		025042	#64-2416							
TST36		025146	#65-2421							
TST37		025252	#66-2426							
TST4		021050	#38-1953							
TST40		025356	#67-2431							
TST41		025462	#68-2436							
TST42		025566	#69-2451							
TST43		025662	#70-2478							
TST44		026210	#71-2576							
TST45		026344	#72-2616							
TST46		026602	72-2643	#74-2674						
TST47		027276	75-2744	75-2746	75-2752	#76-2768				
TST5		021214	#39-2002							
TST50		030136	76-2867	#77-2908						
TST51		031020	77-3004	#78-3052						
TST52		031634	78-3144	#80-3171						
TST53		032030	#81-3176							
TST54		032236	#82-3183							
TST55		032444	#83-3197							
TST6		021366	39-2022	#40-2039						
TST7		021404	#41-2050							
TYPBN	=	104406	88-3271	#98-3347						
TYPDS	=	104405	84-3215	84-3215	88-3265	90-3326	#98-3347			

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
TYPE	= 104401	33-1839	84-3215	84-3215	84-3215	86-3219	86-3219	88-3221	88-3243	88-3245
		88-3248	88-3250	88-3280	88-3294	88-3300	88-3305	89-3315	89-3315	89-3315
		89-3315	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315
		89-3315	89-3315	89-3315	89-3315	89-3315	90-3320	90-3324	91-3333	93-3337
		94-3339	95-3341	#98-3347	99-3349					
TYPOC	= 104402	88-3229	88-3259	89-3315	90-3323	#98-3347				
TYPON	= 104404	#98-3347								
TYPOS	= 104403	#98-3347								
UDPAR0	= 177660	#15-1200								
UDPAR1	= 177662	#15-1200								
UDPAR2	= 177664	#15-1200								
UDPAR3	= 177666	#15-1200								
UDPAR4	= 177670	#15-1200								
UDPAR5	= 177672	#15-1200								
UDPAR6	= 177674	#15-1200								
UDPAR7	= 177676	#15-1200	53-2343	53-2343						
UDPDR0	= 177620	#15-1200								
UDPDR1	= 177622	#15-1200								
UDPDR2	= 177624	#15-1200								
UDPDR3	= 177626	#15-1200								
UDPDR4	= 177630	#15-1200								
UDPDR5	= 177632	#15-1200								
UDPDR6	= 177634	#15-1200								
UDPDR7	= 177636	#15-1200	56-2358	56-2358	62-2400					
UIPAR0	= 177640	#15-1200	32-1811	44-2085	53-2343	53-2343	53-2343	53-2343	53-2343	65-2422
		*65-2422	65-2422	65-2422	65-2422	70-2493	70-2553	78-3058		
UIPAR1	= 177642	#15-1200								
UIPAR2	= 177644	#15-1200								
UIPAR3	= 177646	#15-1200	82-3185							
UIPAR4	= 177650	#15-1200	*78-3079	*78-3109	*78-3127	*78-3138				
UIPAR5	= 177652	#15-1200	*78-3080	*78-3110	*78-3128	*78-3139				
UIPAR6	= 177654	#15-1200								
UIPAR7	= 177656	#15-1200								
UIPDR0	= 177600	#15-1200	45-2096	56-2358	56-2358	56-2358	56-2358	56-2358	62-2400	68-2437
		*68-2437	68-2437	68-2437	68-2437	70-2492	70-2542	74-2682	78-3068	82-3185
		82-3185	82-3185							
UIPDR1	= 177602	#15-1200								
UIPDR2	= 177604	#15-1200								
UIPDR3	= 177606	#15-1200								
UIPDR4	= 177610	#15-1200	*78-3075	*78-3111	*78-3125	*78-3134				
UIPDR5	= 177612	#15-1200	*78-3076	*78-3112	*78-3126	*78-3135				
UIPDR6	= 177614	#15-1200								
UIPDR7	= 177616	#15-1200								
USESTK	= 000600	#15-1214	38-1960							
USP	=%000006	#15-1209	*38-1960	*38-1976	48-2266	*48-2267	*48-2268	*48-2275		
VIRT1	001276	#16-1276	32-1816	32-1822	*78-3094	78-3102	*78-3151	102-3458	102-3460	
VIRT2	001300	#16-1276	*78-3093	102-3458						
WASR6	001256	#16-1276	*30-1751	*31-1781	*72-2648	102-3447	102-3448			
WASSR0	001264	#16-1276	*31-1782	*72-2646	*78-3153	102-3448	102-3460			
WASSR1	001266	#16-1276	*31-1783	102-3448						
WASSR2	001270	#16-1276	*31-1784	*46-2125	46-2127	*46-2146	46-2147	*72-2647	*78-3154	102-3448
		102-3459	102-3460	102-3463						

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
WBIT	= 000100	#15-1211	80-3172	80-3172	80-3172	81-3178	81-3178	81-3178	82-3185	82-3185
		82-3185								
$APTHD	000204	15-1275	#15-1275							
$ASTAT	= ******	92-3335	92-3335							
$ATYC	035760	92-3335	#92-3335							
$ATY1	035734	#92-3335								
$ATY3	035742	91-3333	#92-3335							
$ATY4	035752	86-3219	#92-3335							
$AUTOB	001134	#16-1276	*33-1839	89-3315	89-3315	89-3315				
$BDADR	001122	#16-1276								
$BDDAT	001126	#16-1276								
$BELL	001214	#16-1276	86-3219	87-3219	87-3219					
$BIN	036254	*93-3337	*93-3337	93-3337	#93-3337					
$CHARC	035730	*91-3333	*91-3333	91-3333	*91-3333	#91-3333				
$CKSWR	034264	#89-3315	98-3347	98-3347						
$CLR.T	032732	84-3215	#84-3215							
$CMTAG	001100	#16-1276	33-1838	33-1838	33-1838	33-1838	33-1838	33-1838		
$CM1	= 000006	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276
		#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276
		#16-1276								
$CM2	= 000014	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276
		#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276
		#16-1276								
$CM3	= 000006	#16-1276	16-1276	16-1276						
$CM4	= 000006	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276
		#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276	#16-1276	16-1276	16-1276
		#16-1276								
$CNTLC	001350	#16-1276	89-3315	89-3315	89-3315	89-3315				
$CNTLG	035231	89-3315	#89-3315							
$CNTLU	035224	89-3315	89-3315	#89-3315						
$CORE	002676	28-1689	#28-1689							
$CPUOP	001252	#16-1276								
$CRLF	001221	#16-1276	84-3215	86-3219	87-3219	87-3219	88-3221	88-3245	88-3250	88-3305
		89-3315	89-3315	89-3315	89-3315	91-3333	91-3333	91-3333		
$CROUT	002726	28-1689	#28-1689							
$DBLK	036720	95-3341	95-3341	#95-3341						
$DB20	037024	88-3277	88-3291	#97-3345						
$DEVCT	001234	#16-1276								
$DOAGN	032752	84-3215	84-3215	84-3215	#84-3215					
$DTBL	036710	95-3341	#95-3341							
$ENDAD	032742	15-1274	33-1839	#84-3215	86-3219					
$ENDCT	032570	33-1838	#84-3215							
$ENULL	033014	#84-3215								
$ENV	001244	#16-1276	33-1839	75-2743	86-3219	91-3333	92-3335	92-3335		
$ENVM	001245	#16-1276	33-1838	91-3333	91-3333	92-3335				
$EOP	032540	#84-3215	90-3328							
$EOPCT	032562	*33-1838	#84-3215	84-3215						
$ERFLG	001103	#16-1276	27-1659	28-1683	85-3217	*85-3217	85-3217	*85-3217	85-3217	85-3217
		*86-3219	87-3219	87-3219						
$ERMAX	001115	#16-1276	*33-1838	*85-3217	85-3217	85-3217				
$ERROR	033246	33-1838	#86-3219							
$ERRPC	001116	#16-1276	*86-3219	*86-3219	86-3219	87-3219	87-3219	88-3227	88-3313	102-5447

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
		102-3448	102-3449	102-3450	102-3451	102-3452	102-3453	102-3454	102-3455	102-3456
		102-3457	102-3458	102-3459	102-3460	102-3461	102-3462	102-3463	102-3467	102-3470
		102-3471	102-3472	102-3473	102-3474	102-3475	102-3476	102-3477	102-3478	
$ERRTB	001372	#17-1276	88-3240							
$ERTTL	001112	#16-1276	84-3215	*84-3215	*86-3219	87-3219	87-3219			
$ESCAP	001212	#16-1276	*33-1838	*85-3217	86-3219	86-3219	87-3219	87-3219		
$ETABL	001244	#16-1276								
$ETEND	001254	15-1275	#16-1276							
$FATAL	001226	#16-1276	*92-3335							
$FFLG	036200	*92-3335	*92-3335	92-3335	*92-3335	#92-3335				
$FILLC	001156	#16-1276	91-3333	91-3333	91-3333					
$FILLS	001155	#16-1276	91-3333	91-3333						
$GDADR	001120	#16-1276								
$GDDAT	001124	#16-1276								
$GET42	032714	#84-3215								
$GTSWR	034334	#89-3315	98-3347	98-3347						
$HD	= 000000	15-1197	15-1197	15-1197						
$HIBTS	000204	#15-1275								
$ICNT	001104	#16-1276								
$ILLUP	037410	99-3349	99-3349	#99-3349						
$INTAG	001135	#16-1276	89-3315	89-3315	89-3315	89-3315				
$ITEMB	001114	#16-1276	*86-3219	86-3219	86-3219	*86-3219	86-3219	87-3219	87-3219	88-3224
$KTNEX	002670	28-1689	#28-1689							
$KTOUT	002660	28-1689	#28-1689							
$KT11	002512	#28-1689	*28-1689	*28-1689	*33-1853					
$LF	001222	#16-1276	87-3219	87-3219	89-3315	89-3315	89-3315	91-3333	91-3333	
$LFLG	036177	*92-3335	#92-3335							
$LOOP	033010	84-3215	#84-3215							
$LPADR	001106	#16-1276	*33-1838	76-2889	77-3026	*85-3217	*85-3217	85-3217	85-3217	85-3217
$LPERR	001110	#16-1276	*29-1696	*29-1706	*33-1838	*35-1867	*35-1882	*36-1889	*36-1904	*37-1914
		*37-1928	*37-1941	*38-1970	*39-2004	*39-2017	*46-2124	*46-2133	*46-2157	*48-2194
		*48-2202	*48-2207	*48-2217	*48-2227	*48-2238	*48-2251	*48-2264	*48-2278	*49-2294
		*49-2303	*49-2309	*49-2314	*51-2333	*51-2333	*51-2333	*52-2338	*52-2338	*52-2338
		*53-2343	*53-2343	*53-2343	*54-2348	*54-2348	*54-2348	*55-2353	*55-2353	*55-2353
		*56-2358	*56-2358	*56-2358	*57-2375	*57-2375	*58-2380	*58-2380	*59-2385	*59-2385
		*60-2390	*60-2390	*61-2395	*61-2395	*62-2400	*62-2400	*63-2412	*63-2412	*63-2412
		*64-2417	*64-2417	*64-2417	*65-2422	*65-2422	*65-2422	*66-2427	*66-2427	*66-2427
		*67-2432	*67-2432	*67-2432	*68-2437	*68-2437	*68-2437	*69-2452	*69-2460	*69-2468
		*71-2587	*71-2601	*72-2618	*72-2641	*74-2697	*76-2781	*76-2793	*76-2828	*76-2845
		*76-2853	*76-2866	*77-2921	*77-2933	*77-2966	*77-2981	*77-2989	*77-3002	*78-3084
		*78-3143	*80-3172	*80-3172	*81-3178	*81-3178	*82-3185	*82-3185	*83-3200	*83-3213
		85-3217	*85-3217	85-3217	85-3217	86-3219				
$LSTAD	003020	*28-1689	#28-1689							
$LSTBK	003022	*28-1689	#28-1689	74-2715	76-2773	76-2785	76-2854	76-2858	76-2874	77-2914
		77-2924	77-2949	77-2990	77-2994	77-3011	102-3474			
$MAIL	001224	15-1275	15-1275	#16-1276	33-1838	33-1839	85-3217	86-3219	91-3333	
$MBADR	000206	#15-1275								
$MFLG	036176	*92-3335	92-3335	*92-3335	#92-3335					
$MNEW	035247	89-3315	#89-3315							
$MSGAD	001240	#16-1276	*92-3335	92-3335						
$MSGLG	001242	#16-1276	*92-3335							
$MSGTY	001224	#16-1276	92-3335	*92-3335	92-3335	*92-3335				

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
$MSWR	035236	89-3315	#89-3315							
$MXCNT	001344	#16-1276								
$NULL	001154	#16-1276	91-3333	91-3333	91-3333					
$NWTST	= 000001	#34-1866	34-1866	#35-1866	35-1866	#35-1888	35-1888	#36-1888	36-1888	#36-1913
		36-1913	#37-1913	37-1913	#37-1953	37-1953	#38-1953	38-1953	#38-2002	38-2002
		#39-2002	39-2002	#39-2039	39-2039	#40-2039	40-2039	#40-2050	40-2050	#41-2050
		41-2050	#41-2061	41-2061	#42-2061	42-2061	#42-2072	42-2072	#43-2072	43-2072
		#43-2083	43-2083	#44-2083	44-2083	#44-2094	44-2094	#45-2094	45-2094	#45-2114
		45-2114	#46-2114	46-2114	#46-2167	46-2167	#47-2167	47-2167	#47-2191	47-2191
		#48-2191	48-2191	#48-2286	48-2286	#49-2286	49-2286	#50-2332	50-2332	#51-2332
		51-2332	#51-2337	51-2337	#52-2337	52-2337	#52-2342	52-2342	#53-2342	53-2342
		#53-2347	53-2347	#54-2347	54-2347	#54-2352	54-2352	#55-2352	55-2352	#55-2357
		55-2357	#56-2357	56-2357	#56-2374	56-2374	#57-2374	57-2374	#57-2379	57-2379
		#58-2379	58-2379	#58-2384	58-2384	#59-2384	59-2384	#59-2389	59-2389	#60-2389
		60-2389	#60-2394	60-2394	#61-2394	61-2394	#61-2399	61-2399	#62-2399	62-2399
		#62-2411	62-2411	#63-2411	63-2411	#63-2416	63-2416	#64-2416	64-2416	#64-2421
		64-2421	#65-2421	65-2421	#65-2426	65-2426	#66-2426	66-2426	#66-2431	66-2431
		#67-2431	67-2431	#67-2436	67-2436	#68-2436	68-2436	#68-2451	68-2451	#69-2451
		69-2451	#69-2478	69-2478	#70-2478	70-2478	#70-2576	70-2576	#71-2576	71-2576
		#71-2616	71-2616	#72-2616	72-2616	#73-2674	73-2674	#74-2674	74-2674	#75-2768
		75-2768	#76-2768	76-2768	#76-2908	76-2908	#77-2908	77-2908	#77-3052	77-3052
		#78-3052	78-3052	#79-3171	79-3171	#80-3171	80-3171	#80-3176	80-3176	#81-3176
		81-3176	#81-3183	81-3183	#82-3183	82-3183	#82-3197	82-3197	#83-3197	83-3197
$OCNT	036500	*94-3339	*94-3339	#94-3339						
$OCTVL	037126	97-3345	#97-3345							
$OMODE	036502	*94-3339	*94-3339	94-3339	*94-3339	*94-3339	#94-3339			
$OVER	033230	85-3217	85-3217	85-3217	#85-3217					
$PASS	001232	#16-1276	*33-1838	*84-3215	*84-3215	84-3215	84-3215	84-3215	90-3318	
$PASTM	000212	#15-1275								
$PWRAD	037372	#99-3349								
$PWRDN	037232	33-1838	#99-3349	99-3349						
$PWRMG	037366	#99-3349								
$PWRUP	037304	99-3349	#99-3349							
$QUES	001220	#16-1276	87-3219	87-3219	89-3315	89-3315	89-3315	89-3315	91-3333	91-3333
$RDCHR	034606	#89-3315	98-3347	98-3347						
$RDDEC	= ******	98-3347								
$RDLIN	034736	#89-3315	98-3347	98-3347						
$RDOCT	= ******	98-3347								
$RDSZ	= 000010	#89-3315	89-3315							
$REGAD	001160	#16-1276								
$REG0	001162	#16-1276	*86-3219	102-3449	102-3450	102-3452	102-3453	102-3456	102-3457	102-3464
		102-3467	102-3468	102-3469	102-3471	102-3476				
$REG1	001164	#16-1276	*86-3219	102-3449	102-3452	102-3452	102-3453	102-3454	102-3455	102-3456
		102-3457	102-3459	102-3462	102-3467	102-3468	102-3469	102-3473		
$REG2	001166	#16-1276	*86-3219	102-3453	102-3453	102-3455	102-3456	102-3457	102-3462	102-3464
		102-3467	102-3469	102-3471						
$REG3	001170	#16-1276	*86-3219	102-3454	102-3471	102-3475	102-3476			
$REG4	001172	#16-1276	*86-3219	102-3458	102-3460	102-3463	102-3469			
$REG5	001174	#16-1276	*86-3219	102-3458	102-3475	102-3476	102-3477			
$RESRE	036766	#96-3343	98-3347							
$RTNAD	033012	#84-3215								
$RTRN	033006	33-1838	*33-1838	*33-1838	84-3215	#84-3215				

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
$R2A	= ******	98-3347								
$SAVRE	036730	#96-3343	98-3347	98-3347						
$SAVR6	037414	*99-3349	99-3349	*99-3349	*99-3349	#99-3349				
$SCOPE	033020	33-1838	#85-3217							
$SETUP	= 000137	#15-1272	15-1272	#15-1272	15-1272	#15-1272	15-1272	#15-1272	15-1272	#15-1272
		15-1272	#15-1272	15-1272	#15-1272	33-1838	33-1838	33-1838	33-1838	33-1838
		33-1838	33-1838	33-1838	33-1838	33-1838	33-1838	33-1838	33-1839	33-1839
		33-1839	84-3215	84-3215	85-3217	86-3219	86-3219	86-3219	86-3219	89-3315
		89-3315	99-3349							
$SIZE	002454	#28-1689	33-1854							
$SIZEX	002732	28-1689	#28-1689							
$STUP	= 177777	#15-1272	#15-1272	15-1272	#15-1272	#15-1272	15-1272	#15-1272	#15-1272	15-1272
		#15-1272	#15-1272	15-1272	#15-1272	#15-1272	15-1272	#15-1272	#15-1272	15-1272
$SVLAD	033174	85-3217	85-3217	#85-3217						
$SVPC	= 000204	#15-1274	15-1274							
$SWR	= 173400	#15-1193	15-1197	15-1198	15-1198	15-1198	15-1198	15-1198	15-1198	15-1198
		15-1198	16-1276	16-1276	16-1276	33-1838	33-1838	33-1838	33-1838	33-1838
		35-1866	36-1888	37-1913	38-1953	39-2002	40-2039	41-2050	42-2061	43-2072
		44-2083	45-2094	46-2114	47-2167	48-2191	49-2286	51-2332	52-2337	53-2342
		54-2347	55-2352	56-2357	57-2374	58-2379	59-2384	60-2389	61-2394	62-2399
		63-2411	64-2416	65-2421	66-2426	67-2431	68-2436	69-2451	70-2478	71-2576
		72-2616	74-2674	76-2768	77-2908	78-3052	80-3171	81-3176	82-3183	83-3197
		84-3215	84-3215	84-3215	84-3215	84-3215	85-3217	85-3217	85-3217	85-3217
		85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217
		85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	86-3219	86-3219
		86-3219	86-3219	86-3219	86-3219	86-3219	86-3219	86-3219	87-3219	87-3219
		99-3349								
$SWREG	001246	#16-1276	33-1838							
$SWRMK	= 000000	15-1198	15-1198	15-1198	15-1198	15-1198	15-1198	15-1198	15-1198	15-1198
		85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217	85-3217
		85-3217								
$TBIT	001346	#16-1276	*33-1838	*84-3215	84-3215	84-3215	*99-3349			
$TESTN	001230	#16-1276	*85-3217	88-3313						
$TKB	001146	#16-1276	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315	91-3333	91-3333
		91-3333	91-3333							
$TKS	001144	#16-1276	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315	89-3315
		91-3333	91-3333	91-3333	91-3333					
$TMP0	001176	#16-1276	*48-2253	48-2262	*48-2266	48-2275	*51-2333	*51-2333	*52-2338	*52-2338
		*53-2343	*53-2343	*54-2348	*54-2348	*55-2353	*55-2353	*56-2358	*56-2358	*74-2701
		74-2710	*76-2787	76-2805	*77-2927	77-2945	*77-2968	77-2971	*78-3086	102-3458
		102-3460								
$TMP1	001200	#16-1276	*76-2884	*77-3021	102-3470	102-3472				
$TMP2	001202	#16-1276	*76-2792	*77-2932	102-3470					
$TMP3	001204	#16-1276								
$TMP4	001206	#16-1276	29-1691	29-1693	*29-1711	*29-1714	*88-3288	88-3290		
$TMP5	001210	#16-1276	*51-2333	*52-2338	*53-2343	*54-2348	*55-2353	*56-2358	*57-2375	*58-2380
		*59-2385	*60-2390	*61-2395	*62-2400	*88-3289	*90-3318	*90-3319	90-3325	
$TN	- 000056	#15-1194	15-1197	34-1866	35-1866	#35-1866	35-1888	36-1888	#36-1888	36-1913
		37-1913	#37-1913	37-1953	38-1953	#38-1953	38-2002	39-2002	#39-2002	39-2022
		39-2039	40-2039	#40-2039	40-2050	41-2050	#41-2050	41-2061	42-2061	#42-2061
		42-2072	43-2072	#43-2072	43-2083	44-2083	#44-2083	44-2094	45-2094	#45-2094
		45-2114	46-2114	#46-2114	46-2167	47-2167	#47-2167	47-2191	48-2191	#48-2191

SYMBOL CROSS REFERENCE

SYMBOL	VALUE	REFERENCES								
		48-2286	49-2286	#49-2286	50-2332	51-2332	#51-2332	51-2333	51-2337	52-2337
		#52-2337	52-2338	52-2342	53-2342	#53-2342	53-2343	53-2347	54-2347	#54-2347
		54-2348	54-2352	55-2352	#55-2352	55-2353	55-2357	56-2357	#56-2357	56-2358
		56-2374	57-2374	#57-2374	57-2375	57-2379	58-2379	#58-2379	58-2380	58-2384
		59-2384	#59-2384	59-2385	59-2389	60-2389	#60-2389	60-2390	60-2394	61-2394
		#61-2394	61-2395	61-2399	62-2399	#62-2399	62-2400	62-2411	63-2411	#63-2411
		63-2416	64-2416	#64-2416	64-2421	65-2421	#65-2421	65-2426	66-2426	#66-2426
		66-2431	67-2431	#67-2431	67-2436	68-2436	#68-2436	68-2451	69-2451	#69-2451
		69-2478	70-2478	#70-2478	70-2576	71-2576	#71-2576	71-2616	72-2616	#72-2616
		72-2643	73-2674	74-2674	#74-2674	75-2744	75-2746	75-2752	75-2768	76-2768
		#76-2768	76-2867	76-2908	77-2908	#77-2908	77-3004	77-3052	78-3052	#78-3052
		78-3144	79-3171	80-3171	#80-3171	80-3176	81-3176	#81-3176	81-3183	82-3183
		#82-3183	82-3197	83-3197	#83-3197					
$TPB	001152	#16-1276	91-3333	91-3333	91-3333					
$TPFLG	001157	#16-1276	91-3333	91-3333	91-3333					
$TPS	001150	#16-1276	91-3333	91-3333	91-3333					
$TRAP	037144	33-1838	#98-3347							
$TRAP2	037166	#98-3347	98-3347							
$TRP	= 000015	#98-3347	98-3347	98-3347	98-3347	98-3347	#98-3347	98-3347	98-3347	98-3347
		98-3347	#98-3347	98-3347	98-3347	98-3347	98-3347	#98-3347	98-3347	98-3347
		98-3347	98-3347	#98-3347	98-3347	98-3347	98-3347	98-3347	#98-3347	98-3347
		98-3347	98-3347	98-3347	#98-3347	98-3347	98-3347	98-3347	98-3347	#98-3347
		98-3347	98-3347	98-3347	98-3347	#98-3347	98-3347	98-3347	98-3347	98-3347
		#98-3347	98-3347	98-3347	98-3347	98-3347	#98-3347	98-3347	98-3347	98-3347
		98-3347	#98-3347	98-3347	98-3347	98-3347	98-3347	#98-3347		
$TRPAD	037200	98-3347	#98-3347							
$TSTM	000210	#15-1275								
$TSTNM	001102	#16-1276	*84-3215	85-3217	85-3217	*85-3217	85-3217	85-3217	85-3217	85-3217
		86-3219	86-3219	87-3219	87-3219	90-3321				
$TTYIN	035214	89-3315	89-3315	89-3315	89-3315	89-3315	#89-3315			
$TYPBN	036202	#93-3337	98-3347	98-3347						
$TYPDS	036504	#95-3341	98-3347	98-3347						
$TYPE	035370	#91-3333	92-3335	98-3347	98-3347					
$TYPEC	035602	89-3315	91-3333	91-3333	91-3333	#91-3333				
$TYPEX	035732	91-3333	91-3333	91-3333	#91-3333					
$TYPOC	036302	#94-3339	98-3347	98-3347						
$TYPON	036316	94-3339	#94-3339	98-3347						
$TYPOS	036256	#94-3339	98-3347							
$UNIT	001236	#16-1276								
$UNITM	000214	#15-1275								
$USWR	001250	#16-1276	75-2745							
$XOFF	= 000023	91-3333	91-3333							
$XON	= 000021	89-3315	91-3333	91-3333	91-3333					
$XTSTR	033032	#85-3217								
$$GET4	= 000001	#84-3215	#84-3215	84-3215						
$OFILL	036501	*94-3339	*94-3339	94-3339	#94-3339					
$40CAT	= ******	85-3217	86-3219							
.$ASTA	= ******	92-3335	92-3335							
.$X	= 000204	#15-1275	*15-1275							

MACRO CROSS REFERENCE CREF V01

MACRO NAME	REFERENCES						
BYTADR	#15-1162	#63-2412	#64-2417	#65-2422	#66-2427	#67-2432	#68-2437
BYTEMG	#62-2401	#63-2411	#64-2416	#65-2421	#66-2426	#67-2431	#68-2436
COMMEN	#15-1199						
COUNT1	#15-1074	57-2375	58-2380	59-2385	60-2390	61-2395	62-2400
DUAL	#15-1033	51-2333	52-2338	53-2343	54-2348	55-2353	56-2358
DUALMG	#50-2319	#51-2332	#52-2337	#53-2342	#54-2347	#55-2352	#56-2357
ENDCOM	#15-1199						
ESCAPE	#15-1199						
GETPRI	#15-1199	84-3215					
GETSWR	#15-1199	#33-1839	33-1839				
MSG1	#34-1860	35-1866					
MSG10	#43-2080	#44-2083					
MSG11	#44-2091	45-2094					
MSG12	#45-2102	46-2114					
MSG13	#46-2158	47-2167					
MSG14	#47-2179	48-2191					
MSG14A	#48-2279	#49-2286					
MSG15	#50-2329	#51-2332					
MSG15A	#51-2334	#52-2337					
MSG15B	#52-2339	#53-2342					
MSG15C	#53-2344	54-2347					
MSG15D	#54-2349	#55-2352					
MSG15E	#55-2354	56-2357					
MSG16	#56-2371	#57-2374					
MSG16A	#57-2376	#58-2379					
MSG16B	#58-2381	#59-2384					
MSG16C	#59-2386	#60-2389					
MSG16D	#60-2391	#61-2394					
MSG16E	#61-2396	#62-2399					
MSG17	#62-2408	#63-2411					
MSG17A	#63-2413	#64-2416					
MSG17B	#64-2418	65-2421					
MSG17C	#65-2423	66-2426					
MSG17D	#66-2428	67-2431					
MSG17E	#67-2433	#68-2436					
MSG2	#35-1883	36-1888					
MSG20	#68-2438	69-2451					
MSG21A	#69-2469	#70-2478					
MSG21B	#70-2564	71-2576					
MSG21C	#71-2603	#72-2616					
MSG22	#73-2663	74-2674					
MSG23	#75-2754	76-2768					
MSG23A	#76-2895	77-2908					
MSG24	#77-3032	#78-3052					
MSG25	#79-3168	80-3171					
MSG25A	#80-3173	81-3176					
MSG26	#81-3180	#82-3183					
MSG27	#82-3187	83-3197					
MSG3	#36-1906	#37-1913					
MSG4	#37-1942	38-1953					
MSG5	#38-1995	#39-2002					
MSG6	#39-2036	40-2039					

MACRO CROSS REFERENCE

MACRO NAME	REFERENCES									
MSG7	#40-2047	41-2050								
MSG7A	#41-2058	42-2061								
MSG7B	#42-2069	#43-2072								
MULT	#15-1199									
NEWTST	#15-1188	#15-1199	#34-1866	#35-1888	#36-1913	#37-1953	#38-2002	#39-2039	#40-2050	#41-2061
	#42-2072	#43-2083	#44-2094	#45-2114	#46-2167	#47-2191	#48-2286	#50-2332	#51-2337	#52-2342
	#53-2347	#54-2352	#55-2357	#56-2374	#57-2379	#58-2384	#59-2389	#60-2394	#61-2399	#62-2411
	#63-2416	#64-2421	#65-2426	#66-2431	#67-2436	#68-2451	#69-2478	#70-2576	#71-2616	#73-2674
	#75-2768	#76-2908	#77-3052	#79-3171	#80-3176	#81-3183	#82-3197			
PARMSG	#56-2359	57-2374	58-2379	59-2384	60-2389	61-2394	62-2399			
POP	#15-1199	92-3335	92-3335	95-3341	96-3343	99-3349	99-3349			
PUSH	#15-1199	92-3335	92-3335	92-3335	95-3341	96-3343	99-3349	99-3349		
REPORT	#15-1199									
SAVR	#15-936	#86-3219								
SETPRI	#15-1199									
SETTRA	#98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347
	98-3347	98-3347	98-3347							
SETUP	#15-1199	33-1838								
SKIP	#15-1199	39-2022	51-2333	52-2338	53-2343	54-2348	55-2353	56-2358	57-2375	58-2380
	59-2385	60-2390	61-2395	62-2400	72-2643	75-2744	75-2746	75-2752	76-2867	77-3004
	78-3144									
SLASH	#15-1199									
SPACE	#15-933	#15-1199								
STARS	#15-1199	15-1274	15-1275	15-1275	15-1275	16-1276	16-1276	16-1276	23-1576	23-1578
	23-1585	24-1596	24-1602	25-1611	25-1620	26-1629	26-1633	27-1645	27-1651	28-1666
	28-1674	30-1730	30-1732	30-1739	31-1763	31-1770	32-1792	32-1806	33-1834	33-1836
	34-1857	34-1859	35-1866	35-1866	36-1888	36-1888	37-1913	37-1913	38-1953	38-1953
	38-1982	38-1994	39-2002	39-2002	40-2039	40-2039	41-2050	41-2050	42-2061	42-2061
	43-2072	43-2072	44-2083	44-2083	45-2094	45-2094	46-2114	46-2114	47-2167	47-2167
	48-2191	48-2191	49-2286	49-2286	50-2316	50-2318	51-2332	51-2332	52-2337	52-2337
	53-2342	53-2342	54-2347	54-2347	55-2352	55-2352	56-2357	56-2357	57-2374	57-2374
	58-2379	58-2379	59-2384	59-2384	60-2389	60-2389	61-2394	61-2394	62-2399	62-2399
	63-2411	63-2411	64-2416	64-2416	65-2421	65-2421	66-2426	66-2426	67-2431	67-2431
	68-2436	68-2436	69-2451	69-2451	70-2478	70-2478	71-2576	71-2576	72-2616	72-2616
	73-2660	73-2662	74-2674	74-2674	76-2768	76-2768	77-2908	77-2908	78-3052	78-3052
	79-3165	79-3167	80-3171	80-3171	81-3176	81-3176	82-3183	82-3183	83-3197	83-3197
	84-3215	85-3217	86-3219	89-3315	89-3315	89-3315	89-3315	91-3333	92-3335	93-3337
	94-3339	95-3341	96-3343	97-3345	98-3347	99-3349	99-3349			
SWRSU	#15-1199	#33-1838	#33-1838							
TIMMSG	#15-1028	#40-2039	#41-2050	#42-2061	#43-2072	#44-2083	#45-2094			
TRMTRP	#98-3347									
TYPBIN	#15-1199									
TYPDEC	#15-1199	84-3215	84-3215							
TYPNAM	#15-1199	33-1839								
TYPNUM	#15-1199									
TYPOCS	#15-1199									
TYPOCT	#15-1199	#89-3315								
TYPTXT	#15-1199	84-3215	84-3215							
USER	#15-1225	#16-1276								
WMSG	#15-1101	#80-3171	#81-3176	#82-3183						
WTST	#15-1116	80-3172	81-3178	82-3185						
$$CMRE	#15-1276	#16-1276	#16-1276	#16-1276	#16-1276	#16-1276	#16-1276			

MACRO CROSS REFERENCE CREF V01

MACRO NAME	REFERENCES									
$$CMTM	#15-1276	16-1276	16-1276	16-1276	16-1276	16-1276	16-1276			
$$ESCA	#15-1199									
$$NEWT	#15-1188	#15-1199	#34-1866	#35-1888	#36-1913	#37-1953	#38-2002	#39-2039	#40-2050	#41-2061
	#42-2072	#43-2083	#44-2094	#45-2114	#46-2167	#47-2191	#48-2286	#50-2332	#51-2337	#52-2342
	#53-2347	#54-2352	#55-2357	#56-2374	#57-2379	#58-2384	#59-2389	#60-2394	#61-2399	#62-2411
	#63-2416	#64-2421	#65-2426	#66-2431	#67-2436	#68-2451	#69-2478	#70-2576	#71-2616	#73-2674
	#75-2768	#76-2908	#77-3052	#79-3171	#80-3176	#81-3183	#82-3197			
$$SET	#98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347	98-3347
	98-3347	98-3347	98-3347							
$$SETM	#33-1838	#33-1838								
$$SETU	#33-1838	#33-1838								
$$SKIP	#15-1199	39-2022	51-2333	52-2338	53-2343	54-2348	55-2353	56-2358	57-2375	58-2380
	59-2385	60-2390	61-2395	62-2400	72-2643	75-2744	75-2746	75-2752	76-2867	77-3004
	78-3144									
.EQUAT	#15-1188	15-1199								
.EQUIV	#15-930	#15-1187	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199
	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199
	#15-1199	#15-1199	#15-1199	#15-1199	#15-1199	#15-1203	#15-1204	#15-1205	#15-1206	#15-1207
	#15-1208	#15-1209	#15-1210	#15-1211						
.HEADE	#15-1188	15-1197								
.KT11	#15-1188	15-1200								
.SETUP	#15-1188	15-1272								
.SIZME	#15-945	28-1689								
.SWRHI	#15-1188	15-1198								
.SWRLO	#15-1198									
.$ACT1	#15-1189	#15-1274								
.$APTB	#16-1276	16-1276								
.$APTH	#15-1191	#15-1275								
.$APTY	#15-1191	#92-3335								
.$CATC	#15-1189	15-1273								
.$CMTA	#15-1189	15-1276								
.$DB20	#15-1192	97-3345								
.$EOP	#15-1189	84-3215								
.$ERRO	#15-751	#86-3219								
.$POWE	#15-1190	99-3349								
.$READ	#15-1191	89-3315								
.$SAVE	#15-1192	#96-3343								
.$SCOP	#15-500	85-3217								
.$TRAP	#15-1190	98-3347								
.$TYPB	#15-1191	93-3337								
.$TYPD	#15-1190	95-3341								
.$TYPE	#15-1189	91-3333								
.$TYPO	#15-1190	#94-3339								