KTF11-AA

KTF11-AA DIAG
CJKDADO

AH-F137D-MC
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IDENTIFICATION

PRODUCT CODE: AC-F138D-MC

PRODUCT NAME: CJKDADO KTF11-AA MEMORY MANAGEMENT DIAGNOSTIC

DATE: JANUARY, 1981

MAINTAINER: DIAGNOSTIC PROGRAMMIMG

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PROGRAM HISTORY

DATE	REVISION	REASON FOR REVISION
JANUARY,1979	A	FIRST RELEASE
JUNE,1979	B	SUBROUTINE FORMPA MODIFIED ERROR INFORMATION STORED IN R0,R2. THIS REVISION SAVES THE REGISTERS ON ENTRY TO THE ROUTINE AND RESTORES THEM ON EXIT.
NOVEMBER,1979	C	CORRECTIONS WERE MADE TO THE MULTI-TESTER SUPPORT CODE. ALSO CODE WAS ADDED TO ALLOW PROGRAM OPERATION WHILE LINE CLOCK IS INTERRUPTING.
JANUARY,1981	D	EXPANDED 'READ AND WRITE WHILE IN RELOCATE MODE' TEST TO ALLOW UP TO 1.92MW OF MEMORY TO BE TESTED. CORRECTED BUGS IN THE 'RELOCATION AND ADDER' TESTS TO ALLOW 22 BIT ADDRESSING TO BE TURNED ON AND TESTED. REMOVED RESET INSTRUCTONS FROM TESTS WHERE THEY WERE NOT REQUIRED. PUT IN CODE TO SKIP TESTS AFTER FIRST PASS IN APT MODE THAT REQUIRED RESETS FOR TESTING.

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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.

THE PROGRAM 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 FOLLOWED BY TESTING OF THE ABORT AND STATUS SEGMENTS OF LOGIC. FINALLY, CHECKS OF SPECIAL ABORT SEQUENCES AND TESTING OF THE MFPI/MTPI INSTRUCTIONS ARE DONE.

1.2 REQUIREMENTS

A KDF11 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 CPU DIAGNOSTIC SHOULD BE RUN:

CJKDB DCF11-AA CPU TESTS

ALSO, ONE OF THE MAIN MEMORY DIAGNOSTICS 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. SINCE THERE
IS NO HARDWARE SWITCH REGISTER, 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)

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 OTHER PASS STARTING WITH THE THIRD PASS.
SW11	004000	INHIBIT SUBTEST ITERATIONS THIS SWITCH WHEN SET INHIBITS ITERATIONS OF EACH SUBTEST AFTER

```
                                                    THE FIRST PASS.  IF THIS SWITCH
                                                    IS NOT SET, EACH SUBTEST IS RUN
                                                    200. TIMES.

                        SW10    002000          BELL ON ERROR
                                                    THIS SWITCH WHEN SET WILL RING
                                                    THE CONSOLE TERMINAL BELL WHEN
                                                    AN ERROR HAS BEEN DETECTED.

                        SW9     00'000          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 INTFRMITTANT

                        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
                        ---------------------------


                        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 REQUFSTED 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 WILI 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
```

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                        -----   EXECUTION OF A COUPLE 'RESET' INSTRUCTIONS
                                WITHIN THE PROGRAM.

                2.5     EXECUTION TIMES
                        ---------------

                        THE RUN TIME FOR A SINGLE PASS WITH NO ITERATIONS
                        OR TRACE TRAPPING IS APPROXIMATELY 5 SECONDS.

                        THE RUN TIME FOR A SINGLE PASS WITH ITERATIONS
                        AND TRACE TRAPPING ENABLED IS APPROXIMATELY 30 SECONDS.

                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 LOACTION
022060. THE "REGISTR 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.

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
AND TOTAL NUMBER OF ERRORS SINCE THE LAST END-OF-PASS ARE
REPORTED IN THE END-OF-PASS MESSAGE. FOR EXAMPLE:

```
        END OF PASS #2  TOTAL ERRORS SINCE LAST REPORT 0
```

THAT WOULD INDICATE THAT PASS TWO WAS JUST COMPLETED
AND NO ERRORS WERE 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 2 = 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 'RESTRT:'

4.5 PHYSICAL BUS ADDRESS CONSTRUCTION

BELOW IS A SIMPLIFIED DIAGRAM OF HOW THE MEMORY MAMAGEMENT 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.

```
                                 12 11 10 09 08 07 06 05 04 03 02 01 00
                                ---------------------------------------
                               / 0  1  1  1  1  1  1/ 1  1  1  1  1  0/  VBA*
                               ---------------------------------------
                                                    I
                                 (ADDED TO)         I
                                                    I
                  15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00   I
                 ------------------------------------------------   I
                / 0  0  0  0  0  0  0  0  1  0  1  0  0  0  0  0  1/  I          PAR**
                ------------------------------------------------    I
                                       I                            I
                                       I                            I
                                       V                            V
21 20 19 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
-----------------------------------------------------------------
/ 0  0  0  0  0  0  0  1  1  0  0  0  0  0  0  0  1  1  1  1  1  0/ PBA
-----------------------------------------------------------------
```

*= VBA BITS <15:13> SELECT THE APPROPRIATE PAR AND PDR
**= PSW MODE BIT 01 (BIT 15) SELECTS THE USER (=1) OR KERNEL (=0) SET OF PAR'S/PDR'S

4.6 RELOCATION THROUGHOUT MEMORY

A FEATURE WAS ADDED TO ALLOW THE CONSTRUCTION OF PHYSICAL BUS ADDRESSES ABOVE THE NORMAL 16K LIMIT. THE SETTING OF THE LOCATION $MADR1 IN THE E-TABLE WITH ONE OF THE FOLLOWING CONSTANTS WILL ACCESS LOCATIONS BETWEEN 60000 AND 67600 OF EACH 16K GROUP UP TO THE MAXIMUM MEMORY ON THE SYSTEM. THE FIRST LOCATION OF EACH BLOCK(32 WORDS) IS WRITTEN AND READ. SEE TEST #25 IN THE LISTING FOR MORE DETAILS.

CONST.	MAX. MEM.	CONST.	MAX. MEM.	CONST.	MAX. MEM.
0/600	16K	50600	656K	120600	1296K
1600	32K	51600	672K	121600	1312K

441	2600	48K	52600	688K	122600	1328K
442	3600	64K	53600	704K	123600	1344K
443	4600	80K	54600	720K	124600	1360K
444	5600	96K	55600	736K	125600	1376K
445	6600	112K	56600	752K	126600	1392K
446	7600	128K	57600	768K	127600	1408K
447	10600	144K	60600	784K	130600	1424K
448	11600	160K	61600	800K	131600	1440K
449	12600	176K	62600	816K	132600	1456K
450	13600	192K	63600	832K	133600	1472K
451	14600	208K	64600	848K	134600	1488K
452	15600	224K	65600	864K	135600	1504K
453	16600	240K	66600	880K	136600	1520K
454	17600	256K	67600	896K	137600	1536K
455	20600	272K	70600	912K	140600	1552K
456	21600	288K	71600	928K	141600	1568K
457	22600	304K	72600	944K	142600	1584K
458	23600	320K	73600	960K	143600	1600K
459	24600	336K	74600	976K	144600	1616K
460	25600	352K	75600	992K	145600	1632K
461	26600	368K	76600	1008K	146600	1648K
462	27600	384K	77600	1024K	147600	1664K
463	30600	400K	100600	1040K	150600	1680K
464	31600	416K	101600	1056K	151600	1696K
465	32600	432K	102600	1072K	152600	1712K
466	33600	448K	103600	1088K	153600	1728K
467	34600	464K	104600	1104K	154600	1744K
468	35600	480K	105600	1120K	155600	1760K
469	36600	496K	106600	1136K	156600	1776K
470	37600	512K	107600	1152K	157600	1792K
471	40600	528K	110600	1168K	160600	1808K
472	41600	544K	111600	1184K	161600	1824K
473	42600	560K	112600	1200K	162600	1840K
474	43600	576K	113600	1216K	163600	1856K
475	44600	592K	114600	1232K	164600	1872K
476	45600	608K	115600	1248K	165600	1888K
477	46600	624K	116600	1264K	166600	1904K
478	47600	640K	117600	1280K	167600	1920K
479						
480						

5.0 PROGRAM DESCRIPTION

5.1 SUBROUTINES USED BY THIS PROGRAM

FOLLOWING IS A LIST OF THE SUBROUTINES AND HANDLERS USED BY THIS PROGRAM THAT ARE NOT PROVIDED BY THE "SYSMAC PACKAGE". DETAILS OF THE SUBROUTINES UNIQUE TO THIS PROGRAM MAY BE FOUND IN THE PROGRAM LISTING. REFER TO THE "SYSMAC" DOCUMENT AND PROGRAM LISTING FOR THE OTHER ROUTINES.

1. TURN OFF T-BIT AND SAVE CURRENT PSW
2. TURN ON T-BIT AND RESTORE PREVIOUS PSW
3. SET ALL WRITEABLE BITS IN ALL PAR/PDR'S

4. READ AND COMPARE KERNEL AND USER PAR/PDR'S
5. CONVERT VIRTUAL ADDRESS TO PHYSICAL ADDRESS

5.2 PROGRAM LISTING

A TABLE OF CONTENTS APPEARS AT THE BEGINNING OF THE LISTING WHICH CONTAINS THE NAMES OF EACH SECTION, SUBTEST, AND ROUTINE AND THE LINE NUMBERS CORRESPONDING TO THE START OF EACH.

FOLLOWING THIS SECTION OF DOCUMENTATION IS THE ACTUAL PROGRAM LISTING COMPLETE WITH SUBTEST DESCRIPTIONS AND ''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. IF THE PASS NUMBER IS GREATER THAN ONE, THE ERROR MAY BE ITERATION SENSITIVE. TRY RUNNING THE PROGRAM AGAIN WITH BIT 11 OF THE SWITCH REG. EQUAL TO ''1'' TO INHIBIT ITERATIONS. THESE HINTS 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''.

```
                        .TITLE  CJKDADO KTF11-AA MMU DIAG
                        ;*COPYRIGHT (C) AUGUST, 1980
                        ;*DIGITAL EQUIPMENT CORP.
                        ;*MAYNARD, MASS. 01754
                        ;*
                        ;*
                        ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                        ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                        ;*
                        .SBTTL  OPERATIONAL SWITCH SETTINGS
                        ;*
                        ;*      SWITCH                  USE
                        ;*      ------          --------------------
                        ;*        15            HALT ON ERROR
                        ;*        14            LOOP ON TEST
                        ;*        13            INHIBIT ERROR TYPEOUTS
                        ;*        12            INHIBIT TRACE TRAP
                        ;*        11            INHIBIT ITERATIONS
                        ;*        10            BELL ON ERROR
                        ;*         9            LOOP ON ERROR
                        ;*         8            LOOP ON TEST IN SWR<7:0>
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK=  1100
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                        ;*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
                        .EQUIV  PS,PSW
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
```

```
609             000100                  PR2=    100             ;;PRIORITY LEVEL 2
610             000140                  PR3=    140             ;;PRIORITY LEVEL 3
611             000200                  PR4=    200             ;;PRIORITY LEVEL 4
612             000240                  PR5=    240             ;;PRIORITY LEVEL 5
613             000300                  PR6=    300             ;;PRIORITY LEVEL 6
614             000340                  PR7=    340             ;;PRIORITY LEVEL 7
615
616                                     ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
617             100000                  SW15=   100000
618             040000                  SW14=   40000
619             020000                  SW13=   20000
620             010000                  SW12=   10000
621             004000                  SW11=   4000
622             002000                  SW10=   2000
623             001000                  SW09=   1000
624             000400                  SW08=   400
625             000200                  SW07=   200
626             000100                  SW06=   100
627             000040                  SW05=   40
628             000020                  SW04=   20
629             000010                  SW03=   10
630             000004                  SW02=   4
631             000002                  SW01=   2
632             000001                  SW00=   1
633                                     .EQUIV  SW09,SW9
634                                     .EQUIV  SW08,SW8
635                                     .EQUIV  SW07,SW7
636                                     .EQUIV  SW06,SW6
637                                     .EQUIV  SW05,SW5
638                                     .EQUIV  SW04,SW4
639                                     .EQUIV  SW03,SW3
640                                     .EQUIV  SW02,SW2
641                                     .EQUIV  SW01,SW1
642                                     .EQUIV  SW00,SW0
643
644                                     ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
645             100000                  BIT15=  100000
646             040000                  BIT14=  40000
647             020000                  BIT13=  20000
648             010000                  BIT12=  10000
649             004000                  BIT11=  4000
650             002000                  BIT10=  2000
651             001000                  BIT09=  1000
652             000400                  BIT08=  400
653             000200                  BIT07=  200
654             000100                  BIT06=  100
655             000040                  BIT05=  40
656             000020                  BIT04=  20
657             000010                  BIT03=  10
658             000004                  BIT02   4
659             000002                  BIT01=  2
660             000001                  BIT00=  1
661                                     .EQUIV  BIT09,BIT9
662                                     .EQUIV  BIT08,BIT8
663                                     .EQUIV  BIT07,BIT7
664                                     .EQUIV  BIT06,BIT6
```

```
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

                        ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
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
                        .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 "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

                        ;*KERNEL "I" PAGE DESCRIPTOR REGISTERS
```

```
                        KIPDR0= 172300
                        KIPDR1= 172302
                        KIPDR2= 172304
                        KIPDR3= 172306
                        KIPDR4= 172310
                        KIPDR5= 172312
                        KIPDR6= 172314
                        KIPDR7= 172316

                        ;*KERNEL "I" PAGE ADDRESS REGISTERS

                        KIPAR0= 172340
                        KIPAR1= 172342
                        KIPAR2= 172344
                        KIPAR3= 172346
                        KIPAR4= 172350
                        KIPAR5= 172352
                        KIPAR6= 172354
                        KIPAR7= 172356

                                .EQUIV  SP,KSP
                                .EQUIV  SP,USP
                                .EQUIV  BIT4,TBIT
                                .EQUIV  BIT6,WBIT
                               KERSTK= STACK
                               USESTK= STACK-200

                        ;*ADDITIONAL DEFINITIONS
                        ;*


                        .SBTTL  TRAP CATCHER

                                .=0
                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                                .=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
                        .SBTTL  ACT11 HOOKS

                        ;;**********************************************************************
                        ;HOOKS REQUIRED BY ACT11
                                $SVPC=.                 ;SAVE PC
                                .=46
000046  034166                  $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                                .=52
000052  000000                   WORD   0               ;;2)SET LOC.52 TO ZERO
                                .=$SVPC                 ;; RESTORE PC
                        .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  001226                          $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
000210  000014                          $TSTM:  .WORD   14      ;;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  000016                                  .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
                                .SBTTL  COMMON TAGS

                                ;;*****************************************************************
                                ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
                                ;*USED IN THE PPOGRAM.

                        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 COUNT
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
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)
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          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001214  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001216  177607  000377    $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001222  077             $QUES:  .ASCII  /?/             ;;QUESTION MARK
001223  015             $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
```

```
001224  000012                  $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;*****************************************************************
                                .EVEN
001226                          $MAIL:                          ;;APT MAILBOX
001226  000000                  $MSGTY: .WORD   AMSGTY   ;;MESSAGE TYPE CODE
001230  000000                  $FATAL: .WORD   AFATAL   ;;FATAL ERROR NUMBER
001232  000000                  $TESTN: .WORD   ATESTN   ;;TEST NUMBER
001234  000000                  $PASS:  .WORD   APASS    ;;PASS COUNT
001236  000000                  $DEVCT: .WORD   ADEVCT   ;;DEVICE COUNT
001240  000000                  $UNIT:  .WORD   AUNIT    ;;I/O UNIT NUMBER
001242  000000                  $MSGAD: .WORD   AMSGAD   ;;MESSAGE ADDRESS
001244  000000                  $MSGLG: .WORD   AMSGLG   ;;MESSAGE LENGTH
001246                          $ETABLE:                        ;;APT ENVIRONMENT TABLE
001246  000                     $ENV:   .BYTE   AENV     ;;ENVIRONMENT BYTE
001247  000                     $ENVM:  .BYTE   AENVM    ;;ENVIRONMENT MODE BITS
001250  000000                  $SWREG: .WORD   ASWREG   ;;APT SWITCH REGISTER
001252  000000                  $USWR:  .WORD   AUSWR    ;;USER SWITCHES
001254  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
001256  000                     $MAMS1: .BYTE   AMAMS1   ;;HIGH ADDRESS,M.S. BYTE
001257  000                     $MTYP1: .BYTE   AMTYP1   ;;MEM. TYPE,BLK#1
                                ;*                              MEM.TYPE BYTE   --  (HIGH BYTE)
                                ;*                                      900 NSEC CORE=001
                                ;*                                      300 NSEC BIPOLAR=002
                                ;*                                      500 NSEC MOS=003
001260  000000                  $MADR1: .WORD   AMADR1   ;;HIGH ADDRESS,BLK#1
                                ;*                                MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF ''TYPE'' ABOVE
001262                          $ETEND:
                                .MEXIT

001262  000000                  TESTNO: .WORD   0               ;HOLDS TEST NUMBER FOR TYPEOUTS
001264  000000                  WASR6:  .WORD   0               ;USED TO STORE THE STACK POINTER AFTER A TRAP
001266  000000                  TRAPPC: .WORD   0               ;USED TO STORE THE PC OF A TRAP OR ABORT
001270  000000                  TRAPPS: .WORD   0               ;USED TO STORE THE PS OF A TRAP OR ABORT
001272  000000                  WASSR0: .WORD   0               ;USED TO STORE CONTENTS OF SR0
001274  000000                  WASSR2: .WORD   0               ;USED TO STORE CONTENTS OR SR2
001276  000000                  TBITPS: .WORD   0               ;SAVES THE PSW THAT MAY HAVE ITS T-BIT ON
001300  000000                  ANDADR: .WORD   0               ;HOLDS RESULT OF ADDRESSES BEING AND-ED
001302  000000                  ORADR:  .WORD   0               ;HOLDS RESULT OF ADDRESSES BEING OR-ED
001304  000000                  TONUM:  .WORD   0               ;HOLDS NUMBER OF TIME-OUTS
001306  000000                  VIRT1:  .WORD   0               ;HOLDS VIRTUAL ADDRESS TO BE CONVERTED
001310  000000                  VIRT2:  .WORD   0               ;       ''      ''      ''
001312  000000                  PBALO:  .WORD   0               ;HOLDS BITS <15:00> OF PHYSICAL ADDRESS
001314  000000                  PBAHI:  .WORD   0               ;HOLDS BITS <17:16> OF PHYSICAL ADDRESS
```

```
                                .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


001316                          $ERRTB:

                                ;*ITEM 1
001316  041162                          EM1                     ;UNEXPECTED CPU TRAP TO LOC. 004
001320  044253                          DH1                     ;OLD PC  OLD PSW R6 WAS  TESTNO  ERRORPC
001322  047460                          DT1                     ;TRAPPC, TRAPPS, WASR6, TESTNO, $ERPPC, 0
001324  050270                          DF1                     ;0,0,0,0,0

                                ;*ITEM 2
001326  041222                          EM2                     ;UNEXPECTED MEM. MGMT. TRAP TO LOC. 250
001330  044323                          DH2                     ;OLD PC  OLD PSW R6 WAS  SR0     SR2     TESTNO  ERRORPC
001332  047474                          DT2                     ;TRAPPC, TRAPPS, WASR6, WASSR0, WASSR2, TESTNO, $ERRPC,
001334  050275                          DF2                     ;0,0,0,0,0,0,0

                                ;*ITEM 3
001336  041271                          EM3                     ;PRIORITY BITS SET WRONG IN PSW
001340  044413                          DH3                     ;WROTE   READ    TESTNO  ERRORPC
001342  047514                          DT3                     ;$REG0,$REG1,TESTNO,$ERRPC,0
001344  050304                          DF3                     ;0,0,0,0

                                ;*ITEM 4
001346  041330                          EM4                     ;MODE BITS SET WRONG IN PSW
001350  044413                          DH3                     ;WROTE   READ    TESTNO  ERRORPC
001352  047514                          DT3                     ;$REG0,$REG1,TESTNO,$ERRPC,0
001354  050304                          DF3                     ;0,0,0,0

                                ;*ITEM 5
001356  041363                          EM5                     ;DUAL ADDRESSING BETWEEN HI&LO BYTES OF PSW
001360  044413                          DH3                     ;WROTE   READ    TESTNO  ERRORPC
001362  047514                          DT3                     ;$REG0,$REG1,TESTNO,$ERRPC,0
001364  050304                          DF3                     ;0,0,0,0

                                ;*ITEM 6
001366  041436                          EM6                     ;KERNEL R6 CHANGED BY WRITING USER R6
001370  044413                          DH3                     ;WROTE   READ    TESTNO  ERRORPC
001372  047514                          DT3                     ;$REG0,$REG1,TESTNO,$ERRPC,0
001374  050304                          DF3                     ;0,0,0,0

                                ;*ITEM 7
001376  041503                          EM7                     ;A MEMORY MGMT. REG. TIMED OUT
001400  044453                          DH7                     ;ADDRESS TESTNO  ERRORPC
001402  047526                          DT7                     ;$REG0,TESTNO,$ERRPC,0
```

```
 960  001404  050310                    DF7                 ;0,0,0
 961
 962                                  ;*ITEM 10
 963  001406  041541                    EM10                ;SUMMARY OF MEM. MGMT. REG. TIMEOUTS
 964  001410  044503                    DH10                ;REGISTER-ADDRS  NUM. OF
 965                                                         ;AND-ED  OR-ED   TIMOUTS TESTNO ERRORPC
 966  001412  047536                    DT10                ;ANDADR,ORADR,TONUM,TESTNO,$ERRPC,0
 967  001414  050313                    DF10                ;0,0,1,0,0
 968
 969                                  ;*ITEM 11
 970  001416  041605                    EM11                ;MEM. MGMT. REG. WOULD NOT CLEAR
 971  001420  044603                    DH11                ;REGISTR READ    READ-(BINARY)
 972                                                         ;ADDRESS (OCTAL) 5432109876543210  TESTNO  ERRORPC
 973  001422  047552                    DT11                ;$REG0,$REG1,$REG1,TESTNO,$ERRPC,0
 974  001424  050320                    DF11                ;0,0,2,0,0
 975
 976                                  ;*ITEM 12
 977  001426  041645                    EM12                ;MEM. MGMT. REG. BITS NOT SET CORRECTLY
 978  001430  044723                    DH12                ;REGISTR WROTE   READ    READ
 979                                                         ;ADDRESS (OCTAL) (OCTAL) (BINARY) TESTNO ERRORPC
 980  001432  047566                    DT12                ;$REG0,$REG1,$REG2,$REG2,TESTNO,$ERRPC,0
 981  001434  050325                    DF12                ;0,0,0,2,0,0
 982
 983                                  ;*ITEM 13
 984  001436  041714                    EM13                ;SR0 EFFECTED BY WRITE TO PSW
 985  001440  045063                    DH13                ;READ    TESTNO  ERRORPC
 986  001442  047604                    DT13                ;$REG0,TESTNO,$ERRPC,0
 987  001444  050333                    DF13                ;0,0,0
 988
 989                                  ;*ITEM 14
 990  001446  041751                    EM14                ;SR1 DID NOT READ ALL ZEROS
 991  001450  045063                    DH13                ;READ    TESTNO  ERRORPC
 992  001452  047604                    DT13                ;$REG0,TESTNO,$ERRPC,0
 993  001454  050333                    DF13                ;0,0,0
 994
 995                                  ;*ITEM 15
 996  001456  042004                    EM15                ;DUAL ADDRESSING BETWEEN BYTES OF PAR OR PDR
 997  001460  044723                    DH12                ;REGISTER WROTE   READ    READ
 998                                                         ;ADDRESS (OCTAL) (OCTAL) (BINARY) TESTNO  ERRORPC
 999  001462  047566                    DT12                ;$REG0,$REG1,$REG2,$REG2,TESTNO,$ERRPC,0
1000  001464  050325                    DF12                ;0,0,0,2,0,0
1001
1002                                  ;*ITEM 16
1003  001466  042060                    EM16                ;DUAL ADDRESSING BETWEEN PAR-PDR'S
1004  001470  045113                    DH16                ;PAR-PDR PAR-PDR
1005                                                         ;CLEARED EFFECTD EXPECTD RECEIVD TESTNO ERRORPC
1006  001472  047614                    DT16                ;$REG0,$REG1,$REG5,$REG2,TESTNO,$ERRPC,0
1007  001474  050336                    DF16                ;0,0,0,0,0,0
1008
1009                                  ;*ITEM 17
1010  001476  042122                    EM17                ;PHYS. ADDR. FORMED READ WRONG
1011  001500  045213                    DH17                ;PHYSICAL VIRTUAL
1012                                                         ;ADDRESS ADDRESS KIPAR4  TESTNO  ERRORPC
1013  001502  047632                    DT17                ;PBALO,VIRT1,$REG4,TESTNO,$ERRPC,0
1014  001504  050344                    DF17                ;3,0,0,0,0
1015
```

```
1016
1017  001506  042160                ;*ITEM 20
1018  001510  045303                        EM20    ;PHYS. ADDR. FORMED READ WRONG IN RELOCATE MODE
1019                                  DH20    ;PHYSICL PAR 4   PAR 5
                                              ;ADDRESS VBA     VBA     PAR 4   PAR 5   PSW     TESTNO
1020  001512  047646                  DT20    ;PBALO,VIRT1,VIRT2,$REG4,$REG5,$TMP0,TESTNO,$ERRPC,0
1021  001514  050351                  DF20    ;3,0,0,0,0,0,0,0
1022
1023                                  ;*ITEM 21
1024  001516  042232                        EM21    ;W-BIT DID NOT GET SET IN PDR
1025  001520  045431                  DH21    ;PDR     VIRTUAL
1026                                          ;TESTED  ADDRESS TESTNO  ERRORPC
1027  001522  047670                  DT21    ;$REG5,$REG3,TESTNO,$ERRPC,0
1028  001524  050361                  DF21    ;0,0,0,0
1029
1030                                  ;*ITEM 22
1031  001526  042267                        EM22    ;W-BIT SET IN MORE THAN ONE PDR
1032  001530  045511                  DH22    ;PDR IN  PDR     VIRTUAL
1033                                          ;ERROR   TESTED  ADDRESS TESTNO  ERRORPC
1034  001532  047702                  DT22    ;$REG0,$REG5,$REG3,TESTNO,$ERRPC,0
1035  001534  050365                  DF22    ;0,0,0,0,0
1036
1037                                  ;*ITEM 23
1038  001536  042326                        EM23    ;W-BIT NOT CLEARED BY WRITING TO PDR
1039  001540  045610                  DH23    ;PDR     TESTNO  ERRORPC
1040  001542  047716                  DT23    ;$REG5,TESTNO,$ERRPC,0
1041  001544  050372                  DF23    ;0,0,0
1042
1043                                  ;*ITEM 24
1044  001546  042372                        EM24    ;WRITING SR0 SET W-BIT IN KIPDR7
1045  001550  045640                  DH24    ;PDR WAS EXPECTD TESTNO  ERRORPC
1046  001552  047726                  DT24    ;$REG2,$REG1,TESTNO,$ERRPC,0
1047  001554  050375                  DF24    ;0,0,0,0
1048
1049                                  ;*ITEM 25
1050  001556  042432                        EM25    ;W-BIT GOT SET DURING TIMEOUT ABORT
1051  001560  045640                  DH24    ;PDR WAS EXPECTD TESTNO  ERRORPC
1052  001562  047726                  DT24    ;$REG2,$REG1,TESTNO,$ERRPC,0
1053  001564  050375                  DF24    ;0,0,0,0
1054
1055                                  ;*ITEM 26
1056  001566  042475                        EM26    ;MEMORY MGMT. ACCESS ABORT DID NOT OCCUR
1057  001570  045700                  DH26    ;PDR 4   PSW     TESTNO  ERRORPC
1058  001572  047740                  DT26    ;$REG2,$TMP0,TESTNO,$ERRPC,0
1059  001574  050375                  DF24    ;0,0,0,0
1060
1061                                  ;*ITEM 27
1062  001576  042545                        EM27    ;ACCESS ERROR DID NOT ABORT INSTRUCTION
1063  001600  045700                  DH26    ;PDR 4   PSW     TESTNO  ERRORPC
1064  001602  047740                  DT26    ;$REG2,$TMP0,TESTNO,$ERRPC,0
1065  001604  050375                  DF24    ;0,0,0,0
1066
1067                                  ;*ITEM 30
1068  001606  042614                        EM30    ;SR0 DID NOT REPORT ACCESS ERROR CORRECTLY
1069  001610  045740                  DH30    ;SR0 WAS EXPECTD PDR 4   PSW     TESTNO ERRORPC
1070  001612  047752                  DT30    ;WASSR0,$REG3,$REG2,$TMP0,TESTNO,$ERRPC,0
1071  001614  050401                  DF30    ;0,0,0,0,0,0
```

```
1072
1073                                    ;*ITEM 31
1074  001616  042666                           EM31    ;SR2 DID NOT LOCKUP CORRECT VIRTUAL ADDR.
1075  001620  046020                           DH31    ;SR2 WAS EXPECTD PDR 4   PSW     TESTNO ERRORPC
1076  001622  047770                           DT31    ;WASSR2,$REG4,$REG2,$TMP0,TESTNO,$ERRPC,0
1077  001624  050401                           DF30    ;0,0,0,0,0,0
1078
1079                                    ;*ITEM 32
1080  001626  042733                           EM32    ;PAGE LGTH. ABORT OCCURRED WHEN IT SHOULDN'T HAVE
1081  001630  046100                           DH32    ;V.B.A.  KIPDR4  SR0 WAS SR2 WAS TESTNO  ERRORPC
1082  001632  050006                           DT32    ;$REG0,$REG4,WASSR0,WASSR2,TESTNO,$ERRPC,0
1083  001634  050401                           DF30    ;0,0,0,0,0,0
1084
1085                                    ;*ITEM 33
1086  001636  043014                           EM33    ;PAGE LGTH. ABORT DID NOT OCCUR WHEN IT SHOULD HAVE
1087  001640  046160                           DH33    ;V.B.A.  KIPDR4  TESTNO  ERRORPC
1088  001642  050024                           DT33    ;$REG0,$REG4,TESTNO,$ERRPC,0
1089  001644  050375                           DF24    ;0,0,0,0
1090
1091                                    ;*ITEM 34
1092  001646  043077                           EM34    ;SR0 DID NOT REPORT PAGE LGTH. ABORT CORRECTLY
1093  001650  046220                           DH34    ;V.B.A.  KIPDR4  SR0 WAS EXPECTD TESTNO  ERRORPC
1094  001652  050036                           DT34    ;$REG0,$REG4,WASSR0,$REG2,TESTNO,$ERRPC,0
1095  001654  050401                           DF30    ;0,0,0,0,0,0
1096                                    ;*ITEM 35
1097  001656  042666                           EM31    ;SR2 DID NOT LOCKUP CORRECT VIRUAL ADDR.
1098  001660  046300                           DH35    ;V.B.A.  KIPDR4  SR2 WAS EXPECTD TESTNO  ERRORPC
1099  001662  050054                           DT35    ;$REG0,$REG4,WASSR2,$REG3,TESTNO,$ERRPC,0
1100  001664  050401                           DF30    ;0,0,0,0,0,0
1101
1102                                    ;*ITEM 36
1103  001666  042666                           EM31    ;SR2 DID NOT LOCKUP CORRECT VIRUAL ADDR.
1104  001670  046360                           DH36    ;SR2 WAS EXPECTD TESTNO  ERRORPC
1105  001672  050072                           DT36    ;WASSR2,$REG1,TESTNO,$ERRPC,0
1106  001674  050375                           DF24    ;0,0,0,0
1107
1108                                    ;*ITEM 37
1109  001676  043155                           EM37    ;SR0 OR SR2 CHANGED BY A SECOND ABORT
1110  001700  046420                           DH37    ;FIRST ABORT     SECOND ABORT
1111                                                    ;SR0 WAS SR2 WAS SR0 WAS SR2 WAS TESTNO  ERRORPC
1112  001702  050104                           DT37    ;$TMP0,$TMP2,WASSR0,WASSR2,TESTNO,$ERRPC,0
1113  001704  050401                           DF30    ^,0,0,0,0,0
1114
1115                                    ;*ITEM 40
1116  001706  043222                           EM40    ;SR0 OR SR2 WAS NOT 'RESET'' BY A RESET
1117  001710  046535                           DH40    ;SR0 WAS SR2 WAS TESTNO  ERRORPC
1118  001712  050122                           DT40    ;WASSR0,WASSR2,TESTNO,$ERRPC,0
1119  001714  050375                           DF24    ;0,0,0,0
1120
1121                                    ;*ITEM 41
1122  001716  043271                           EM41    ;SR2 NOT TRACKING CORRECTLY
1123  001720  046360                           DH36    ;SR2 WAS EXPECTD TESTNO  ERROPC
1124  001722  050072                           DT36    ;WASSR2,$REG1,TESTNO,$ERRPC,0
1125  001724  050375                           DF24    ;0,0,0,0
1126
1127                                    ;*ITEM 42
```

```
1128  001726  043324                    EM42        ;DID NOT TRAP THRU KERNEL SPACE
1129  001730  046575                    DH42        ;PSW WAS R6 WAS  TESTNO  ERRORPC
1130  001732  050134                    DT42        ;$REG1,$REG2,TESTNO,$ERRPC,0
1131  001734  050375                    DF24        ;0,0,0,0
1132
1133                              ;*ITEM 43
1134  001736  043363                    EM43        ;KT ERROR NOT SERVICED ON TIMEOUT ERROR
1135  001740  045610                    DH23        ;PDR     TESTNO  ERRORPC
1136  001742  047716                    DT23        ;$REG5,TESTNO,$ERRPC,0
1137  001744  050372                    DF23        ;0,0,0
1138
1139                              ;*ITEM 44
1140  001746  043432                    EM44        ;SR0 OR SR2 CHANGED BY TIMEOUT ERROR
1141  001750  046635                    DH44        ;EXPECTED         RECEIVED
1142                                                ;SR0     SR2      SR0 WAS SR2 WAS TESTNO  ERRORPC
1143  001752  050146                    DT44        ;$REG0,$REG1,WASSR0,WASSR2,TESTNO,$ERRPC,0
1144  001754  050401                    DF30        ;0,0,0,0,0,0
1145
1146                              ;*ITEM 45
1147  001756  043476                    EM45        ;ERROR DURING 'DOUBLE ERROR'' (KT & ODD ADDR.)
1148  001760  046747                    DH45        ;EXPECTED:
1149                                                ;PSW     PC        SR0      SR2
1150                                                ;170017  (3$+4)  020147  (3$)
1151                                                ;RECEIVED
1152                                                ;PSW     PC        SR0      SR2      TESTNO  ERRORPC
1153  001762  050164                    DT45        ;$REG1,$REG3,WASSR0,WASSR2,TESTNO,$ERRPC,0
1154  001764  050401                    DF30        ;0,0,0,0,0,0
1155
1156                              ;*ITEM 46
1157  001766  043551                    EM46        ;MFPI INSTRUCTION PUSHED WRONG DATA
1158  001770  047144                    DH46        ;DATA    DATA
1159                                                ;EXPECTD RECEIVD TESTNO  ERRORPC
1160  001772  050202                    DT46        ;$REG0,$REG1,TESTNO,$ERRPC,0
1161  001774  050407                    DF46        ;0,0,0,0
1162
1163                              ;*ITEM 47
1164  001776  043614                    EM47        ;MTPI INSTRUCTION LOADED WRONG DATA
1165  002000  047144                    DH46        ;DATA    DATA
1166                                                ;EXPECTD RECEIVD TESTNO  ERRORPC
1167  002002  050202                    DT46        ;$REG0,$REG1,TESTNO,$ERRPC,0
1168  002004  050407                    DF46        ;0,0,0,0
1169
1170                              ;*ITEM 50
1171  002006  043657                    EM50        ;STACK NOT PUSHED BY MFPI-MTPI
1172  002010  047221                    DH50        ;TESTNO  ERRORPC
1173  002012  050214                    DT50        ;TESTNO,$ERRPC,0
1174  002014  050413                    DF50        ;0,0
1175
1176                              ;*ITEM 51
1177  002016  043715                    EM51        ;KERNEL PAGE ACCESSED INSTEAD OF USER: MFPI-MTPI
1178  002020  047241                    DH51        ;SR0 WAS SR2 WAS TESTNO  ERRORPC
1179  002022  050222                    DT51        ;WASSR0,WASSR2,TESTNO,$ERRPC,0
1180  002024  050415                    DF51        ;0,0,0,0
1181
1182                              ;*ITEM 52
1183  002026  043773                    EM52        ;WRONG PDR'S REFERENCED WHILE IN RELOCATE MODE
```

```
1184  002030  047301                    DH52          ;PHYSICL PAR 4
1185                                                  ;ADDRESS V.B.A.  PAR 4   SR0 WAS SR2 WAS PSW    TESTNO
1186  002032  050234                    DT52          ;PBALO,VIRT1,$REG4,WASSR0,WASSR2,$TMP0,TESTNO,$ERRPC,0
1187  002034  050421                    DF52          ;3,0,0,0,0,0,0,0
1188                              ;*ITEM 53
1189  002036  044051                    EM53          ;MFPD INSTRUCTION PUSHED WRONG DATA
1190  002040  047144                    DH46          ;DATA    DATA
1191                                                  ;EXPECTD RECEIVD TESTNO  ERRORPC
1192  002042  050202                    DT46          ;$REG0,$REG1,TESTNO,$ERRPC,0
1193  002044  050407                    DF46          ;0,0,0,0
1194
1195                              ;*ITEM 54
1196  002046  044114                    EM54          ;STACK NOT PUSHED BY MFPD-MTPD
1197  002050  047221                    DH50          ;TESTNO  ERRORPC
1198  002052  050214                    DT50          ;TESTNO,$ERRPC,0
1199  002054  050413                    DF50          ;0,0
1200
1201                              ;*ITEM 55
1202  002056  044152                    EM55          ;PAR OR PDR WAS CHANGED BY A RESET
1203  002060  044603                    DH11          ;REGISTR READ    READ-(BINARY)
1204                                                  ;ADDRESS (OCTAL) 5432109876543210  TESTNO  ERRORPC
```

```
1205  002062  047552                    DT11                    ;$REG0,$REG1,$REG1,TESTNO,$ERRPC,0
1206  002064  050320                    DF11                    ;0,0,2,0,0
1207
1208                                ;*ITEM 56
1209  002066  044210                    EM56                    ;PSW CHANGED BY AN RTI IN USER MODE
1210  002070  047417                    DH56                    ;PSW WAS EXPECTD TESTNO  ERRORPC
1211  002072  050256                    DT56                    ;$REG1,$REG2,TESTNO,$ERRPC,0
1212  002074  050431                    DF56                    ;0,0,0,0
1213
1214
```

```
                        .SBTTL  *****   TRAP HANDLING ROUTINES  *****

                        .SBTTL  CPU TRAP HANDLER ROUTINE
                        ;;*****************************************************************
                        ;*
                        ;*      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.
                        ;*
                        ;;*****************************************************************
002076  005227          TIMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
002100  177777          TIMFLG: .WORD   -1              ;NEGATIVE ONE FOR "HAVE ENTERED" FLAG
002102  001403                  BEQ     1$              ;BRANCH IF FIRST TIME IN
002104  005237  001226          INC     $MSGTYPE        ;TELL APT THERE WAS AN ERROR
002110  000000                  HALT                    ;STOP! - I'VE ENTERED THIS ROUTINE
                                                        ;A SECOND TIME BEFORE I FINISHED
                                                        ;REPORTING THE FIRST ERROR.  THE
                                                        ;SECOND ENTRY ADDRESS SHOULD BE ON
                                                        ;THE KERNEL STACK.
002112  012637  001266  1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
002116  012637  001270          MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
002122  010637  001264          MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
002126  104001                  ERROR   1               ;UNEXPECTED TRAP OR ABORT TO LOC. 4
002130  012737  177777  002100  MOV     #-1,TIMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
002136  013746  001270          MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
002142  013746  001266          MOV     TRAPPC,-(KSP)
002146  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.
                        ;*
                        ;;*****************************************************************
002150  005227          MGMERR: INC     (PC)+           ;MAKE FLAG ZERO IF FIRST TIME THRU
002152  177777          MGMFLG: .WORD   -1              ;NEGATIVE ONE FOR "HAVE ENTERED" FLAG
002154  001403                  BEQ     1$              ;BRANCH IF FIRST TIME IN
002156  005237  001226          INC     $MSGTYPE        ;TELL APT THERE WAS AN ERROR
002162  000000                  HALT                    ;STOP! - I'VE ENTERED THIS ROUTINE
                                                        ;A SECOND TIME BEFORE I FINISHED
                                                        ;REPORTING THE FIRST ERROR.  THE
                                                        ;SECOND ENTRY ADDRESS SHOULD BE ON
                                                        ;THE KERNEL STACK.
002164  012637  001266  1$:     MOV     (KSP)+,TRAPPC   ;SAVE PC+2 AT TIME OF ABORT
002170  012637  001270          MOV     (KSP)+,TRAPPS   ;SAVE PS AT TIME OF ABORT
002174  010637  001264          MOV     KSP,WASR6       ;SAVE STACK POINTER VALUE
002200  013737  177572  001272  MOV     SR0,WASSR0      ;SAVE CONTENTS OF KT STATUS REG. 0
002206  013737  177576  001274  MOV     SR2,WASSR2      ;SAVE CONTENTS OF KT STATUS REG. 2
002214  042737  160000  177572  BIC     #160000,SR0     ;CLEAR ERROR BITS IN STATUS REG 0
002222  104002                  ERROR   2               ;UNEXPECTED TRAP OR ABORT TO LOC. 250
002224  012737  177777  002152  MOV     #-1,MGMFLG      ;MAKE FLAG NEGATIVE ONE FOR NEXT TIME
```

```
1271  002232  013746  001270          MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
1272  002236  013746  001266          MOV     TRAPPC,-(KSP)
1273  002242  000006                  RTI                     ;RETURN FROM INTERRUPT OR ABORT.
1274
```

```
                                                .SBTTL
                                                .SBTTL  *****   STARTING POINT OF TEST  *****
                                                .SBTTL  *****   STARTING ADDRESS OF 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  034304  000020                  MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
020026  012737  000340  000022                  MOV     #340,@#IOTVEC+2 ;;LEVEL 7
020034  012737  034564  000030                  MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
020042  012737  000340  000032                  MOV     #340,@#EMTVEC+2 ;;LEVEL 7
020050  012737  040646  000034                  MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
020056  012737  000340  000036                  MOV     #340,@#TRAPVEC+2;LEVEL 7
020064  012737  040734  000024                  MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
020072  012737  000340  000026                  MOV     #340,@#PWRVEC+2 ;;LEVEL 7
020100  013737  034016  034010                  MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
020106  005037  001212                          CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
020112  005037  001214                          CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
020116  112737  000001  001115                  MOVB    #1,$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'' OP ''RTT''.
020124  012737  034270  000014                  MOV     #$RTRN,@#TBITVEC ;;SET ''T'' BIT VECTOR TO $RTRN
020132  012737  000340  000016                  MOV     #340,@#TBITVEC+2 ;;LEVEL 7
020140  012737  000002  034270                  MOV     #RTI,$RTRN      ;;SET $RTRN TO A RTI
020146  012737  020174  000010                  MOV     #65$,@#RESVEC   ;;TRY TO DO A RTT
020154  005046                                  CLR     -(SP)           ;;DUMMY PS
020156  012746  020164                          MOV     #64$,-(SP)      ;;AND PC
020162  000006                                  RTT                     ;;TRY THE RTT
020164  012737  000006  034270  64$:     MOV     #RTT,$RTRN      ;;RTT IS LEGAL--SET $RTRN TO A RTT
020172  000402                                  BR      66$
020174  062706  000010          65$:     ADD     #10,SP          ;;RTT ILLEGAL--CLEAN OFF THE STACK
020200  012737  000012  000010  66$:     MOV     #RESVEC+2,@#RESVEC ;;RESTORE TRAP CATCHER
020206  005037  034276                          CLR     $TBIT           ;;CLEAR ''T'' BIT SWITCH
020212  012737  020212  001106                  MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
020220  012737  020220  001110                  MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
                                        ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                        ;;EQUAL TO A ''-1'', SETUP FOR A SOFTWARE SWITCH REGISTER.
020226  013746  000004                          MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
020232  012737  020266  000004                  MOV     #67$,@#ERRVEC   ;;SET UP ERROR VECTOR
020240  012737  177570  001140                  MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
020246  012737  177570  001142                  MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
020254  022777  177777  160656                  CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
020262  001012                                  BNE     69$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                        ;;AND  THE HARDWARE SWR IS NOT = -1
020264  000403                                  BR      68$             ;;BRANCH IF NO TIMEOUT
020266  012716  020274          67$:     MOV     #68$,(SP)       ;;SET UP FOR TRAP RETURN
020272  000002                                  RTI
020274  012737  000176  001140  68$:     MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
020302  012737  000174  001142                  MOV     #DISPREG,DISPLAY
```

```
1331  020310  012637  000004          69$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1332
1333  020314  005037  001234                  CLR     $PASS           ;;CLEAR PASS COUNT
1334  020320  132737  000200  001247          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
1335  020326  001403                          BEQ     70$             ;;YES,USE NON-APT SWITCH
1336  020330  012737  001250  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
1337  020336                                  70$:
1338                                          ;; INITIALIZE THE ERROR COUNTER FOR EOP REPORT($ERTTL).
1339  020336  005037  001112                  CLR     $ERTTL          ;CLEAR ERROR COUNTER
1340                                          .SBTTL  TYPE PROGRAM NAME
1341                                          ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
1342  020342  005227  177777                  INC     #-1             ;;FIRST TIME?
1343  020346  001046                          BNE     71$             ;;BRANCH IF NO
1344  020350  022737  034166  000042          CMP     #$ENDAD,@#42    ;;ACT-11?
1345  020356  001442                          BEQ     71$             ;;BRANCH IF YES
1346  020360  104401  020426                  TYPE    ,72$            ;;TYPE ASCIZ STRING
1347                                          .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
1348  020364  005737  000042                  TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
1349  020370  001012                          BNE     73$             ;;BRANCH IF YES
1350  020372  123727  001246  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
1351  020400  001406                          BEQ     73$             ;;BRANCH IF YES
1352  020402  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
1353  020410  001005                          BNE     74$             ;;BRANCH IF NO
1354  020412  104407                          GTSWR                   ;;GET SOFT-SWR SETTINGS
1355  020414  000403                          BR      74$
1356  020416  112737  000001  001134  73$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
1357  020424                                  74$:
1358  020424  000417                          BR      71$             ;;GET OVER THE ASCIZ
1359                                          ;;72$:  .ASCIZ  <CRLF>#CJKDADO KTF11-AA MMU DIAG.#<CRLF>
1360  020464                                  71$:
1361
1362  020464                                  RESTRT:
1363  020464  012706  001100          LOOP:   MOV     #STACK,KSP      ;INITIALIZE THE STACK POINTER
1364  020470  012737  002076  000004          MOV     #TIMERR,ERRVEC  ;LOAD CPU SERVICE ROUTINE INTO TRAP VECTOR
1365  020476  012737  000340  000006          MOV     #340,ERRVEC+2   ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
1366  020504  012737  002150  000250          MOV     #MGMERR,MMVEC   ;LOAD MEMORY MANAGENT ROUTINE INTO VECTOR
1367  020512  012737  000340  000252          MOV     #340,MMVEC+2    ;SET NEW PS TO PRIORITY LEVEL 7-KERNEL
1368  020520  012700  177777                  MOV     #-1,R0          ;PUT -1 INTO R0 TO INITIALIZE FLAGS
1369  020524  010037  002100                  MOV     R0,TIMFLG       ;INITIALIZE CPU ERROR FLAG
1370  020530  010037  002152                  MOV     R0,MGMFLG       ;INITIALIZE MEMORY MANAGEMENT ERROR FLAG
1371  020534  012737  000340  001276          MOV     #340,TBITPS     ;INITIALIZE LOG THAT HOLDS T-BIT PSW
1372  020542  005037  177572                  CLR     SR0             ;BE SURE MEM. MGMT IS OFF TO START WITH
1373
```

```
1374
1375
1376                                    ;;*****************************************************************
1377                                    ;*TEST 1        PSW PRIORITY BIT TEST
1378                                    ;*
1379                                    ;*      THIS TEST READS AND WRITES THE PROCESSOR STATUS WORD <7:5> 'PRIORITY BITS''
1380                                    ;*      TO SEE THAT SOME OF THE BASIC 'DATA PATH'' LOGIC IS WORKING.
1381                                    ;*
1382                                    ;;*****************************************************************
1383  020546  000004                    TST1:   SCOPE
1384  020550  012737  020560  001110    1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1385  020556  005000                            CLR     R0              ;INITIALIZE R0 WITH PRIORITY=0 DATA
1386  020560  005001                    2$:     CLR     R1              ;PREPARE R1 TO ACCEPT DATA READ
1387  020562  106400                            MTPS    R0              ;WRITE PRIORITY BITS IN THE PSW
1388  020564  106701                            MFPS    R1              ;READ BACK THE LOW BYTE OF PSW
1389  020566  042701  177437                    BIC     #177437,R1      ;MASK OFF EVERYTHING EXCEPT PRIORITY BITS
1390  020572  020001                            CMP     R0,R1           ;WAS CORRECT PRIORITY SET IN THE PSW?
1391  020574  001401                            BEQ     3$              ;BRANCH IF YES
1392  020576  104003                            ERROR   3               ;PRIORITY BITS SET WRONG IN PSW
1393                                                                    ;FOR TIGHTER SCOPE LOOP
1394                                                                    ;REPLACE ERROR CALL WITH
1395                                                                    ;'BR 2$'' = 000770
1396  020600  062700  000040            3$:     ADD     #40,R0          ;CHANGE DATA TO NEXT PRIORITY
1397  020604  022700  000400                    CMP     #400,R0         ;HAVE PRIORITIES 0-7 ALL BEEN CHECKED?
1398  020610  001363                            BNE     2$              ;BRANCH IF NO
1399  020612  012737  020550  001110            MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1400
1401                                    ;;*****************************************************************
1402                                    ;*TEST 2        PSW MODE BIT TEST
1403                                    ;*      THIS TEST READS AND WRITES THE PROCESSOR STATUS WORD <15:12> 'MODE BITS''
1404                                    ;*
1405                                    ;;*****************************************************************
1406  020620  000004                    TST2:   SCOPE
1407  020622  012737  020632  001110    1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1408  020630  005000                            CLR     R0              ;INITIALIZE R0 WITH MODE BITS = 0000
1409  020632  005037  177776            2$:     CLR     PSW             ;INITIALIZE PSW
1410  020636  050037  177776                    BIS     R0,PSW          ;BIT SET THE PSW MODE BITS WITH R0
1411  020642  013701  177776                    MOV     PSW,R1          ;READ BACK THE CONTENTS OF THE PSW
1412  020646  042701  007777                    BIC     #007777,R1      ;MASK OFF EVERYTHING EXCEPT THE MODE BITS
1413  020652  020001                            CMP     R0,R1           ;WERE THE MODE BITS SET CORRECTLY?
1414  020654  001403                            BEQ     3$              ;BRANCH IF YES
1415  020656  005037  177776                    CLR     PSW             ;CLEAR PSW FOR ERROR REPORT
1416  020662  104004                            ERROR   4               ;MODE BITS SET WRONG IN PSW
1417                                                                    ;FOR TIGHTER SCOPE LOOP
1418                                                                    ;REPLACE ERROR CALL WITH
1419                                                                    ;'BR 2$'' = 000763
1420  020664  062700  010000            3$:     ADD     #10000,R0       ;CHANGE MODE BIT DATA
1421  020670  001360                            BNE     2$              ;BRANCH IF STILL MORE COMBINATIONS
1422  020672  012737  020622  001110            MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1423  020700  005037  177776                    CLR     PSW             ;RESET PSW BEFORE LEAVING
1424
1425                                    ;;*****************************************************************
1426                                    ;*TEST 3        BYTE ADDRESSING TEST FOR PSW
1427                                    ;*
1428                                    ;*      THIS TEST WRITES THE HIGH AND LOW BYTES OF THE PROCESSOR STATUS WORD
1429                                    ;*      AND READS THEM BACK TO BE SURE THEY CAN BE WRITTEN INDEPENDENTLY.
```

```
1430                                        ;*
1431                                        ;;*****************************************************************
1432  020704  000004                        TST3:   SCOPE
1433  020706  012737  020714  001110        1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1434  020714  005037  177776               2$:     CLR     PSW             ;CLEAR THE PSW
1435  020720  012700  000360                       MOV     #360,R0         ;PUT THE HIGH BYTE DATA INTO R0
1436  020724  110037  177777                       MOVB    R0,PSW+1        ;WRITE THE HIGH BYTE OF THE PSW
1437  020730  013701  177776                       MOV     PSW,R1          ;READ BACK THE ENTIRE PSW
1438  020734  042701  007437                       BIC     #007437,R1      ;MASK OFF THE T & CC BITS
1439  020740  000300                             SWAB    R0              ;GET DATA WRITTEN IN HIGH BYTE OF R0
1440  020742  020001                             CMP     R0,R1           ;WAS THE PSW WRITTEN TO CORRECTLY
1441  020744  001403                             BEQ     3$              ;BRANCH IF YES
1442  020746  005037  177776                     CLR     PSW             ;CLEAR PSW FOR ERROR REPORT
1443  020752  104005                             ERROR   5               ;LOW BYTE EFFECTED BY WRITE TO HIGH BYTE OF PSW
1444                                                                      ;FOR TIGHTER SCOPE LOOP
1445                                                                      ;REPLACE ERROR CALL WITH
1446                                                                      ;'BR 2$'' = 000760
1447  020754  012737  020762  001110        3$:     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
1448  020762  005037  177776               4$:     CLR     PSW             ;CLEAR THE PSW
1449  020766  012700  000340                       MOV     #340,R0         ;PUT THE LOW BYTE DATA INTO R0
1450  020772  110037  177776                       MOVB    R0,PSW          ;WRITE THE LOW BYTE OF THE PSW
1451  020776  013701  177776                       MOV     PSW,R1          ;READ BACK THE ENTIRE PSW
1452  021002  042701  007437                       BIC     #007437,R1      ;MASK OFF THE T&CC BITS
1453  021006  020001                             CMP     R0,R1           ;WAS PSW WRITTEN TO CORRECTLY
1454  021010  001403                             BEQ     5$              ;BRANCH IF YES
1455  021012  005037  177776                     CLR     PSW             ;CLEAR PSW FOR ERROR REPORT
1456  021016  104005                             ERROR   5               ;HIGH BYTE EFFECTED BY WRITE TO LOW BYTE OF PSW
1457                                                                      ;FOR TIGHTER SCOPE LOOP
1458                                                                      ;REPLACE ERROR CALL WITH
1459                                                                      ;'BR 2$'' = 000736
1460  021020  012737  020706  001110        5$:     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1461
1462                                        ;;*****************************************************************
1463                                        ;*TEST 4        TEST AND SETUP OF STACK POINTERS
1464                                        ;*
1465                                        ;*      THIS TEST SETS THE USER AND KERNEL STACK POINTERS FOR THE
1466                                        ;*      REST OF THE PROGRAM AND MAKES SURE THEY ARE INDEPENDENT OF
1467                                        ;*      EACH OTHER.  KERNEL R6 IS SET TO 1100, USER R6 IS SET TO 700, THEN
1468                                        ;*      KERNEL R6 IS READ TO BE SURE ITS STILL 1100.
1469                                        ;*
1470                                        ;;*****************************************************************
1471  021026  000004                        TST4:   SCOPE
1472  021030  005037  177776                       CLR     PSW             ;GO TO KERNEL MODE
1473  021034  012706  001100                       MOV     #KERSTK,KSP     ;SET KERNEL STACK POINTER TO 1100
1474  021040  012737  140000  177776               MOV     #140000,PSW     ;GO TO USER MODE
1475  021046  012706  000700                       MOV     #USESTK,USP     ;SET USER STACK POINTER TO 700
1476  021052  005037  177776                       CLR     PSW             ;BACK TO KERNEL MODE
1477  021056  022706  001100                       CMP     #KERSTK,KSP     ;IS KERNEL R6 STILL 1100?
1478  021062  001404                             BEQ     TST5            ;;BRANCH IF KERNEL R6 IS OKAY
1479  021064  012700  001100                       MOV     #KERSTK,R0      ;SAVE DATA WRITTEN FOR ERROR REPORT
1480  021070  010601                             MOV     KSP,R1          ;SAVE DATA READ AFTER USER R6 WAS WRITTEN
1481  021072  104006                             ERROR   6               ;KERNEL R6 CHANGED BY WRITING USER R6
1482                                                                      ;FOR TIGHTER SCOPE LOUP
1483                                                                      ;REPLACE ERROR CALL WITH
1484                                                                      ;000756
1485
```

```
                        ;;*****************************************************************
                        ;*
                        ;*      THE NEXT FIVE (5) TESTS WILL TRY TO ADDRESS ALL OF THE
                        ;*      MEMORY MANAGEMENT REGISTERS (SR0,SR1,SR2,SR3,KERNEL & USER PAR/PDR'S).
                        ;*      EVERY TIME A REGISTER TIMES OUT ITS ADDRESS WILL BE REPORTED.
                        ;*      AT THE END OF EACH TEST A SUMMARY OF THE ADDRESSES THAT TIMED
                        ;*      OUT DURING THAT TEST IS GIVEN.  THE RESULTS OF ''AND-ING'' AND 'OR-ING''
                        ;*      THEIR ADDRESSES IS GIVEN TO SHOW WHICH ADDRESS LINES MAY BE
                        ;*      STUCK AT 0 OR 1.  THE PAR/PDR ADDRESS AND KT MUX'S ARE THE
                        ;*      THINGS BEING CHECKED.
                        ;*
                        ;;*****************************************************************


                        ;;*****************************************************************
                        ;*TEST 5        SR0,SR1,SR2,SR3 TIMEOUT TEST
                        ;*
                        ;*      THIS TEST ADDRESSES THE MEMORY MANAGEMENT STATUS REGISTERS
                        ;*      0,1,2, AND 3.  STATUS REG. 1 IS NOT USED BUT SHOULD STILL
                        ;*      RESPOND TO ITS UNIBUS ADDRESS.  DATA WILL BE WRITTEN OR READ
                        ;*      FROM THESE REGISTERS IN LATER TESTS, THIS TEST JUST CHECK
                        ;*      FOR A RESPONSE.
                        ;*
                        ;;*****************************************************************
021074  000004         T5ST5:  SCOPE

021076  012737  021140  001110  1$:    MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
021104  012737  021202  000004        MOV     #5$,@#4         ;SET TIMEOUT VECTOR TO 5$
021112  012700  177572                MOV     #SR0,R0         ;LOAD R0 WITH ADDRESS OF FIRST REG.
021116  012701  000003                MOV     #3,R1           ;LOAD R1 WITH THE LOOP COUNT
021122  012737  177777  001300        MOV     #-1,ANDADR      ;INITIALIZE ''AND'' OF ADDRS. LOC.
021130  005037  001302                CLR     ORADR           ;INITIALIZE 'OR'' OF ADDRS. LOC.
021134  005037  001304                CLR     TONUM           ;INITIALIZE 'TIMEOUTS'' COUNTER
021140  005710                2$:     TST     (R0)            ;TRY ADDRESSING A STATUS REGISTER
                                                              ;IF IT TIMES OUT GO TO 5$
021142  062700  000002        3$:     ADD     #2,R0           ;PUT NEXT ADDRESS IN R0
021146  077104                        SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
021150  005737  172516                TST     @#172516        ;CHECK SR3 FOR RESPONSE
                                                              ;IF IT TIMES OUT GO TO 5$
021154  012737  021076  001110        MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
021162  005737  001304                TST     TONUM           ;DID ANY OF THE STATUS REG.S TIMEOUT?
021166  001401                        BEQ     4$              ;BRANCH IF NO
021170  104010                        ERROR   10              ;SUMMARY OF STATUS REG. TIMEOUTS
021172  012737  002076  000004  4$:   MOV     #TIMERR,@#4     ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
021200  000414                        BR      TST6            ;;GO TO NEXT TEST

021202  062706  000004        5$:     ADD     #4,KSP          ;CLEAN UP THE STACK
021206  104007                        ERROR   7               ;ONE OF THE STATUS REGS. TIMED OUT
                                                              ;FOR TIGHTER SCOPE LOOP
                                                              ;REPLACE ERROR CALL WITH
                                                              ;''BR 2$'' = 000756
021210  010002                        MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
021212  050237  001302                BIS     R2,ORADR        ;''OR'' IT WITH OTHER ADDRS. THAT TIMED OUT
021216  005102                        COM     R2              ;''AND'' IT WITH OTHER ADDRS. THAT TIMED OUT
021220  040237  001300                BIC     R2,ANDADR
021224  005237  001304                INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
```

```
1542  021230  000744                          BR      3$              ;BRANCH BACK TO TEST THE NEXT ADDR.
1543
1544                                  ;;*****************************************************************
1545                                  ;*TEST 6        KERNEL PAR'S TIMEOUT TEST
1546                                  ;*
1547                                  ;*      THIS TEST ADDRESSES THE EIGHT (8) KERNEL PAGE ADDRESS
1548                                  ;*      REGISTERS (KIPAR0-KIPAR7) AND CHECKS THAT SOMETHING
1549                                  ;*      RESPONDS TO THEIR ADDRESSES.
1550                                  ;*
1551                                  ;;*****************************************************************
1552  021232  000004                  TST6:   SCOPE
1553
1554  021234  012737  021276  001110  1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1555  021242  012737  021334  000004          MOV     #5$,@#4         ;SET TIMEOUT VECTOR TO 5$
1556  021250  012700  172340                  MOV     #KIPAR0,R0      ;LOAD R0 WITH ADDRESS OF FIRST REG.
1557  021254  012701  000010                  MOV     #10,R1          ;LOAD R1 WITH LOOP COUNT (8)
1558  021260  012737  177777  001300          MOV     #-1,ANDADR      ;INITIALIZE ''AND'' OF ADDR. LOC
1559  021266  005037  001302                  CLR     ORADR           ;INITIALIZE ''OR'' OF ADDR. LOC.
1560  021272  005037  001304                  CLR     TONUM           ;INITIALIZE ''TIMEOUTS'' COUNTER
1561  021276  005710                  2$:     TST     (R0)            ;TRY ADDRESSING A KIPAR
1562                                                                  ;IF IT TIMES OUT, WILL GO TO 5$
1563  021300  062700  000002          3$:     ADD     #2,R0           ;PUT NEXT KIPAR ADDRESS IN R0
1564  021304  077104                          SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
1565  021306  012737  021234  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1566  021314  005737  001304                  TST     TONUM           ;DID ANY OF THE KIPARS TIME OUT?
1567  021320  001401                          BEQ     4$              ;BRANCH IF NO
1568  021322  104010                          ERROR   10              ;SUMMARY OF KIPAR TIMEOUTS
1569  021324  012737  002076  000004  4$:     MOV     #TIMERR,@#4     ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
1570  021332  000414                          BR      TST7            ;;GO TO NEXT TEST
1571
1572  021334  062706  000004          5$:     ADD     #4,KSP          ;CLEAN UP THE STACK
1573  021340  104007                          ERROR   7               ;ONE OF THE KIPARS TIMED OUT
1574                                                                  ;FOR TIGHTER SCOPE LOOP
1575                                                                  ;REPLACE ERROR CALL WITH
1576                                                                  ;''BR 2$'' = 000756
1577  021342  010002                          MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
1578  021344  050237  001302                  BIS     R2,ORADR        ;''OR'' IT WITH OTHER ADDRS. THAT TIMED OUT
1579  021350  005102                          COM     R2              ;''AND'' IT WITH OTHER ADDRS. THAT TIMED OUT
1580  021352  040237  001300                  BIC     R2,ANDADR
1581  021356  005237  001304                  INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
1582  021362  000746                          BR      3$              ;BRANCH BACK TO TEST THE NEXT KIPAR
1583
1584                                  ;;*****************************************************************
1585                                  ;*TEST 7        KERNEL PDR'S TIMEOUT TEST
1586                                  ;*
1587                                  ;*      THIS TEST ADDRESSES THE EIGHT (8) KERNEL PAGE DESCRIPTOR
1588                                  ;*      REGISTERS (KIPDR0-KIPDR7) AND CHECKS THAT SOMETHING
1589                                  ;*      RESPONDS TO THEIR ADDRESSES.
1590                                  ;*
1591                                  ;;*****************************************************************
1592  021364  000004                  TST7:   SCOPE
1593
1594  021366  012737  021430  001110  1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1595  021374  012737  021466  000004          MOV     #5$,@#4         ;SET TIMEOUT VECTOR TO 5$
1596  021402  012700  172300                  MOV     #KIPDR0,R0      ;LOAD R0 WITH ADDRESS OF FIRST REG.
1597  021406  012701  000010                  MOV     #10,R1          ;LOAD R1 WITH LOOP COUNT (8)
```

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1598  021412  012737  177777  001300          MOV     #-1,ANDADR      ;INITIALIZE ''AND'' OF ADDR. LOC
1599  021420  005037  001302                  CLR     ORADR           ;INITIALIZE ''OR'' OF ADDR. LOC.
1600  021424  005037  001304                  CLR     TONUM           ;INITIALIZE ''TIMEOUTS'' COUNTER
1601  021430  005710                  2$:     TST     (R0)            ;TRY ADDRESSING A KIPDR
1602                                                                  ;IF IT TIMES OUT, WILL GO TO 5$
1603  021432  062700  000002          3$:     ADD     #2,R0           ;PUT NEXT KIPDR ADDRESS IN R0
1604  021436  077104                          SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
1605  021440  012737  021366  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1606  021446  005737  001304                  TST     TONUM           ;DID ANY OF THE KIPDRS TIME OUT?
1607  021452  001401                          BEQ     4$              ;BRANCH IF NO
1608  021454  104010                          ERROR   10              ;SUMMARY OF KIPDR TIMEOUTS
1609  021456  012737  002076  000004  4$:     MOV     #TIMERR,@#4     ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
1610  021464  000414                          BR      TST10           ;;GO TO NEXT TEST
1611
1612  021466  062706  000004          5$:     ADD     #4,KSP          ;CLEAN UP THE STACK
1613  021472  104007                          ERROR   7               ;ONE OF THE KIPDRS TIMED OUT
1614                                                                  ;FOR TIGHTER SCOPE LOOP
1615                                                                  ;REPLACE ERROR CALL WITH
1616                                                                  ;''BR 2$'' = 000756
1617  021474  010002                          MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
1618  021476  050237  001302                  BIS     R2,ORADR        ;''OR'' IT WITH OTHER ADDRS. THAT TIMED OUT
1619  021502  005102                          COM     R2              ;''AND'' IT WITH OTHER ADDRS. THAT TIMED OUT
1620  021504  040237  001300                  BIC     R2,ANDADR
1621  021510  005237  001304                  INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
1622  021514  000746                          BR      3$              ;BRANCH BACK TO TEST THE NEXT KIPDR
1623
1624                                  ;;**************************************************************
1625                                  ;*TEST 10       USER PAR'S TIMEOUT TEST
1626                                  ;*
1627                                  ;*      THIS TEST ADDRESSES THE EIGHT (8) USER PAGE ADDRESS
1628                                  ;*      REGISTERS (UIPAR0-UIPAR7) AND CHECKS THAT SOMETHING
1629                                  ;*      RESPONDS TO THEIR ADDRESSES.
1630                                  ;*
1631                                  ;;**************************************************************
1632  021516  000004                  TST10:  SCOPE
1633
1634  021520  012737  021562  001110  1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
1635  021526  012737  021620  000004          MOV     #5$,@#4         ;SET TIMEOUT VECTOR TO 5$
1636  021534  012700  177640                  MOV     #UIPAR0,R0      ;LOAD R0 WITH ADDRESS OF FIRST REG.
1637  021540  012701  000010                  MOV     #10,R1          ;LOAD R1 WITH LOOP COUNT (8)
1638  021544  012737  177777  001300          MOV     #-1,ANDADR      ;INITIALIZE ''AND'' OF ADDR. LOC
1639  021552  005037  001302                  CLR     ORADR           ;INITIALIZE ''OR'' OF ADDR. LOC.
1640  021556  005037  001304                  CLR     TONUM           ;INITIALIZE ''TIMEOUTS'' COUNTER
1641  021562  005710                  2$:     TST     (R0)            ;TRY ADDRESSING A UIPAR
1642                                                                  ;IF IT TIMES OUT, WILL GO TO 5$
1643  021564  062700  000002          3$:     ADD     #2,R0           ;PUT NEXT UIPAR ADDRESS IN R0
1644  021570  077104                          SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
1645  021572  012737  021520  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1646  021600  005737  001304                  TST     TONUM           ;DID ANY OF THE UIPARS TIME OUT?
1647  021604  001401                          BEQ     4$              ;BRANCH IF NO
1648  021606  104010                          ERROR   10              ;SUMMARY OF UIPAR TIMEOUTS
1649  021610  012737  002076  000004  4$:     MOV     #TIMERR,@#4     ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
1650  021616  000414                          BR      TST11           ;;GO TO NEXT TEST
1651
1652  021620  062706  000004          5$:     ADD     #4,KSP          ;CLEAN UP THE STACK
1653  021624  104007                          ERROR   7               ;ONE OF THE UIPARS TIMED OUT
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```
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 2$' = 000756
021626  010002                  MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
021630  050237  001302            BIS     R2,ORADR        ;'OR' IT WITH OTHER ADDRS. THAT TIMED OUT
021634  005102                  COM     R2              ;'AND' IT WITH OTHER ADDRS. THAT TIMED OUT
021636  040237  001300            BIC     R2,ANDADR
021642  005237  001304            INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
021646  000746                  BR      3$              ;BRANCH BACK TO TEST THE NEXT UIPAR

                        ;;**************************************************************************
                        ;*TEST 11        USER PDR'S TIMEOUT TEST
                        ;*
                        ;*      THIS TEST ADDRESSES THE EIGHT (8) USER PAGE DESCRIPTOR
                        ;*      REGISTERS (UIPDR0-UIPDR7) AND CHECKS THAT SOMETHING
                        ;*      RESPONDS TO THEIR ADDRESSES.
                        ;*
                        ;;**************************************************************************
021650  000004         TST11:  SCOPE

021652  012737  021714  001110  1$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
021660  012737  021752  000004          MOV     #5$,@#4         ;SET TIMEOUT VECTOR TO 5$
021666  012700  177600                  MOV     #UIPDR0,R0      ;LOAD R0 WITH ADDRESS OF FIRST REG.
021672  012701  000010                  MOV     #10,R1          ;LOAD R1 WITH LOOP COUNT (8)
021676  012737  177777  001300          MOV     #-1,ANDADR      ;INITIALIZE 'AND' OF ADDR. LOC
021704  005037  001302                  CLR     ORADR           ;INITIALIZE 'OR' OF ADDR. LOC.
021710  005037  001304                  CLR     TONUM           ;INITIALIZE 'TIMEOUTS' COUNTER
021714  005710                  2$:     TST     (R0)            ;TRY ADDRESSING A UIPDR
                                                                ;IF IT TIMES OUT, WILL GO TO 5$
021716  062700  000002          3$:     ADD     #2,R0           ;PUT NEXT UIPDR ADDRESS IN R0
021722  077104                  SOB     R1,2$           ;LOOP BACK TO 2$ UNTIL ALL TESTED
021724  012737  021652  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
021732  005737  001304                  TST     TONUM           ;DID ANY OF THE UIPDRS TIME OUT?
021736  001401                  BEQ     4$              ;BRANCH IF NO
021740  104010                  ERROR   10              ;SUMMARY OF UIPDR TIMEOUTS
021742  012737  002076  000004  4$:     MOV     #TIMERR,@#4     ;RESTORE NORMAL CPU TRAP ROUTINE ADDRESS
021750  000414                  BR      TST12           ;;GO TO NEXT TEST

021752  062706  000004          5$:     ADD     #4,KSP          ;CLEAN UP THE STACK
021756  104007                  ERROR   7               ;ONE OF THE UIPDRS TIMED OUT
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 2$' = 000756
021760  010002                  MOV     R0,R2           ;LOAD THE ADDRESS THAT TIMED OUT INTO R2
021762  050237  001302            BIS     R2,ORADR        ;'OR' IT WITH OTHER ADDRS. THAT TIMED OUT
021766  005102                  COM     R2              ;'AND' IT WITH OTHER ADDRS. THAT TIMED OUT
021770  040237  001300            BIC     R2,ANDADR
021774  005237  001304            INC     TONUM           ;INCREMENT THE TIMEOUT COUNTER
022000  000746                  BR      3$              ;BRANCH BACK TO TEST THE NEXT UIPDR

                        ;;**************************************************************************
                        ;*TEST 12        SR0(15:13) BIT TEST & SR2 TEST
                        ;*
                        ;*      THIS TEST CHECKS BITS <15:13> OF STATUS REGISTER 0 TO SEE
                        ;*      THAT EACH CAN BE SET AND CLEARED AND THAT A 'RESET' WILL
                        ;*      CLEAR ALL OF THEM.
```

```
                        ;*      THE REST OF 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.
                        ;*
                        ;;*****************************************************************
022002  000004           TST12:  SCOPE

022004  012700  177572   1$:     MOV     #SR0,R0         ;LOAD ADDRESS OF SR0 INTO R0
022010  012710  160000           MOV     #160000,(R0)    ;SET BITS <15:13> IN SR0 (ERROR BITS)
022014  000005                   RESET                   ;ISSUE AND ''INIT'' SIGNAL
022016  011001                   MOV     (R0),R1         ;READ SR0 INTO R1 TO SEE IF CLEAR
022020  001401                   BEQ     2$              ;BRANCH IF SR0<15:13> CLEARED BY ''INIT''
022022  104011                   ERROR   11              ;SR0<15:13> NOT CLEARED BY A 'RESET''
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;''BR 1$'' = 000770
022024  012737  022024  001110  2$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
022032  013737  177576  001274  8$:     MOV     SR2,WASSR2      ;READ CONTENTS OF SR2
022040  012701  022032                   MOV     #8$,R1          ;LOAD EXPECTED CONTENTS INTO R1
022044  020137  001274                   CMP     R1,WASSR2       ;IS SR2 TRACKING?
022050  001401                   BEQ     3$              ;BRANCH IF YES
022052  104041                   ERROR   41              ;SR2 NOT ''TRACKING'' VIRTUAL ADDRESSES
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;''BR 2$'' = 000767
022054  012737  022072  001110  3$:     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
022062  012701  100000           MOV     #BIT15,R1       ;PUT DATA TO BE WRITTEN IN R1
022066  012703  000003           MOV     #3,R3           ;SETUP R3 AS A LOOP COUNTER
022072  005010           4$:     CLR     (R0)            ;CLEAR SR0
022074  050110           5$:     BIS     R1,(R0)         ;SET ONE OF THE ERROR BITS IN SR0
022076  011002                   MOV     (R0),R2         ;READ SR0 INTO R2
022100  020102                   CMP     R1,R2           ;DID RIGHT ERROR BIT GET SET?
022102  001401                   BEQ     6$              ;BRANCH IF YES
022104  104012                   ERROR   12              ;BITS WERE SET WRONG IN SR0
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;''BR 4$'' = 000772
022106  012704  022074   6$:     MOV     #5$,R4          ;LOAD EXPECTED CONTENTS OF SR2 IN R4
022112  013737  177576  001274           MOV     SR2,WASSR2      ;READ SR2
022120  020437  001274           CMP     R4,WASSR2       ;DID SR2 LOCK UP WHEN ERROR
                                                        ;BIT SET IN SR1?
022124  001401                   BEQ     7$              ;BRANCH IF YES
022126  104064                   ERROR   64              ;SR2 DID NOT LOCK UP
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;''BR 4$'' = 000761
022130  006001           7$:     ROR     R1              ;CHANGE DATA TO CHECK NEXT ERROR BIT
022132  077321                   SOB     R3,4$           ;LOOP BACK UNTIL <15:13> ALL TESTED
022134  005010                   CLR     (R0)            ;CLEAR SR0 BEFORE LEAVING
022136  012737  022004  001110           MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$

                        ;;*****************************************************************
                        ;*TEST 13       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
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                        ;*      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.
                        ;*
                        ;;*****************************************************************
022144  000004         TST13:  SCOPE
022146  005037  177776  1$:     CLR     PSW             ;CLEAR THE PSW
022152  005037  177572         CLR     SR0             ;CLEAR STATUS REGISTER 0
022156  106427  000340         MTPS    #340            ;SET PRIORITY 7 IN LOW BYTE OF PSW
022162  013700  177572         MOV     SR0,R0          ;READ STATUS REGISTER 0
022166  001401                 BEQ     2$              ;BRANCH IF IT WAS STILL 0
022170  104013                 ERROR   13              ;SR0 EFFECTED BY A WRITE TO THE PSW
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;''BR 1$'' = 000767
022172  005037  177572  2$:     CLR     SR0             ;BE SURE SR0 IS 0 BEFORE LEAVING
022176  005037  177776         CLR     PSW             ;BE SURE PSW IS 0 BEFORE LEAVING
                        ;;*****************************************************************
                        ;*TEST 14       TEST THAT SR1 READS ALL ZEROS
                        ;*
                        ;*      THIS TESTS CHECKS THAT STATUS REGISTER 1
                        ;*      RESPONDS WITH ALL ZEROS, AND THAT ONLY BITS<5:4>
                        ;*      OF STATUS REGISTER 3 ARE WRITEABLE.
                        ;*
                        ;;*****************************************************************
022202  000004         TST14:  SCOPE
022204  012700  177777  1$:     MOV     #-1,R0          ;FILL R0 WITH ALL ONES
022210  013700  177574         MOV     SR1,R0          ;READ SR1 INTO R0
022214  001401                 BEQ     2$              ;BRANCH IF SR1 READS ALL ZEROS
022216  104014                 ERROR   14              ;SR1 DID NOT READ ALL ZEROS
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;000772
022220  012737  177777  172516  2$:     MOV     #-1,SR3         ;TRY TO WRITE ONES TO SR3
022226  022737  000060  172516         CMP     #60,SR3         ;ONLY BITS <5:4> SHOULD BE ONES
022234  001401                 BEQ     3$
022236  104012                 ERROR   12              ;DIDN'T READ BACK A ''60''
022240  105737  001246  3$:     TSTB    @#$ENV          ;TEST APT ENVIRONMENT BIT
022244  001406                 BEQ     6$              ;IF CLEAR, NOT ON APT SO DO TEST
022246  005737  001234         TST     @#$PASS         ;IF ON APT TEST PASS COUNTER
022252  001403                 BEQ     6$              ;IF CLEAR, FIRST PASS SO DO TEST
022254  005037  172516         CLR     SR3             ;IF ON APT AND NOT FIRST PASS FUDGE TEST
022260  000401                 BR 7$
022262  000005         6$:     RESET                   ;CLEARS SR3
022264  005737  172516  7$:     TST     SR3             ;VERIFY THAT IT WAS CLEARED
022270                 4$:
022270  001401                 BEQ     TST15           ;;BRANCH IF SR3 READ ALL ZEROS
022272  104012                 ERROR   12              ;SR3 DIDN'T READ ALL ZEROS
                        ;;*****************************************************************
                        ;*TEST 15       BIT TEST OF KERNEL & USER PAR'S
                        ;*
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```
                                        ;*      THE FOLLOWING TEST CHECKS THE BITS <15:00> OF BOTH THE KERNEL
                                        ;*      AND USER PAGE ADDRESS REGISTERS.  A "0" IS ROTATED THRU
                                        ;*      THE REGISTERS FROM LEFT TO RIGHT.
                                        ;*
                                        ;;*****************************************************************
022274  000004                        TST15:  SCOPE

022276  012700  172340                1$:     MOV     #KIPAR0,R0      ;LOAD ADDRESS OF FIRST PAR IN R0
022302  012703  000010                2$:     MOV     #10,R3          ;SETUP R3 TO COUNT 8 PAR'S
022306  012737  022314  001110                MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
022314  005010                        3$:     CLR     (R0)            ;CLEAR THE PAR
022316  011001                                MOV     (R0),R1         ;READ THE PAR INTO R1
022320  001401                                BEQ     4$              ;BRANCH IF PAR CLEARED OK
022322  104011                                ERROR   11              ;PAR WOULD NOT CLEAR
                                                                        ;FOR TIGHTER SCOPE LOOP
                                                                        ;REPLACE ERROR CALL WITH
                                                                        ;"BR 3$" = 000774
022324  012704  077777                4$:     MOV     #077777,R4      ;LOAD "WALKING 0" TEST PATTERN IN R4
022330  012737  022336  001110                MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
022336  005010                        5$:     CLR     (R0)            ;CLEAR THE PAR BEFORE LOADING DATA
022340  050410                                BIS     R4,(R0)         ;BIT SET THE TEST PATTERN INTO THE PAR
022342  011002                                MOV     (R0),R2         ;READ THE PAR INTO R2
022344  020402                                CMP     R4,R2           ;DOES DATA WRITTEN=DATA READ?
022346  001402                                BEQ     6$              ;BRANCH IF YES
022350  010401                                MOV     R4,R1           ;SETUP FOR ERROR REPORTING
022352  104012                                ERROR   12              ;PAR BITS DID NOT SET CORRECTLY
                                                                        ;FOR TIGHTER SCOPE LOOP
                                                                        ;REPLACE ERROR CALL WITH
                                                                        ;"BR 5$" = 000767
022354  000261                        6$:     SEC                     ;SET THE C-BIT FOR THE ROTATE INST.
022356  006004                                ROR     R4              ;ROTATE THE TEST PATTERN IN R4
022360  103766                                BCS     5$              ;BRANCH BACK IF MORE BITS TO TEST
022362  062700  000002                        ADD     #2,R0           ;GET NEXT PAR ADDRESS IN R0
022366  077326                                SOB     R3,3$           ;BRANCH BACK UNTIL ALL PAR'S TESTED
022370  022700  177660                        CMP     #UIPAR7+2,R0    ;HAVE USER PAR'S BEEN TESTED
022374  103003                                BHIS    7$              ;BRANCH IF YES
022376  012700  177640                        MOV     #UIPAR0,R0      ;LOAD FIRST USER PAR ADDR. IN R0
022402  000737                                BR      2$              ;BRANCH BACK TO TEST USER PAR'S
022404  012737  022276  001110        7$:     MOV     #1$,$LPERR      ;RESET LOOP OR ERROR POINTER TO 1$
                                                                        ;LEAVE TEST WITH BITS <11:1>=1 IN ALL PAR'S
                                        ;;*****************************************************************
                                        ;*TEST 16        BIT TEST OF KERNEL & USER PDR'S
                                        ;*
                                        ;*      THE FOLLOWING TEST CHECKS THE BITS <14:8> AND <3:1> OF BOTH THE
                                        ;*      KERNEL AND USER PAGE DESCRIPTOR REGISTERS.  A "0" IS ROTATED
                                        ;*      THRU THE REGISTERS FROM LEFT TO RIGHT.  SOME TEST PATTERNS WILL
                                        ;*      BE LOADED MORE THAN ONCE DUE TO THE UNUSED BITS IN THE PDR'S.
                                        ;*
                                        ;;*****************************************************************
022412  000004                        TST16:  SCOPE

022414  012700  172300                1$:     MOV     #KIPDR0,R0      ;LOAD ADDRESS OF FIRST PDR IN R0
022420  012703  000010                2$:     MOV     #10,R3          ;SETUP R3 TO COUNT 8 PDR'S
022424  012737  022432  001110                MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
022432  005010                        3$:     CLR     (R0)            ;CLEAR THE PDR
022434  011001                                MOV     (R0),R1         ;READ THE PDR INTO R1
```

```
1878  022436  001401                        BEQ     4$              ;BRANCH IF PDR CLEARED OK
1879  022440  104011                        ERROR   11              ;PDR WOULD NOT CLEAR
1880                                                                ;FOR TIGHTER SCOPE LOOP
1881                                                                ;REPLACE ERROR CALL WITH
1882                                                                ;'BR 3$'' - 000774
1883  022442  012704  077777        4$:     MOV     #077777,R4      ;LOAD 'WALKING ''0'' TEST PATTERN IN R4
1884  022446  012737  022454  001110        MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
1885  022454  005010                5$:     CLR     (R0)            ;CLEAR THE PDR BEFORE LOADING DATA
1886  022456  010401                        MOV     R4,R1           ;LOAD DATA INTO R1
1887  022460  042701  100361                BIC     #100361,R1      ;MASK UNUSED BITS OUT OF THE DATA
1888  022464  050110                        BIS     R1,(R0)         ;BIT SET THE TEST PATTERN INTO THE PDR
1889  022466  011002                        MOV     (R0),R2         ;READ THE PDR INTO R2
1890  022470  020102                        CMP     R1,R2           ;DOES DATA WRITTEN=DATA READ?
1891  022472  001401                        BEQ     6$              ;BRANCH IF YES
1892  022474  104012                        ERROR   12              ;PDR BITS DID NOT SET CORRECTLY
1893                                                                ;FOR TIGHTER SCOPE LOOP
1894                                                                ;REPLACE ERROR CALL WITH
1895                                                                ;'BR 5$'' = 000767
1896  022476  000261                6$:     SEC                     ;SET THE C-BIT FOR THE ROTATE INST.
1897  022500  006004                        ROR     R4              ;ROTATE THE TEST PATTERN IN R4
1898  022502  103764                        BCS     5$              ;BRANCH BACK IF MORE BITS TO TEST
1899  022504  062700  000002                ADD     #2,R0           ;GET NEXT PDR ADDRESS IN R0
1900  022510  077330                        SOB     R3,3$           ;BRANCH BACK UNTIL ALL PDR'S TESTED
1901  022512  022700  177620                CMP     #UIPDR7+2,R0    ;HAVE USER PDR'S BEEN TESTED?
1902  022516  103003                        BHIS    7$              ;BRANCH IF YES
1903  022520  012700  177600                MOV     #UIPDR0,R0      ;LOAD FIRST USER PDR ADDR. IN R0
1904  022524  000735                        BR      2$              ;BRANCH BACK TO TEST USER PDR'S
1905  022526  012737  022414  001110  7$:   MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1906                                                                ;LEAVE TEST WITH ALL WRITEABLE BITS IN
1907                                                                ;ALL PDR'S = 1
1908
1909                                ;;*****************************************************************
1910                                ;*TEST 17       TEST FOR DUAL BYTE ADDRESSING OF KERNEL & USER PAR'S
1911                                ;*
1912                                ;*      THE FOLLOWING TEST WRITES TO BOTH BYTES OF THE KERNEL & USER
1913                                ;*      PAR'S SEPERATELY TO SEE THAT WRITING TO ONE DOES NOT EFFECT
1914                                ;*      THE OTHER.
1915                                ;*
1916                                ;;*****************************************************************
1917  022534  000004                TST17:  SCOPE
```

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1918
1919  022536  012700  172340          1$:     MOV     #KIPAR0,R0      ;LOAD ADDRESS OF FIRST PAR INTO R0
1920  022542  012737  022554  001110  2$:     MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1921  022550  012703  000010                  MOV     #10,R3          ;LOAD LOOP COUNTER TO DO 8 PAR'S
1922  022554  012701  177777          3$:     MOV     #-1,R1          ;LOAD TEST PATTERN INTO R1
1923  022560  005010                          CLR     (R0)            ;CLEAR THE PAR
1924  022562  110110                          MOVB    R1,(R0)         ;WRITE 1'S TO THE LOW BYTE OF THE PAR
1925  022564  011002                          MOV     (R0),R2         ;READ THE ENTIRE PAR INTO R2
1926  022566  042701  177400                  BIC     #177400,R1      ;MASK HIGH BYTE & UNUSFD BITS OUT OF THE DATA
1927  022572  020102                          CMP     R1,R2           ;WAS ONLY THE LOW BYTE WRITTEN TO
1928  022574  001401                          BEQ     4$              ;BRANCH IF YES
1929  022576  104015                          ERROR   15              ;HIGH BYTE EFFECTED BY WRITING LOW BYTE IN PAR
1930                                                                  ;FOR TIGHTER SCOPE LOOP
1931                                                                  ;REPLACE ERROR CALL WITH
1932                                                                  ;'BR 3$'' = 000766
1933  022600  012737  022606  001110  4$:     MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
1934  022606  005010                  5$:     CLR     (R0)            ;CLEAR THE PAR
1935  022610  012701  177777                  MOV     #-1,R1          ;LOAD TEST, PATTERN INTO R1
1936  022614  110160  000001                  MOVB    R1,1(R0)        ;WRITE 1'S TO THE HIGH BYTE OF THE PAR
1937  022620  011002                          MOV     (R0),R2         ;READ THE ENTIRE PAR INTO R2
1938  022622  042701  000377                  BIC     #000377,R1      ;MASK LOW BYTE
1939  022626  020102                          CMP     R1,R2           ;WAS ONLY THE HIGH BYTE WRITTEN TO?
1940  022630  001401                          BEQ     6$              ;BRANCH IF YES
1941  022632  104015                          ERROR   15              ;LOW BYTE EFFECTED BY WRITING HIGH BYTE IN PAR
1942                                                                  ;FOR TIGHTER SCOPE LOOP
1943                                                                  ;REPLACE ERROR CALL WITH
1944                                                                  ;'BR 5'' = 000765
1945  022634  062700  000002          6$:     ADD     #2,R0           ;PUT ADDRESS OF NEXT PAR IN R0
1946  022640  077333                          SOB     R3,3$           ;BRANCH BACK UNTIL 8 PAR'S TESTED
1947  022642  022700  177660                  CMP     #UIPAR7+2,R0    ;HAVE USER PAR'S BEEN TESTED
1948  022646  103003                          BHIS    7$              ;BRANCH IF YES
1949  022650  012700  177640                  MOV     #UIPAR0,R0      ;LOAD ADDRESS OF FIRST USER PAR IN R0
1950  022654  000732                          BR      2$              ;BRANCH BACK TO TEST USER PAR'S
1951  022656  012737  022536  001110  7$:     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
1952
1953                                  ;;*****************************************************************
1954                                  ;*TEST 20       TEST FOR DUAL BYTE ADDRESSING OF KERNEL & USER PDR'S
1955                                  ;*
1956                                  ;*      THE FOLLOWING TEST WRITES TO BOTH BYTES OF THE KERNEL & USER
1957                                  ;*      PDR'S SEPERATELY TO SEE THAT WRITING TO ONE DOES NOT EFFECT
1958                                  ;*      THE OTHER.
1959                                  ;*
1960                                  ;;*****************************************************************
1961  022664  000004                  TST20:  SCOPE
1962
1963  022666  012700  172300          1$:     MOV     #KIPDR0,R0      ;LOAD ADDRESS OF FIRST PDR INTO R0
1964  022672  012737  022704  001110  2$:     MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
1965  022700  012703  000010                  MOV     #10,R3          ;LOAD LOOP COUNTER TO DO 8 PDR'S
1966  022704  012701  177777          3$:     MOV     #-1,R1          ;LOAD TEST PATTERN INTO R1
1967  022710  005010                          CLR     (R0)            ;CLEAR THE PDR
1968  022712  110110                          MOVB    R1,(R0)         ;WRITE 1'S TO THE LOW BYTE OF THE PDR
1969  022714  011002                          MOV     (R0),R2         ;READ THE ENTIRE PDR INTO R2
1970  022716  042701  177761                  BIC     #177761,R1      ;MASK HIGH BYTE & UNUSED BITS OUT OF DATA
1971  022722  020102                          CMP     R1,R2           ;WAS ONLY THE LOW BYTE WRITTEN TO?
1972  022724  001401                          BEQ     4$              ;BRANCH IF YES
1973  022726  104015                          ERROR   15              ;HIGH BYTE EFFECTED BY WRITING LOW BYTE IN PDR
```

```
1974                                                    ;FOR TIGHTER SCOPE LOOP
1975                                                    ;REPLACE ERROR CALL WITH
1976                                                    ;'BR 3$'' = 000766
1977  022730  012737  022736  001110  4$:   MOV   #5$,$LPERR    ;SET LOOP ON ERROR POINTER TO 5$
1978  022736  005010                  5$:   CLR   (R0)          ;CLEAR THE PDR
1979  022740  012701  177777                MOV   #-1,R1        ;LOAD TEST PATTERN INTO R1
1980  022744  110160  000001                MOVB  R1,1(R0)      ;WRITE 1'S TO THE HIGH BYTE OF THE PDR
1981  022750  011002                        MOV   (R0),R2       ;READ THE ENTIRE PDR INTO R2
1982  022752  042701  100377                BIC   #100377,R1    ;MASK LOW BYTE & UNUSED BITS OUT OF DATA
1983  022756  020102                        CMP   R1,R2         ;WAS ONLY THE HIGH BYTE WRITTEN TO?
1984  022760  001401                        BEQ   6$            ;BRANCH IF YES
1985  022762  104015                        ERROR 15            ;LOW BYTE EFFECTED BY WRITING HIGH BYTE IN PDR
1986                                                    ;FOR TIGHTER SCOPE LOOP
1987                                                    ;REPLACE ERROR CALL WITH
1988                                                    ;'BR 5$'' = 000765
1989  022764  062700  000002          6$:   ADD   #2,R0           ;PUT ADDRESS OF NEXT PDR IN R0
1990  022770  077333                        SOB   R3,3$         ;BRANCH BACK UNTIL 8 PDR'S TESTED
1991  022772  022700  177620                CMP   #UIPDR7+2,R0  ;HAVE USER PDR'S BEEN TESTED?
1992  022776  103003                        BHIS  7$            ;BRANCH IF YES
1993  023000  012700  177600                MOV   #UIPDR0,R0    ;LOAD ADDRESS OF FIRST USER PDR IN R0
1994  023004  000732                        BR    2$            ;BRANCH BACK TO TEST USER PDR'S
1995  023006  012737  022666  001110  7$:   MOV   #1$,$LPERR    ;RESET LOOP ON ERROR POINTER TO 1$
1996
1997                                    ;;*****************************************************************
1998                                    ;*TEST 21       PAR-PDR DUAL ADDRESSING TEST
1999                                    ;*
2000                                    ;*      THE FOLLOWING TEST SETS ALL OF THE WRITEABLE BITS TO 1
2001                                    ;*      IN THE SIXTEEN (16) PAR'S AND PDR'S USING THE ''SETREG''
2002                                    ;*      SUBROUTINE AND THEN CLEARS JUST ONE OF THEM.  THE ''CMPREG''
2003                                    ;*      SUBROUTINE IS USED TO READ ALL OF THE PAR'S AND PDR'S TO SEE
2004                                    ;*      THAT ONLY ONE REGISTER WAS CLEARED IN RESPONSE TO THAT ONE
2005                                    ;*      PAR OR PDR ADDRESS.  THE ''CMPREG'' SUBROUTINE REPORTS THE
2006                                    ;*      ADDRESS OF ANY REGISTER WHOSE BITS DID NOT REMAIN SET WHEN
2007                                    ;*      ANOTHER REGISTER WAS CLEARED.
2008                                    ;;*****************************************************************
2009  023014  000004          TST21:  SCOPE
2010
2011  023016  012737  023040  001110  1$:   MOV   #2$,$LPERR    ;SET LOOP ON ERROR POINTER 2$
2012  023024  012703  000010                MOV   #10,R3        ;LOAD LOOP COUNTER WITH AN 8
2013  023030  012700  172300                MOV   #KIPDR0,R0    ;LOAD ADDRESS OF FIRST KERNEL PDR AND R0
2014  023034  004737  035334                JSR   PC,SETREG     ;SET ALL BITS IN ALL PAR'S IN PDR'S
2015  023040  012706  001100          2$:   MOV   #KERSTK,KSP   ;SETUP STACK POINTER
2016  023044  005010                        CLR   (R0)          ;CLEAR ONE OF THE KERNEL PDR'S
2017  023046  004737  035426                JSR   PC,CMPREG     ;SEE IF OTHER PAR/PDR'S WERE EFFECTED
2018  023052  012720  177777                MOV   #-1,(R0)+     ;RESTORE ALL ONES, AND SETUP FOR NEXT PDR
2019  023056  077310                        SOB   R3,2$         ;LOOP TO 2$ UNTIL ALL KERNEL PDR'S CHECKED
2020  023060  012737  023076  001110        MOV   #3$,$LPERR    ;SET LOOP ON ERROR POINTER TO 3$
2021  023066  012703  000010                MOV   #10,R3        ;LOAD LOOP COUNTER WITH AN 8
2022  023072  012700  172340                MOV   #KIPAR0,R0    ;LOAD ADDRESS OF FIRST KERNEL PAR IN R0
2023  023076  012706  001100          3$:   MOV   #KERSTK,KSP   ;SETUP STACK POINTER
2024  023102  005010                        CLR   (R0)          ;CLEAR ONE OF THE KERNEL PAR'S
2025  023104  004737  035426                JSR   PC,CMPREG     ;SEE IF OTHER PAR/PDR'S WERE EFFECTED
2026  023110  012720  177777                MOV   #-1,(R0)+     ;RESTORE ALL ONES, AND SETUP FOR NEXT PAR
2027  023114  077310                        SOB   R3,3$         ;LOOP TO 3$ UNTIL ALL KERNEL PAR'S CHECKED
2028  023116  012737  023134  001110        MOV   #4$,$LPERR    ;SET LOOP ON ERROR POINTER TO 4$
2029  023124  012703  000010                MOV   #10,R3        ;LOAD LOOP COUNTER WITH AN 8
```

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2030  023130  012700  177600            MOV     #UIPDR0,R0      ;LOAD ADDRESS OF FIRST USER PDR IN R0
2031  023134  012706  001100     4$:    MOV     #KERSTK,KSP     ;SETUP STACK POINTER
2032  023140  005010                    CLR     (R0)            ;CLEAR ONE OF THE USER PDR'S
2033  023142  004737  035426            JSR     PC,CMPREG       ;SEE IF OTHER PAR/PDR'S WERE EFFECTED
2034  023146  012720  177777            MOV     #-1,(R0)+       ;RESTORE ALL ONES, AND SETUP FOR NEXT UPDR
2035  023152  077310                    SOB     R3,4$           ;LOOP TO 4$ UNTIL ALL USER PDR'S CHECKED
2036  023154  012737  023172  001110    MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
2037  023162  012703  000010            MOV     #10,R3          ;LOAD LOOP COUNTER WITH AN 8
2038  023166  012700  177640            MOV     #UIPAR0,R0      ;LOAD ADDRESS OF FIRST USER PAR IN R0
2039  023172  012706  001100     5$:    MOV     #KERSTK,KSP     ;SETUP STACK POINTER
2040  023176  005010                    CLR     (R0)            ;CLEAR ONE OF THE USER PAR'S
2041  023200  004737  035426            JSR     PC,CMPREG       ;SEE IF OTHER PAR/PDR'S WERE EFFECTED
2042  023204  012720  177777            MOV     #-1,(R0)+       ;RESTORE ALL ONES, AND SETUP FOR NEXT UPAR
2043  023210  077310                    SOB     R3,5$           ;LOOP TO 5$ UNTIL ALL USER PAR'S CHECKED
2044  023212  012737  023016  001110    MOV     #1$,$LPERR      ;SET LOOP ON ERROR POINTER TO 1$
2045
2046                                    ;;*********************************************************************
2047                                    ;*TEST 22       TEST THAT PAR-PDR'S NOT AFFECTED BY RESET
2048                                    ;*
2049                                    ;*      THIS TEST CHECKS TO SEE THAT THE KERNEL OR USER PAR/PDR'S ARE
2050                                    ;*      NOT AFFECTED BY THE EXECUTION OF A ''RESET'' INSTRUCTION.  THE
2051                                    ;*      ''SETREG'' SUBROUTINE IS USED TO SET ALL WRITEABLE BITS TO A ''1'' IN
2052                                    ;*      THE PAR/PDR'S.  THEN THEY ARE READ TO SEE THAT THEY REMAINED
2053                                    ;*      UNCHANGED
2054                                    ;*
2055                                    ;;*********************************************************************
2056  023220  000004            TST22:  SCOPE
2057
2058
2059  023222  105737  001246            TSTB    @#$ENV          ;TEST APT ENVIRONMENT BIT
2060  023226  001403                    BEQ     1$              ;IF CLEAR, NOT ON APT SO DO TEST
2061  023230  005737  001234            TST     @#$PASS         ;IF ON APT TEST PASS COUNTER
2062  023234  001063                    BNE     10$             ;IF NOT FIRST PASS SKIP TEST
2063  023236  004737  035334     1$:    JSR     PC,SETREG       ;SET ALL BITS IN ALL PAR'S AND PDR'S
2064  023242  000005                    RESET                   ;ISSUE AN ''INIT'' BY EXECUTING A RESET
2065  023244  012700  172300            MOV     #KIPDR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PDR IN R0
2066  023250  012704  000010            MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
2067  023254  011001             2$:    MOV     (R0),R1         ;READ A KERNEL PDR INTO R1
2068  023256  022701  077416            CMP     #77416,R1       ;ARE ALL THE BITS STILL SET?
2069  023262  001401                    BEQ     3$              ;BRANCH IF YES
2070  023264  104055                    ERROR   55              ;KERNEL PDR AFFECTED BY A RESET
2071                                                            ;FOR TIGHTER SCOPE LOOP
2072                                                            ;REPLACE ERROR CALL WITH
2073                                                            ;''BR 2$'' = 000773
2074  023266  062700  000002     3$:    ADD     #2,R0           ;FORM ADDRESS OF NEXT KERNEL PDR
2075  023272  077410                    SOB     R4,2$           ;LOOP TO 2$ UNTIL ALL KERNEL PDR'S CHECKED
2076  023274  012700  172340            MOV     #KIPAR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PAR IN R0
2077  023300  012704  000010            MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
2078  023304  011001             4$:    MOV     (R0),R1         ;READ A KERNEL PAR INTO R1
2079  023306  022701  177777            CMP     #177777,R1      ;ARE ALL THE BITS STILL SET?
2080  023312  001401                    BEQ     5$              ;BRANCH IF YES
2081  023314  104055                    ERROR   55              ;KERNEL PAR AFFECTED BY A RESET
2082                                                            ;FOR TIGHTER SCOPE LOOP
2083                                                            ;REPLACE ERROR CALL WITH
2084                                                            ;''BR 4$'' = 000773
2085  023316  062700  000002     5$:    ADD     #2,R0           ;FORM ADDRESS OF NEXT KERNEL PAR
```

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2086  023322  077410                  SOB     R4,4$           ;LOOP TO 4$ UNTIL ALL KERNEL PAR'S CHECKED
2087  023324  012700  177600          MOV     #UIPDR0,R0      ;LOAD ADDRESS OF FIRST USER PDR IN R0
2088  023330  012704  000010          MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
2089  023334  011001              6$: MOV     (R0),R1         ;READ A USER PDR INTO R1
2090  023336  022701  077416          CMP     #77416,R1       ;ARE ALL THE BITS STILL SET?
2091  023342  001401                  BEQ     7$              ;BRANCH IF YES
2092  023344  104055                  ERROR   55              ;USER PDR AFFECTED BY A RESET
2093                                                          ;FOR TIGHTER SCOPE LOOP
2094                                                          ;REPLACE ERROR CALL WITH
2095                                                          ;'BR 6$'' = 000773
2096  023346  062700  000002      7$: ADD     #2,R0           ;FORM ADDRESS OF NEXT USER PDR
2097  023352  077410                  SOB     R4,6$           ;LOOP TO 6$ UNTIL ALL USER PDR'S CHECKED
2098
2099  023354  012700  177640          MOV     #UIPAR0,R0      ;LOAD ADDRESS OF FIRST USER PAR IN R0
2100  023360  012704  000010          MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
2101  023364  011001              8$: MOV     (R0),R1         ;READ A USER PAR INTO R1
2102  023366  022701  177777          CMP     #177777,R1      ;ARE ALL THE BITS STILL SET?
2103  023372  001401                  BEQ     9$              ;BRANCH IF YES
2104  023374  104055                  ERROR   55              ;USER PAR AFFECTED BY A RESET
2105                                                          ;FOR TIGHTER SCOPE LOOP
2106                                                          ;REPLACE ERROR CALL WITH
2107                                                          ;'BR 8$'' = 000773
2108  023376  062700  000002      9$: ADD     #2,R0           ;FORM ADDRESS OF NEXT USER PAR
2109  023402  077410                  SOB     R4,8$           ;LOOP TO 8$ UNTIL ALL USER PAR'S CHECKED
2110  023404                      10$:
2111                                ;;**********************************************************************
2112                                ;*TEST 23       RELOCATION & ADDER TEST (NO CARRIES)
2113                                ;*
2114                                ;*      THE FOLLOWING TEST SETS UP THE KERNEL PAR'S AND PDR'S
2115                                ;*      FOR THE REST OF THE PROGRAM.  IT THEN USES DIFFERENT
2116                                ;*      VIRTUAL ADDRESSES AND DIFFERENT VALUES FOR KERNEL PAR 4
2117                                ;*      TO PUT DIFFERENT PATTERNS AT THE INPUTS OF THE
2118                                ;*      MEMORY MANAGEMENT ADDER.  THE VALUES ARE SUCH
2119                                ;*      THAT NO CARRIES ARE GENERATED OUT OF THE ADDER.
2120                                ;*
2121                                ;*      THE METHOD USED TO SEE THAT THE RIGHT PHYSICAL BUS ADDRESS
2122                                ;*      IS FORMED BY THE ADDER IS TO WRITE A PATTERN TO VIRTUAL
2123                                ;*      LOCATION WITH MEMORY MGMT., AND
2124                                ;*      THEN READ THAT LOCATION USING THE PHYSICAL ADDRESS THAT SHOULD
2125                                ;*      HAVE BEEN FORMED TO SEE IF THE TEST PATTERN GOT THERE.
2126                                ;*      22-BIT AND 18-BIT ADDRESSING ARE USED.
2127                                ;**********************************************************************
2128  023404  000004              TST23:  SCOPE
2129
2130  023406  012700  172340      1$:     MOV     #KIPAR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PAR IN R0
2131  023412  005001                      CLR     R1              ;CLEAR R1
2132  023414  012702  000007              MOV     #7,R2           ;LOAD LOOP COUNTER WITH A 7
2133  023420  010120              2$:     MOV     R1,(R0)+        ;MAP KERNEL PAR'S TO PAGES 0-6 (4K EACH)
2134  023422  062701  000200              ADD     #200,R1
2135  023426  077204                      SOB     R2,2$           ;LOOP UNTIL KIPAR0 - KIPAR6 ARE LOADED
2136  023430  012710  177600              MOV     #177600,(R0)    ;MAP KIPAR7 TO THE I/O PAGE
2137  023434  012700  172300              MOV     #KIPDR0,R0      ;LOAD ADDRESS OF FIRST KERNEL PDR IN R0
2138  023440  012701  077406              MOV     #77406,R1       ;LOAD PDR DATA INTO R1
2139  023444  012702  000010              MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
2140  023450  010120              3$:     MOV     R1,(R0)+        ;MAP ALL 8 PAGES 128 BLOCKS, UPWARD
2141  023452  077202                      SOB     R2,3$           ;       EXPANDABLE, READ/WRITE
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2142
2143  023454  012737  023454  001110  4$:     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2144  023462  012700  067776                  MOV     #67776,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2145  023466  012701  107776                  MOV     #107776,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2146  023472  012702  125250                  MOV     #125250,R2      ;LOAD TEST PATTERN INTO R2
2147  023476  012704  000600                  MOV     #600,R4 ;LOAD R4 WITH PAR VALUE
2148  023502  010437  172350                  MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2149  023506  01'037  001176                  MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2150  023512  005037  172516                  CLR     SR3             ;SET UP FOR 18 BIT ADDRESSING
2151  023516  052737  000001  177572          BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2152  023524  010211                          MOV     R2,(R1)         ;LOAD 125250 USING ADDER  (PAR4 + VIRT ADDR.)
2153  023526  005037  177572                  CLR     SR0             ;TURN OFF MEMORY MGMT.
2154  023532  011003                          MOV     (R0),R3         ;READ 125250 BACK WITHOUT USING MEM. MGMT.
2155  023534  013710  001176                  MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2156  023540  020203                          CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2157                                                                  ;WRITTEN USING MEMORY MANAGEMENT?
2158  023542  001405                          BEQ     5$              ;BRANCH IF YES
2159  023544  010137  001306                  MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2160  023550  004737  035620                  JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
2161  023554  104017                          ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2162                                                                  ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
2163                                                                  ;APPARENTLY PHYSICAL ADDR. WAS
2164                                                                  ;FORMED WRONG BY ADDERS USING
2165                                                                  ;THE VIRTUAL ADDR. AND KIPAR4
2166                                                                  ;FOR TIGHTER SCOPE LOOP
2167                                                                  ;REPLACE ERROR CALL WITH
2168                                                                  ;'BR 4$'' = 000742
2169  023556                          5$:
2170  023556  012737  023556  001110  6$:     MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
2171  023564  012700  067776                  MOV     #67776,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2172  023570  012701  102576                  MOV     #102576,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2173  023574  012702  125251                  MOV     #125251,R2      ;LOAD TEST PATTERN INTO R2
2174  023600  012704  000652                  MOV     #652,R4 ;LOAD R4 WITH PAR VALUE
2175  023604  010437  172350                  MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2176  023610  011037  001176                  MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2177  023614  005037  172516                  CLR     SR3             ;SET UP FOR 18 BIT ADDRESSING
2178  023620  052737  000001  177572          BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2179  023626  010211                          MOV     R2,(R1)         ;LOAD 125251 USING ADDER  (PAR4 + VIRT ADDR.)
2180  023630  005037  177572                  CLR     SR0             ;TURN OFF MEMORY MGMT.
2181  023634  011003                          MOV     (R0),R3         ;READ 125251 BACK WITHOUT USING MEM. MGMT.
2182  023636  013710  001176                  MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2183  023642  020203                          CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2184                                                                  ;WRITTEN USING MEMORY MANAGEMENT?
2185  023644  001405                          BEQ     7$              ;BRANCH IF YES
2186  023646  010137  001306                  MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2187  023652  004737  035620                  JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
2188  023656  104017                          ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2189                                                                  ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
2190                                                                  ;APPARENTLY PHYSICAL ADDR. WAS
2191                                                                  ;FORMED WRONG BY ADDERS USING
2192                                                                  ;THE VIRTUAL ADDR. AND KIPAR4
2193                                                                  ;FOR TIGHTER SCOPE LOOP
2194                                                                  ;REPLACE ERROR CALL WITH
2195                                                                  ;'BR 6$'' = 000742
2196  023660                          7$:
2197  023660  012737  023660  00111C  8$:     MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
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2198  023666  012700  067776                MOV     #67776,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2199  023672  012701  105276                MOV     #105276,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2200  023676  012702  125252                MOV     #125252,R2      ;LOAD TEST PATTERN INTO R2
2201  023702  012704  000625                MOV     #625,R4 ;LOAD R4 WITH PAR VALUE
2202  023706  010437  172350                MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2203  023712  011037  001176                MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2204  023716  052737  000020  172516        BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
2205  023724  052737  000001  177572        BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2206  023732  010211                        MOV     R2,(R1)         ;LOAD 125252 USING ADDER  (PAR4 + VIRT ADDR.)
2207  023734  005037  177572                CLR     SR0             ;TURN OFF MEMORY MGMT.
2208  023740  011003                        MOV     (R0),R3         ;READ 125252 BACK WITHOUT USING MEM. MGMT.
2209  023742  013710  001176                MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2210  023746  020203                        CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2211                                                                ;WRITTEN USING MEMORY MANAGEMENT?
2212  023750  001405                        BEQ     9$              ;BRANCH IF YES
2213  023752  010137  001306                MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2214  023756  004737  035620                JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
2215  023762  104017                        ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2216                                                                ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
2217                                                                ;APPARENTLY PHYSICAL ADDR. WAS
2218                                                                ;FORMED WRONG BY ADDERS USING
2219                                                                ;THE VIRTUAL ADDR. AND KIPAR4
2220                                                                ;FOR TIGHTER SCOPE LOOP
2221                                                                ;REPLACE ERROR CALL WITH
2222                                                                ;'BR 8$'' = 000742
2223  023764                        9$:
2224
2225  023764  012737  023764  001110  10$:   MOV     #10$,$LPERR     ;SET LOOP ON ERROR POINTER TO 10$
2226  023772  012700  177776                MOV     #PSW,R0         ;LOAD PHYS. ADDR. OF PSW INTO R0
2227  023776  012701  100076                MOV     #100076,R1      ;LOAD VIRTUAL ADDR. FOR PSW INTO R1
2228  024002  012702  030340                MOV     #030340,R2      ;LOAD DATA FOR PSW IN R2
2229  024006  012704  007777                MOV     #7777,R4        ;LOAD R4 WITH PAR VALUE
2230  024012  010437  172350                MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <11:00>
2231  024016  005010                        CLR     (R0)            ;CLEAR THE PSW
2232  024020  005037  172516                CLR     SR3             ;SET UP FOR 18 BIT ADDRESSING
2233  024024  052737  000001  177572        BIS     #BIT0,SR0       ;TURN ON MEMORY MANAGEMENT
2234  024032  010211                        MOV     R2,(R1)         ;LOAD PSW USING ADDER (PAR4 + VIRT ADDR.)
2235  024034  005037  177572                CLR     SR0             ;TURN OFF MEM. MGMT (SR0=0)
2236  024040  011003                        MOV     (R0),R3         ;READ PSW BACK WITHOUT USING MEM. MGMT.
2237  024042  005010                        CLR     (R0)            ;CLEAR THE PSW
2238  024044  042703  000037                BIC     #37,R3          ;MASK T-BIT & CC BITS OUT OF DATA READ
2239  024050  020203                        CMP     R2,R3           ;WAS PSW WRITTEN?
2240  024052  001405                        BEQ     11$             ;BRANCH IF YES
2241  024054  010137  001306                MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2242  024060  004737  035620                JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDR. FOR TYPING
2243  024064  104017                        ERROR   17              ;PSW DID NOT HAVE DATA THAT IT SHOULD HAVE.
2244                                                                ;APPARENTLY PHYS. ADDR. OF PSW WAS
2245                                                                ;NOT FORMED BY ADDERS USING THE
2246                                                                ;VIRTUAL ADDR. AND KIPAR4
2247                                                                ;FOR TIGHTER SCOPE LOOP
2248                                                                ;REPLACE ERROR CALL WITH
2249                                                                ;'BR 10$'' = 000742
2250  024066  012737  024066  001110  11$:   MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
2251  024074  012700  177776                MOV     #PSW,R0         ;LOAD PHYS. ADDR. OF PSW INTO R0
2252  024100  012701  117776                MOV     #117776,R1      ;LOAD VIRTUAL ADDR. FOR PSW INTO R1
2253  024104  012702  030240                MOV     #030240,R2      ;LOAD DATA FOR PSW IN R2
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2254  024110  012704  177600                  MOV     #177600,R4      ;LOAD R4 WITH PAR VALUE
2255  024114  010437  172350                  MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2256  024120  052737  000020  172516          BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
2257  024126  052737  000001  177572          BIS     #BIT0,SR0       ;TURN ON MEMORY MANAGEMENT
2258  024134  010211                          MOV     R2,(R1)         ;LOAD PSW USING ADDER (PAR4 + VIRT. ADDR.)
2259  024136  005037  177572                  CLR     SR0             ;TURN OFF MEM. MGMT (SR0=0)
2260  024142  011003                          MOV     (R0),R3         ;READ PSW BACK WITHOUT USING MEM. MGMT.
2261  024144  005010                          CLR     (R0)            ;CLEAR THE PSW
2262  024146  042703  000037                  BIC     #37,R3          ;MASK T-BIT & CC BITS OUT OF DATA READ
2263  024152  020203                          CMP     R2,R3           ;WAS PSW WRITTEN?
2264  024154  001405                          BEQ     12$             ;BRANCH IF YES
2265  024156  010137  001306                  MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYSICAL ADDR.
2266  024162  004737  035620                  JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDR. FOR TYPING
2267  024166  104017                          ERROR   17              ;PSW DID NOT HAVE DATA THAT IT SHOULD
2268                                                                  ;HAVE, APPARENTLY PHYS. ADDR. OF PSW WAS
2269                                                                  ;NOT FORMED BY ADDERS USING THE
2270                                                                  ;VIRTUAL ADDR. AND KIPAR4
2271                                                                  ;FOR TIGHTER SCOPE LOOP
2272                                                                  ;REPLACE ERROR CALL WITH
2273                                                                  ;'BR 11$'' = 000743
2274  024170  012737  023406  001110  12$:    MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2275
2276                          ;;*****************************************************************
2277                          ;*TEST 24       RELOCATION & ADDER TEST (WITH CARRIES)
2278                          ;*
2279                          ;*      THE FOLLOWING TEST USES THE SAME METHOD AS THE PREVIOUS
2280                          ;*      TEST TO VERIFY MEMORY MANAGEMENTS ABILITY TO CONSTRUCT
2281                          ;*      PHYSICAL BUS ADDRESSES USING A VIRTUAL BUS ADDRESS AND THE
2282                          ;*      CONTENTS OF A PAGE ADDRESS REGISTER.  HOWEVER, THE VALUES
2283                          ;*      AND PATTERNS USED IN THIS TEST WILL GENERATE CARRIES
2284                          ;*      AND CHECK 'WRAPAROUND'' TO ADDRESS 000000 BY
2285                          ;*      USING VIRTUAL ADDR. 111400 AND KIPAR4 = 177664.
2286                          ;*      22-BIT ADDRESSING IS USED.
2287                          ;;*****************************************************************
2288  024176  000004          TST24:  SCOPE
2289
2290  024200                  1$:                                     ;KERNEL PAR'S AND PDR'S HAVE BEEN
2291                                                                  ;SET UP BY THE PREVIOUS TEST
2292  024200  012737  024200  001110  2$:     MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
2293  024206  012700  066476                  MOV     #66476,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2294  024212  012701  114376                  MOV     #114376,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2295  024216  012702  125253                  MOV     #125253,R2      ;LOAD TEST PATTERN INTO R2
2296  024222  012704  000521                  MOV     #521,R4 ;LOAD R4 WITH PAR VALUE
2297  024226  010437  172350                  MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2298  024232  011037  001176                  MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2299  024236  052737  000020  172516          BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
2300  024244  052737  000001  177572          BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2301  024252  010211                          MOV     R2,(R1)         ;LOAD 125253 USING ADDER  (PAR4 + VIRT ADDR.)
2302  024254  005037  177572                  CLR     SR0             ;TURN OFF MEMORY MGMT.
2303  024260  011003                          MOV     (R0),R3         ;READ 125253 BACK WITHOUT USING MEM. MGMT.
2304  024262  013710  001176                  MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2305  024266  020203                          CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2306                                                                  ;WRITTEN USING MEMORY MANAGEMENT?
2307  024270  001405                          BEQ     3$              ;BRANCH IF YES
2308  024272  010137  001306                  MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2309  024276  004737  035620                  JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
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2310  024302  104017                          ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2311                                                                  ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
2312                                                                  ;APPARENTLY PHYSICAL ADDR. WAS
2313                                                                  ;FORMED WRONG BY ADDERS USING
2314                                                                  ;THE VIRTUAL ADDR. AND KIPAR4
2315                                                                  ;FOR TIGHTER SCOPE LOOP
2316                                                                  ;REPLACE ERROR CALL WITH
2317                                                                  ;'BR 2$'' = 000742
2318  024304                                3$:
2319  024304  012737  024304  001110  4$:   MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
2320  024312  012700  062276                MOV     #62276,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2321  024316  012701  107376                MOV     #107376,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2322  024322  012702  125254                MOV     #125254,R2      ;LOAD TEST PATTERN INTO R2
2323  024326  012704  000527                MOV     #527,R4 ;LOAD R4 WITH PAR VALUE
2324  024332  010437  172350                MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2325  024336  011037  001176                MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2326  024342  052737  000020  172516        BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
2327  024350  052737  000001  177572        BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2328  024356  010211                        MOV     R2,(R1)         ;LOAD 125254 USING ADDER  (PAR4 + VIRT ADDR.)
2329  024360  005037  177572                CLR     SR0             ;TURN OFF MEMORY MGMT.
2330  024364  011003                        MOV     (R0),R3         ;READ 125254 BACK WITHOUT USING MEM. MGMT.
2331  024366  013710  001176                MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2332  024372  020203                        CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2333                                                                  ;WRITTEN USING MEMORY MANAGEMENT?
2334  024374  001405                        BEQ     5$              ;BRANCH IF YES
2335  024376  010137  001306                MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2336  024402  004737  035620                JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
2337  024406  104017                        ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2338                                                                  ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
2339                                                                  ;APPARENTLY PHYSICAL ADDR. WAS
2340                                                                  ;FORMED WRONG BY ADDERS USING
2341                                                                  ;THE VIRTUAL ADDR. AND KIPAR4
2342                                                                  ;FOR TIGHTER SCOPE LOOP
2343                                                                  ;REPLACE ERROR CALL WITH
2344                                                                  ;'BR 4$'' = 000742
2345  024410                                5$:
2346  024410  012737  024410  001110  6$:   MOV     #6$,$LPERR      ;SET LOOP ON ERROR POINTER TO 6$
2347  024416  012700  062076                MOV     #62076,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2348  024422  012701  104576                MOV     #104576,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2349  024426  012702  125255                MOV     #125255,R2      ;LOAD TEST PATTERN INTO R2
2350  024432  012704  000553                MOV     #553,R4 ;LOAD R4 WITH PAR VALUE
2351  024436  010437  172350                MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2352  024442  011037  001176                MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2353  024446  052737  000020  172516        BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
2354  024454  052737  000001  177572        BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2355  024462  010211                        MOV     R2,(R1)         ;LOAD 125255 USING ADDER  (PAR4 + VIRT ADDR.)
2356  024464  005037  177572                CLR     SR0             ;TURN OFF MEMORY MGMT.
2357  024470  011003                        MOV     (R0),R3         ;READ 125255 BACK WITHOUT USING MEM. MGMT.
2358  024472  013710  001176                MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2359  024476  020203                        CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2360                                                                  ;WRITTEN USING MEMORY MANAGEMENT?
2361  024500  001405                        BEQ     7$              ;BRANCH IF YES
2362  024502  010137  001306                MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2363  024506  004737  035620                JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
2364  024512  104017                        ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2365                                                                  ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
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2366                                                                    ;APPARENTLY PHYSICAL ADDR. WAS
2367                                                                    ;FORMED WRONG BY ADDERS USING
2368                                                                    ;THE VIRTUAL ADDR. AND KIPAR4
2369                                                                    ;FOR TIGHTER SCOPE LOOP
2370                                                                    ;REPLACE ERROR CALL WITH
2371                                                                    ;'BR 6$'' = 000742
2372  024514                                    7$:
2373  024514  012737  024514  001110  8$:       MOV     #8$,$LPERR      ;SET LOOP ON ERROR POINTER TO 8$
2374  024522  012700  000000                    MOV     #00000,R0       ;LOAD PHYSICAL ADDR. PBA INTO R0
2375  024526  012701  111400                    MOV     #111400,R1      ;LOAD VIRTUAL ADDR. VBA INTO R1
2376  024532  012702  125256                    MOV     #125256,R2      ;LOAD TEST PATTERN INTO R2
2377  024536  012704  177664                    MOV     #177664,R4      ;LOAD R4 WITH PAR VALUE
2378  024542  010437  172350                    MOV     R4,KIPAR4       ;LOAD KERNEL PAR 4 BITS <15:00>
2379  024546  011037  001176                    MOV     (R0),$TMP0      ;SAVE CONTENTS AT TEST LOCATION
2380  024552  052737  000020  172516            BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
2381  024560  052737  000001  177572            BIS     #BIT0,SR0       ;TURN ON MEM. MGNT.
2382  024566  010211                            MOV     R2,(R1)         ;LOAD 125256 USING ADDER  (PAR4 + VIRT ADDR.)
2383  024570  005037  177572                    CLR     SR0             ;TURN OFF MEMORY MGMT.
2384  024574  011003                            MOV     (R0),R3         ;READ 125256 BACK WITHOUT USING MEM. MGMT.
2385  024576  013710  001176                    MOV     $TMP0,(R0)      ;RESTORE ORIGINAL CONTENTS TO TEST LOC.
2386  024602  020203                            CMP     R2,R3           ;WAS SAME PATTERN READ BACK THAT WAS
2387                                                                    ;WRITTEN USING MEMORY MANAGEMENT?
2388  024604  001405                            BEQ     9$              ;BRANCH IF YES
2389  024606  010137  001306                    MOV     R1,VIRT1        ;SAVE VIRTUAL ADDR. TO FORM PHYS. ADDR
2390  024612  004737  035620                    JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS FOR TYPING
2391  024616  104017                            ERROR   17              ;TEST LOCATION DID NOT HAVE PATTERN
2392                                                                    ;THAT SHOULD HAVE BEEN WRITTEN TO IT.
2393                                                                    ;APPARENTLY PHYSICAL ADDR. WAS
2394                                                                    ;FORMED WRONG BY ADDERS USING
2395                                                                    ;THE VIRTUAL ADDR. AND KIPAR4
2396                                                                    ;FOR TIGHTER SCOPE LOOP
2397                                                                    ;REPLACE ERROR CALL WITH
2398                                                                    ;'BR 8$'' = 000742
2399  024620                                    9$:
2400  024620  012737  024200  001110            MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2401
2402                                    ;;**************************************************************************
2403                                    ;*TEST 25       READ AND WRITE WHILE IN RELOCATE MODE
2404                                    ;*
2405                                    ;*      THE FOLLOWING TEST TURNS ON MEMORY MANAGEMENT AND THEN
2406                                    ;*      READS AND WRITES LOCATIONS BETWEEN PHYSICAL ADDRESSES
2407                                    ;*      060000-067600.  ONE LOCATION IN EVERY BLOCK (32. WORDS)
2408                                    ;*      IS WRITTEN USING PAR4 AND READ USING PAR5.  THIS IS
2409                                    ;*      DONE IN BOTH USER AND KERNEL MODES.  THE USER PAR/PDR'S
2410                                    ;*      ARE SET UP AT THE BEGINNING OF THE TEST AND ONCE MEMORY
2411                                    ;*      MANAGEMENT IS TURNED ON IT IS LEFT ON FOR THE REST OF THE
2412                                    ;*      OF THE PROGRAM.  THE 'MODE'' INPUT TO THE PAR/PDR ADDRESS MUX
2413                                    ;*      IS CHECKED BY READING AND WRITING IN USER MODE.  REMEMBER
2414                                    ;*      ALSO, THAT SINCE MEMORY MANAGEMENT IS ON (IN RELOCATE
2415                                    ;*      MODE) THE PROGRAM ITSELF IS USING ITS VIRTUAL ADDRESSES AND
2416                                    ;*      PAR/PDR'S 0-3 TO EXECUTE.  PAR7/PDR7 ARE USED TO ACCESS THE
2417                                    ;*      I/O PAGE.
2418                                    ;*
2419                                    ;*      WHILE TESTING IN KERNEL MODE, USER PAGES 4 & 5 ARE MAPPED
2420                                    ;*      NON-RESIDENT WITH DIFFERENT PAR VALUES THAN THE KERNEL
2421                                    ;*      PAR'S TO BE SURE THAT THE KERNEL PAR'S AND PDR'S ARE BEING
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                        ;*      USED WHEN IN KERNEL MODE (AND VICE VERSA WHILE TESTING IN
                        ;*      USER MODE).  IF A MEM. MGMT. TRAP OCCURS, THE PROGRAM GOES
                        ;*      TO 9$ WHERE THE TRAP IS REPORTED.
                        ;*
                        ;*      BY SETTING THE LOCATION $MADR1 IN THE E-TABLE TO A CONSTANT,
                        ;*      AS DESCRIBED IN THE DOCUMENTATION, THIS TEST WILL CONTINUE
                        ;*      ACCESSING LOCATIONS THROUGHOUT MEMORY BY INCREASING THE VALUE
                        ;*      OF PAR4 AND PAR5.
                        ;;*****************************************************************
024626  000004         TST25:  SCOPE

024630  005037  177776  1$:     CLR     PSW             ;START IN KERNEL MODE
024634  012704  000577          MOV     #577,R4         ;LOAD R4 WITH VALUE FOR PAR4
024640  012705  000600          MOV     #600,R5         ;LOAD R5 WITH VALUE FOR PAR5
024644  010437  172350          MOV     R4,KIPAR4       ;LOAD KERNEL PAR4
024650  010537  172352          MOV     R5,KIPAR5       ;LOAD KERNEL PAR5
024654  012700  177640          MOV     #UIPAR0,R0      ;LOAD ADDRESS OF FIRST USER PAR IN R0
024660  005001                  CLR     R1              ;CLEAR R1
024662  012702  000007          MOV     #7,R2           ;LOAD LOOP COUNTER WITH A 7
024666  010120          2$:     MOV     R1,(R0)+        ;MAP USER PAR'S TO PAGES 0-6 (4K EACH)
024670  062701  000200          ADD     #200,R1
024674  077204                  SOB     R2,2$           ;LOOP UNTIL UIPAR0-UIPAR6 ARE LOADED
024676  012710  177600          MOV     #177600,(R0)    ;MAP USER PAR7 TO THE I/O PAGE
024702  012700  177600          MOV     #UIPDR0,R0      ;LOAD ADDRESS OF FIRST USER PDR IN R0
024706  012701  077406          MOV     #77406,R1       ;LOAD PDR DATA INTO R1
024712  012702  000010          MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
024716  010120          3$:     MOV     R1,(R0)+        ;MAP ALL 8 PAGES 128 BLOCKS, UPWARD
024720  077202                  SOB     R2,3$           ;       EXPANDABLE, READ/WRITE
024722  012737  025010  001110  MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
024730  012737  025274  000250  MOV     #9$,MMVEC       ;SET M. M. TRAP VECTOR TO 9$
024736  052737  000020  172516  BIS     #BIT4,SR3       ;SET UP FOR 22 BIT ADDRESSING
024744  012737  000001  177572  MOV     #BIT0,SR0       ;TURN ON MEMORY MANAGEMENT
024752  105037  177610  10$:    CLRB    UIPDR4          ;MAP USER SPACE NON-RESIDENT WHILE
024756  105037  177612          CLRB    UIPDR5          ;       TESTING KERNEL SPACE
024762  010537  177650          MOV     R5,UIPAR4       ;MAP USER PAR'S OPPOSITE OF KIPAR'S
024766  010437  177652          MOV     R4,UIPAR5
024772  013737  177776  001176  4$:     MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
025000  012700  100100          MOV     #100100,R0      ;PUT VIRTUAL ADDR. THAT USES PAR4 IN R0
025004  012701  120000          MOV     #120000,R1      ;PUT VIRTUAL ADDR. THAT USES PAR5 IN R1
025010  010010          5$:     MOV     R0,(R0)         ;WRITE TO TEST LOC. USING PAR4
025012  011102                  MOV     (R1),R2         ;READ THE SAME LOC., BUT USING PAR5
025014  020002                  CMP     R0,R2           ;DID WE READ WHAT WE WROTE?
025016  001411                  BEQ     6$              ;BRANCH IF YES
025020  010137  001310          MOV     R1,VIRT2        ;SAVE VIRTUAL ADDR. THAT SELECTED PAR5
025024  010037  001306          MOV     R0,VIRT1        ;SAVE VIRTUAL ADDR. THAT SELECTED PAR4
025030  004737  035620          JSR     PC,FORMPA       ;GO FORM PHYSICAL ADDRESS  BEING USED
025034  104020                  ERROR   20              ;READING LOC. USING PAR5 AND A VIRT.
                                                        ;ADDR. DID NOT FIND DATA WRITTEN WHEN USING
                                                        ;PAR4 AND VIRT. ADDRESS.
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 5$'' = 000765
025036  013700  001306          MOV     VIRT1,R0        ;RESTORE VBA IN R0
025042  062700  000100  6$:     ADD     #100,R0         ;CHANGE VIRTUAL ADDRS. TO POINT TO NEXT BLOCK
025046  062701  000100          ADD     #100,R1
025052  020127  127700          CMP     R1,#127700      ;WERE BLOCKS FROM 60000-67600 ALL TRIED?
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2478  025056  001354                          BNE     5$              ;BRANCH IF NO
2479  025060  032737  140000  177776          BIT     #140000,PSW     ;HAVE WE DONE TEST IN USER MODE YET?
2480  025066  001026                          BNE     7$              ;BRANCH IF YES
2481  025070  010437  177650                  MOV     R4,UIPAR4       ;LOAD USER PAR4
2482  025074  010537  177652                  MOV     R5,UIPAR5       ;LOAD USER PAR5
2483  025100  112737  000006  177610          MOVB    #6,UIPDR4       ;MAP USER SPACE R/W TO TEST IT
2484  025106  112737  000006  177612          MOVB    #6,UIPDR5
2485  025114  105037  172310                  CLRB    KIPDR4          ;MAP  KERNEL SPACE NON-RESIDENT WHILE
2486  025120  105037  172312                  CLRB    KIPDR5          ;       TESTING USER SPACE
2487  025124  010537  172350                  MOV     R5,KIPAR4       ;MAP KERNEL PAR'S OPPOSITE UIPAR'S
2488  025130  010437  172352                  MOV     R4,KIPAR5
2489  025134  012737  140000  177776          MOV     #140000,PSW     ;GO TO USER MODE
2490  025142  000713                          BR      4$              ;GO BACK AND READ/WRITE IN USER MODE
2491  025144  005037  177776          7$:     CLR     PSW             ;GO BACK TO KERNEL MODE BEFORE LEAVING
2492
2493  025150  020537  001260                  CMP     R5,@#$MADR1     ,HAVE WE CHECKED ALL MEMORY?
2494  025154  002020                          BGE     8$              ;BRANCH IF YES
2495  025156  062704  001000                  ADD     #1000,R4        ;LOAD WITH NEXT VALUE FOR PAR4
2496  025162  062705  001000                  ADD     #1000,R5        ;LOAD WITH NEXT VALUE FOR PAR5
2497  025166  010437  172350                  MOV     R4,KIPAR4       ;LOAD KERNAL PAR4
2498  025172  010537  172352                  MOV     R5,KIPAR5       ;LOAD KERNAL PAR5
2499  025176  112737  000006  172310          MOVB    #6,KIPDR4       ;MAP KERNAL SPACE R/W WHILE TESTING
2500  025204  112737  000006  172312          MOVB    #6,KIPDR5
2501  025212  000137  024752                  JMP     10$             ;CONTINUE TEST
2502
2503  025216  012737  077406  172310  8$:     MOV     #77406,KIPDR4   ;REMAP KERNEL PAGES READ/WRITE
2504  025224  012737  077406  172312          MOV     #77406,KIPDR5
2505  025232  012705  000600                  MOV     #600,R5
2506  025236  010537  172350                  MOV     R5,KIPAR4       ;MAP KERNEL  AND USER PAR'S 4 & 5
2507  025242  010537  172352                  MOV     R5,KIPAR5       ;  BACK TO 12-16K
2508  025246  010537  177650                  MOV     R5,UIPAR4
2509  025252  010537  177652                  MOV     R5,UIPAR5
2510  025256  012737  002150  000250          MOV     #MGMERR,MMVEC   ;RESTORE ADDR. OF NORMAL M.M. TRAP ROUTINE
2511  025264  012737  024630  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2512  025272  000427                          BR      TST26           ;;GO TO NEXT TEST
2513
2514  025274  012637  001266          9$:     MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
2515  025300  012637  001270                  MOV     (KSP)+,TRAPPS
2516                                                                  ;PROGRAM WILL TRAP TO HERE IF TRY
2517                                                                  ;TO USE USER PDR'S WHEN IN KERNEL MODE
2518                                                                  ;OR KERNEL PDR'S WHEN IN USER MODE
2519  025304  010037  001306                  MOV     R0,VIRT1        ;SAVE VIRTUAL ADDRESS FOR ERROR REPORT
2520  025310  004737  035620                  JSR     PC,FORMPA       ;GO FORM THE PHYSICAL ADDRESS  BEING USED
2521  025314  013737  177572  001272          MOV     SR0,WASSR0      ;SAVE SR0 & SR2  FOR ERROR REPORT
2522  025322  013737  177576  001274          MOV     SR2,WASSR2
2523  025330  042737  160000  177572          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
2524  025336  104052                          ERROR   52              ;M.M. TRAP WHILE IN RELOCATE MODE -
2525                                                                  ;REFERENCED WRONG SET OF PDR'S
2526                                                                  ;FOR TIGHTER SCOPE LOOP
2527                                                                  ;REPLACE ERROR CALL WITH
2528                                                                  ;A 'NOP' = 000240
2529  025340  013746  001270                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
2530  025344  013746  001266                  MOV     TRAPPC,-(KSP)
2531  025350  000002                          RTI                     ;RETURN TO TEST
2532
2533
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```
                                        ;;*****************************************************************
                                        ;*TEST 26       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, & 777776 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 IS BEING CHECKED.
                                        ;*****************************************************************
025352  000004                  TST26:  SCOPE
025354  012737  000340  177776  1$:     MOV     #340,PSW                ;LOCK OUT ALL POSSIBLE INTERRUPTS
025362  004737  035246                  JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
025366  012702  000004                  MOV     #4,R2           ;SET LOOP COUNTER TO 4
025372  012700  172346                  MOV     #KIPAR3,R0      ;LOAD ADDRESS OF PAR3 INTO R0
025376  012701  000600                  MOV     #600,R1         ;LOAD "12-16K" PAR VALUE INTO R1
025402  010120                  2$:     MOV     R1,(R0)+        ;MAP PARS 3-6 TO 12-16K
025404  077202                          SOB     R2,2$           ;LOOP TIL ALL 4 OF THEM LOADED
025406  012705  172300                  MOV     #KIPDR0,R5      ;LOAD ADDRESS OF FIRST PDR TO BE TESTED IN R5
025412  012704  000010                  MOV     #10,R4          ;SET LOOP COUNTER TO 8
025416  012703  017776                  MOV     #17776,R3       ;INITIALIZE VIRTUAL ADDRESS TO BE IN R3
025422  012737  025430  001110          MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
025430  012700  172300          3$:     MOV     #KIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE SETUP IN R0
025434  012702  000010                  MOV     #10,R2          ;SET LOOP COUNTER TO 8
025440  012701  077406                  MOV     #77406,R1       ;PUT "W-BIT OFF DATA" INTO R1
025444  010120                  4$:     MOV     R1,(R0)+        ;CLEAR ALL W-BITS BY WRITING TO ALL PDRS
025446  077202                          SOB     R2,4$           ;LOOP UNTIL ALL OF THEM SETUP
025450  011313                          MOV     (R3),(R3)       ;DO "DATO" TO VIRTUAL ADDR.-SETTING A W-BIT
025452  031527  000100                  BIT     (R5),#WBIT      ;DID THAT CAUSE W-BIT TO BE SET?
025456  001002                          BNE     5$              ;BRANCH IF YES
025460  104021                          ERROR   21              ;W-BIT DID NOT GET SET IN PDR
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;"BR 3$" = 000763
025462  000422                          BR      8$              ;SKIP CHECKING OTHER PDR'S-ERROR WILL SET W-BITS
025464  012702  000010          5$:     MOV     #10,R2          ;SET LOOP COUNTER TO 8
025470  012700  172300                  MOV     #KIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE CHECKED IN R0
025474  031027  000100          6$:     BIT     (R0),#WBIT      ;DID W-BIT IN OTHER PDRS REMAIN CLEAR?
025500  001403                          BEQ     7$              ;BRANCH IF YES
025502  020500                          CMP     R5,R0           ;IF W-BIT SET, THEN WAS IT PDR UNDER TEST?
025504  001401                          BEQ     7$              ;BRANCH IF YES
025506  104022                          ERROR   22              ;W-BIT GOT SET IN MORE THAN ONE PDR
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;"BR 3$" = 000750
025510  062700  000002          7$:     ADD     #2,R0           ;POINT R0 TO NEXT PDR TO BE CHECKED
025514  077211                          SOB     R2,6$           ;LOOP UNTIL ALL 8 CHECKED FOR CLEAR W-BIT
025516  010115                          MOV     R1,(R5)         ;WRITE TO THE PDR TESTED TO CLEAR W-BIT
025520  031527  000100                  BIT     (R5),#WBIT      ;DID WRITING PDR CLEAR THE W-BIT:
025524  001401                          BEQ     8$              ;BRANCH IF YES
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2590  025526  104023                          ERROR   23              ;W-BIT DID NOT CLEAR BY WRITING THE PDR
2591                                                                  ;FOR TIGHTER SCOPE LOOP
2592                                                                  ;REPLACE ERROR CALL WITH
2593                                                                  ;'BR 3$'' = 000740
2594  025530  062705  000002          8$:     ADD     #2,R5           ;POINT R5 TO THE NEXT PDR TO BE TESTED
2595  025534  062703  020000                  ADD     #20000,R3       ;CHANGE VIRT. ADDR TO REF. NEXT PDR
2596  025540  077445                          SOB     R4,3$           ;LOOP BACK TO 3$ UNTIL ALL 8 PDR'S TESTED
2597  025542  012737  025354  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2598  025550  004737  035302                  JSR     PC,TON          ;TURN T-BIT BACK ON FOR NEXT TEST
2599
2600                                  ;;**********************************************************************
2601                                  ;*TEST 27        W-BIT LOGIC TEST, USER PDR'S
2602                                  ;*
2603                                  ;*      THIS TEST WRITES TO EIGHT (8) DIFFERENT VIRTUAL ADDRESSES
2604                                  ;*      (VBA'S = 17776,37776,57776,77776,117776,137776,157776, & 177776
2605                                  ;*      & PBA'S CONSTRUCTED = 17776,37776,57776,77776,77776,
2606                                  ;*      77776,77776, & 777776 RESPECTIVELY).
2607                                  ;*      WHICH SHOULD CAUSE THE 'W-BIT'' TO SET IN EACH OF THE
2608                                  ;*      EIGHT (8) USER PAGE DESCRIPTOR REGISTERS.  THE PDR'S
2609                                  ;*      ARE CHECKED TO SEE THAT IT'S W-BIT DOES SET WHEN THE
2610                                  ;*      PAGE IT IS MAPPED TO IS WRITTEN TO AND THAT THE w-BIT
2611                                  ;*      DOES NOT SET IN ANY OF THE OTHER PDR'S.  USER PDR'S 3,4,5,6
2612                                  ;*      ARE MAPPED TO 12-16K FOR THIS TEST.  ALSO THE W-BIT
2613                                  ;*      SHOULD BE CLEARED WHEN THE PDR IS WRITTEN TO.  THE
2614                                  ;*      W-BIT PORTION OF THE PDR'S IS BEING CHECKED.
2615                                  ;;**********************************************************************
2616  025554  000004                  TST27:  SCOPE
2617  025556  012737  140000  177776  1$:     MOV     #140000,PSW     ;GO TO USER MODE FOR THIS TEST
2618  025564  004737  035246                  JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
2619  025570  012702  000004                  MOV     #4,R2           ;SET LOOP COUNTER TO 4
2620  025574  012700  177646                  MOV     #UIPAR3,R0      ;LOAD ADDRESS OF PAR3 INTO R0
2621  025600  012701  000600                  MOV     #600,R1         ;LOAD ''12-16K'' PAR VALUE INTO R1
2622  025604  010120                  2$:     MOV     R1,(R0)+        ;MAP PARS 3-6 TO 12-16K
2623  025606  077202                          SOB     R2,2$           ;LOOP TIL ALL 4 OF THEM LOADED
2624  025610  012705  177600                  MOV     #UIPDR0,R5      ;LOAD ADDRESS OF FIRST PDR TO BE TESTED IN R5
2625  025614  012704  000010                  MOV     #10,R4          ;SET LOOP COUNTER TO 8
2626  025620  012703  017776                  MOV     #17776,R3       ;INITIALIZE VIRTUAL ADDRESS TO BE IN R3
2627  025624  012737  025632  001110          MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2628  025632  012700  177600          3$:     MOV     #UIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE SETUP IN R0
2629  025636  012702  000010                  MOV     #10,R2          ;SET LOOP COUNTER TO 8
2630  025642  012701  077406                  MOV     #77406,R1       ;PUT 'W-BIT OFF DATA'' INTO R1
2631  025646  010120                  4$:     MOV     R1,(R0)+        ;CLEAR ALL W-BITS BY WRITING TO ALL PDRS
2632  025650  077202                          SOB     R2,4$           ;LOOP UNTIL ALL OF THEM SETUP
2633  025652  011313                          MOV     (R3),(R3)       ;DO 'DATO'' TO VIRTUAL ADDR.-SETTING A W-BIT
2634  025654  031527  000100                  BIT     (R5),#WBIT      ;DID THAT CAUSE W-BIT TO BE SET?
2635  025660  001002                          BNE     5$              ;BRANCH IF YES
2636  025662  104021                          ERROR   21              ;W-BIT DID NOT GET SET IN PDR
2637                                                                  ;FOR TIGHTER SCOPE LOOP
2638                                                                  ;REPLACE ERROR CALL WITH
2639                                                                  ;'BR 3$'' = 000763
2640  025664  000422                          BR      8$              ;SKIP CHECKING OTHER PDR'S-ERROR WILL SET W-BITS
2641  025666  012702  000010          5$:     MOV     #10,R2          ;SET LOOP COUNTER TO 8
2642  025672  012700  177600                  MOV     #UIPDR0,R0      ;LOAD ADDR. OF FIRST PDR TO BE CHECKED IN R0
2643  025676  031027  000100          6$:     BIT     (R0),#WBIT      ;DID W-BIT IN OTHER PDRS REMAIN CLEAR?
2644  025702  001403                          BEQ     7$              ;BRANCH IF YES
2645  025704  020500                          CMP     R5,R0           ;IF W-BIT SET, THEN WAS IT PDR UNDER TEST?
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```
2646  025706  001401                        BEQ     7$              ;BRANCH IF YES
2647  025710  104022                        ERROR   22              ;W-BIT GOT SET IN MORE THAN ONE PDR
2648                                                                ;FOR TIGHTER SCOPE LOOP
2649                                                                ;REPLACE ERROR CALL WITH
2650                                                                ;'BR 3$'' = 000750
2651  025712  062700  000002          7$:     ADD     #2,R0           ;POINT R0 TO NEXT PDR TO BE CHECKED
2652  025716  077211                        SOB     R2,6$           ;LOOP UNTIL ALL 8 CHECKED FOR CLEAR W-BIT
2653  025720  010115                        MOV     R1,(R5)         ;WRITE TO THE PDR TESTED TO CLEAR W-BIT
2654  025722  031527  000100               BIT     (R5),#WBIT      ;DID WRITING PDR CLEAR THE W-BIT?
2655  025726  001401                        BEQ     8$              ;BRANCH IF YES
2656  025730  104023                        ERROR   23              ;W-BIT DID NOT CLEAR BY WRITING THE PDR
2657                                                                ;FOR TIGHTER SCOPE LOOP
2658                                                                ;REPLACE ERROR CALL WITH
2659                                                                ;'BR 3$'' = 000740
2660  025732  062705  000002          8$:     ADD     #2,R5           ;POINT R5 TO THE NEXT PDR TO BE TESTED
2661  025736  062703  020000                  ADD     #20000,R3       ;CHANGE VIRT. ADDR TO REF. NEXT PDR
2662  025742  077445                        SOB     R4,3$           ;LOOP BACK TO 3$ UNTIL ALL 8 PDR'S TESTED
2663  025744  012737  025556  001110        MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2664  025752  004737  035302                JSR     PC,TON          ;TURN T-BIT BACK ON FOR NEXT TEST
2665  025756  005037  177776                CLR     PSW             ;BACK TO KERNEL MODE BEFORE LEAVING
2666
2667                                        ;;*****************************************************************
2668                                        ;*TEST 30       TEST 'W-BIT'' SPECIAL CASES
2669                                        ;*
2670                                        ;*      THIS TEST CHECKS TWO SPECIAL CASES OF THE W-BIT. FIRST CASE IS
2671                                        ;*      THAT THE W-BIT SHOULD NOT SET IN PDR 7 WHEN WRITING TO
2672                                        ;*      STATUS REG SR0 (KERNEL PDR 7 IS USED).  SECOND CASE IS THAT
2673                                        ;*      THE W-BIT IS STILL SET IF THE 'DATO'' IS ABORTED DUE TO A
2674                                        ;*      TIMEOUT ERROR (KERNEL PDR6 & VIRTUAL ADDR 140000 ARE USED).
2675                                        ;*
2676                                        ;;*****************************************************************
2677  025762  000004                TST30:  SCOPE
2678
2679  025764  004737  035246          1$:     JSR     PC,TOFF         ;TURN OFF T-BIT TRAPPING FOR THIS TEST
2680  025770  012701  077406                  MOV     #77406,R1       ;PUT 'W-BIT OFF'' VALUE FOR PDR IN R1
2681  025774  012737  026002  001110        MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
2682  026002  010137  172316          2$:     MOV     R1,KIPDR7       ;LOAD KERNEL PDR 7 TO CLEAR W-BIT
2683  026006  013700  177572                  MOV     SR0,R0          ;READ PRESENT CONTENTS OF STATUS REG. 0
2684  026012  010037  177572                  MOV     R0,SR0          ;WRITE PRESENT CONTENTS OF SR0 BACK TO ITSELF
2685  026016  013702  172316                  MOV     KIPDR7,R2       ;READ CONTENTS OF KIPDR7 INTO R2
2686  026022  020102                        CMP     R1,R2           ;WAS W-BIT LEFT CLEARED?
2687  026024  001401                        BEQ     3$              ;BRANCH IF YES
2688  026026  104024                        ERROR   24              ;W-BIT IN KIPDR7 SET WHEN SR0 WAS WRITTEN TO
2689                                                                ;FOR TIGHTER SCOPE LOOP
2690                                                                ;REPLACE ERROR CALL WITH
2691                                                                ;'BR 2$'' = 000765
2692  026030  012737  026030  001110  3$.     MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2693  026036  010137  172314                  MOV     R1,KIPDR6       ;LOAD KERNEL PDR6 WITH 77406 TO CLEAR W-BIT
2694  026042  012737  026054  000004        MOV     #4$,ERRVEC      ;SET UP LOC. 4 TO 4$ FOR ODD ADDR. ABORT
2695  026050  005037  140000                  CLR     @#140000        ;CAUSE TIMEOUT ABORT THRU LOC. 4
2696  026054  012706  001100          4$:     MOV     #KERSTK,KSP     ;RESTORE THE STACK POINTER
2697  026060  013702  172314                  MOV     KIPDR6,R2       ;READ KIPDR6 INTO R2
2698  026064  052701  000100                  BIS     #100,R1         ;R1-77506
2699  026070  020102                        CMP     R1,R2           ;WAS W-BIT SET?
2700  026072  001401                        BEQ     5$              ;BRANCH IF YES
2701  026074  104025                        ERROR   25              ;W-BIT WAS NOT SET DURING A TIMEOUT ABOR
```

```
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 3$'' = 000757
026076  010137  172314          5$:     MOV     R1,KIPDR6       ;RESTORE KIPDR6 TO 77406
026102  012737  001400  172354          MOV     #1400,KIPAR6    ;RESTORE KIPAR6 TO 1400
026110  012737  002076  000004          MOV     #TIMERR,ERRVEC  ;RESTORE NORMAL CPU TRAP ROUTINE TO LOC.4
026116  012737  025764  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
026124  004737  035302                  JSR     PC,TON          ;TURN T-BIT TRAPPING BACK ON

                        ;;*****************************************************************
                        ;*
                        ;*      THE NEXT THREE (3) TESTS CAUSE MEMORY MANAGEMENT ERRORS
                        ;*      TO CHECK THE ABILITY OF STATUS REGISTER 0 TO RECORD KT
                        ;*      ERRORS AND THE ABILITY OF STATUS REGISTER 2 TO LOCK UP THE
                        ;*      VIRTUAL ADDR. OF THE INSTRUCTION THAT CAUSED THE ERROR.
                        ;*      THE BITS OF SR2 ARE CHECKED AND BITS <15:13>, <6:5>, AND <3:0>
                        ;*      ARE CHECKED IN SR0.  SO THE SR0 AND SR2 LOGIC AND THE
                        ;*      KT ERROR LOGIC ARE CHECKED.
                        ;*
                        ;;*****************************************************************

                        ;;*****************************************************************
                        ;*TEST 31       NON-RESIDENT ABORT TEST (ACF=0&4)
                        ;*
                        ;*      THIS TEST CHECKS THE ACCESS CONTROL FIELD (ACF) COMPARATOR
                        ;*      LOGIC BY CAUSING NON-RESIDENT ABORTS IN BOTH KERNEL AND
                        ;*      USER MODES.  PDR 4 IS LOADED WITH ACF'S = 0&4 AND
                        ;*      THEN PHYSICAL ADDR. 60000 IS ACCESSED TO CAUSE THE ABORT.
                        ;*
                        ;;*****************************************************************
026130  000004          TST31:  SCOPE

026132  012700  000600          1$:     MOV     #600,R0         ;LOAD DATA FOR PAR'S INTO R0
026136  010037  172346                  MOV     R0,KIPAR3       ;MAP KERNEL PAR'S 3&4 TO 12-16K
026142  010037  172350                  MOV     R0,KIPAR4
026146  010037  177646                  MOV     R0,UIPAR3       ;MAP USER PAR'S 3&4 TO 12-16K
026152  010037  177650                  MOV     R0,UIPAR4
026156  012737  077406  172306          MOV     #77406,KIPDR3   ;MAP KERNEL PDR 3  128 BLKS, READ-WRITE
026164  012737  077406  177606          MOV     #77406,UIPDR3   ;MAP USER PDR 3  128 BLKS, READ-WRITE
026172  012700  060000                  MOV     #60000,R0       ;LOAD VIRTUAL ADDR. TO REFERENCE PDR3 INTO R0
026176  012701  100000                  MOV     #100000,R1      ;LOAD VIRTUAL ADDR. TO REFERENCE PDR4 INTO R1
026202  012703  100011                  MOV     #100011,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., KERNEL, PG.4
026206  012702  077400                  MOV     #77400,R2       ;LOAD ACF=0 (NON-RESIDENT) PDR VALUE IN R2
026212  012737  026254  000250  2$:     MOV     #5$,MMVEC       ;POINT MEM. MGMT. TRAP VECTOR TO 5$ BELOW
026220  010237  172310                  MOV     R2,KIPDR4       ;LOAD ACF TEST VALUE INTO KIPDR4
026224  010237  177610                  MOV     R2,UIPDR4       ;LOAD ACF TEST VALUE INTO UIPDR4
026230  012737  026236  001110          MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
026236  005010                  3$:     CLR     (R0)            ;CLEAR PHYS. LOC. 60000 USING PDR3
026240  013737  177776  001176          MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
026246  005211                  4$:     INC     (R1)            ;TRY TO REF. IT USING PDR4 - SHOULD TRAP TO 5$
026250  104026                          ERROR   26              ;MEM. MGMT. ABORT DID NOT OCCUR
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 3$'' - 000772
026252  000425                          BR      8$              ;BRANCH AROUND STATUS REG. CHECKS IF NO ABORT
026254  062706  000004          5$:     ADD     #4,SP           ;RESTORE STACK POINTER
```

```
2758  026260  005710                        TST     (R0)            ;DID INSTRUCTION GET ABORTED & NOT EXECUTE
2759  026262  001401                        BEQ     6$              ;BRANCH IF YES
2760  026264  104027                        ERROR   27              ;INSTRUCTION WAS NOT ABORTED, LOC. GOT CHANGED
2761                                                                ;FOR TIGHTER SCOPE LOOP
2762                                                                ;REPLACE ERROR CALL WITH
2763                                                                ;'BR 3$'' = 000764
2764  026266  013737  177572  001272  6$:     MOV     SR0,WASSR0      ;READ STATUS REGISTER 0
2765  026274  013737  177576  001274          MOV     SR2,WASSR2      ;READ STATUS REGISTER 2
2766  026302  020337  001272                  CMP     R3,WASSR0       ;DID SR0 REPORT NON-RESIDENT ERROR CORRECTLY?
2767  026306  001401                        BEQ     7$              ;BRANCH IF YES
2768  026310  104030                        ERROR   30              ;SR0 DID NOT REPORT NON-RES. ERROR CORRECTLY
2769                                                                ;FOR TIGHTER SCOPE LOOP
2770                                                                ;REPLACE ERROR CALL WITH
2771                                                                ;'BR 3$'' = 000752
2772  026312  012704  026246          7$:     MOV     #4$,R4          ;LOAD R4 WITH WHAT SR2 SHOULD READ
2773  026316  020437  001274                  CMP     R4,WASSR2       ;DID SR2 LOCKUP RIGHT VIRTUAL ADDR. ( 4$)?
2774  026322  001401                        BEQ     8$              ;BRANCH IF YES
2775  026324  104031                        ERROR   31              ;SR2 DID NOT LOCK VIRTUAL ADDR. OF NON-RES. ERROR
2776                                                                ;FOR TIGHTER SCOPE LOOP
2777                                                                ;REPLACE ERROR CALL WITH
2778                                                                ;'BR 3$'' = 000744
2779  026326  042737  160000  177572  8$:     BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
2780  026334  032737  140000  001176          BIT     #140000,$TMP0   ;HAS ACF=0&4 BEEN TESTED IN USER YET
2781  026342  001006                        BNE     9$              ;BRANCH IF YES
2782  026344  012703  100151                  MOV     #100151,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ - N.R., USER, PG.4
2783  026350  012737  140000  177776          MOV     #140000,PSW     ;GO TO USER MODE
2784  026356  000715                        BR      2$              ;REPEAT TEST IN USER MODE
2785  026360  022702  077404          9$:     CMP     #77404,R2       ;HAS ACF=4 BEEN TESTED YET?
2786  026364  001407                        BEQ     10$             ;BRANCH IF YES
2787  026366  012702  077404                  MOV     #77404,R2       ;THEN LOAD ACF=4 (NON-RES) PDR VALUE IN R2
2788  026372  012703  100011                  MOV     #100011,R3      ;LOAD R3 WITH WHAT SR0 SHOULD READ-N.R.,KERNFL,PG. 4
2789  026376  005037  177776                  CLR     PSW             ;GO BACK TO KERNEL MODE
2790  026402  000703                        BR      2$              ;GO BACK & TEST ACF=4 IN SAME MODE
2791  026404  005037  177776          10$:    CLR     PSW             ;GO BACK TO KERNEL MODE BEFORE LEAVING
2792  026410  012737  026132  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2793  026416  012737  002150  000250          MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL MEMORY
2794                                                                ;MANAGEMENT ERROR ROUTINE TO MMVEC
2795
2796                                  ;;*****************************************************************
2797                                  ;*TEST 32       READ-ONLY ABORT TEST (ACF=2)
2798                                  ;*
2799                                  ;*      THIS TEST CHECKS THE ACCESS CONTROL FIELD (ACF) COMPARATOR
2800                                  ;*      LOGIC BY CAUSING READ-ONLY ABORTS IN BOTH KERNEL AND
2801                                  ;*      USER MODES.  PDR 4 IS LOAD WITH ACF=2 AND THEN
2802                                  ;*      PHYSICAL ADDR. 60000 IS WRITTEN TO CAUSE THE ABORT.
2803                                  ;*
2804                                  ;;*****************************************************************
2805  026424  000004                  TST32:  SCOPE
2806  026426                          1$:                             ;KERNEL & USER PAR'S 3 & 4 AND PDR 3
2807                                                                  ;ARE SETUP FROM LAST TEST
2808  026426  012700  060000                  MOV     #60000,R0       ;LOAD VIRTUAL ADDR. TO REFERENCE PDR3 INTO R0
2809  026432  012701  100000                  MOV     #100000,R1      ;LOAD VIRTUAL ADDR. TO REFERENCE PDR4 INTO R1
2810  026436  012703  020011                  MOV     #20011,R3       ;LOAD R3 WITH WHAT SR0 SHOULD READ - R/O, KERNEL, PG.4
2811  026442  012702  077402                  MOV     #77402,R2       ;LOAD ACF=2 (READ-ONLY) PDR VALUE IN R2
2812  026446  012737  026510  000250  2$:     MOV     #5$,MMVEC       ;POINT MEM. MGMT. TRAP VECTOR TO 5$ BELOW
2813  026454  010237  172310                  MOV     R2,KIPDR4       ;LOAD ACF=2 INTO KIPDR4
```

```
2814  026460  010237  177610            MOV     R2,UIPDR4       ;LOAD ACF=2 INTO UIPDR4
2815  026464  012737  026472  001110    MOV     #3$,$LPERR      ;SET LOOP ON ERROR POINTER TO 3$
2816  026472  005010            3$:     CLR     (R0)            ;CLEAR PHYS. LOC. 60000 USING PDR3
2817  026474  013737  177776  001176    MOV     PSW,$TMP0       ;SAVE PSW IN CASE OF ERROR
2818  026502  005211            4$:     INC     (R1)            ;TRY TO WRITE USING PDR4 - SHOULD TRAP TO 5$
2819  026504  104026                    ERROR   26              ;MEM. MGMT. ABORT DID NOT OCCUR
2820                                                            ;FOR TIGHTER SCOPE LOOP
2821                                                            ;REPLACE ERROR CALL WITH
2822                                                            ;'BR 3$'' = 000772
2823  026506  000425                    BR      8$              ;BRANCH AROUND STATUS REG. CHECKS IF NO ABORT
2824  026510  062706  000004    5$:     ADD     #4,SP           ;RESTORE STACK POINTER
2825  026514  005710                    TST     (R0)            ;DID INSTRUCTION GET ABORTED & NOT EXECUTE
2826  026516  001401                    BEQ     6$              ;BRANCH IF YES
2827  026520  104027                    ERROR   27              ;INSTRUCTION WAS NOT ABORTED, LOC. GOT CHANGED
2828                                                            ;FOR TIGHTER SCOPE LOOP
2829                                                            ;REPLACE ERROR CALL WITH
2830                                                            ;'BR 3$'' = 000764
2831  026522  013737  177572  001272  6$:     MOV     SR0,WASSR0      ;READ STATUS REG. 0
2832  026530  013737  177576  001274        MOV     SR2,WASSR2      ;READ STATUS REG. 2
2833  026536  020337  001272              CMP     R3,WASSR0       ;DID SR0 REPORT READ-ONLY ERROR CORRECTLY?
2834  026542  001401                    BEQ     7$              ;BRANCH IF YES
2835  026544  104030                    ERROR   30              ;SR0 DID NOT REPORT R/O ERROR CORRECTLY
2836                                                            ;FOR TIGHTER SCOPE LOOP
2837                                                            ;REPLACE ERROR CALL WITH
2838                                                            ;'BR 3$'' = 000752
2839  026546  012704  026502    7$:     MOV     #4$,R4          ;LOAD R4 WITH WHAT SR2 SHOULD READ
2840  026552  020437  001274            CMP     R4,WASSR2       ;DID SR2 LOCKUP RIGHT VIRTUAL ADDR. ( 4$)?
2841  026556  001401                    BEQ     8$              ;BRANCH IF YES
2842  026560  104031                    ERROR   31              ;SR2 DID NOT LOCKUP VIRTUAL ADDR. OF R/O ERROR
2843                                                            ;FOR TIGHTER SCOPE LOOP
2844                                                            ;REPLACE ERROR CALL WITH
2845                                                            ;'BR 3$'' = 000744
2846  026562  042737  160000  177572  8$:     BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
2847  026570  032737  140000  001176        BIT     #140000,$TMP0   ;HAS ACF=2 BEEN TESTED IN USER MODE?
2848  026576  001006                    BNE     9$              ;BRANCH IF YES
2849  026600  012703  020151            MOV     #20151,R3       ;LOAD R3 WITH WHAT SR0 SHOULD READ-R/O, USER, PG.4
2850  026604  012737  140000  177776    MOV     #140000,PSW     ;GO TO USER MODE
2851  026612  000715                    BR      2$              ;REPEAT TEST IN USER MODE
2852  026614  005037  177776    9$:     CLR     PSW             ;GO BACK TO KERNEL MODE BEFORE LEAVING
2853  026620  012737  026426  001110    MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
2854  026626  012737  002150  000250    MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL MEMORY
2855                                                            ;MANAGEMENT ERROR ROUTINE TO MMVEC.
2856
2857
2858
2859
2860
2861
2862
2863
2864
2865
2866
2867                        ;;*****************************************************************
2868                        ;*
2869                        ;*      THE NEXT TWO (2) TESTS WILL BE CHECKING THE PAGE LENGTH
```

```
                        ;*      COMPARATORS AND SOME MORE OF THE KT ERROR DETECTION
                        ;*      AND STATUS LOGIC.  THE PAGE LENGTH FIELD (PLF) IN KERNEL
                        ;*      PDR 4 IS VARIED AND FOR EVERY PLF, THREE (3) VIRTUAL
                        ;*      ADDRESSES ARE READ.  WHILE USING BOTH UPWARD & DOWNWARD PAGE
                        ;*      EXPANSION, ONE OF THOSE THREE VIRTUAL ADDRESSES WILL CAUSE A
                        ;*      "PAGE LENGTH ABORT" WHILE THE OTHER TWO WON'T.
                        ;*
                        ;*      STATUS REGISTER 0 & 2 ARE CHECKED WHEN THE PAGE LENGTH
                        ;*      ABORT DOES OCCUR TO SEE THAT THE ABORT IS REPORTED AND THAT
                        ;*      THE VIRTUAL ADDRESS OF THE INSTRUCTION THAT CAUSED THE ABORT
                        ;*      IS LOCKED UP.
                        ;*
                        ;;*****************************************************************


                        ;;*****************************************************************
                        ;*TEST 33       PAGE LENGTH FAULTS-UPWARD EXPANSION
                        ;*
                        ;*      THIS TEST VARIES THE PAGE LENGTH FIELD (PLF) IN KERNEL PDR 4
                        ;*      FROM 1 TO 177 AND FOR EACH PLF, THREE VIRTUAL ADDRESSES (VBA'S)
                        ;*      ARE ACCESSED.  WHEN VBA <12:6> IS LESS THAN OR EQUAL TO PDR <14:8>
                        ;*      NO ABORT SHOULD OCCUR.  WHEN VBA <12:6> IS GREATER THAN PDR <14:8>,
                        ;*      A PAGE LENGTH ABORT SHOULD OCCUR AND BE REPORTED BY SR0 & SR2.
                        ;*      THE PAGE EXPANSION DIRECTION IN THIS TEST IS UPWARD, (THE ED BIT
                        ;*      (BIT 3) OF PDR 4 = 0).
                        ;*
                        ;;*****************************************************************
026634  000004          TST33:  SCOPE
026636  012737  077406  172306  1$:     MOV     #77406,KIPDR3   ;MAKE SURE PDR3 IS DESCRIBED AS R/W
026644  012737  077406  172312          MOV     #77406,KIPDR5   ;MAKE SURE PDR5 IS DESCRIBED AS R/W
026652  012700  027132          MOV     #DALTB1,R0      ;DAL TABLE FOR VIRTUAL ADDR'S. TO SELECT PDR4.
026656  012704  027150          MOV     #PDRTB1,R4      ;PDR TABLE FOR PDR4 (COINCIDES WITH DAL TABLE).
026662  012701  000006          MOV     #6,R1           ;SET UP LOOP COUNTER.
026666  012737  027044  000250  MOV     #9$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR UNEXPECTED ABORTS
026674  012737  026706  001110  MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
026702  012706  001100          MOV     #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
                        ;TEST NON-ABORT CASES (VBA < OR = PLF)
026706  012437  172310  2$:     MOV     (R4)+,KIPDR4    ;LOAD KIPDR4 WITH PAGE LENGTH VALUE
026712  005730          TST     @(R0)+          ;ACCESS VIRTUAL ADDR. (VBA < OR = PLF)
                                                ;NO ABORT SHOULD OCCUR!!!
026714  077104          SOB     R1,2$           ;DONE?...NO- TEST NEXT COMBINATION OF DAL & PDR.
                        ;TEST ABORT CASES (VBA > PLF)
026716  012701  000005  3$:     MOV     #5,R1           ;SET UP LOOP COUNTER.
026722  012700  027166          MOV     #DALTB2,R0      ;DAL TABLE
026726  012704  027202          MOV     #PDRTB2,R4      ;PDR TABLE
026732  012737  026746  001110  MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
026740  012737  026760  000250  MOV     #6$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR EXPECTED ABORT
026746  012437  172310  4$:     MOV     (R4)+,KIPDR4    ;LOAD KIPDR4 WITH PAGE LENGHT VALUE
026752  005730          5$:     TST     @(R0)+          ;ACCESS VIRTUAL ADDR. (VBA > PLF - ABORT TO 6$)
026754  104033          ERROR   33              ;EXPECTED PAGE LENGTH ABORT DID NOT OCCUR
                                                ;FOR TIGHTER SCOPE LOOP
                                                ;REPLACE ERROR CALL WITH
```

```
                                                        ;'BR 5$'' = 000776
                        BR      8$              ;BRANCH AROUND ABORT CHECKS
                6$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER FOLLOWING ABORT
                        MOV     SR0,WASSR0      ;READ M.M. STATUS REG. 0
                        MOV     SR2,WASSR2      ;READ M.M. STATUS REG. 2
                        MOV     #40011,R2       ;PUT EXPECTED SR0 CONTENTS IN R2
                        CMP     R2,WASSR0       ;DID SR0 REPORT PG. LENGTH ABORT, PAGE 4, KERNEL?
                        BEQ     7$              ;BRANCH IF YES
                        ERROR   34              ;SR0 DID NOT REPORT PG. LENGTH ABORT CORRECTLY
                                                ;FOR TIGHTER SCOPE LOOP
                                                ;REPLACE ERROR CALL WITH
                                                ;'BR 5$'' = 000757
                7$:     MOV     #5$,R3          ;PUT EXPECTED SR2 CONTENTS IN R3
                        CMP     R3,WASSR2       ;DID SR2 LOCKUP VIRT. ADDR. OF ABORTED INSTRUCTION?
                        BEQ     8$              ;BRANCH IF YES
                        ERROR   35              ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ABORT CORRECTLY
                                                ;FOR TIGHTER SCOPE LOOP
                                                ;REPLACE ERROR CALL WITH
                                                ;'BR 5$'' = 000751
177572  8$:     BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
                SOB     R1,4$           ;DONE?..NO - GET NEXT DAL & PDR PAIR
                JMP     10$             ;YES...
                MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
                MOV     (KSP)+,TRAPPS
001272          MOV     SR0,WASSR0      ;SAVE CONTENTS OF SR0 FOR ERROR
001274          MOV     SR2,WASSR2      ;SAVE CONTENTS OF SR2 FOR ERROR
177572          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
                ERROR   32              ;GOT PG. LENGTH ABORT BEFORE IT WAS EXPECTED
                                        ;FOR TIGHTER SCOPE LOOP
                                        ;REPLACE ERROR CALL WITH
                                        ;A 'NOP'' = 000240
                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
                MOV     TRAPPC,-(KSP)
                RTI                     ;RETURN FROM UNEXPECTED ABORT

001110  10$:    MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
000250          MOV     #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP HANDLER
                                        ;ADDRESS TO M.M. TRAP VECTOR
                JMP     TST34

                ;DAL TABLE FOR UPWARD EXPANSION (NON-ABORT CASES)
DALTB1: 100000
        106100
        102300
        102500
        113700
        104600
        117700

                ;PDR TABLE FOR KPDR4 (NON-ABORT CASES)
PDRTB1: 000006
        052006
        045006
        052006
        074406
        025006
```

```
2982  027164  077406                          077406
2983
2984                                          ;DAL TABLE (ABORT CASES)
2985  027166  100100                    DALTB2: 100100
2986  027170  110100                            110100
2987  027172  116600                            116600
2988  027174  112700                            112700
2989  027176  117000                            117000
2990  027200  117700                            117700
2991
2992                                          ;PDR TABLE (ABORT CASES)
2993  027202  000006                    PDRTB2: 000006
2994  027204  030406                            030406
2995  027206  046406                            046406
2996  027210  042006                            042006
2997  027212  073406                            073406
2998  027214  077006                            077006
2999
3000
3001                                          ;;*****************************************************************
3002                                          ;*TEST 34       PAGE LENGTH FAULTS-DOWNWARD EXPANSION
3003                                          ;*
3004                                          ;*      THIS TEST VARIES THE PAGE LENGTH FIELD (PLF) IN KERNEL PDR4
3005                                          ;*      FROM 176 TO 0 AND FOR EACH PLF, THREE VIRTUAL ADDRESSES (VBA'S)
3006                                          ;*      ARE ACCESSED.  WHEN VBA <12:6> IS GREATER THAN OR EQUAL TO PDR <14:8>
3007                                          ;*      NO PAGE ABORT SHOULD OCCUR.  WHEN VBA <12:6> IS LESS THAN PDR <14:8>
3008                                          ;*      A PAGE LENGTH ABORT SHOULD OCCUR AND BE REPORTED BY SR0 & SR2.
3009                                          ;*      THE PAGE EXPANSION DIRECTION IN THIS TEST IS DOWNWARD, (THE ED BIT
3010                                          ;*      (BIT 3) OF PDR4=1).
3011                                          ;*
3012                                          ;;*****************************************************************
3013  027216  000004                    TST34:  SCOPE
3014  027220  012700  027500           1$:     MOV     #DALTB3,R0      ;DAL TABLE FOR VIRTUAL ADDR'S. TO SELECT PDR4.
3015  027224  012704  027516                   MOV     #PDRTB3,R4      ;PDR TABLE FOR PDR4 (COINCIDES WITH DAL TABLE).
3016  027230  012701  000006                   MOV     #6,R1           ;SET UP LOOP COUNTER.
3017  027234  012737  027412  000250           MOV     #9$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR UNEXPECTED ABORTS
3018  027242  012737  027254  001110           MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
3019  027250  012706  001100                   MOV     #KERSTK,KSP     ;MAKE SURE STACK POINTER IS ALL SET UP
3020
3021                                          ;TEST NON-ABORT CASES (VBA > OR = PLF)
3022  027254  012437  172310           2$:     MOV     (R4)+,KIPDR4    ;LOAD KIPDR4 WITH PAGE LENGTH VALUE
3023  027260  005730                           TST     @(R0)+          ;ACCESS VIRTUAL ADDR. (VBA > OR = PLF)
3024                                                                  ;NO ABORT SHOULD OCCUR!!!
3025  027262  077104                           SOB     R1,2$           ;DONE?...NO- TEST NEXT COMBINATION OF DAL & PDR.
3026
3027                                          ;TEST ABORT CASES (VBA < PLF)
3028  027264  012701  000005           3$:     MOV     #5,R1           ;SET UP LOOP COUNTER.
3029  027270  012700  027534                   MOV     #DALTB4,R0      ;DAL TABLE
3030  027274  012704  027550                   MOV     #PDRTB4,R4      ;PDR TABLE
3031  027300  012737  027314  001110           MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
3032  027306  012737  027326  000250           MOV     #6$,MMVEC       ;SETUP M.M. TRAP VECTOR FOR EXPECTED ABORT
3033
3034  027314  012437  172310           4$:     MOV     (R4)+,KIPDR4    ;LOAD KIPDR4 WITH PAGE LENGHT VALUE
3035  027320  005730                   5$:     TST     @(R0)+          ;ACCESS VIRTUAL ADDR. (VBA < PLF - ABORT TO 6$)
3036  027322  104033                           ERROR   33              ;EXPECTED PAGE LENGTH ABORT DID NOT OCCUR
3037                                                                  ;FOR TIGHTER SCOPE LOOP
```

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3038
3039
3040  027324  000424                        BR      8$              ;REPLACE ERROR CALL WITH
3041  027326  012706  001100        6$:     MOV     #KERSTK,KSP     ;'BR 5$'' = 000776
3042  027332  013737  177572  001272        MOV     SR0,WASSR0      ;BRANCH AROUND ABORT CHECKS
3043  027340  013737  177576  001274        MOV     SR2,WASSR2      ;RESTORE STACK POINTER FOLLOWING ABORT
3044  027346  012702  040011                MOV     #40011,R2       ;READ M.M. STATUS REG. 0
3045  027352  020237  001272                CMP     R2,WASSR0       ;READ M.M. STATUS REG. 2
3046  027356  001401                        BEQ     7$              ;PUT EXPECTED SR0 CONTENTS IN R2
3047  027360  104034                        ERROR   34              ;DID SR0 REPORT PG. LENGTH ABORT, PAGE 4, KERNEL?
3048                                                                ;BRANCH IF YES
3049                                                                ;SR0 DID NOT REPORT PG. LENGTH ABORT CORRECTLY
3050                                                                ;FOR TIGHTER SCOPE LOOP
3051  027362  012703  027320        7$:     MOV     #5$,R3          ;REPLACE ERROR CALL WITH
3052  027366  020337  001274                CMP     R3,WASSR2       ;'BR 5$'' = 000757
3053  027372  001401                        BEQ     8$              ;PUT EXPECTED SR2 CONTENTS IN R3
3054  027374  104035                        ERROR   35              ;DID SR2 LOCKUP VIRT. ADDR. OF ABORTED INSTRUCTION?
3055                                                                ;BRANCH IF YES
3056                                                                ;SR2 DID NOT LOCKUP VIRT. ADDR. OF ABORT CORRECTLY
3057                                                                ;FOR TIGHTER SCOPE LOOP
3058  027376  042737  160000  177572  8$:     BIC     #160000,SR0     ;REPLACE ERROR CALL WITH
3059  027404  077135                        SOB     R1,4$           ;'BR 5$'' = 000751
3060  027406  000137  027460                JMP     10$             ;CLEAR ERROR BITS IN SR0
3061  027412  012637  001266        9$:     MOV     (KSP)+,TRAPPC   ;DONE?..NO - GET NEXT DAL & PDR PAIR
3062  027416  012637  001270                MOV     (KSP)+,TRAPPS   ;YES...
3063  027422  013737  177572  001272        MOV     SR0,WASSR0      ;SAVE PC & PS OF TRAP
3064  027430  013737  177576  001274        MOV     SR2,WASSR2      ;SAVE CONTENTS OF SR0 FOR ERROR
3065  027436  042737  160000  177572        BIC     #160000,SR0     ;SAVE CONTENTS OF SR2 FOR ERROR
3066  027444  104032                        ERROR   32              ;CLEAR ERROR BITS IN SR0
3067                                                                ;GOT PG. LENGTH ABORT BEFORE IT WAS EXPECTED
3068                                                                ;FOR TIGHTER SCOPE LOOP
3069                                                                ;REPLACE ERROR CALL WITH
3070  027446  013746  001270                MOV     TRAPPS,-(KSP)   ;A 'NOP'' = 000240
3071  027452  013746  001266                MOV     TRAPPC,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3072  027456  000002                        RTI                     ;RETURN FROM UNEXPECTED ABORT
3073
3074  027460  012737  027220  001110  10$:     MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
3075  027466  012737  002150  000250          MOV     #MGMERR,MMVEC   ;RESTORE NORMAL M.M. TRAP HANDLER
3076                                                                ;ADDRESS TO M.M. TRAP VECTOR
3077  027474  000137  027564                JMP     TST35
3078
3079                                  ;DAL TABLE FOR DOWNWARD EXPANSION (NON-ABORT CASES)
3080  027500  117700                  DALTB3: 117700
3081  027502  111600                          111600
3082  027504  115400                          115400
3083  027506  115200                          115200
3084  027510  104000                          104000
3085  027512  113100                          113100
3086  027514  100000                          100000
3087
3088                                  ;PDR TABLE (NON-ABORT CASES)
3089  027516  077416                  PDRTB3: 77416
3090  027520  025416                          25416
3091  027522  032416                          32416
3092  027524  025416                          25416
3093  027526  003016                          03016
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3094  027530  052416                    52416
3095  027532  000016                    00016
3096
3097                                    ;DAL TABLE (ABORT CASES)
3098  027534  117600                    DALTB4: 117600
3099  027536  107600                            107600
3100  027540  101100                            101100
3101  027542  105000                            105000
3102  027544  100700                            100700
3103  027546  100000                            100000
3104
3105                                    ;PDR TABLE (ABORT CASES)
3106  027550  077416                    PDRTB4: 77416
3107  027552  047016                            47016
3108  027554  031016                            31016
3109  027556  035416                            35416
3110  027560  004016                            04016
3111  027562  000416                            00416
3112
3113
3114
3115                                    ;;*****************************************************************
3116                                    ;*TEST 35       SR2 BIT TEST
3117                                    ;*
3118                                    ;*      THIS TEST CHECKS THE BITS IN MEMORY MANAGEMENT REGISTER 2 BY
3119                                    ;*      CAUSING 'READ-ONLY ABORTS'' AT VIRTUAL ADDRESSES BETWEEN 100000
3120                                    ;*      TO 110000 (PHYSICAL ADDRESSES 060000-070000).  KIPDR4 IS USED TO EXECUTE
3121                                    ;*      THE FOLLOWING FOUR WORDS OF CODE WHICH ARE MOVED THRU MEMORY:
3122                                    ;*      010727  MOV     PC,(PC)+  ;THIS INSTRUCTION SHOULD CAUSE A R/O ABORT
3123                                    ;*      000000                    ;ITS VIRTUAL ADDR. SHOULD BE LOCKED UP IN SR2
3124                                    ;*      000137  JMP     @#3$      ;THIS INSTRUCTION IS ALSO MOVED THRU MEMORY
3125                                    ;*      (ADDR. OF 3$)             ;IN CASE A R/O ABORT DOES NOT OCCUR,
3126                                    ;*                                ;IN WHICH CASE SR2 WILL NOT CONTAIN CORRECT ADDR.
3127                                    ;*
3128                                    ;;*****************************************************************
3129  027564  000004            TST35:  SCOPE
3130  027566  012737  000600  172346  1$:     MOV     #600,KIPAR3     ;BE SURE PAR3 IS MAPPED TO 12-16K
3131  027574  012737  000600  172350          MOV     #600,KIPAR4     ;BE SURE PAR4 IS MAPPED TO 12-16K
3132  027602  012737  077406  172306          MOV     #77406,KIPDR3   ;MAP PAGE 3  128 BLOCKS, R/W
3133  027610  012737  077402  172310          MOV     #77402,KIPDR4   ;MAP PAGE 4  128 BLOCKS, READ-ONLY
3134  027616  012700  060002                  MOV     #60002,R0       ;LOAD R0 WITH VIRTUAL ADDR. WHICH USES PDR3
3135  027622  012701  100002                  MOV     #100002,R1      ;LOAD R1 WITH VIRTUAL ADDR. WHICH USES PDR4
3136  027626  012737  027662  000250          MOV     #3$,MMVEC       ;SET M.M. TRAP VECTOR TO 3$
3137  027634  012737  027642  001110          MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
3138  027642  012720  010727          2$:     MOV     #010727,(R0)+   ;LOAD 'MOV PC,(PC)+'' INSTRUCTION AT ADDR.
3139  027646  005020                          CLR     (R0)+           ;       REACHED THRU PDR/PAR 4.
3140  027650  012720  000137                  MOV     #000137,(R0)+   ;LOAD ''JMP @#3$'' INSTRUCTION AT VIRT. ADDR.
3141  027654  012710  027662                  MOV     #3$,(R0)        ;       IN CASE R/O VIOL. DOES NOT ABORT
3142  027660  010107                          MOV     R1,PC           ;TRANSFER PROGRAM EXECUTION TO 'PAGE 4 INSTRUCTIONS''
3143  027662  012706  001100          3$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER
3144  027666  013737  177576  001274          MOV     SR2,WASSR2      ;READ CONTENTS OF STATUS REG 2
3145  027674  020137  001274                  CMP     R1,WASSR2       ;WAS ADDR. OF 'RELOCATED - R/O ABORT'' LOCKED UP?
3146  027700  001401                          BEQ     4$              ;BRANCH IF YES
3147  027702  104036                          ERROR   36              ;SR2 DID NOT LOCK UP VIRTUAL ADDR. OF R/O VIOL.
3148                                                                  ;FOR TIGHTER SCOPE LOOP
3149                                                                  ;REPLACE ERROR CALL WITH
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3150                                                                    ;'BR 2$'' = 000757
3151  027704  042737  160000  177572  4$:     BIC     #160000,SR0       ;CLEAR THE ERROR BITS IN SR0
3152  027712  060101                          ADD     R1,R1             ;SETUP TO FORM NEXT VIRTUAL ADDRESS
3153  027714  010100                          MOV     R1,R0             ;SETUP R0 TO FORM NEXT VIRT. ADDR. TO LOAD
3154  027716  052701  100000                  BIS     #100000,R1        ;FORM VIRTUAL ADDR. THAT SHOULD BE LOCKED UP NEXT
3155  027722  052700  060000                  BIS     #60000,R0         ;POINT R0 TO NEXT VIRT. ADDR. TO LOAD
3156  027726  020127  110000                  CMP     R1,#110000        ;HAVE ALL VBA'S 100000-110000 BEEN TESTED?
3157  027732  101743                          BLOS    2$                ;BRANCH IF NO
3158
3159  027734  012737  027566  001110  5$:     MOV     #1$,$LPERR        ;RESET LOOP ON ERROR POINTER TO 1$
3160  027742  012737  077406  172310          MOV     #77406,KIPDR4     ;RESTORE PDR4 TO R/W ACCESS
3161  027750  012737  002150  000250          MOV     #MGMERR,MMVEC     ;RESTORE ADDRESS OF NORMAL M.M.
3162                                                                    ;TRAP HANDLER TO M.M. VECTOR
3163
3164
3165                          ;;*****************************************************************
3166                          ;*TEST 36       MORE CHECKS OF SR0 & SR2
3167                          ;*
3168                          ;*      THIS TEST PERFORMS SOME ADDITIONAL CHECKS OF THE SR0 & SR2 LOGIC.
3169                          ;*      FIRST IT CHECKS THAT SR2 ''TRACKS'' ALONG ACTING AS A VIRTUAL ADDRESS
3170                          ;*      PROGRAM COUNTER.  ALSO SR0 & SR2 ARE LOCKED UP BY A PAGE LENGTH
3171                          ;*      ABORT, THEN WITHOUT CLEARING SR0'S ERROR BITS, A R/O ABORT IS CAUSED.
3172                          ;*      SR0 & SR2 SHOULD NOT BE CHANGED BY THE SECOND ABORT AND THE
3173                          ;*      INFORMATION ABOUT THE PAGE LENGTH ABORT SOULD STILL BE LOCKED UP.
3174                          ;*      IN ADDITION A ''RESET'' IS EXECUTED TO VERIFY THAT SR0 IS CLEARED
3175                          ;*      AND SR2 IS UNLOCKED BY A RESET.  AFTER MEMORY MANAGEMENT IS TURNED BACK ON,
3176                          ;*      SR2 IS CHECKED TO SEE THAT IT IS TRACKING AGAIN.
3177                          ;*
3178                          ;;*****************************************************************
3179  027756  000004          TST36:  SCOPE
3180  027760  012737  000600  172352  1$:     MOV     #600,KIPAR5       ;MAP KERNEL PAGE 5 TO 12-16K
3181  027766  012737  000406  172310          MOV     #406,KIPDR4       ;SETUP PDR4 FOR PAGE LENGTH ABORT
3182  027774  012737  077402  172312          MOV     #77402,KIPDR5     ;SETUP PDR5 FOR R/O ABORT
3183  030002  012737  030010  001110          MOV     #2$,$LPERR        ;SET LOOP ON ERROR POINTER TO 2$
3184  030010  013737  177576  001274  2$:     MOV     SR2,WASSR2        ;READ SR2 TO SEE IF ITS TRACKING
3185  030016  012701  030010                  MOV     #2$,R1            ;PUT EXPECTED VIRTUAL PC IN R1
3186  030022  020137  001274                  CMP     R1,WASSR2         ;DID SR2 CONTAIN VIRTUAL PC AT 2$?
3187  030026  001401                          BEQ     3$                ;BRANCH IF YES
3188  030030  104041                          ERROR   41                ;SR2 NOT TRACKING CORRECTLY
3189                                                                    ;FOR TIGHTER SCOPE LOOP
3190                                                                    ;REPLACE ERROR CALL WITH
3191                                                                    ;'BR 2$'' = 000767
3192  030032  012737  030040  001110  3$:     MOV     #4$,$LPERR        ;SET LOOP ON ERROR POINTER TO 4$
3193  030040  013737  177576  001274  4$:     MOV     SR2,WASSR2        ;READ SR2 TO SEE IF ITS TRACKING
3194  030046  012701  030040                  MOV     #4$,R1            ;PUT EXPECTED VIRTUAL PC IN R1
3195  030052  020137  001274                  CMP     R1,WASSR2         ;DID SR2 CONTAIN VIRTUAL PC AT 4$
3196  030056  001401                          BEQ     5$                ;BRANCH IF YES
3197  030060  104041                          ERROR   41                ;SR2 NOT TRACKING CORRECTLY
3198                                                                    ;FOR TIGHTER SCOPE LOOP
3199                                                                    ;REPLACE ERROR CALL WITH
3200                                                                    ;'BR 4$'' = 000767
3201  030062  012737  030070  001110  5$:     MOV     #6$,$LPERR        ;SET LOOP ON ERROR POINTER TO 6$
3202  030070  012737  030106  000250  6$:     MOV     #7$,MMVEC         ;PUT ADDRESS OF 7$ IN M.M. TRAP VECTOR
3203  030076  005037  001200                  CLR     $TMP1             ;CLEAR ERROR INDICATOR
3204  030102  005237  100500                  INC     @#100500          ;CAUSE PAGE LENGTH ABORT - TRAP TO 7$
3205  030106  012706  001100          7$:     MOV     #KERSTK,KSP       ;RESTORE STACK POINTER AFTER ABORT
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3206  030112  013737  177572  001176          MOV     SR0,$TMP0       ;SAVE SR0'S INFORMATION ON PG. LGTH. ABORT
3207  030120  013737  177576  001202          MOV     SR2,$TMP2       ;SAVE SR2'S INFORMATION ON PG. LGTH. ABORT
3208  030126  012737  030140  000250          MOV     #8$,MMVEC       ;PUT ADDRESS OF 8$ IN M.M. TRAP VECTOR
3209  030134  005237  120000                  INC     @#120000        ;CAUSE R/O ABORT - TRAP TO 8$
3210  030140  012706  001100          8$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER ABORT
3211  030144  013737  177572  001272          MOV     SR0,WASSR0      ;READ SR0 FOLLWOING SECOND KT ABORT
3212  030152  013737  177576  001274          MOV     SR2,WASSR2      ;READ SR2 FOLLOWING SECOND KT ABORT
3213  030160  023737  001176  001272          CMP     $TMP0,WASSR0    ;IS SR0 STILL HOLDING INFO ON FIRST ABORT?
3214  030166  001402                          BEQ     9$              ;BRANCH IF YES
3215  030170  005237  001200                  INC     $TMP1           ;SET ERROR INDICATOR
3216  030174  023737  001202  001274  9$:     CMP     $TMP2,WASSR2    ;DOES SR2 STILL HOLD PC OF FIRST ABORT?
3217  030202  001402                          BEQ     10$             ;BRANCH IF YES
3218  030204  005237  001200                  INC     $TMP1           ;SET ERROR INDICATOR
3219  030210  005737  001200          10$:    TST     $TMP1           ;WERE SR0 OR SR2 CHANGED BY A SECOND ABORT?
3220  030214  001401                          BEQ     11$             ;BRANCH IF NO
3221  030216  104037                          ERROR   37              ;ONE OF STATUS REGS. CHANGED BY SECOND ABORT
3222                                                                  ;FOR TIGHTER SCOPE LOOP
3223                                                                  ;REPLACE ERROR CALL WITH
3224                                                                  ;'BR 6$'' = 000726
3225  030220  005037  001200          11$:    CLR     $TMP1           ;CLEAR ERROR INDICATOR
3226  030224  000005                          RESET                   ;EXECUTE A RESET, APPLYING AN ''INIT''
3227  030226  013737  177572  001272          MOV     SR0,WASSR0      ;READ SR0
3228  030234  005737  001272                  TST     WASSR0          ;WAS SR0 CLEARED BY THE RESET?
3229  030240  001402                          BEQ     12$             ;BRANCH IF YES
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3230  030242  005237  001200              INC     $TMP1           ;SR0 NOT CLEARED BY A RESET
3231  030246  013737  177576  001274 12$: MOV     SR2,WASSR2      ;READ SR2
3232  030254  022737  030246  001274      CMP     #12$,WASSR2     ;WAS SR2 UNLOCKED BY A RESET?
3233  030262  001402                      BEQ     13$             ;BRANCH IF YES
3234  030264  005237  001200              INC     $TMP1           ;SR2 NOT UNLOCKED BY A RESET
3235  030270  005737  001200        13$:  TST     $TMP1           ;WERE SR0 & SR2 BOTH 'RESET'' BY A RESET?
3236  030274  001401                      BEQ     14$             ;BRANCH IF YES
3237  030276  104040                      ERROR   40              ;SR0 OR SR2 NOT 'RESET'' BY A RESET
3238                                                              ;FOR TIGHTER SCOPE LOOP
3239                                                              ;REPLACE ERROR CALL WITH
3240                                                              ;''BR 6$'' = 000676
3241  030300  012737  000001  177572 14$: MOV     #1,SR0          ;TURN MEMORY MANAGEMENT BACK ON
3242  030306  013737  177576  001274 15$: MOV     SR2,WASSR2      ;READ SR2 TO SEE IF ITS TRACKING AGAIN
3243  030314  012701  030306              MOV     #15$,R1         ;PUT EXPECTED VIRTUAL PC IN R1
3244  030320  020137  001274              CMP     R1,WASSR2       ;DID SR2 CONTAIN VIRTUAL PC AT 15$
3245  030324  001401                      BEQ     16$             ;BRANCH IF YES
3246  030326  104041                      ERROR   41              ;SR2 NOT TRACKING CORRECTLY
3247                                                              ;FOR TIGHTER SCOPE LOOP
3248                                                              ;REPLACE ERROR CALL WITH
3249                                                              ;''BR 6$'' = 000663
3250  030330  012737  027760  001110 16$: MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
3251  030336  012737  077406  172310      MOV     #77406,KIPDR4   ;RESET PDR4 TO 128 BLKS, R/W
3252  030344  012737  077406  172312      MOV     #77406,KIPDR5   ;RESET PDR5 TO 128 BLKS, R/W
3253  030352  012737  002150  000250      MOV     #MGMERR,MMVEC   ;RESTORE ADDRESS OF NORMAL MEMORY
3254                                                              ;MANAGEMENT TRAP ROUTINE TO M.M. VECTOR
3255
3256
3257                                  ;;*****************************************************************
3258                                  ;*TEST 37      USER ABORT PICKS UP KERNEL SPACE VECTOR
3259                                  ;*
3260                                  ;*      THIS TEST CHECKS TO BE SURE THAT WHEN AN ABORT OCCURS WHILE IN
3261                                  ;*      USER MODE, THE TRAP VECTOR INFORMATION FETCHED IS TAKEN FROM
3262                                  ;*      KERNEL SPACE.  USER PAGE 0 IS MAPPED TO 12K (60000-77776) SO
3263                                  ;*      THAT IF USER SPACE IS USED INSTEAD OF KERNEL, THE NEW PC THAT
3264                                  ;*      WAS LOADED AT LOC. 060004 IS USED INSTEAD OF THE NEW PC THAT
3265                                  ;*      SHOULD BE PICKED UP FROM LOC. 000004.  A TIMEOUT ERROR IS USED
3266                                  ;*      TO CAUSE A TRAP TO ''4''.
3267                                  ;*
3268                                  ;;*****************************************************************
3269  030360  000004              TST37:  SCOPE
3270  030362  004737  035246        1$:   JSR     PC,TOFF         ;TURN OFF T-BIT TRAPPING FOR THIS TEST
3271  030366  012737  030374  001110      MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
3272  030374  005037  177776        2$:   CLR     PSW             ;GO TO KERNEL MODE
3273  030400  012706  001100              MOV     #KERSTK,KSP     ;SETUP KERNEL STACK PTR.
3274  030404  012737  000600  177640      MOV     #600,UIPAR0     ;MAP USER PAGE 0 TO 12K
3275  030412  012737  030474  000004      MOV     #4$,@#4         ;LOAD KERNEL VECTOR 4 (LOC.4) WITH 4$
3276  030420  012737  000340  000006      MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
3277  030 26  012737  140000  177776      MOV     #140000,PSW     ;GO TO USER MODE
3278  030434  012706  000700              MOV     #USESTK,USP     ;SETUP USER STACK PTR.
3279  030440  012737  030460  000004      MOV     #3$,@#4         ;LOAD USER VECTOR 4 (LOC. 60004) WITH 3$
3280  030446  012737  000340  000006      MOV     #340,@#6        ;LOAD VECTOR+2 WITH NEW PSW
3281  030454  005737  160000              TST     160000          ;CAUSE TIMEOUT ERROR TRAP TO ''4''
3282                                                              ;SHOULD PICK UP NEW PC=4$ FROM KERNEL
3283                                                              ;LOC. 4, NOT PC=3$ FROM USER LOC. 4 (=60004)
3284  030460  013701  177776        3$:   MOV     PSW,R1          ;SAVE PSW FOR ERROR
3285  030464  010602                      MOV     SP,R2           ;SAVE VALUE OF STACK POINTER FOR ERROR
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3286  030466  005037  177776            CLR     PSW             ;BE SURE BACK IN KERNEL MODE
3287  030472  104042                    ERROR   42              ;DID NOT TRAP THRU KERNEL SPACE
3288                                                            ;FOR TIGHTER SCOPE LOOP
3289                                                            ;REPLACE ERROR CALL WITH
3290                                                            ;'BR 2$'' = 000740
3291  030474  005037  177776      4$:   CLR     PSW             ;BE SURE BACK IN KERNEL MODE
3292  030500  012706  001100            MOV     #KERSTK,KSP     ;RESTORE KERNEL S.P. IN CASE IT CHANGED
3293  030504  005037  177640            CLR     UIPAR0          ;REMAP USER PAGE 0 TO 0-4K
3294  030510  012737  140000  177776    MOV     #140000,PSW     ;GO TO USER MODE
3295  030516  012706  000700            MOV     #USESTK,USP     ;RESTORE USER STACK POINTER
3296  030522  005037  177776            CLR     PSW             ;GO BACK TO KERNEL MODE
3297  030526  012737  002076  000004    MOV     #TIMERR,@#4     ;RESTORE ADDR. OF NORMAL CPU TRAP HANDLER TO 4
3298  030534  012737  030362  001110    MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
3299  030542  004737  035302            JSR     PC,TON          ;TURN T-BIT TRAPPING BACK ON
3300
3301                                    ;;*******************************************************************
3302                                    ;*TEST 40       RTI IN USER MODE DOES NOT CHANGE PSW
3303                                    ;*
3304                                    ;*      THIS TEST CHECKS TO SEE THAT WHEN AN RTI IS EXECUTED IN USER
3305                                    ;*      MODE, THE MODE OR PRIORITY BITS OF THE PSW ARE NOT CHANGED.
3306                                    ;*
3307                                    ;;*******************************************************************
3308  030546  000004            TST40:  SCOPE
3309
3310  030550  012737  030562  001110  1$:   MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
3311  030556  012702  170000            MOV     #170000,R2      ;LOAD 'PRESENT & EXPECTED'' PSW VALUE INTO R2
3312  030562  010237  177776      2$:   MOV     R2,PSW          ;GO TO USER MODE-PRIORITY 0
3313  030566  012746  000340            MOV     #340,-(SP)      ;PUT A NEW PSW (PRIORITY=7) ON STACK
3314  030572  012746  030600            MOV     #3$,-(SP)       ;PUT NEW PC ON THE STACK
3315  030576  000002                    RTI                     ;DO AN RTI FROM USER MODE
3316  030600  013701  177776      3$:   MOV     PSW,R1          ;READ NEW PSW INTO R1
3317  0:0604  042701  007437            BIC     #7437,R1        ;MASK OFF COND. CODE, T-BIT, AND UNUSED BITS
3318  030610  005037  177776            CLR     PSW             ;GO BACK TO KERNEL MODE
3319  030614  020201                    CMP     R2,R1           ;DID PSW STAY IN USER, PRIORITY=0?
3320  030616  001401                    BEQ     4$              ;BRANCH IF YES
3321  030620  104060                    ERROR   60              ;PSW CHANGED BY AN RTI FROM USER
3322                                                            ;FOR A TIGHTER SCOPE LOOP
3323                                                            ;REPLACE ERROR CALL WITH
3324                                                            ;'BR-2$'' = 000760
3325  030622  012737  030550  001110  4$:   MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
3326
3327
```

```
                                ;;*****************************************************************
                                ;*TEST 41       KT ERROR SERVICED BEFORE TIMEOUT ERROR
                                ;*
                                ;*      THIS TEST CHECKS TO SEE THAT IF A CERTAIN VIRTUAL ADDRESS THAT
                                ;*      WOULD CAUSE A MEMORY MANAGEMENT ERROR CAUSES A TIMEOUT
                                ;*      ERROR FIRST, THE TIMEOUT ERROR IS SERVICED BUT THE MEMORY
                                ;*      MANAGEMENT ERROR ISN'T.  THIS MEANS THAT SR0 AND SR2
                                ;*      SHOULD NOT REPORT THE ERROR OR LOCK UP ITS VIRTUAL ADDRESS.
                                ;*      A READ-ONLY VIOLATION IS USED AS THE POTENTIAL MEMORY MANAGEMENT
                                ;*      ERROR
                                ;*
                                ;;*****************************************************************
030630  000004                  TST41:  SCOPE
030632  012705  077006          1$:     MOV     #77006,R5       ;LOAD PDR7 DATA INTO R5
030636  010537  172316                  MOV     R5,KIPDR7       ;MAP PAGE 7 R/W  PLF=176
030642  012737  030670  000004          MOV     #3$,@#4         ;SET CPU TRAP VECTOR TO ADDRESS OF 3$
030650  012737  030672  000250          MOV     #4$,@#250       ;SET M.M. TRAP VECTOR TO ADDRESS OF 4$
030656  012737  030664  001110          MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
030664  005237  177700          2$:     INC     @#177700        ;CAUSE PLF ABORT AND POTENTIAL TIMEOUT
030670  104043                  3$:     ERROR   43              ;TRAPPED THRU CPU TRAP VECTOR BUT SHOULDN'T HAVE
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 2$'' = 000776
030672  012706  001100          4$:     MOV     #KERSTK,KSP     ;RESTORE STACK POINTER AFTER TRAPPING
030676  013737  177572  001272          MOV     SR0,WASSR0      ;READ STATUS REG.0
030704  013737  177576  001274  5$:     MOV     SR2,WASSR2      ;READ STATUS REG. 2
030712  012700  040017                  MOV     #40017,R0       ;LOAD EXPECTED SR0 CONTENTS INTO R0
030716  020037  001272                  CMP     R0,WASSR0       ;SR0 PLF ERROR BIT SET?
030722  001401                          BEQ     6$              ;BRANCH IF YES
030724  104044                          ERROR   44              ;SR0 DIDN'T REPORT PLF ERROR
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 2$'' = 000741
030726  012701  030664          6$:     MOV     #2$,R1          ;LOAD EXPECTED SR2 CONTENTS INTO R1
030732  020137  001274                  CMP     R1,WASSR2       ;WAS SR2 LOCKED BY PLF ABORT?
030736  001401                          BEQ     7$              ;BRANCH IF YES
030740  104044                          ERROR   44              ;SR2 DIDN'T LOCK UP VIRTUAL ADDRESS
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 2$'' = 000741
030742  042737  160000  177572  7$:     BIC     #160000,SR0     ;CLEAR ERROR BITS THAT WERE SET IN SR0
030750  012737  002076  000004          MOV     #TIMERR,@#4     ;RESTORE ADDRESS OF NORMAL CPU TRAP HANDLER
030756  012737  002150  000250          MOV     #MGMERR,@#250   ;RESTORE ADDRESS OF NORMAL M.M. TRAP HANDLER
030764  012737  077406  172316          MOV     #77406,KIPDR7   ;REMAP PAGE 7 TO READ/WRITE PLF=177
030772  012737  030632  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$

                                ;;*****************************************************************
                                ;*TEST 42       PC & PSW SAVED FOR KT ERROR DURING SERVICE OF TIMEOUT ERROR
                                ;*
                                ;*      THIS TEST CHECKS THE PC AND PROCESSOR STATUS WORD SAVED WHEN
                                ;*      A KT ERROR OCCURS DURING THE SECOND PUSH ON THE STACK DURING
                                ;*      SERVICING OF A TIMEOUT ERROR.  DURING A 'DOUBLE ERROR''
                                ;*      SEQUENCE SUCH AS THIS, THE PSW SAVED WILL BE THE ONE PICKED UP
                                ;*      FROM VECTOR+2 (LOC. 6 IN THIS CASE) AFTER THE FIRST TRAP,
                                ;*      NOT THE PSW PRESENT BEFORE THE FIRST TRAP.  SR0 AND SR2
```

```
                                        ;*      SHOULD RECORD THE KT ERROR (A R/O VIOLATION BY THE USER STACK PTR.)
                                        ;*
                                        ;*      NOTE THAT THE PREVIOUS MODE BITS <13:12> OF THE PSW
                                        ;*      WILL BE SET IN THE PSW THAT IS SAVED.
                                        ;*
                                        ;**************************************************************************
031000  000004                          TST42:  SCOPE
031002  004737  035246                  1$:     JSR     PC,TOFF         ;TURN T-BIT TRAPPING OFF FOR THIS TEST
031006  012737  000600  177646                  MOV     #600,UIPAR3     ;MAP USER PAGE 3 TO 12-16K
031014  012737  000600  177650                  MOV     #600,UIPAR4     ;MAP USER PAGE 4 TO 12-16K
031022  012737  077402  177606                  MOV     #77402,UIPDR3   ;MAP USER PAGE 3 READ-ONLY
031030  012737  077406  177610                  MOV     #77406,UIPDR4   ;MAP USER PAGE 4 READ/WRITE
031036  012737  031112  000004                  MOV     #4$,@#4         ;LOAD ADDRESS OF 4$ IN CPU (TIMEOUT) VECTOR
031044  012737  140017  000006                  MOV     #140017,@#6     ;LOAD PSW THAT SHOULD BE PUT ON STACK IN VECTOR+2
031052  012737  031112  000250                  MOV     #4$,@#250       ;LOAD ADDRESS OF 4$ IN M.M. TRAP VECTOR
031060  012737  000340  000252                  MOV     #340,@#252      ;LOAD A KERNEL PSW IN MMVEC+2
031066  012737  031074  001110                  MOV     #2$,$LPERR      ;SET LOOP ON ERROR POINTER TO 2$
031074  012737  140000  177776  2$:     MOV     #140000,PSW     ;GO TO USER MODE
031102  012706  100002                  MOV     #100002,USP     ;SET USER STACK PTR. SO SECOND PUSH IS IN PG. 3
031106  005737  177700          3$:     TST     @#177700        ;CAUSE TIMEOUT ERROR THAT WILL CAUSE
                                                                ;R/O ERROR WHEN TRY TO SAVE OLD PC
031112  016601  000002          4$:     MOV     2(KSP),R1       ;PUT PSW SAVED ON KERNEL STACK INTO R1
031116  011603                          MOV     (KSP),R3        ;PUT PC SAVED ON KERNEL STACK INTO R3
031120  013737  177572  001272          MOV     SR0,WASSR0      ;READ THE CONTENTS OF M.M. STATUS REG. 0
031126  013737  177576  001274          MOV     SR2,WASSR2      ;READ THE CONTENTS OF M.M. STATUS REG. 2
031134  042737  160000  177572          BIC     #160000,SR0     ;CLEAR THE ERROR BITS IN SR0
031142  005037  177776                  CLR     PSW             ;BE SURE IN KERNEL MODE
031146  012706  001100                  MOV     #KERSTK,KSP     ;RESTORE KERNEL STACK POINTER
031152  012737  140000  177776          MOV     #140000,PSW     ;GO TO USER MODE
031160  012706  000700                  MOV     #USESTK,USP     ;RESTORE USER STACK POINTER
031164  005037  177776                  CLR     PSW             ;GO BACK TO KERNEL MODE
031170  005037  001176                  CLR     $TMP0           ;CLEAR ERROR INDICATOR
031174  020127  170017                  CMP     R1,#170017      ;WAS THE PSW SAVED THE ONE PICKED UP BY THE
                                                                ;TIMEOUT TRAP FROM ERRVEC+2?
                                                                ;VALUE 170017 = PSW FROM LOC. 6 WITH
                                                                ;PREVIOUS MODE BITS = USER
031200  001402                          BEQ     5$              ;BRANCH IF YES
031202  005237  001176                  INC     $TMP0           ;WRONG PSW SAVED DURING 'DOUBLE ERROR' SEQUENCE
031206  020327  031112          5$:     CMP     R3,#3$+4        ;WAS THE PC AT THE TIME OF THE TIMEOUT ERROR
                                                                ;SAVED ON THE STACK?
031212  001402                          BEQ     6$              ;BRANCH IF YES
031214  005237  001176                  INC     $TMP0           ;WRONG PC SAVED DURING TRAP SEQUENCE
031220  023727  001272  020147  6$:     CMP     WASSR0,#20147   ;DID SR0 REPORT - USER, PAGE 3, R/O ABORT?
031226  001402                          BEQ     7$              ;BRANCH IF YES
031230  005237  001176                  INC     $TMP0           ;SR0 DID NOT REPORT R/O ABORT
031234  023727  001274  031106  7$:     CMP     WASSR2,#3$      ;DID SR2 LOCK UP VIRTUAL ADDR. OF LAST
                                                                ;INSTRUCTION SUCCESSFULLY FETCHED?
031242  001402                          BEQ     8$              ;BRANCH IF YES
031244  005237  001176                  INC     $TMP0           ;SR2 DID NOT LOCK UP ADDR. OF TIMEOUT INST.
031250  005737  001176          8$:     TST     $TMP0           ;ANY 'ERRORS' DURING TRAP SEQUENCE?
031254  001401                          BEQ     9$              ;BRANCH IF NO
031256  104045                          ERROR   45              ;THE WRONG PC OR PSW WERE SAVED
                                                                ;OR SR0 OR SR2 DID NOT REPORT R/O
                                                                ;ERROR DURING TIMEOUT - KT TRAP
                                                                ;SEQUENCE
                                                                ;FOR TIGHTER SCOPE LOOP
```

```
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 2$'' = 000710
031260  012737  002076  000004  9$:     MOV     #TIMERR,@#4     ;RESTORE ADDRESS OF NORMAL CPU TRAP HANDLER
031266  012737  000340  000006          MOV     #340,@#6        ;RELOAD ERRVEC+2 WITH KERNEL PSW
031274  012737  002150  000250          MOV     #MGMERR,@#250   ;RESTORE ADDRESS OF NORMAL M.M. TRAP HANDLER
031302  012737  077406  177606          MOV     #77406,UIPDR3   ;REMAP USER PAGE 3 READ/WRITE
031310  012737  031002  001110          MOV     #1$,$LPERR      ;RESET LOOP ON ERROR POINTER TO 1$
031316  004737  035302                  JSR     PC,TON          ;TURN T-BIT TRAPPING BACK ON
                        ;;*****************************************************************
                        ;*
                        ;*      THIS GROUP OF TESTS WILL TEST ALL THE LOGIC ASSOCIATED WITH
                        ;*      THE 'MOVE FROM PREVIOUS'' AND MOVE TO PREVIOUS'' INSTRUCTIONS.
                        ;*
                        ;;*****************************************************************


                        ;;*****************************************************************
                        ;*TEST 43       MOVE FROM PREVIOUS (USER) I-SPACE
                        ;*
                        ;*      THIS TEST USES THE 'MFPI' INSTRUCTION TO ENSURE THAT THE
                        ;*      PREVIOUS MODE IS CLOCKED CORRECTLY
                        ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                        ;*
                        ;*
                        ;*      IF THE CORRECT MODE (USER) IS NOT ENABLED A NON-RESIDENT ABORT
                        ;*      WILL OCCUR AND TRAP TO 23$, WHERE THE ERRORS ARE REPORTED.
                        ;*
                        ;;*****************************************************************
031322  000004         TST43:  SCOPE
031324  005037  172340  1$:     CLR     KIPAR0          ;MAP KERNEL PAGE 0 TO 0-4K
031330  012737  000200  172342          MOV     #200,KIPAR1     ;MAP KERNEL PAGE 1 TO 4-8K
031336  012737  000400  172344          MOV     #400,KIPAR2     ;MAP KERNEL PAGE 2 TO 8-12K
031344  012737  000600  172346          MOV     #600,KIPAR3     ;MAP KERNEL PAGE 3 TO 12-16K
031352  012737  000600  172350          MOV     #600,KIPAR4     ;MAP KERNEL PAGE 4 TO 12-16K
031360  012737  007600  172356          MOV     #7600,KIPAR7    ;MAP KERNEL PAGE 7 TO THE I/O PAGE
031366  012700  077406                  MOV     #77406,R0       ;MAKE ALL KERNEL I-SPACE PAGES RESIDENT
                                                        ;READ/WRITE, LENGTH 200 BLOCKS
031372  012702  000010                  MOV     #10,R2          ;SET LOOP COUNTER TO 8
031376  012701  172300                  MOV     #KIPDR0,R1      ;PUT ADDRESS OF FIRST PDR IN R1
031402  010021          2$:     MOV     R0,(R1)+        ;LOAD PDR WITH 77406
031404  077202                  SOB     R2,2$           ;LOOP TO 2$ UNTIL ALL PDRS LOADED
031406  012702  000010                  MOV     #10,R2          ;SET LOOP COUNTER TO 8
031412  012701  177600                  MOV     #UIPDR0,R1      ;PUT ADDRESS OF FIRST PDR IN R1
031416  010021          3$:     MOV     R0,(R1)+        ;LOAD PDR WITH 77406
031420  077202                  SOB     R2,3$           ;LOOP TO 3$ UNTIL ALL PDRS LOADED
031422  012737  000000  177640          MOV     #000,UIPAR0     ;MAP USER I PAGE 0 TO 0-4K
031430  012737  000200  177642          MOV     #200,UIPAR1     ;MAP USER I PAGE 1 TO 4-8K
031436  012737  000400  177644          MOV     #400,UIPAR2     ;MAP USER I PAGE 2 TO 8-12K
031444  012737  000600  177646          MOV     #600,UIPAR3     ;MAP USER I PAGE 3 TO 12-16K
031452  012737  007600  177656          MOV     #7600,UIPAR7    ;MAP USER I PAGE 7 TO THE I/O PAGE
031460  012737  031466  001110          MOV     #4$,$LPERR      ;SET LOOP ON ERROR TO 4$
031466          4$:
031466  012737  077406  172310          MOV     #77406,KIPDR4   ;KERNEL I-SPACE PAGE 4 READ/WRITE
031474  012737  000600  172350          MOV     #600,KIPAR4     ;MAP KERNEL I PAGE 4 TO 12K
031502  012737  000600  177650          MOV     #600,UIPAR4     ;MAP USER I PAGE 4 TO 12K
031510  012700  036514                  MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
```

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3496  031514  010037  100000                    MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
3497  031520  012737  032122  000250            MOV     #23$,MMVEC      ;SET M.M. VECTOR TO 23$
3498  031526  105037  172310                    CLRB    KIPDR4          ;MAKE KERNEL I-SPACE PAGE 4 NON-RESIDENT
3499                                            ;THE FOLLOWING WILL TEST DSTM=0 MFPI
3500                                            ;
3501  031532  012737  031540  001110            MOV     #5$,$LPERR      ;SET LOOP ON ERROR POINTER TO 5$
3502  031540  012737  030340  177776  5$:       MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3503  031546  006506                    6$:     MFPI    USP             ;PUT USER STACK POINTER ON KERNEL
3504                                            ;STACK
3505  031550  022706  001100                    CMP     #KERSTK,KSP     ;WAS SOMETHING PUSHED ON STACK AT 6$
3506  031554  001407                            BEQ     7$              ;BRANCH IF NOTHING WAS PUSHED
3507  031556  012600                            MOV     (KSP)+,R0       ;POP KERNEL STACK INTO R0
3508  031560  012701  000700                    MOV     #USESTK,R1      ;EXPECTING TO GET 700 AS USP
3509  031564  020001                            CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
3510  031566  001403                            BEQ     8$              ;BRANCH IF YOU DID
3511  031570  104046                            ERROR   46              ;WRONG THING WAS PUSHED ON STACK
3512                                            ;FOR TIGHTER SCOPE LOOP
3513                                            ;REPLACE ERROR CALL WITH
3514                                            ;'BR 5$'' = 000763
3515  031572  000401                            BR      8$              ;BRANCH TO NEXT TRY
3516  031574  104050                    7$:     ERROR   50              ;NOTHING PUSHED ON STACK
3517                                            ;FOR TIGHTER SCOPE LOOP
3518                                            ;REPLACE ERROR CALL WITH
3519                                            ;'BR 5$'' = 000761
3520  031576                            8$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
3521  031576  012737  031610  001110            MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
3522  031604  012700  036514                    MOV     #36514,R0       ;RELOAD DATA PATTERN IN R0
3523  031610  012737  030340  177776  9$:       MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3524  031616  012702  100000                    MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3525  031622  006512                            MFPI    (R2)            ;READ FROM PHYSICAL 60000
3526  031624  012601                            MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
3527  031626  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3528  031630  001401                            BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
3529  031632  104046                            ERROR   46              ;WRONG DATA WAS FETCHED
3530                                            ;FOR TIGHTER SCOPE LOOP
3531                                            ;REPLACE ERROR CALL WITH
3532                                            ;'BR 9$'' = 000766
3533  031634                            10$:    ;THE FOLLOWING WILL TEST DSTM=2 MFPI.
3534  031634  012737  031642  001110            MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
3535  031642  012737  030340  177776  11$:      MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3536  031650  012702  100000                    MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3537  031654  006522                            MFPI    (R2)+           ;READ FROM PHYSICAL 60000
3538  031656  012601                            MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
3539  031660  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3540  031662  001401                            BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
3541  031664  104046                            ERROR   46              ;WRONG DATA WAS FETCHED
3542                                            ;FOR TIGHTER SCOPE LOOP
3543                                            ;REPLACE ERROR CALL WITH
3544                                            ;'BR 11$'' = 000766
3545  031666                            12$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
3546  031666  012737  031674  001110            MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3547  031674  012737  030340  177776  13$:      MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3548  031702  006537  100000                    MFPI    @#100000        ;READ FROM PHYSICAL 60000
3549  031706  012601                            MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
3550  031710  020001                            CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3551  031712  001401                            BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
```

```
                                        ERROR   46              ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 13$'' = 000767
                                14$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
031716  012737  031724  001110        MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
031 24  012737  030340  177776  15$:   MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
031732  012702  100002                MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
031736  006542                        MFPI    -(R2)           ;READ FROM PHYSICAL 60000
031740  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
031742  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
031744  001401                        BEQ     16$             ;BRANCH IF CORRECT DATA WAS FETCHED
031746  104046                        ERROR   46              ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 15$'' = 000766
031750                          16$:
                                        ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
                                        ;
031750  012737  031756  001110        MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$
031756  012737  030340  177776  17$:   MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
031764  012737  100000  001202        MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
031772  012702  001204                MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF $TMP2+2 INTO R2
031776  006552                        MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
032000  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
032002  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
032004  001401                        BEQ     18$             ;BRANCH IF CORRECT DATA WAS FETCHED
032006  104046                        ERROR   46              ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 17$'' = 000763
032010                          18$:    ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
                                        ;
032010  012737  032016  001110        MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
032016  012737  030340  177776  19$:   MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
032024  005002                        CLR     R2              ;MAKE REGISTER 2 A ZERO
032026  006562  100000                MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
032032  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
032034  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
032036  001401                        BEQ     20$             ;BRANCH IF CORRECT DATA WAS FETCHED
032040  104046                        ERROR   46              ;WRONG DATA WAS FETCHED
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;'BR 19$'' = 000766
032042                          20$:    ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
                                        ;
032042  012737  032050  001110        MOV     #21$,$LPERR     ;SET LOOP ON ERROR POINTER TO 21$
032050  012737  030340  177776  21$:   MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
032056  012737  100000  001202        MOV     #100000,$TMP2   ;LOAD TEST LOC. V.A. INTO $TMP2
032064  012702  001202                MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
032070  006572  000000                MFPI    @0(R2)          ;USE $TMP2 TO FETCH VIRTUAL
                                                                ;ADDRESS OF 60000
032074  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
032076  020001                        CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
032100  001401                        BEQ     22$             ;BRANCH IF CORRECT DATA WAS FETCHED
032102  104046                        ERROR   46              ;WRONG DATA WAS FETCHED
```

```
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 21$'' = 000762
032104  012737  002150  000250  22$:   MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
032112  012737  031324  001110        MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
032120  000423                        BR      TST44           ;;BRANCH TO NEXT TEST

032122  012637  001266        23$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
032126  012637  001270                MOV     (KSP)+,TRAPPS
032132  013737  177572  001272        MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
032140  013737  177576  001274        MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
032146  042737  160000  177572        BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0 AND LEAVE
032154  104051                        ERROR   51              ;TRIED TO READ NON-RESIDENT PAGE
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;A 'NOP'' = 000240
032156  013746  001270                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
032162  013746  001266                MOV     TRAPPC,-(KSP)
C32166  000002                        RTI

;*******************************************************************
;*TEST 44        MOVE TO PREVIOUS (USER) I-SPACE
;*
;*      THIS TEST USES THE 'MTPI' INSTRUCTION TO ENSURE THAT THE
;*      PREVIOUS MODE IS CLOCKED CORRECTLY
;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED.
;*
;*
;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
;*      WILL OCCUR AND TRAP TO 20$, WHERE THE ERRORS ARE REPORTED.
;*
;*******************************************************************
032170  000004          TST44:  SCOPE
032172  012737  077406  172310  1$:     MOV     #77406,KIPDR4   ;KERNEL I-SPACE PAGE 4 READ/WRITE
032200  012737  077406  177610        MOV     #77406,UIPDR4   ;USER I-SPACE PAGE 4 READ/WRITE
032206  012737  000600  172350        MOV     #600,KIPAR4     ;MAP KERNEL I PAGE 4 TO 12K
032214  012737  000600  177650        MOV     #600,UIPAR4     ;MAP USER I PAGE 4 TO 12K
032222  012737  033002  000250        MOV     #20$,MMVEC      ;SET M.M. VECTOR TO 20$
                                    ;THE FOLLOWING WILL TEST DSTM=0 MTPI
                                    ;
032230  012737  030340  177776  2$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
032236  012746  007777                MOV     #7777,-(KSP)    ;PUSH DATA ON KERNEL STACK
032242  006606                        MTPI    USP             ;LOAD USER STACK POINTER
032244  006506                        MFPI    USP             ;READ USER STACK POINTER
032246  012601                        MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
032250  022701  007777                CMP     #7777,R1        ;WAS USER STACK POINTER CHANGED
032254  001401                        BEQ     3$              ;BRANCH IF IT WAS
032256  104050                        ERROR   50              ;USER STACK POINTER NOT CHANGED
                                                        ;FOR TIGHTER SCOPE LOOP
                                                        ;REPLACE ERROR CALL WITH
                                                        ;'BR 2$'' = 000764
032260  012737  030340  177776  3$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
032266  012746  000700                MOV     #USESTK,-(KSP)  ;GET READY TO RESTORE USER S. POINT
032272  006606                        MTPI    USP             ;RESTORE USER STACK POINTER
```

```
3664  032274                                  4$:   ;THIS WILL TEST DSTM = 1 MTPI.
3665  032274  012737  032312  001110              MOV   #5$,$LPERR     ;SET LOOP ON ERROR POINTER TO 5$
3666  032302  012702  100000                      MOV   #100000,R2     ;LOAD VIRTUAL ADDRESS INTO R2
3667  032306  012700  125252                      MOV   #125252,R0     ;LOAD TEST DATA INTO R0
3668  032312  010046                        5$:   MOV   R0,-(KSP)      ;PUSH TEST DATA ON KERNEL STACK
3669  032314  105037  172310                      CLRB  KIPDR4         ;MAKE KERNEL I PAGE 4 NON-RESIDENT
3670  032320  006612                            MTPI  (R2)             ;LOAD TEST DATA INTO PHYSICAL 60000
3671  032322  112737  000006  172310              MOVB  #006,KIPDR4    ;MAKE KERNEL PAGE 4 RESIDENT
3672  032330  011201                            MOV   (R2),R1          ;READ FROM ADDRESS 60000
3673  032332  020001                            CMP   R0,R1            ;SEE IF DATA WAS STORED AT CORRECT PLACE
3674  032334  001401                            BEQ   6$               ;BRANCH IF STORE WAS CORRECT
3675  032336  104047                            ERROR 47               ;INCORRECT STORE
3676                                                                   ;FOR TIGHTER SCOPE LOOP
3677                                                                   ;REPLACE ERROR CALL WITH
3678                                                                   ;'BR 5$' = 000765
3679  032340                                  6$:   ;THE FOLLOWING WILL TEST DSTM=2 MTPI.
3680                                                ;
3681  032340  012737  032364  001110              MOV   #8$,$LPERR     ;SET LOOP ON ERROR POINTER TO 8$
3682  032346  012737  030340  177776              MOV   #030340,PSW    ;MAKE PREVIOUS MODE USER
3683  032354  012700  125252                      MOV   #125252,R0     ;LOAD TEST DATA INTO R0
3684  032360  012702  100000                      MOV   #100000,R2     ;LOAD VIRTUAL ADDRESS INTO R2
3685  032364  010046                        8$:   MOV   R0,-(KSP)      ;PUSH TEST DATA ON KERNEL STACK
3686  032366  105037  172310                      CLRB  KIPDR4         ;MAKE KERNEL PAGE 4 NON-RESIDENT
3687  032372  006612                            MTPI  (R2)             ;LOAD TEST DATA INTO PHYSICAL 60000
3688  032374  112737  000006  172310              MOVB  #006,KIPDR4    ;MAKE KERNEL PAGE 4 RESISENT
3689  032402  013701  100000                      MOV   @#100000,R1    ;READ FROM ADDRESS 60000
3690  032406  020001                            CMP   R0,R1            ;SEE IF DATA WAS STORED CORRECTLY
3691  032410  001401                            BEQ   9$               ;BRANCH IF STORE WAS CORRECT
3692  032412  104047                            ERROR 47               ;INCORRECT STORE
3693                                                                   ;FOR TIGHTER SCOPE LOOP
3694                                                                   ;REPLACE ERROR CALL WITH
3695                                                                   ;'BR 8$' = 000764
3696  032414                                  9$:   ;THIS WILL TEST DSTM = 3 MTPI.
3697  032414  012737  032434  001110              MOV   #10$,$LPERR    ;SET LOOP ON ERROR POINTER TO 10$
3698  032422  012737  030340  177776              MOV   #030340,PSW    ;MAKE PREVIOUS MODE USER
3699  032430  012700  052525                      MOV   #52525,R0      ;LOAD TEST DATA INTO R0
3700  032434  010046                        10$:  MOV   R0,-(KSP)      ;PUSH TEST DATA ON KERNEL STACK
3701  032436  105037  172310                      CLRB  KIPDR4         ;MAKE KERNEL I PAGE 4 NON-RESIDENT
3702  032442  006637  100000                      MTPI  @#100000       ;LOAD TEST DATA INTO PHYSICAL 60000
3703  032446  112737  000006  172310              MOVB  #006,KIPDR4    ;MAKE KERNEL PAGE 4 RESIDENT
3704  032454  013701  100000                      MOV   @#100000,R1    ;READ FROM ADDRESS 60000
3705  032460  020001                            CMP   R0,R1            ;SEE IF DATA WAS STORED CORRECTLY
3706  032462  001401                            BEQ   11$              ;BRANCH IF STORE WAS CORRECT
3707  032464  104047                            ERROR 47               ;INCORRECT STORE
3708                                                                   ;FOR TIGHTER SCOPE LOOP
3709                                                                   ;REPLACE ERROR CALL WITH
3710                                                                   ;'BR 10$' = 000763
3711  032466                                  11$:  ;THIS WILL TEST DSTM = 4 MTPI.
3712  032466  012737  032506  001110              MOV   #12$,$LPERR    ;SET LOOP ON ERROR POINTER TO 12$
3713  032474  012737  030340  177776              MOV   #030340,PSW    ;MAKE PREVIOUS MODE USER
3714  032502  012700  125252                      MOV   #125252,R0     ;LOAD TEST DATA INTO R0
3715  032506  010046                        12$:  MOV   R0,-(KSP)      ;PUSH TEST DATA ON KERNEL STACK
3716  032510  012702  100002                      MOV   #100002,R2     ;LOAD VIRTUAL ADDRESS INTO R2
3717  032514  105037  172310                      CLRB  KIPDR4         ;MAKE KERNEL I PAGE 4 NON-RESIDENT
3718  032520  006642                            MTPI  -(R2)            ;LOAD TEST DATA INTO PHYSICAL 60000
3719  032522  112737  000006  172310              MOVB  #006,KIPDR4    ;MAKE KERNEL PAGE 4 RESIDENT
```

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3720  032530  013701  100000          MOV     @#100000,R1     ;READ FROM ADDRESS 60000
3721  032534  020001                  CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
3722  032536  001401                  BEQ     13$             ;BRANCH IF STORE WAS CORRECT
3723  032540  104047                  ERROR   47              ;INCORRECT STORE
3724                                                          ;FOR TIGHTER SCOPE LOOP
3725                                                          ;REPLACE ERROR CALL WITH
3726                                                          ;'BR 12$'' = 000762
3727  032542                  13$:    ;THE FOLLOWING WILL TEST DSTM=5 MTPI.
3728                                  ;
3729  032542  012737  032574  001110  MOV     #14$,$LPERR     ;SET LOOP ON ERROR POINTER TO 14$
3730  032550  012737  030340  177776  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3731  032556  012700  052525          MOV     #52525,R0       ;LOAD TEST DATA INTO R0
3732  032562  012702  001204          MOV     #<$TMP2+2>,R2   ;LOAD ADDR. OF LOC. $TMP2+2 INTO R2
3733  032566  012737  100000  001202  MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOC. INTO $TMP2
3734  032574  010046          14$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
3735  032576  105037  172310          CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
3736  032602  006652                  MTPI    @-(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
3737  032604  112737  000006  172310  MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
3738  032612  013701  100000          MOV     @#100000,R1     ;READ FROM ADDRESS 60000
3739  032616  020001                  CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
3740  032620  001401                  BEQ     15$             ;BRANCH IF STORE WAS CORRECT
3741  032622  104047                  ERROR   47              ;INCORRECT STORE
3742                                                          ;FOR TIGHTER SCOPE LOOP
3743                                                          ;REPLACE ERROR CALL WITH
3744                                                          ;'BR 14$'' = 000764
3745  032624                  15$:    ;THIS WILL TEST DSTM = 6 MTPI.
3746                                  ;
3747  032624  012737  032646  001110  MOV     #16$,$LPERR     ;SET LOOP ON ERROR POINTER TO 16$
3748  032632  012737  030340  177776  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3749  032640  012700  052525          MOV     #52525,R0       ;LOAD TEST DATA INTO R0
3750  032644  005002                  CLR     R2              ;MAKE REGISTER 2 ZERO
3751  032646  010046          16$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
3752  032650  105037  172310          CLRB    KIPDR4          ;MAKE KERNEL I PAGE 4 NON-RESIDENT
3753  032654  006662  100000          MTPI    100000(R2)      ;LOAD TEST DATA INTO PHYSICAL 60000
3754  032660  112737  000006  172310  MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
3755  032666  013701  100000          MOV     @#100000,R1     ;READ FROM ADDRESS 60000
3756  032672  020001                  CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
3757  032674  001401                  BEQ     17$             ;BRANCH IF STORE WAS CORRECT
3758  032676  104047                  ERROR   47              ;INCORRECT STORE
3759                                                          ;FOR TIGHTER SCOPE LOOP
3760                                                          ;REPLACE ERROR CALL WITH
3761                                                          ;'BR 16$'' = 000763
3762  032700                  17$:    ;THE FOLLOWING WILL TEST DSTM=7 MTPI.
3763                                  ;
3764  032700  012737  032732  001110  MOV     #18$,$LPERR     ;SET LOOP ON ERROR POINTER TO 18$
3765  032706  012737  030340  177776  MOV     #030340,PSW     ;MAKE PREVIOUS MODE USER
3766  032714  012700  125252          MOV     #125252,R0      ;LOAD TEST DATA INTO R0
3767  032720  012737  100000  001202  MOV     #100000,$TMP2   ;LOAD VIRT. ADDR. OF TEST LOCATION
3768                                                          ;INTO LOCATION $TMP2
3769  032726  012702  001202          MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
3770  032732  010046          18$:    MOV     R0,-(KSP)       ;PUSH TEST DATA ON KERNEL STACK
3771  032734  105037  172310          CLRB    KIPDR4          ;MAKE KERNEL PAGE 4 NON-RESIDENT
3772  032740  006672  000000          MTPI    @0(R2)          ;LOAD TEST DATA INTO PHYSICAL 60000
3773  032744  112737  000006  172310  MOVB    #006,KIPDR4     ;MAKE KERNEL PAGE 4 RESIDENT
3774  032752  013701  100000          MOV     @#100000,R1     ;READ FROM ADDRESS 60000
3775  032756  020001                  CMP     R0,R1           ;SEE IF DATA WAS STORED CORRECTLY
```

```
                                                BEQ     19$             ;BRANCH IF STORE WAS CORRECT
                                                ERROR   47              ;INCORRECT STORE
                                                                        ;FOR TIGHTER SCOPE LOOP
                                                                        ;REPLACE ERROR CALL WITH
                                                                        ;'BR 18$'' = 000763
                                        19$:    MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
                                                MOV     #MGMERR,MMVEC   ;RESTORE M.M. VECTOR TO NORMAL ROUTINE
                                                BR      TST45           ;;BRANCH TO NEXT TEST

                                        20$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
                                                MOV     (KSP)+,TRAPPS
                                                MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
                                                MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
                                                BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
                                                ERROR   51              ;TRIED TO LOAD A N.R. PAGE 4
                                                                        ;FOR TIGHTER SCOPE LOOP
                                                                        ;REPLACE ERROR CALL WITH
                                                                        ;A 'NOP'' = 000240
                                                MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
                                                MOV     TRAPPC,-(KSP)
                                                RTI                     ;RETURN TO TEST


                                ;;**************************************************************************
                                ;*TEST 45        MOVE FROM PREVIOUS (KERNEL) I-SPACE TO USER MODE
                                ;*
                                ;*      THIS TEST CHECKS THAT IF THE PREVIOUS MODE IS KERNEL THE
                                ;*      FETCH IS FROM KERNEL SPACE.
                                ;*      THERE IS A DESCRIPTION BEFORE EACH DESTINATION MODE TESTED,
                                ;*
                                ;*
                                ;*      IF THE CORRECT MODE IS NOT ENABLED A NON-RESIDENT ABORT
                                ;*      WILL OCCUR AND TRAP TO 21$, WHERE THE ERRORS ARE REPORTED.
                                ;*
                                ;;**************************************************************************
                                TST45:  SCOPE
                                1$:     MOV     #77406,R0       ;MAKE ALL USER I-SPACE PAGES RESIDENT
                                                                ;READ/WRITE, LENGTH 200 BLOCKS
                                        MOV     #10,R2          ;SET LOOP COUNTER TO 8
                                        MOV     #UIPDR0,R1      ;LOAD ADDRESS OF FIRST PDR IN R1
                                2$:     MOV     R0,(R1)+        ;LOAD PDR WITH 77406
                                        SOB     R2,2$           ;LOOP UNTIL 8 USER PDRS LOADED
                                        MOV     #3$,$LPERR      ;SET LOOP ON ERROR TO 3$
                                3$:     MOV     #140340,PSW     ;GO TO USER MODE FOR THIS TEST
                                        MOV     #77406,KIPDR4   ;KERNEL I-SPACE PAGE 4 READ/WRITE
                                        MOV     #600,KIPAR4     ;MAP KERNEL I PAGE 4 TO 12K
                                        MOV     #600,UIPAR4     ;MAP USER I PAGE 4 TO 12K
                                        MOV     #36514,R0       ;LOAD DATA PATTERN INTO R0
                                        MOV     R0,@#100000     ;LOAD DATA PATTERN INTO PHY 60000
                                        MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
                                        ;THE FOLLOWING WILL TEST DSTM=0 MFPI
                                        ;
                                        MOV     #21$,MMVEC      ;SET M.M. VECTOR TO 21$
                                        CLRB    UIPDR4          ;MAKE USER I-SPACE PAGE 4 NON-RESIDENT
```

```
3832  033156  012737  140340  177776          MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3833  033164  006506                  4$:     MFPI    KSP             ;PUT KERNEL STACK POINTER ON USER STACK
3834  033166  022706  000700                  CMP     #USESTK,USP     ;WAS SOMETHING PUSHED ON STACK AT 1$
3835  033172  001407                          BEQ     5$              ;BRANCH IF NOTHING WAS PUSHED
3836  033174  012600                          MOV     (USP)+,R0       ;POP USER STACK INTO R0
3837  033176  012701  001100                  MOV     #KERSTK,R1      ;EXPECTING 1100 AS KSP
3838  033202  020001                          CMP     R0,R1           ;DID YOU GET THE RIGHT POINTER?
3839  033204  001403                          BEQ     6$              ;BRANCH IF YOU DID
3840  033206  104046                          ERROR   46              ;WRONG THING WAS PUSHED ON STACK
3841                                                                  ;FOR TIGHTER SCOPE LOOP
3842                                                                  ;REPLACE ERROR CALL WITH
3843                                                                  ;'BR 4$'' = 000766
3844  033210  000401                          BR      6$              ;BRANCH TO NEXT TRY
3845  033212  104050                  5$:     ERROR   50              ;NOTHING PUSHED ON STACK
3846                                                                  ;FOR TIGHTER SCOPE LOOP
3847                                                                  ;REPLACE ERROR CALL WITH
3848                                                                  ;'BR 4$'' = 000764
3849  033214                          6$:     ;THE FOLLOWING WILL TEST DSTM=1 MFPI.
3850  033214  012737  033222  001110          MOV     #7$,$LPERR      ;SET LOOP ON ERROR POINTER TO 7$
3851  033222  012737  140340  177776  7$:     MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3852  033230  012700  036514                  MOV     #36514,R0       ;LOAD DATA EXPECTED INTO R0
3853  033234  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3854  033240  006512                          MFPI    (R2)            ;READ FROM PHYSICAL 60000
3855  033242  012601                          MOV     (USP)+,R1       ;POP USER STACK INTO R1
3856  033244  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3857  033246  001401                          BEQ     8$              ;BRANCH IF CORRECT DATA WAS FETCHED
3858  033250  104046                          ERROR   46              ;WRONG DATA WAS FETCHED
3859                                                                  ;FOR TIGHTER SCOPE LOOP
3860                                                                  ;REPLACE ERROR CALL WITH
3861                                                                  ;'BR 7$'' = 000764
3862  033252                          8$:     ;THE FOLLOWING WILL TEST DSM=2 MFPI.
3863  033252  012737  033260  001110          MOV     #9$,$LPERR      ;SET LOOP ON ERROR POINTER TO 9$
3864  033260  012737  140340  177776  9$:     MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3865  033266  012702  100000                  MOV     #100000,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3866  033272  006522                          MFPI    (R2)+           ;`EAD FROM PHYSICAL 60000
3867  033274  012601                          MOV     (USP)+,R1       ;POP USER STACK INTO R1
3868  033276  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3869  033300  001401                          BEQ     10$             ;BRANCH IF CORRECT DATA WAS FETCHED
3870  033302  104046                          ERROR   46              ;WRONG DATA WAS FETCHED
3871                                                                  ;FOR TIGHTER SCOPE LOOP
3872                                                                  ;REPLACE ERROR CALL WITH
3873                                                                  ;'BR 9$'' = 000766
3874  033304                          10$:    ;THE FOLLOWING WILL TEST DSTM=3 MFPI.
3875  033304  012737  033312  001110          MOV     #11$,$LPERR     ;SET LOOP ON ERROR POINTER TO 11$
3876  033312  012737  140340  177776  11$:    MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3877  033320  006537  100000                  MFPI    @#100000        ;READ FROM PHYSICAL 60000
3878  033324  012601                          MOV     (USP)+,R1       ;POP USER STACK INTO R1
3879  033326  020001                          CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3880  033330  001401                          BEQ     12$             ;BRANCH IF CORRECT DATA WAS FETCHED
3881  033332  104046                          ERROR   46              ;WRONG DATA WAS FETCHED
3882                                                                  ;FOR TIGHTER SCOPE LOOP
3883                                                                  ;REPLACE ERROR CALL WITH
3884                                                                  ;'BR 11$'' = 000767
3885  033334                          12$:    ;THE FOLLOWING WILL TEST DSTM=4 MFPI.
3886  033334  012737  033342  001110          MOV     #13$,$LPERR     ;SET LOOP ON ERROR POINTER TO 13$
3887  033342  012737  140340  177776  13$:    MOV     #140340,PSW     ;MAKE PREVIOUS MODE DERNEL PRESENT USER
```

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3888  033350  012702  100002            MOV     #100002,R2      ;LOAD VIRTUAL ADDRESS INTO R2
3889  033354  006542                    MFPI    -(R2)           ;READ FROM PHYSICAL 60000
3890  033356  012601                    MOV     (USP)+,R1       ;POP USER STACK INTO R1
3891  033360  020001                    CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3892  033362  001401                    BEQ     14$             ;BRANCH IF CORRECT DATA WAS FETCHED
3893  033364  104046                    ERROR   46              ;WRONG DATA WAS FETCHED
3894                                                            ;FOR TIGHTER SCOPE LOOP
3895                                                            ;REPLACE ERROR CALL WITH
3896                                                            ;'BR 13$'' = 000766
3897  033366                    14$:    ;THE FOLLOWING WILL TEST DSTM=5 MFPI.
3898                                    ;
3899  033366  012737  033374  001110    MOV     #15$,$LPERR     ;SET LOOP ON ERROR POINTER TO 15$
3900  033374  012737  140340  177776  15$:MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3901  033402  012737  100000  001202    MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR INTO LOC. $TMP2
3902  033410  012702  001204            MOV     #<$TMP2+2>,R2   ;LOAD ADDRESS OF $TMP2+2 INTO R2
3903  033414  006552                    MFPI    @-(R2)          ;READ FROM PHYSICAL 60000
3904  033416  012601                    MOV     (USP)+,R1       ;POP USER STACK INTO R1
3905  033420  020001                    CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3906  033422  001401                    BEQ     16$             ;BRANCH IF CORRECT DATA FETCHED
3907  033424  104046                    ERROR   46              ;WRONG DATA WAS FETCHED
3908                                                            ;FOR TIGHTER SCOPE LOOP
3909                                                            ;REPLACE ERROR CALL WITH
3910                                                            ;'BR 15$'' = 000763
3911  033426                    16$:    ;THE FOLLOWING WILL TEST DSTM=6 MFPI.
3912                                    ;
3913  033426  012737  033434  001110    MOV     #17$,$LPERR     ;SET LOOP ON ERROR POINTER TO 17$.
3914  033434  012737  140340  177776  17$:MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3915  033442  005002                    CLR     R2              ;MAKE REGISTER 2 A ZERO
3916  033444  006562  100000            MFPI    100000(R2)      ;READ FROM PHYSICAL 60000
3917  033450  012601                    MOV     (USP)+,R1       ;POP USER STACK INTO R1
3918  033452  020001                    CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3919  033454  001401                    BEQ     18$             ;BRANCH IF CORRECT DATA FETCHED
3920  033456  104046                    ERROR   46              ;WRONG DATA WAS FETCHED
3921                                                            ;FOR TIGHTER SCOPE LOOP
3922                                                            ;REPLACE ERROR CALL WITH
3923                                                            ;'BR 17$'' = 000766
3924  033460                    18$:    ;THE FOLLOWING WILL TEST DSTM=7 MFPI.
3925                                    ;
3926  033460  012737  033466  001110    MOV     #19$,$LPERR     ;SET LOOP ON ERROR POINTER TO 19$
3927  033466  012737  140340  177776  19$:MOV     #140340,PSW     ;MAKE PREVIOUS MODE KERNEL PRESENT USER
3928  033474  012737  100000  001202    MOV     #100000,$TMP2   ;LOAD TEST LOC. VIRT. ADDR. INTO $TMP2
3929  033502  012702  001202            MOV     #$TMP2,R2       ;LOAD ADDRESS OF $TMP2 INTO R2
3930  033506  006572  000000            MFPI    @0(R2)          ;READ FROM PHYSICAL 60000
3931  033512  012601                    MOV     (USP)+,R1       ;POP USER STACK INTO R1
3932  033514  020001                    CMP     R0,R1           ;WAS DATA FETCHED SAME AS STORED
3933  033516  001401                    BEQ     20$             ;BRANCH IF CORRECT DATA FETCHED
3934  033520  104046                    ERROR   46              ;WRONG DATA WAS FETCHED
3935                                                            ;FOR TIGHTER SCOPE LOOP
3936                                                            ;REPLACE ERROR CALL WITH
3937                                                            ;'BR 19$'' = 000762
3938  033522  012737  002150  000250  20$:MOV     #MGMERR,MMVEC   ;SET M.M. VECTOR TO NORMAL ROUTINE
3939  033530  012737  000340  177776    MOV     #00340,PSW      ;GO BACK TO KERNEL MODE, PREVIOUS KERNEL
3940  033536  012737  033052  001110    MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
3941  033544  000423                    BR      TST46           ;;BRANCH TO NEXT TEXT
3942
3943
```

```
3944  033546  012637  001266          21$:    MOV     (KSP)+,TRAPPC   ;SAVE PC & PS OF TRAP
3945  033552  012637  001270                  MOV     (KSP)+,TRAPPS
3946  033556  013737  177572  001272          MOV     SR0,WASSR0      ;SAVE SR0 FOR ERROR TYPEOUT
3947  033564  013737  177576  001274          MOV     SR2,WASSR2      ;SAVE SR2 FOR ERROR TYPEOUT
3948  033572  042737  160000  177572          BIC     #160000,SR0     ;CLEAR ERROR BITS IN SR0
3949  033600  104051                          ERROR   51              ;TRIED TO READ NON-RESIDENT PAGE
3950                                                                  ;FOR TIGHTER SCOPE LOOP
3951                                                                  ;REPLACE ERROR CALL WITH
3952                                                                  ;A 'NOP' = 000240
3953  033602  013746  001270                  MOV     TRAPPS,-(KSP)   ;PUT PC & PS OF TRAP ON STACK
3954  033606  013746  001266                  MOV     TRAPPC,-(KSP)
3955  033612  000002                          RTI                     ;RETURN TO TEST
3956
3957                                  ;;*****************************************************************
3958                                  ;*TEST 46       MOVE FROM/TO D-SPACE - MOVE FROM/TO I-SPACE
3959                                  ;*
3960                                  ;*      THIS TEST CHECKS THAT SINCE THERE IS NO DISTINCTION
3961                                  ;*      BETWEEN INSTRUCTION AND DATA SPACE IN THE FONZ-11
3962                                  ;*      MFPD & MTPD SHOULD BE DECODED THE SAME AS MFPI & MTPI.
3963                                  ;*
3964                                  ;;*****************************************************************
3965  033614  000004                  TST46:  SCOPE
3966  033616  012737  030340  177776  1$:     MOV     #030340,PSW     ;MAKE PREVIOUS MODE=USER,CURRENT=KERNEL
3967  033624  106506                          MFPD    USP             ;MFPD SHOULD ACT LIKE MFPI PUTTING
3968                                                                  ;USER STACK POINTER ON THE KERNEL STACK
3969  033626  022706  001100                  CMP     #KERSTK,KSP     ;WAS SOMETHING PUSHED ON KERNEL STACK?
3970  033632  001407                          BEQ     2$              ;BRANCH IF NO
3971  033634  012600                          MOV     (KSP)+,R0       ;POP KERNEL STACK INTO R0
3972  033636  012701  000700                  MOV     #USESTK,R1      ;EXPECTING TO GET 700 AS USP
3973  033642  020001                          CMP     R0,R1           ;DID GET RIGHT POINTER VALUE?
3974  033644  001403                          BEQ     3$              ;BRANCH IF YES
3975  033646  104053                          ERROR   53              ;WRONG THING WAS PUSHED ON STACK
3976                                                                  ;FOR TIGHTER SCOPE LOOP
3977                                                                  ;REPLACE ERROR CALL WITH
3978                                                                  ;'BR 1$' = 000763
3979  033650  000401                          BR      3$              ;BRANCH TO NEXT TRY
3980  033652  104054                  2$:     ERROR   54              ;NOTHING PUSHED ON STACK
3981                                                                  ;FOR TIGHTER SCOPE LOOP
3982                                                                  ;REPLACE ERROR CALL WITH
3983                                                                  ;'BR 1$' = 000761
3984  033654  012737  033662  001110  3$:     MOV     #4$,$LPERR      ;SET LOOP ON ERROR POINTER TO 4$
3985  033662  012746  007777          4$:     MOV     #7777,-(KSP)    ;PUSH DATA ON KERNEL STACK
3986  033666  106606                          MTPD    USP             ;LOAD THE USER STACK POINTER
3987  033670  106506                          MFPD    USP             ;READ USER STACK POINTER
3988  033672  012601                          MOV     (KSP)+,R1       ;POP KERNEL STACK INTO R1
3989  033674  022701  007777                  CMP     #7777,R1        ;WAS USER STACK POINTER CHANGED?
3990  033700  001401                          BEQ     5$              ;BRANCH IF YES
3991  033702  104054                          ERROR   54              ;USER STACK POINTER NOT CHANGED
3992                                                                  ;FOR TIGHTER SCOPE LOOP
3993                                                                  ;REPLACE ERROR CALL WITH
3994                                                                  ;'BR 4$' = 000767
3995  033704  012746  000700          5$:     MOV     #USESTK,-(KSP)  ;GET READY TO RESTORE USER STK. PTR.
3996  033710  106606                          MTPD    USP             ;RESTORE USER STACK POINTER
3997  033712  012737  033616  001110          MOV     #1$,$LPERR      ;SET LOOP POINTER TO START OF TEST
3998
3999                                  ;;*****************************************************************
```

```
                                        ;*TEST 47       MOVE FROM PREVIOUS I=SPACE (PREVIOUS=CURRENT-KERNEL)
                                        ;*
                                        ;*      THIS TEST CHECKS THAT IF BOTH PREVIOUS AND CURRENT MODES
                                        ;*      ARE KERNEL, AND THE SOURCE MODE IS 0, THE DESTINATION
                                        ;*      STACK IS NOT DECREMENTED BEFORE ACCESS.
                                        ;*      'MFPI KSP'' SHOULD PUSH THE NON-DECREMENTED VALUE
                                        ;*      OF KSP (1100) ONTO THE STACK (AT LOC. 1076).
                                        ;;*****************************************************************
033720  000004                  TST47:  SCOPE
033722  005037  177776          1$:     CLR     @#PSW           ;SET PREVIOUS = CURRENT = KERNEL
033726  012700  001100                  MOV     #STACK,R0       ;SETUP VALUE FOR STACK POINTER
033732  010006                          MOV     R0,KSP          ;LOAD STACK POINTER
033734  006506                          MFPI    KSP             ;THE VALUE ''STACK'' SHOULD BE PUSHED
                                                                ;BEFORE BEING DECREMENTED
033736  011601                          MOV     (KSP),R1        ;READ DATA WHICH WAS PUSHED
033740  020001                          CMP     R0,R1           ;WAS THE ORIGINAL VALUE OF THE
                                                                ;STACK POINTER PUSHED?
033742  001401                          BEQ     2$              ;BRANCH IF YES
033744  104046                          ERROR   46              ;MFPI FETCHED WRONG DATA
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;''BR 1$'' = 000766
033746  005740                  2$:     TST     -(R0)           ;SETUP EXPECTED STACK POINTER VALUE
033750  020600                          CMP     KSP,R0          ;WAS THE STACK POINTER DECREMENTED?
033752  001401                          BEQ     3$              ;BRANCH IF YES
033754  104050                          ERROR   50              ;STACK NOT PUSHED BY THE MFPI
                                                                ;FOR TIGHTER SCOPE LOOP
                                                                ;REPLACE ERROR CALL WITH
                                                                ;''BR 1$'' = 000762
033756  012706  001100          3$:     MOV     #STACK,KSP      ;RESTORE STACK POINTER
```

```
                                        .SBTTL  END OF PASS ROUTINE

                                        ;;**********************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*TYPE 'END OF PASS #XXXX
                                        ;TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYY''
                                        ;*WHERE XXXX AND YYYY ARE DECIMAL NUMBERS
                                        ;*IF SW12=1 INHIBIT TRACE TRAP
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO LOOP

033762                                  $EOP:
033762  000004                                SCOPE
033764  005037  001102                        CLR     $TSTNM          ;;ZERO THE TEST NUMBER
033770  005037  001212                        CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
033774  005237  001234                        INC     $PASS           ;;INCREMENT THE PASS NUMBER
034000  042737  100000  001234              BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
034006  005327                              DEC     (PC)+           ;;LOOP?
034010  000001                  $EOPCT: .WORD   1
034012  003110                          BGT     $DOAGN          ;;YES
034014  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
034016  000001                  $ENDCT: .WORD   1
034020  034010                          $EOPCT
034022  104401  034030                  TYPE    ,65$            ;;TYPE ASCIZ STRING
034026  000407                          BR      64$             ;;GET OVER THE ASCIZ
034030  006412  047105  020104  65$:    .ASCIZ  <12><15>/END PASS #/
034036  040520  051523  021440
034044     000
                034046                  .EVEN
034046                                  64$:
034046  013746  001234                          MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
                                                                        ;;TYPE PASS NUMBER
034052  104405                          TYPDS                           ;;GO TYPE--DECIMAL ASCIZ WITH SIGN
034054  104401  034062                  TYPE    ,67$            ;;TYPE ASCII STRING
034060  000425                          BR      66$             ;;GET OVER THE ASCIZ
034062  035411  047524  040524  67$:    .ASCIZ  /       ;TOTAL ERRORS SINCE LAST START AT 200  /
034070  020114  051105  047522
034076  051522  051440  047111
034104  042503  046040  051501
034112  020124  052123  051101
034120  020124  052101  031040
034126  030060  020040     000
                034134                  .EVEN
034134                                  66$:
034134  013746  001112                  MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
                                                                ;;TOTAL NUMBER OF ERRORS
034140  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
034142  104401  001223                  TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
034146  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
034152  001411                          BEQ     DOAGIN          ;;BRANCH IF NO MONITOR
034154  005046                          CLR     -(SP)           ;;INSURE THE "T" BIT IS CLEAR
034156  012746  034164                  MOV     #$CLR.T,-(SP)   ;;SETUP FOR AN RTI OR RTT
034162  000442                          BR      $RTRN           ;;GO DO AN RTI OR RTT TO LOAD THE PSW
                                                                ;;WITH A CLEARED "T" BIT
034164  000005                  $CLR.T: RESET                   ;;CLEAR THE WORLD
034166  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
```

```
 4086  034170  000240                          NOP                     ;;SAVE ROOM
 4087  034172  000240                          NOP                     ;;FOR
 4088  034174  000240                          NOP                     ;;ACT11
 4089
 4090  034176  013737  000004  001176  DOAGIN: MOV     @#4,@#$TMP0     ;SAVE CONTENTS OF LOCATION 4
 4091  034204  012737  034222  000004          MOV     #1$,@#4         ;SET UP VECTOR IN CASE OF TRAP
 4092  034212  012737  000001  164000          MOV     #1,@#164000     ;NOTIFY MULTI-TESTER OF PASS COMPLETE
 4093  034220  000402                          BR      2$              ;IF NO TRAP DON'T TOUCH STACK
 4094  034222  062706  000004          1$:     ADD     #4,SP           ;RESET STACK IN CASE OF TRAP
 4095  034226  013737  001176  000004  2$:     MOV     @#$TMP0,@#4     ;RESTORE CONTENTS OF LOACTION 4
 4096  034234                          $DOAGN:
 4097  034234  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
 4098  034236  042716  000020                  BIC     #20,(SP)        ;;CLEAR THE "T" BIT
 4099  034242  032777  010000  144670          BIT     #BIT12,@SWR     ;;RUN WITH TRACE TRAP?
 4100  034250  001005                          BNE     1$              ;;BR IF NO
 4101  034252  005137  034276                  COM     $TBIT           ;;IS IT TIME FOR TRACE TRAP
 4102  034256  100402                          BMI     1$              ;;BR IF NO
 4103  034260  052716  000020                  BIS     #20,(SP)        ;;SET TRACE TRAP
 4104  034264  012746  034272          1$:     MOV     #$LOOP,-(SP)    ;;JUMP TO START OF TEST
 4105  034270  000002                  $RTRN:  RTI                     ;;RETURN--THIS IS CHANGED TO
 4106                                                                  ;;AN "RTT" IF "RTT" IS A LEGAL
 4107                                                                  ;;INSTRUCTION
 4108  034272                          $LOOP:
 4109  034272  000137                          JMP     @(PC)+          ;;RETURN
 4110  034274  020464                  $RTNAD: .WORD   RESTRT
 4111  034276  000000                  $TBIT:  .WORD   0               ;;"T" BIT STATE INDICATOR
 4112  034300     377       377       000  $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
 4113           034304                          .EVEN
 4114                                  .SBTTL  SCOPE HANDLER ROUTINE
 4115
 4116                                  ;;**************************************************************
 4117                                  ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
 4118                                  ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
 4119                                  ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
 4120                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
 4121                                  ;*SW14=1         LOOP ON TEST
 4122                                  ;*SW11=1         INHIBIT ITERATIONS
 4123                                  ;*SW09=1         LOOP ON ERROR
 4124                                  ;*SW08=1         LOOP ON TEST IN SWR<7:0>
 4125                                  ;*CALL
 4126                                  ;*      SCOPE           ;;SCOPE=IOT
 4127
 4128  034304                          $SCOPE:
 4129  034304  104410                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
 4130  034306  032777  040000  144624  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
 4131  034314  001114                          BNE     $OVER           ;;YES IF SW14=1
 4132                                  ;#####START OF CODE FOR THE XOR TESTER######
 4133  034316  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
 4134                                                                  ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
 4135  034320  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
 4136  034324  012737  034344  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
 4137  034332  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
 4138  034336  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
 4139  034342  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
 4140  034344  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
 4141  034346  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
```

```
4142  034352  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
4143  034354                          6$:;#####END OF CODE FOR THE XOR TESTER#####
4144  034354  032777  000400  144556          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
4145  034362  001404                          BEQ     2$              ;;BR IF NO
4146  034364  127737  144550  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
4147  034372  001465                          BEQ     $OVER           ;;BR IF YES
4148  034374  105737  001103          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
4149  034400  001421                          BEQ     3$              ;;BR IF NO
4150  034402  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
4151  034410  101015                          BHI     3$              ;;BR IF NO
4152  034412  032777  001000  144520          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
4153  034420  001404                          BEQ     4$              ;;BR IF NO
4154  034422  013737  001110  001106  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
4155  034430  000446                          BR      $OVER
4156  034432  105037  001103          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
4157  034436  005037  001212                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
4158  034442  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
4159  034444  032777  004000  144466  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
4160  034452  001011                          BNE     1$              ;;BR IF YES
4161  034454  005737  001234                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
4162  034460  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
4163  034462  005237  001104                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
4164  034466  023737  001212  001104          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
4165  034474  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
4166  034476  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
4167  034504  013737  034562  001212          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
4168  034512  105237  001102          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
4169  034516  113737  001102  001232          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
4170  034524  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
4171  034530  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
4172  034534  005037  001214                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
4173  034540  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
4174  034546  013777  001102  144366  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
4175  034554  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
4176  034560  000002                          RTI                     ;;FIXES PS
4177  034562  000200                  $MXCNT: 200                     ;;MAX. NUMBER OF ITERATIONS
4178                                  .SBTTL  ERROR HANDLER ROUTINE
4179
4180                                  ;;**********************************************************************
4181                                  ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
4182                                  ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
4183                                  ;*AND GO TO ERRTYP ON ERROR
4184                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
4185                                  ;*SW15-1        HALT ON ERROR
4186                                  ;*SW13=1        INHIBIT ERROR TYPEOUTS
4187                                  ;*SW10-1        BELL ON ERROR
4188                                  ;*SW09=1        LOOP ON ERROR
4189                                  ;*CALL
4190                                  ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
4191
4192  034564                          $ERROR:
4193  034564  104410                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
4194  034566  010037  001162                  MOV     R0,$REG0        ;SAVE THE CONTENTS OF R0
4195  034572  010137  001164                  MOV     R1,$REG1        ;SAVE THE CONTENTS OF R1
4196  034576  010237  001166                  MOV     R2,$REG2        ;SAVE THE CONTENTS OF R2
4197  034602  010337  001170                  MOV     R3,$REG3        ;SAVE THE CONTENTS OF R3
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4198  034606  010437  001172                    MOV     R4,$REG4        ;SAVE THE CONTENTS OF R4
4199  034612  010537  001174                    MOV     R5,$REG5        ;SAVE THE CONTENTS OF R5
4200  034616  113737  001102  001262            MOVB    $TSTNM,TESTNO   ;SAVE THE TEST NUMBER
4201  034624  105237  001103          7$:       INCB    $ERFLG          ;;SET THE ERROR FLAG
4202  034630  001775                            BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
4203  034632  013777  001102  144302            MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
4204  034640  032777  002000  144272            BIT     #BIT10,@SWR     ;;BELL ON ERROR?
4205  034646  001402                            BEQ     1$              ;;NO - SKIP
4206  034650  104401  001216                    TYPE    ,$BELL          ;;RING BELL
4207  034654  005237  001112          1$:       INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
4208  034660  011637  001116                    MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
4209  034664  162737  000002  001116            SUB     #2,$ERRPC
4210  034672  117737  144220  001114            MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
4211  034700  032777  020000  144232            BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
4212  034706  001004                            BNE     20$             ;;SKIP TYPEOUTS
4213  034710  004737  035022                    JSR     PC,ERRTYP       ;;GO TO USER ERROR ROUTINE
4214  034714  104401  001223                    TYPE    ,$CRLF
4215  034720                          20$:
4216  034720  122737  000001  001246            CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
4217  034726  001007                            BNE     2$              ;;NO,SKIP APT ERROR REPORT
4218  034730  113737  001114  034742            MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
4219  034736  004737  037454                    JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
4220  034742     000          21$:       .BYTE   0
4221  034743     000                     .BYTE   0
4222  034744  000777          22$:       BR      22$             ;;APT ERROR LOOP
4223  034746  005777  144166  2$:       TST     @SWR            ;;HALT ON ERROR
4224  034752  100002                     BPL     3$              ;;SKIP IF CONTINUE
4225  034754  000000                     HALT                    ;;HALT ON ERROR!
4226  034756  104410                     CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
4227  034760  032777  001000  144152  3$:       BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
4228  034766  001402                     BEQ     4$              ;;BR IF NO
4229  034770  013716  001110                    MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
4230  034774  005737  001214          4$:       TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
4231  035000  001402                            BEQ     5$              ;;BR IF NONE
4232  035002  013716  001214                    MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
4233  035006                          5$:
4234  035006  022737  034166  000042            CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
4235  035014  001001                            BNE     6$              ;;BRANCH IF NO
4236  035016  000000                            HALT                    ;;YES
4237  035020                          6$:
4238  035020  000002                            RTI                     ;;RETURN
4239                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
4240
4241                                  ;;**********************************************************************
4242                                  ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
4243                                  ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
4244                                  ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
4245                                  ;*
4246                                  ;*NOTES:
4247                                  ;*1)    THIS ROUTINE PROVIDES AN AUTOMATIC "CARRIAGE RETURN-LINE FEED"
4248                                  ;*      FOR "EM", "DH", AND "DT".
4249                                  ;*2)    TWO SPACES ARE TYPED AFTER EACH NUMBER FOR "DT"
4250                                  ;*3)    FOR $ITEMB=0, JUST THE ERROR PC IS TYPED
4251                                  ;*4)    THE AVAILABLE FORMATS FOR TYPING DATA ARE:
4252                                  ;*      DF      FORMAT
4253                                  ;*      0       TYPE A 6 DIGIT OCTAL NUMBER (FROM 16-BIT BINARY)
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```
                        ;*      1       TYPE A DECIMAL NUMBER WITHOUT LEADING ZEROS
                        ;*      2       TYPE A 16 DIGIT BINARY NUMBER
                        ;*      3       TYPE A 6 DIGIT OCTAL NUMBER (FROM 18-BIT BINARY)
                        ;*
                        ERRTYP:
                                TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
                                MOV     R0,-(SP)        ;SAVE R0
                                CLR     R0              ;PICKUP THE ITEM INDEX
                                BISB    @#$ITEMB,R0
                                BNE     1$              ;IF ITEM NUMBER IS ZERO, JUST
                                                        ;TYPE THE PC OF THE ERROR
                                MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                        ;;ERROR ADDRESS
                                TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                BR      13$             ;GET OUT
                        1$:     DEC     R0              ;ADJUST THE INDEX SO THAT IT WILL
                                ASL     R0              ;       WORK FOR THE ERROR TABLE
                                ASL     R0
                                ASL     R0
                                ADD     #$ERRTB,R0      ;FORM TABLE POINTER
                                MOV     (R0)+,2$        ;PICKUP ''ERROR MESSAGE'' POINTER
                                BEQ     3$              ;SKIP TYPEOUT IF NO POINTER
                                TYPE                    ;TYPE THE ''ERROR MESSAGE''
                        2$:     .WORD   0               ;''ERROR MESSAGE'' POINTER GOES HERE
                                TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
                        3$:     MOV     (R0)+,4$        ;PICKUP ''DATA HEADER'' POINTER
                                BEQ     5$              ;SKIP TYPEOUT IF 0
                                TYPE                    ;TYPE THE ''DATA HEADER''
                        4$:     .WORD   0               ;''DATA HEADER'' POINTER GOES HERE
                                TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
                        5$:     MOV     R1,-(SP)        ;SAVE R1
                                MOV     (R0)+,R1        ;PICKUP ''DATA TABLE'' POINTER
                                BEQ     12$             ;BR IF NO DATA TO BE TYPED
                                MOV     (R0)+,R0        ;PICKUP ''DATA FORMAT'' POINTER
                        6$:     TSTB    (R0)            ;IS IT FORMAT 0?
                                BNE     7$              ;BR IF NO

                        ;*THIS CODE IS FOR OCTAL (16-BIT) FORMAT (DF=0)
                                MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
                                TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                BR      11$

                        ;*THIS CODE IS FOR DECIMAL FORMAT (DF=1)
                        7$:     CMPB    (R0),#1         ;IS IT FORMAT 1?
                                BNE     8$              ;BRANCH IF NO
                                MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
                                TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
                                BR      11$

                        ;*THIS CODE IS FOR BINARY FORMAT (DF=2)
                        8$:     CMPB    (R0),#2         ;IS IT FORMAT 2?
                                BNE     9$              ;BRANCH IF NO
                                MOV     @(R1)+,-(SP)    ;;SAVE @(R1)+ FOR TYPEOUT
                                TYPBN                   ;;GO TYPE--BINARY ASCII
                                BR      11$
```

```
4310
4311                                    ;*THIS CODE IS FOR OCTAL (18-BIT) FORMAT (DF=3)
4312  035172  012146                    9$:     MOV     (R1)+,-(SP)     ;PUT ADDRESS OF FIRST LOC. ON STACK
4313  035174  004737  040526                    JSR     PC,$DB2O        ;CONVERT TWO LOCS. TO AN ASCII STRING
4314  035200  062716  000005                    ADD     #5,(SP)         ;ONLY NEED 6 CHARACTERS NOT 11
4315  035204  012637  035212                    MOV     (SP)+,10$       ;PUT ADDRESS OF ASCII CHARS. AT 10$
4316  035210  104401                            TYPE                    ;TYPE OCTAL VALUE OF 18-BIT BINARY NO.
4317  035212  000000                    10$:    .WORD   0
4318
4319  035214  005711                    11$:    TST     (R')            ;IS THERE ANOTHER NUMBER?
4320  035216  001404                            BEQ     12$             ;BR IF NO
4321  035220  104401  035242                    TYPE    ,14$            ;TYPE TWO(2) SPACES
4322  035224  105720                            TSTB    (R0)+           ;POINT TO NEW 'DATA FORMAT'
4323  035226  000740                            BR      6$              ;LOOP
4324
4325  035230  012601                    12$:    MOV     (SP)+,R1        ;RESTORE R1
4326  035232  012600                    13$:    MOV     (SP)+,R0        ;RESTORE R0
4327  035234  104401  001223                    TYPE    ,$CRLF          ;''CARRIAGE RETURN'' & 'LINE FEED''
4328  035240  000207                            RTS     PC              ;RETURN
4329  035242  020040      000           14$:    .ASCIZ  /  /            ;TWO(2) SPACES
4330          035246                            .EVEN
4331
```

```
                                .SBTTL  *****   SUBROUTINES USED BY THIS PROGRAM   *****

                                .SBTTL  TURN OFF T-BIT AND SAVE CURRENT PSW
                                ;;*****************************************************************
                                ;*
                                ;*      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.
                                ;*
                                ;;*****************************************************************
035246  033727  177776  000020  TOFF:   BIT     PSW,#TBIT       ;IS THE T-BIT SET IN THE PSW?
035254  001411                          BEQ     1$              ;EXIT IF NO
035256  013746  177776                  MOV     PSW,-(SP)       ;PUSH PRESENT PSW ON THE STACK
035262  011637  001276                  MOV     (SP),TBITPS     ;ALSO SAVE IT IN ''TBITPS'' FOR
                                                                ;RESTORING LATER
035266  042716  000020                  BIC     #TBIT,(SP)      ;CLEAR THE T-BIT (BIT 4) IN THE PSW
035272  012746  035300                  MOV     #1$,-(SP)       ;PUSH PC OF ''RTS'' ON STACK
035276  000006                          RTT                     ;''RETURN'' TO 1$ WITH T-BIT OFF
035300  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.
                                ;*
                                ;;*****************************************************************
035302  033727  001276  000020  TON:    BIT     TBITPS,#TBIT    ;WAS T-BIT ON IN THE PREVIOUS PSW?
035310  001410                          BEQ     1$              ;EXIT IF NO
035312  013746  001276                  MOV     TBITPS,-(SP)    ;PUSH PREVIOUS PSW ON THE STACK
035316  012737  000340  001276          MOV     #340,TBITPS     ;RESET THE ''TBITPS'' LOCATION
035324  012746  035332                  MOV     #1$,-(SP)       ;PUSH PC OF ''RTS'' ON STACK
035330  000006                          RTT                     ;''RETURN'' TO 1$ WITH T-BIT RESTORED
035332  000207                  1$:     RTS     PC              ;RETURN TO PROGRAM

                                .SBTTL  SET ALL WRITEABLE BITS IN ALL PAR/PDR'S
                                ;;*****************************************************************
                                ;*
                                ;*      THIS SUBROUTINE IS USED BY THE PAR/PDR DUAL ADDRESSING TEST
                                ;*      TO SET ALL WRITEABLE BITS IN ALL KERNEL AND USE PAR'S AND
                                ;*      PDR'S TO A 1.  THE ''INITIAL STATE'' OF HAVING ALL BITS=1 IS
                                ;*      USED TO SEE THAT ONLY ONE REGISTER IS CLEARED IN RESPONSE TO
                                ;*      A SINGLE PAR OR PDR ADDRESS.
                                ;*
                                ;;*****************************************************************
035334  012702  000010          SETREG: MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
035340  012701  172300                  MOV     #KIPDR0,R1      ;LOAD ADDRESS OF FIRST PDR INTO R1
035344  012721  177777          1$:     MOV     #-1,(R1)+       ;SET BITS IN KERNEL PDR TO 1
035350  077203                          SOB     R2,1$           ;LOOP TO 1$ UNTIL ALL KERNEL PDR'S LOADED
035352  012702  000010                  MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
035356  012701  172340                  MOV     #KIPAR0,R1      ;LOAD ADDRESS OF FIRST PAR INTO R1
035362  012721  177777          2$:     MOV     #-1,(R1)+       ;SET BITS IN A KERNEL PAR TO 1
035366  077203                          SOB     R2,2$           ;LOOP TO 2$ UNTIL ALL KERNEL PAR'S LOADED
```

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4388  035370  012702  000010                  MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
4389  035374  012701  177600                  MOV     #UIPDR0,R1      ;LOAD ADDRESS OF FIRST PDR INTO R1
4390  035400  012721  177777          3$:     MOV     #-1,(R1)+       ;SET BITS IN A USER PDR TO 1
4391  035404  077203                          SOB     R2,3$           ;LOOP TO 3$ UNTIL ALL USER PDR'S LOADED
4392  035406  012702  000010                  MOV     #10,R2          ;LOAD LOOP COUNTER WITH AN 8
4393  035412  012701  177640                  MOV     #UIPAR0,R1      ;LOAD ADDRESS OF FIRST PAR INTO R1
4394  035416  012721  177777          4$:     MOV     #-1,(R1)+       ;SET BITS IN A USER PAR TO 1
4395  035422  077203                          SOB     R2,4$           ;LOOP TO 4$ UNTIL ALL USER PAR'S LOADED
4396  035424  000207                          RTS     PC              ;RETURN TO TEST
4397
4398                                  .SBTTL  READ & COMPARE KERNEL & USER PAR/PDR'S
4399                                  ;*****************************************************************
4400                                  ;*
4401                                  ;*      THIS SUBROUTINE IS USED BY PAR/PDR DUAL ADDRESSING TEST TO
4402                                  ;*      READ ALL THE PAR'S AND PDR'S TO SEE THAT ONLY ONE REGISTER
4403                                  ;*      WAS CLEARED IN RESPONSE TO A SINGLE PAR OR PDR ADDRESS.
4404                                  ;*      ANY FAILURES FOUND BY THE PAR/PDR DUAL ADDRESSING TEST WILL
4405                                  ;*      BE REPORTED BY THIS SUBROUTINE.
4406                                  ;*
4407                                  ;*****************************************************************
4408  035426                          CMPREG:
4409  035426  012701  172300                  MOV     #KIPDR0,R1      ;LOAD ADDRESS OF FIRST KERNEL PDR IN R1
4410  035432  012704  000010                  MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
4411  035436  012705  077416                  MOV     #77416,R5       ;PUT EXPECTED PDR CONTENTS IN R5
4412  035442  021105          1$:     CMP     (R1),R5         ;ARE ALL WRITEABLE BITS SET AS EXPECTED?
4413  035444  001404                  BEQ     2$              ;BRANCH IF YES
4414  035446  020100                  CMP     R1,R0           ;WAS IT THE REG. THAT WAS CLEARED?
4415  035450  001402                  BEQ     2$              ;BRANCH IF YES
4416  035452  011102                  MOV     (R1),R2         ;SAVE CONTENTS OF IMPROPERLY CLEARED REGISTER
4417  035454  104016                  ERROR   16              ;A PDR WAS EFFECTED BY CLEARING A DIFFERENT PAR/PDR
4418                                                          ;FOR TIGHTER SCOPE LOOP
4419                                                          ;REPLACE ERROR CALL WITH
4420                                                          ;AN 'RTS PC'' = 000207
4421  035456  062701  000002          2$:     ADD     #2,R1           ;FORM NEXT ADDRESS
4422  035462  077411                  SOB     R4,1$           ;LOOP TO 1$ UNTIL ALL KERNEL PDR'S CHECKED
4423  035464  012701  172340                  MOV     #KIPAR0,R1      ;LOAD ADDRESS OF FIRST KERNEL PAR IN R1
4424  035470  012704  000010                  MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
4425  035474  012705  177777                  MOV     #177777,R5      ;PUT EXPECTED PAR CONTENTS IN R5
4426  035500  021105          3$:     CMP     (R1),R5         ;ARE ALL WRITEABLE BITS SET AS EXPECTED?
4427  035502  001404                  BEQ     4$              ;BRANCH IF YES
4428  035504  020100                  CMP     R1,R0           ;WAS IT THE REG. THAT WAS CLEARED?
4429  035506  001402                  BEQ     4$              ;BRANCH IF YES
4430  035510  011102                  MOV     (R1),R2         ;SAVE CONTENTS OF IMPROPERLY CLEARED REGISTER
4431  035512  104016                  ERROR   16              ;A PAR WAS EFFECTED BY CLEARING A DIFFENENT PAR/PDR
4432                                                          ;FOR TIGHTER SCOPE LOOP
4433                                                          ;REPLACE ERROR CALL WITH
4434                                                          ;AN 'RTS PC'' = 000207
4435  035514  062701  000002          4$:     ADD     #2,R1           ;FORM NEXT ADDRESS
4436  035520  077411                  SOB     R4,3$           ;LOOP TO 3$ UNTIL ALL KERNEL PAR'S CHECKED
4437  035522  012701  177600                  MOV     #UIPDR0,R1      ;LOAD ADDRESS OF FIRST USER PDR IN R1
4438  035526  012704  000010                  MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
4439  035532  012705  077416                  MOV     #77416,R5       ;PUT EXPECTED PDR CONTENTS IN R5
4440  035536  021105          5$:     CMP     (R1),R5         ;ARE ALL WRITEABLE BITS SET AS EXPECTED?
4441  035540  001404                  BEQ     6$              ;BRANCH IF YES
4442  035542  020100                  CMP     R1,R0           ;WAS IT THE REG. THAT WAS CLEARED?
4443  035544  001402                  BEQ     6$              ;BRANCH IF YES
```

```
4444  035546  011102                  MOV     (R1),R2         ;SAVE CONTENTS OF IMPROPERLY CLEARED REGISTER
4445  035550  104016                  ERROR   16              ;A PDR WAS EFFECTED BY CLEARING A DIFFERENT PAR/PDR
4446                                                          ;FOR TIGHTER SCOPE LOOP
4447                                                          ;REPLACE ERROR CALL WITH
4448                                                          ;AN 'RTS PC'' = 000207
4449  035552  062701  000002      6$: ADD     #2,R1           ;FORM NEXT ADDRESS
4450  035556  077411                  SOB     R4,5$           ;LOOP TO 5$ UNTIL ALL USER PDR'S CHECKED
4451  035560  012701  177640          MOV     #UIPAF0,R1      ;LOAD ADDRESS OF FIRST USER PAR IN R1
4452  035564  012704  000010          MOV     #10,R4          ;LOAD LOOP COUNTER WITH AN 8
4453  035570  012705  177777          MOV     #177777,R5      ;PUT EXPECTED PAR CONTENTS IN R5
4454  035574  021105              7$: CMP     (R1),R5         ;ARE ALL WRITEABLE BITS SET AS EXPECTED?
4455  035576  001404                  BEQ     8$              ;BRANCH IF YES
4456  035600  020100                  CMP     R1,R0           ;WAS IT THE REG. THAT WAS CLEARED?
4457  035602  001402                  BEQ     8$              ;BRANCH IF YES
4458  035604  011102                  MOV     (R1),R2         ;SAVE CONTENTS OF IMPROPERLY CLEARED REGISTER
4459  035606  104016                  ERROR   16              ;A PAR WAS EFFECTED BY CLEARING A DIFFERENT PAR/PDR
4460                                                          ;FOR TIGHTER SCOPE LOOP
4461                                                          ;REPLACE ERROR CALL WITH
4462                                                          ;AN 'RTS PC'' = 000207
4463  035610  062701  000002      8$: ADD     #2,R1           ;FORM NEXT ADDRESS
4464  035614  077411                  SOB     R4,7$           ;LOOP TO 7$ UNTIL ALL USER PAR'S CHECKED
4465  035616  000207                  RTS     PC              ;RETURN TO TEST
4466
4467                          .SBTTL  CONVERT VIRTUAL ADDRESS TO PHYSICAL ADDRESS
4468                          ;;*****************************************************************
4469                          ;*
4470                          ;*      THIS SUBROUTINE IS USED TO FORM AN 18-BIT OR 22-BIT PHYSICAL ADDRESS
4471                          ;*      (PBA) FROM THE 16-BIT VIRTUAL ADDRESS (VBA) AND THE APPROPRIATE
4472                          ;*      PAGE ADDRESS REGISTER (PAR).  THE SAME METHOD USED BY THE MEMORY
4473                          ;*      MANAGEMENT LOGIC IS USED.  VBA <15:13> SELECTS WHICH PAR/PDR
4474                          ;*      IS TO BE USED, VBA <5:0>+PBA <5:0>, AND VBA <12:6> IS ADDED
4475                          ;*      TO PAR <15:00> TO GIVE PBA <21:6>.  BITS <21:16> OF THE
4476                          ;*      PHYSICAL ADDRESS ARE LEFT IN LOC. 'PBAHI'' AND BITS <15:00>
4477                          ;*      ARE LEFT IN LOC. 'PBALO''.  THE PSW'S ''CURRENT MODE'' BITS
4478                          ;*      ARE USED TO SELECT THE KERNEL OR USER PAR/PDR'S.  THE ROUTINE
```

```
                        ;*      IS ENTERED WITH LOC. "VIRT1" CONTAINING THE 16-BIT VIRTUAL
                        ;*      ADDRESS.  IF 18-BIT ADDRESSING IS SELECTED IN SR3, THEN
                        ;*      PBA<21:18> ARE CLEARED IN "PBAHI".
                        ;*
                        ;;*****************************************************************

035620                  FORMPA:
035620  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
035622  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
035624  012702  172340          MOV     #KIPAR0,R2      ;LOAD ADDRESS OF FIRST KERNEL PAR IN R2
035630  032737  140000  177776  BIT     #140000,PSW     ;IN USER MODE?
035636  001402                  BEQ     1$              ;BRANCH IF NO
035640  012702  177640          MOV     #UIPAR0,R2      ;LOAD ADDRESS OF FIRST USER PAR IN R2
035644  013700  001306  1$:     MOV     VIRT1,R0        ;LOAD VIRTUAL ADDR. (VBA) INTO R0
035650  072027  177764          ASH     #-14,R0         ;GET BITS <15:13> DOWN TO BITS <3:1>
035654  042700  177761          BIC     #177761,R0      ;MASK OF ALL BITS BUT BITS <3:1>
035660  060002                  ADD     R0,R2           ;ADD OFFSET TO BASE PAR ADDRESS
035662  011200                  MOV     (R2),R0         ;GET BITS <15:00> FROM APPROPRIATE PAR
035664  010002                  MOV     R0,R2           ;COPY PAR BITS <15:00> INTO R2
035666  013737  001306  001312  MOV     VIRT1,PBALO     ;PUT VIRTUAL ADDR. IN LOC. "PBALO"
035674  042737  160000  001312  BIC     #160000,PBALO   ;CLEAR OFF BITS <15:13> OF ORIGINAL VBA
035702  072227  177766          ASH     #-12,R2         ;GET PAR <15:10> DOWN TO BITS <5:0> OF R2
035706  042702  177700          BIC     #177700,R2      ;CLEAR OFF ALL BITS BUT BITS <5:0>
035712  072027  000006          ASH     #6,R0           ;SHIFT PAR<9:0> TO <15:6> OF R0
035716  042700  000077          BIC     #77,R0          ;CLEAR BITS <5:0> OF R0
035722  060037  001312          ADD     R0,PBALO        ;IN EFFECT, ADD VBA<12:0> TO PAR<9:0>
                                                        ;(PAR<9:0> IN BITS <15:6> OF R0)
035726  005502                  ADC     R2              ;ADD ANY CARRY TO R2
035730  010237  001314          MOV     R2,PBAHI        ;PUT BITS <21:16> OF PHYSICAL ADDR. IN PBAHI
035734  032737  000020  172516  BIT     #BIT4,SR3       ;SEE IF 18 OR 22-BIT ADDRESSING
035742  001003                  BNE     2$              ;BRANCH IF 22-BIT ADDRESSING
035744  042737  000074  001314  BIC     #74,PBAHI       ;CLEAR BITS <5:2>
035752                  2$:
035752  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
035754  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
035756  000207                  RTS     PC              ;RETURN TO PROGRAM
```

```
4517                                    .SBTTL  TTY INPUT ROUTINE
4518
4519                                    ;;*******************************************************************
4520                                    .ENABL  LSB
4521
4522                                    ;;*******************************************************************
4523                                    ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
4524                                    ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
4525                                    ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
4526                                    ;*WHEN OPERATING IN TTY FLAG MODE.
4527  035760  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
4528  035766  001114                          BNE     15$             ;;BRANCH IF NO
4529  035770  105777  143150                  TSTB    @$TKS           ;;CHAR THERE?
4530  035774  100111                          BPL     15$             ;;IF NO, DON'T WAIT AROUND
4531  035776  117746  143144                  MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
4532  036002  042716  177600                  BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
4533  036006  022726  000007                  CMP     #7,(SP)+        ;;IS IT A CONTROL G?
4534  036012  001102                          BNE     15$             ;;NO, RETURN TO USER
4535  036014  123727  001134  000001          CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
4536  036022  001476                          BEQ     15$             ;;BRANCH IF YES
4537
4538  036024  104401  036722                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
4539  036030  104401  036727          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
4540  036034  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
4541  036040  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
4542  036042  104401  036740                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
4543  036046  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
4544  036050  005046                          CLR     -(SP)           ;;THE NEW SWR
4545  036052  105777  143066          7$:     TSTB    @$TKS           ;;CHAR THERE?
4546  036056  100375                          BPL     7$              ;;IF NOT TRY AGAIN
4547
4548  036060  117746  143062                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
4549  036064  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
4550
4551  036070  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
4552  036074  001015                          BNE     9$              ;;BRANCH IF NOT
4553  036076  104401  036710                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
4554  036102  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
4555  036106  123727  001135  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
4556  036114  001003                          BNE     8$              ;;BRANCH IF NO
4557  036116  012777  000100  143020          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
4558  036124  000137  036752          8$:     JMP     CNTRLC          ;;CONTROL-C RESTART
4559
4560
4561  036130  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
4562  036134  001005                          BNE     10$             ;;BRANCH IF NOT
4563  036136  104401  036715                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
4564  036142  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
4565  036146  0007_7                          BR      19$             ;;LET'S TRY IT AGAIN
4566
4567
4568  036150  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
4569  036154  001022                          BNE     16$             ;;BRANCH IF NO
4570  036156  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
4571  036162  001403                          BEQ     11$             ;;BRANCH IF YES
4572  036164  016677  000002  142746          MOV     2(SP),@SWR      ;;SAVE NEW SWR
```

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 4573  036172  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
 4574  036176  104401  001223          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
 4575  036202  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
 4576  036210  001003                          BNE     15$             ;;BRANCH IF NOT
 4577  036212  012777  000100  142724          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
 4578  036220  000002                  15$:    RTI                     ;;RETURN
 4579  036222  004737  037314          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
 4580  036226  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
 4581  036232  002420                          BLT     18$             ;;BRANCH IF YES
 4582  036234  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
 4583  036240  003015                          BGT     18$             ;;BRANCH IF YES
 4584  036242  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
 4585  036246  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
 4586  036252  001403                          BEQ     17$             ;;BRANCH IF YES
 4587  036254  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
 4588  036256  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
 4589  036260  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
 4590  036262  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
 4591  036266  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
 4592  036272  000667                          BR      7$              ;;GET THE NEXT ONE
 4593  036274  104401  001222          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
 4594  036300  000720                          BR      20$             ;;SIMULATE CONTROL-U
 4595                                  .DSABL  LSB
 4596
 4597
 4598                                  ;;**************************************************************************
 4599                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
 4600                                  ;*CALL:
 4601                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
 4602                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
 4603                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
 4604                                  ;
 4605
 4606  036302  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
 4607  036304  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
 4608  036312  105777  142626          1$:     TSTB    @$TKS           ;;WAIT FOR
 4609  036316  100375                          BPL     1$              ;;A CHARACTER
 4610  036320  117766  142622  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
 4611  036326  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
 4612  036334  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
 4613  036342  001013                          BNE     3$              ;;BRANCH IF NO
 4614  036344  105777  142574          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
 4615  036350  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
 4616  036352  117746  142570                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
 4617  036356  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
 4618  036362  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
 4619  036366  001366                          BNE     2$              ;;IF NOT DISCARD IT
 4620  036370  000750                          BR      1$              ;;YES, RESUME
 4621  036372  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
 4622  036400  002407                          BLT     4$              ;;BRANCH IF YES
 4623  036402  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
 4624  036410  003003                          BGT     4$              ;;BRANCH IF YES
 4625  036412  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
 4626  036420  000002                  4$:     RTI                     ;;GO BACK TO USER
 4627                                  ;;**************************************************************************
 4628                                  ;*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

036422  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
036424  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
036426  012703  036700          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
036432  022703  036710          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
036436  101467                          BLOS    4$              ;;BR IF YES
036440  104411                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
036442  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
036444  122713  000003                  CMPB    #3,(R3)         ;;IS IT A CONTROL-C?
036450  001006                          BNE     10$             ;;BRANCH IF NO
036452  104401  036710                  TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
036456  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY OFF OF THE STACK
036460  012603                          MOV     (SP)+,R3        ;;RESTORE R3
036462  000137  036752                  JMP     CNTRLC          ;;GOTO CONTROL-C RESTART
036466  122713  00017?          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
036472  001022                          BNE     5$              ;;BR IF NO
036474  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
036476  001007                          BNE     6$              ;;BR IF NO
036500  112737  000134  036676          MOVB    #'\,9$          ;;TYPE A BACK SLASH
036506  104401  036676                  TYPE    ,9$
036512  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
036516  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
036520  020327  036700                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
036524  103434                          BLO     4$              ;;BR IF YES
036526  111337  036676                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
036532  104401  036676                  TYPE    ,9$             ;;GO TYPE
036536  000735                          BR      2$              ;;GO READ ANOTHER CHAR.
036540  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
036542  001406                          BEQ     7$              ;;BR IF NO
036544  112737  000134  036676          MOVB    #'\,9$          ;;TYPE A BACK SLASH
036552  104401  036676                  TYPE    ,9$
036556  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
036560  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
036564  001003                          BNE     8$              ;;BR IF NO
036566  104401  036715                  TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U'
036572  000715                          BR      1$              ;;GO START OVER
036574  122713  000022          8$:     CMPB    #22,(R3)        ;;IS CHARACTER A '^R'?
036600  001011                          BNE     3$              ;;BRANCH IF NO
036602  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
036604  104401  001223                  TYPE    ,$CRLF          ;;TYPE A 'CR' & 'LF'
036610  104401  036700                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
036614  000706                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
036616  104401  001222          4$:     TYPE    ,$QUES          ;;TYPE A '?'
036622  000701                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
036624  111337  036676          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
036630  104401  036676                  TYPE    ,9$
036634  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
036640  001274                          BNE     2$              ;;LOOP IF NOT RETURN
036642  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
036646  104401  001224                  TYPE    ,$LF            ;;TYPE A LINE FEED
036652  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
036654  012603                          MOV     (SP)+,R3        ;;RESTORE R3
```

```
4685  036656  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
4686  036660  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
4687  036666  012766  036700  000004          MOV     #$TTYIN,4(SP)
4688  036674  000002                          RTI                     ;;RETURN
4689  036676     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
4690  036677     000                          .BYTE   0               ;;TERMINATOR
4691  036700  000010                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
4692  036710  041536  005015     000  $CNTLC: .ASCIZ  /^C/<15><12>    ;;CONTROL "C"
4693  036715     136  006525  000012  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL "U"
4694  036722  043536  005015     000  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL "G"
4695  036727     015  051412  051127  $MSWR:  .ASCIZ  <15><12>/SWR = /
4696  036734  036440  000040
4697  036740  020040  042516  020127  $MNEW:  .ASCIZ  /  NEW = /
4698  036746  020075     000
4699          036752                  .EVEN
4700
4701                                  .SBTTL  CONTROL-C SERVICING ROUTINE
4702
4703                                  ;*      THE FOLLOWING CODE IS EXECUTED WHEN A CONTROL-C HAS
4704                                  ;*      BEEN TYPED INSTEAD OF A NEW SWITCH REG. VALUE.
```

```
                                        ;*      (IN OTHER WORDS, AFTER A CONTROL-G WAS TYPED).
                                        ;*      A NEW SWITCH REG. VALUE WILL BE ASKED FOR,
                                        ;*      THE TEST NUMBER AND PASS NUMBER WILL BE TYPED,
                                        ;*      AND THEN THE PROGRAM WILL GO TO 'END-OF-PASS'' AND CONTINUE

036752  013737  001234  001210  CNTRLC: MOV     $PASS,$TMP5     ;GET THE VALUE OF '$PASS''
036760  005237  001210                  INC     $TMP5           ;FORM CURRENT PASS NO.
036764  104401  037031                  TYPE    ,CMSG           ;TYPE THE TEST STOPS MESSAGE
036770  113737  001102  037024          MOVB    $TSTNM,1$       ;SAVE THE TEST NUMBER
036776  013746  037024                  MOV     1$,-(SP)        ;;SAVE 1$ FOR TYPEOUT
037002  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
037004  104401  037026                  TYPE    ,2$             ;TYPE 2 SPACES
037010  013746  001210                  MOV     $TMP5,-(SP)     ;;SAVE $TMP5 FOR TYPEOUT
037014  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
037016  104407                          GTSWR                   ;ASK FOR NEW SWR VALUE
037020  000137  033764                  JMP     $EOP+2          ;CONTINUE AT $EOP+2
037024  000000                  1$:     .WORD   0               ;BUFFER FOR TEST NUMBER
037026  020040      000         2$:     .ASCIZ  /  /            ;TWO SPACES AND THE STOP MESSAGE
037031     112  046525  044520  CMSG:   .ASCII  /JUMPING TO END-OF-PASS/<15><12>
037036  043516  052040  020117
037044  047105  026504  043117
037052  050055  051501  006523
037060     012
037061     124  051505  047124          .ASCIZ  /TESTNO  PASSNO/<15><12>
037066  020117  050040  051501
037074  047123  006517  000012
                                        .EVEN
                                .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
                                ;*

037102  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
037106  100002                          BPL     1$              ;;BR IF YES
037110  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
037112  000430                          BR      3$              ;;LEAVE
037114  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
037116  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
037122  122737  000001  001246          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
037130  001011                          BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
037132  132737  000100  001247          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
037140  001405                          BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
037142  010037  037152                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
037146  004737  037444                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
```

```
4761  037152  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
4762  037154  132737  000040  001247  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
4763  037162  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
4764  037164  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
4765  037166  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
4766  037170  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
4767  037172  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
4768  037174  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
4769  037200  000002                          RTI                     ;;RETURN
4770  037202  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
4771  037206  001430                          BEQ     8$
4772  037210  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
4773  037214  001006                          BNE     5$
4774  037216  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
4775  037220  104401                          TYPE                    ;;TYPE A CR AND LF
4776  037222  001223                          $CRLF
4777  037224  105037  037432                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
4778  037230  000755                          BR      2$              ;;GET NEXT CHARACTER
4779  037232  004737  037314          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
4780  037236  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
4781  037242  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
4782  037244  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
4783                                                                  ;;AND THE NULL CHAR.
4784  037250  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
4785  037254  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
4786  037256  004737  037314                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
4787  037262  105337  037432                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
4788  037266  000770                          BR      7$              ;;LOOP
4789
4790                                  ;HORIZONTAL TAB PROCESSOR
4791
4792  037270  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
4793  037274  004737  037314          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
4794  037300  132737  000007  037432          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
4795  037306  001372                          BNE     9$              ;;TAB STOP
4796  037310  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
4797  037312  000724                          BR      2$              ;;GET NEXT CHARACTER
4798  037314                          $TYPEC:
4799  037314  105777  141624                  TSTB    @$TKS           ;;CHAR IN KYBD BUFFER?          ;MJD001
4800  037320  100022                          BPL     10$             ;;BR IF NOT                     ;MJD001
4801  037322  017746  141620                  MOV     @$TKB,-(SP)     ;;GET CHAR                      ;MJD001
4802  037326  042716  177600                  BIC     #177600,(SP)    ;;STRIP EXTRANEOUS BITS         ;MJD001
4803  037332  122716  000023                  CMPB    #$XOFF,(SP)     ;;WAS CHAR XOFF                 ;MJD001
4804  037336  001012                          BNE     102$            ;;BR IF NOT                     ;MJD001
4805  037340                          101$:                           ;                               ;MJD001
4806  037340  105777  141600                  TSTB    @$TKS           ;;WAIT FOR CHAR                 ;MJD001
4807  037344  100375                          BPL     101$            ;                               ;MJD001
4808  037346  117716  141574                  MOVB    @$TKB,(SP)      ;;GET CHAR                      ;MJD001
4809  037352  042716  177600                  BIC     #177600,(SP)    ;;STRIP IT                      ;MJD001
4810  037356  122716  000021                  CMPB    #$XON,(SP)      ;;WAS IT XON?                   ;MJD001
4811  037362  001366                          BNE     101$            ;;BR IF NOT                     ;MJD001
4812  037364                          102$:                           ;                               ;MJD001
4813  037364  005726                          TST     (SP)+           ;;FIX STACK                     ;MJD001
4814  037366                          10$:                            ;                               ;MJD001
4815  037366  105777  141556                  TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
4816  037372  100375                          BPL     10$             ;                               ;MJD001
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4817  037374  116677  000002  141550          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
4818  037402  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
4819  037410  001003                          BNE     1$              ;;BRANCH IF NO
4820  037412  105037  037432                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
4821  037416  000406                          BR      $TYPEX          ;;EXIT
4822  037420  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
4823  037426  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
4824  037430  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
4825  037432  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
4826  037434  000207                  $TYPEX: RTS     PC
4827
4828                                  .SBTTL  APT COMMUNICATIONS ROUTINE
4829
4830                                  ;;**************************************************************************
4831  037436  112737  000001  037702  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
4832  037444  112737  000001  037700  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
4833  037452  000403                          BR      $ATYC
4834  037454  112737  000001  037702  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
4835  037462                          $ATYC:
4836  037462  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
4837  037464  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
4838  037466  105737  037700                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
4839  037472  001450                          BEQ     5$              ;;IF NOT:  BR
4840  037474  122737  000001  001246          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
4841  037502  001031                          BNE     3$              ;;IF NOT:  BR
4842  037504  132737  000100  001247          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
4843  037512  001425                          BEQ     3$              ;;IF NOT:  BR
4844  037514  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
4845  037520  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
4846  037526  005737  001226          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
4847  037532  001375                          BNE     1$              ;;IF NOT:  WAIT
4848  037534  010037  001242                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
4849  037540  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
4850  037542  001376                          BNE     2$
4851  037544  163700  001242                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
4852  037550  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
4853  037552  010037  001244                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
4854  037556  012737  000004  001226          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
4855  037564  000413                          BR      5$
4856  037566  017637  000004  037612  3$:     MOV     @4(SP),4$       .;PUT MSG ADDR IN JSR LINKAGE
4857  037574  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
4858  037602  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
4859  037606  004737  037102                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
4860  037612  000000                  4$:     .WORD   0
4861  037614                          5$:
4862  037614  105737  037702          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAI  ERROR?
4863  037620  001416                          BEQ     12$             ;;IF NOT:  BR
4864  037622  005737  001246                  TST     $ENV            ;;RUNNING UNDER APT?
4865  037626  001413                          BEQ     12$             ;;IF NOT:  BR
4866  037630  005737  001226          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
4867  037634  001375                          BNE     11$             ;;IF NOT:  WAIT
4868  037636  017637  000004  001230          MOV     @4(SP),$FATAL   ;;GET ERROR #
4869  037644  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
4870  037652  005237  001226                  INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
4871  037656  105037  037702          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
4872  037662  105037  037701                  CLRB    $LFLG           ;;CLEAR LOG FLAG
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4873  037666  105037  037700                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
4874  037672  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
4875  037674  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
4876  037676  000207                          RTS     PC              ;;RETURN
4877  037700     000                  $MFLG:  .BYTE   0               ;;MESSG. FLAG
4878  037701     000                  $LFLG:  .BYTE   0               ;;LOG FLAG
4879  037702     000                  $FFLG:  .BYTE   0               ;;FATAL FLAG
4880          037704                          .EVEN
4881          000200                  APTSIZE=200
4882          000001                  APTENV=001
4883          000100                  APTSPOOL=100
4884          000040                  APTCSUP=040
4885                                  .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
4886
4887                                  ;;**********************************************************************
4888                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
4889                                  ;*BINARY-ASCII NUMBER AND TYPE IT.
4890                                  ;*CALL:
4891                                  ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
4892                                  ;*      TYPBN                   ;;TYPE IT
4893
4894  037704  010146                  $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
4895  037706  016601  000006                  MOV     6(SP),R1        ;;GET THE INPUT NUMBER
4896  037712  000261                          SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
4897  037714  112737  000060  037756  1$:     MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
4898  037722  006101                          ROL     R1              ;;GET THIS BIT
4899  037724  001406                          BEQ     2$              ;;DONE?
4900  037726  105537  037756                  ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
4901  037732  104401  037756                  TYPE    ,$BIN           ;;GO TYPE THIS BIT
4902  037736  000241                          CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
4903  037740  000765                          BR      1$              ;;GO DO THE NEXT BIT
4904  037742  012601                  2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
4905  037744  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
4906  037752  012616                          MOV     (SP)+,(SP)
4907  037754  000002                          RTI                     ;;RETURN TO USER
4908  037756     000     000          $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
4909                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
4910
4911                                  ;;**********************************************************************
4912                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
4913                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
4914                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
4915                                  ;*CALL:
4916                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
4917                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
4918                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
4919                                  ;*      .BYTE   M               ;;M=1 OR 0
4920                                  ;*                                      ;;1=TYPE LEADING ZEROS
4921                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
4922                                  ;*
4923                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
4924                                  ;*$TYPOS OR $TYPOC
4925                                  ;*CALL:
4926                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
4927                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
4928                                  ;*
```

```
                                        ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                        ;*CALL:
                                        ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                        ;*      TYPOC                   ;;CALL FOR TYPEOUT
                                        $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
037760  017646  000000                          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
037764  116637  000001  040203                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
037772  112637  040205                          ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
037776  062716  000002                          BR      $TYPON
040002  000406
040004  112737  000C01  040203  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
040012  112737  000006  040205          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
040020  112737  000005  040202  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
040026  010346                          MOV     R3,-(SP)        ;;SAVE R3
040030  010446                          MOV     R4,-(SP)        ;;SAVE R4
040032  010546                          MOV     R5,-(SP)        ;;SAVE R5
040034  113704  040205                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
040040  005404                          NEG     R4
040042  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
040046  110437  040204                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
040052  113704  040203                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
040056  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
040062  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
040064  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO 'C'
040066  000404                          BR      3$              ;;GO DO MSB
040070  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
040072  006105                          ROL     R5
040074  006105                          ROL     R5
040076  010503                          MOV     R5,R3
040100  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
040102  105337  040204                  DECB    $OMODE          ;;TYPE THIS DIGIT?
040106  100016                          BPL     7$              ;;BR IF NO
040110  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
040114  001002                          BNE     4$              ;;TEST FOR 0
040116  005704                          TST     R4              ;;SUPPRESS THIS 0?
040120  001403                          BEQ     5$              ;;BR IF YES
040122  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
040124  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
040130  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
040134  110337  040200                  MOVB    R3,8$           ;;SAVE FOR TYPING
040140  104401  040200                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
040144  105337  040202          7$:     DECB    $OCNT           ;;COUNT BY 1
040150  003347                          BGT     2$              ;;BR IF MORE TO DO
040152  002402                          BLT     6$              ;;BR IF DONE
040154  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
040156  000744                          BR      2$              ;;GO DO THE LAST DIGIT
040160  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
040162  012604                          MOV     (SP)+,R4        ;;RESTORE R4
040164  012603                          MOV     (SP)+,R3        ;;RESTORE R3
040166  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
040174  012616                          MOV     (SP)+,(SP)
040176  000002                          RTI                     ;;RETURN
040200     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
040201     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
040202     000          $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
040203     000          $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
```

```
                                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
                                .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

040206                          $TYPDS:
040206  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
040210  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
040212  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
040214  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
040216  010546                         MOV     R5,-(SP)        ;;PUSH R5 ON STACK
040220  012746  020200                 MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
040224  016605  000020                 MOV     20(SP),R5       ;;GET THE INPUT NUMBER
040230  100004                         BPL     1$              ;;BR IF INPUT IS POS.
040232  005405                         NEG     R5              ;;MAKE THE BINARY NUMBER POS.
040234  112766  000055  000001         MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
040242  005000                 1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
040244  012703  040422                 MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
040250  112723  000040                 MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
040254  005002                 2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
040256  016001  040412                 MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
040262  160105                 3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
040264  002402                         BLT     4$              ;;BR IF DONE
040266  005202                         INC     R2              ;;INCREASE THE BCD DIGIT BY 1
040270  000774                         BR      3$
040272  060105                 4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
040274  005702                         TST     R2              ;;CHECK IF BCD DIGIT=0
040276  001002                         BNE     5$              ;;FALL THROUGH IF 0
040300  105716                         TSTB    (SP)            ;;STILL DOING LEADING 0'S?
040302  100407                         BMI     7$              ;;BR IF YES
040304  106316                 5$:     ASLB    (SP)            ;;MSD?
040306  103003                         BCC     6$              ;;BR IF NO
040310  116663  000001  177777         MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
040316  052702  000060         6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
040322  052702  000040         7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
040326  110223                         MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
040330  005720                         TST     (R0)+           ;;JUST INCREMENTING
040332  020027  000010                 CMP     R0,#10          ;;CHECK THE TABLE INDEX
040336  002746                         BLT     2$              ;;GO DO THE NEXT DIGIT
040340  003002                         BGT     8$              ;;GO TO EXIT
040342  010502                         MOV     R5,R2           ;;GET THE LSD
040344  000764                         BR      6$              ;;GO CHANGE TO ASCII
040346  105726                 8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
040350  100003                         BPL     9$              ;;BR IF NO
040352  116663  177777  177776         MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
040360  105013                 9$:     CLRB    (R3)            ;;SET THE TERMINATOR
040362  012605                         MOV     (SP)+,R5        ;;POP STACK INTO R5
040364  012603                         MOV     (SP)+,R3        ;;POP STACK INTO R3
```

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5041  040366  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
5042  040370  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
5043  040372  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
5044  040374  104401  040422                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
5045  040400  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
5046  040406  012616                        MOV     (SP)+,(SP)
5047  040410  000002                        RTI                     ;;RETURN TO USER
5048  040412  023420                $DTBL:  10000.
5049  040414  001750                        1000.
5050  040416  000144                        100.
5051  040420  000012                        10.
5052  040422  000004                $DBLK:  .BLKW   4
5053                                .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
5054
5055                                ;;******************************************************************
5056                                ;*SAVE R0-R5
5057                                ;*CALL:
5058                                ;*      SAVREG
5059                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
5060                                ;*
5061                                ;*TOP---(+16)
5062                                ;* +2---(+18)
5063                                ;* +4---R5
5064                                ;* +6---R4
5065                                ;* +8---R3
5066                                ;*+10---R2
5067                                ;*+12---R1
5068                                ;*+14---R0
5069
5070  040432                        $SAVREG:
5071  040432  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
5072  040434  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
5073  040436  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
5074  040440  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
5075  040442  010446                        MOV     R4,-(SP)        ;;PUSH R4 ON STACK
5076  040444  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
5077  040446  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
5078  040452  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
5079  040456  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
5080  040462  016646  000022                MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
5081  040466  000002                        RTI
5082
5083                                ;*RESTORE R0-R5
5084                                ;*CALL:
5085                                ;*      RESREG
5086  040470                        $RESREG:
5087  040470  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
5088  040474  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
5089  040500  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
5090  040504  012666  000022                MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
5091  040510  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
5092  040512  012604                        MOV     (SP)+,R4        ;;POP STACK INTO R4
5093  040514  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
5094  040516  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
5095  040520  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
5096  040522  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
```

```
                                        RTI
                                .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

040526  104413          $DB20:  SAVREG                  ;;SAVE ALL REGISTERS
040530  016601  000002          MOV     2(SP),R1        ;;PICKUP THE POINTER TO LOW WORD
040534  012705  040645          MOV     #$OCTVL+13.,R5  ;;POINTER TO DATA TABLE
040540  012704  000014          MOV     #12.,R4         ;;DO ELEVEN CHARACTERS
040544  012703  177770          MOV     #^C7,R3         ;;MASK
040550  012100                  MOV     (R1)+,R0        ;;LOWER WORD
040552  012101                  MOV     (R1)+,R1        ;;HIGH WORD
040554  005002                  CLR     R2              ;;TERMINATOR
040556  110245          1$:     MOVB    R2,-(R5)        ;;PUT CHARACTER IN DATA TABLE
040560  010002                  MOV     R0,R2           ;;GET THIS DIGIT
040562  005304                  DEC     R4              ;;COUNT THIS CHARACTER
040564  003007                  BGT     3$              ;;BR IF NOT THE LAST DIGIT
040566  001405                  BEQ     2$              ;;BR IF IT IS THE LAST DIGIT
040570  005205                  INC     R5              ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
040572  010566  000002          MOV     R5,2(SP)        ;;ASCIZ CHAR. & PUT IT ON THE STACK
040576  104414                  RESREG                  ;;RESTORE ALL REGISTERS
040600  000207                  RTS     PC              ;;RETURN TO USER
040602  006203          2$:     ASR     R3              ;;POSITION THE MASK FOR THE LAST DIGIT
040604  006001          3$:     ROR     R1              ;;POSITION THE BINARY NUMBER FOR
040606  006000                  ROR     R0              ;;      THE NEXT OCTAL DIGIT
040610  006001                  ROR     R1
040612  006000                  ROR     R0
040614  006001                  ROR     R1
040616  006000                  ROR     R0
040620  040302                  BIC     R3,R2           ;;MASK OUT ALL JUNK
040622  062702  000060          ADD     #'0,R2          ;;MAKE THIS CHAR. ASCII
040626  000753                  BR      1$              ;;GO PUT IT IN THE DATA TABLE
040630  000016          $OCTVL: .BLKB   14.             ;;RESERVE DATA TABLE
```

```
                                        .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.

040646  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
040650  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
040654  005740                          TST     -(R0)           ;;BACKUP BY 2
040656  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
040660  006300                          ASL     R0              ;;POSITION FOR INDEXING
040662  016000  040702                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
040666  000200                          RTS     R0              ;;GO TO ROUTINE


                                        ;;THIS IS USE TO HANDLE THE ''GETPRI'' MACRO

040670  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
040672  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
040700  000002                          RTI                     ;;RESTORE THE PSW

                                        .SBTTL  TRAP TABLE

                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE ''TRAP'' INSTRUCTION.

                                        ;       ROUTINE
                                        ;       -------
040702  040670                  $TRPAD: .WORD   $TRAP2
040704  037102                          $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
040706  040004                          $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
040710  037760                          $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
040712  040020                          $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
040714  040206                          $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
040716  037704                          $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER

040720  036030                          $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING

040722  035760                          $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
040724  036302                          $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
040726  036422                          $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
040730  040432                          $SAVREG ;;CALL=SAVREG   TRAP+13(104413) SAVE R0-R5 ROUTINE
040732  040470                          $RESREG ;;CALL=RESREG   TRAP+14(104414) RESTORE R0-R5 ROUTINE
                                        .SBTTL  POWER DOWN AND UP ROUTINES

                                        ;;**************************************************************************
                                        ;POWER DOWN ROUTINE
040734  012737  041112  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
040742  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
040750  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
040752  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
040754  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
040756  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
040760  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
```

```
5193  040762  010546                          MOV     R5,-(SP)          ;;PUSH R5 ON STACK
5194  040764  017746  140150                  MOV     @SWR,-(SP)        ;;PUSH @SWR ON STACK
5195  040770  010637  041116                  MOV     SP,$SAVR6         ;;SAVE SP
5196  040774  012737  041006  000024          MOV     #$PWRUP,@#PWRVEC  ;;SET UP VECTOR
5197  041002  000000                          HALT
5198  041004  000776                          BR      .-2               ;;HANG UP
5199
5200                                  ;;*****************************************************************
5201                                  ;POWER UP ROUTINE
5202  041006  012737  041112  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC  ;;SET FOR FAST DOWN
5203  041014  013706  041116                  MOV     $SAVR6,SP         ;;GET SP
5204  041020  005037  041116                  CLR     $SAVR6            ;;WAIT LOOP FOR THE TTY
5205  041024  005237  041116          1$:     INC     $SAVR6            ;;WAIT FOR THE INC
5206  041030  001375                          BNE     1$                ;;OF  WORD
5207  041032  012677  140102                  MOV     (SP)+,@SWR        ;;POP STACK INTO @SWR
5208  041036  012605                          MOV     (SP)+,R5          ;;POP STACK INTO R5
5209  041040  012604                          MOV     (SP)+,R4          ;;POP STACK INTO R4
5210  041042  012603                          MOV     (SP)+,R3          ;;POP STACK INTO R3
5211  041044  012602                          MOV     (SP)+,R2          ;;POP STACK INTO R2
5212  041046  012601                          MOV     (SP)+,R1          ;;POP STACK INTO R1
5213  041050  012600                          MOV     (SP)+,R0          ;;POP STACK INTO R0
5214  041052  012737  040734  000024          MOV     #$PWRDN,@#PWRVEC  ;;SET UP THE POWER DOWN VECTOR
5215  041060  012737  000340  000026          MOV     #340,@#PWRVEC+2   ;;PRIO:7
5216  041066  104401                          TYPE                      ;;REPORT THE POWER FAILURE
5217  041070  041120          $PWRMG: .WORD   PWRMSG            ;;POWER FAIL MESSAGE POINTER
5218  041072  012716                  MOV     (PC)+,(SP)        ;;RESTART AT RESTRT
5219  041074  020464          $PWRAD: .WORD   RESTRT            ;;RESTART ADDRESS
5220  041076  042766  000020  000002          BIC     #20,2(SP)         ;;CLEAR "T" BIT
5221  041104  005037  034276                  CLR     $TBIT             ;;CLEAR THE "T" BIT FLAG
5222  041110  000002                          RTI
5223  041112  000000                  $ILLUP: HALT                      ;;THE POWER UP SEQUENCE WAS STARTED
5224  041114  000776                          BR      .-2               ;; BEFORE THE POWER DOWN WAS COMPLETE
5225  041116  000000                  $SAVR6: 0                         ;;PUT THE SP HERE
5226  041120  006412  050040  053517  PWRMSG: .ASCIZ  <12><15>? POWER FAILURE - RESTARTING ?<12><15>
5227  041126  051105  043040  044501
5228  041134  052514  042522  026440
5229  041142  051040  051505  040524
5230  041150  052122  047111  020107
5231  041156  006412     000
5232          041162                  .EVEN
5233
5234
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                                        .SBTTL  ERROR MESSAGES, DATA HEADERS-TABLES & FORMATS
041162 047125 054105 042520 EM1:    .ASCIZ  /UNEXPECTED CPU TRAP TO LOC. 004/
041170 052103 042105 041440
041176 052520 052040 040522
041204 020120 047524 046040
041212 041517 020056 030060
041220 000064
041222 047125 054105 042520 EM2:    .ASCIZ  /UNEXPECTED MEM. MGMT. TRAP TO LOC. 250/
041230 052103 042105 046440
041236 046505 020056 043515
041244 052115 020056 051124
041252 050101 052040 020117
041260 047514 027103 031040
041266 030065    000
041271    120 044522 051117 EM3:    .ASCIZ  /PRIORITY BITS SET WRONG IN PSW/
041276 052111 020131 044502
041304 051524 051440 052105
041312 053440 047522 043516
041320 044440 020116 051520
041326 000127
041330 047515 042504 041040 EM4:    .ASCIZ  /MODE BITS SET WRONG IN PSW/
041336 052111 020123 042523
041344 020124 051127 047117
041352 020107 047111 050040
041360 053523    000
041363    104 040525 020114 EM5:    .ASCIZ  /DUAL ADDRESSING BETWEEN HI&LO BYTES OF PSW/
041370 042101 051104 051505
041376 044523 043516 041040
041404 052105 042527 047105
041412 044040 023111 047514
041420 041040 052131 051505
041426 047440 020106 051520
041434 000127
041436 042513 047122 046105 EM6:    .ASCIZ  /KERNEL R6 CHANGED BY WRITING USER R6/
041444 051040 020066 044103
041452 047101 042507 020104
041460 054502 053440 044522
041466 044524 043516 052440
041474 042523 020122 033122
041502    000
041503    101 046440 046505 EM7:    .ASCIZ  /A MEMORY MGMT. REG. TIMED OUT/
041510 051117 020131 043515
041516 052115 020056 042522
041524 027107 052040 046511
041532 042105 047440 052125
041540    000
041541    123 046525 040515 EM10:   .ASCIZ  /SUMMARY OF MEM. MGMT. REG. TIMEOUTS/
041546 054522 047440 020106
041554 042515 027115 046440
041562 046507 027124 051040
041570 043505 020056 044524
041576 042515 052517 051524
041604    000
041605    115 046505 020056 EM11:   .ASCIZ  /MEM. MGMT. REG. WOULD NOT CLEAR/
041612 043515 052115 020056
041620 042522 027107 053440
```

```
 5291  041626  052517  042114  047040
 5292  041634  052117  041440  042514
 5293  041642  051101     000
 5294  041645     115  046505  020056  EM12:   .ASCIZ  /MEM. MGMT. REG. BITS NOT SET CORRECTLY/
 5295  041652  043515  052115  020056
 5296  041660  042522  027107  041040
 5297  041666  052111  020123  047516
 5298  041674  020124  042523  020124
 5299  041702  047503  051122  041505
 5300  041710  046124  000131
 5301  041714  051123  020060  043105  EM13:   .ASCIZ  /SR0 EFFECTED BY WRITE TO PSW/
 5302  041722  042506  052103  042105
 5303  041730  041040  020131  051127
 5304  041736  052111  020105  047524
 5305  041744  050040  053523     000
 5306  041751     123  030522  042040  EM14:   .ASCIZ  /SR1 DID NOT READ ALL ZEROS/
 5307  041756  042111  047040  052117
 5308  041764  051040  040505  020104
 5309  041772  046101  020114  042532
 5310  042000  047522  000123
 5311  042004  052504  046101  040440  EM15:   .ASCIZ  /DUAL ADDRESSING BETWEEN BYTES OF PAR OR PDR/
 5312  042012  042104  042522  051523
 5313  042020  047111  020107  042502
 5314  042026  053524  042505  020116
 5315  042034  054502  042524  020123
 5316  042042  043117  050040  051101
 5317  042050  047440  020122  042120
 5318  042056  000122
 5319  042060  052504  046101  040440  EM16:   .ASCIZ  /DUAL ADDRESSING BETWEEN PAR-PDR'S/
 5320  042066  042104  042522  051523
 5321  042074  047111  020107  042502
 5322  042102  053524  042505  020116
 5323  042110  040520  026522  042120
 5324  042116  023522  000123
 5325  042122  044120  051531  041511  EM17:   .ASCIZ  /PHYSICAL ADDRESS FORMED WRONG/
 5326  042130  046101  040440  042104
 5327  042136  042522  051523  043040
 5328  042144  051117  042515  020104
 5329  042152  051127  047117  000107
 5330  042160  044120  051531  020056  EM20:   .ASCIZ  /PHYS. ADDR. FORMED WRONG IN RELOCATE MODE/
 5331  042166  042101  051104  020056
 5332  042174  047506  046522  042105
 5333  042202  053440  047522  043516
 5334  042210  044440  020116  042522
 5335  042216  047514  040503  042524
 5336  042224  046440  042117  000105
 5337  042232  026527  044502  020124  EM21:   .ASCIZ  /W-BIT DID NOT GET SET IN PDR/
 5338  042240  044504  020104  047516
 5339  042246  020124  042507  020124
 5340  042254  042523  020124  047111
 5341  042262  050040  051104     000
 5342  042267     127  041055  052111  EM22:   .ASCIZ  /W-BIT SET IN MORE THAN ONE PDR/
 5343  042274  051440  052105  044440
 5344  042302  020116  047515  042522
 5345  042310  052040  040510  020116
 5346  042316  047117  020105  042120
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5347  042324  000122
5348  042326  026527  044502  020124  EM23:   .ASCIZ  /W-BIT NOT CLEARED BY WRITING TO PDR/
5349  042334  047516  020124  046103
5350  042342  040505  042522  020104
5351  042350  054502  053440  044522
5352  042356  044524  043516  052040
5353  042364  020117  042120  000122
5354  042372  051127  052111  047111  EM24:   .ASCIZ  /WRITING SR0 SET W-BIT IN KIPDR7/
5355  042400  020107  051123  020060
5356  042406  042523  020124  026527
5357  042414  044502  020124  047111
5358  042422  045440  050111  051104
5359  042430  000067
5360  042432  026527  044502  020124  EM25:   .ASCIZ  /W-BIT GOT SET DURING TIMEOUT ABORT/
5361  042440  047507  020124  042523
5362  042446  020124  052504  044522
5363  042454  043516  052040  046511
5364  042462  047505  052125  040440
5365  042470  047502  052122     000
5366  042475     115  046505  051117  EM26:   .ASCIZ  /MEMORY MGMT. ACCESS ABORT DID NOT OCCUR/
5367  042502  020131  043515  052115
5368  042510  020056  041501  042503
5369  042516  051523  040440  047502
5370  042524  052122  042040  042111
5371  042532  047040  052117  047440
5372  042540  041503  051125     000
5373  042545     101  041503  051505  EM27:   .ASCIZ  /ACCESS ERROR DID NOT ABORT INSTRUCTION/
5374  042552  020123  051105  047522
5375  042560  020122  044504  020104
5376  042566  047516  020124  041101
5377  042574  051117  020124  047111
5378  042602  052123  052522  052103
5379  042610  047511  000116
5380  042614  051123  020060  044504  EM30:   .ASCIZ  /SR0 DID NOT REPORT ACCESS ERROR CORRECTLY/
5381  042622  020104  047516  020124
5382  042630  042522  047520  052122
5383  042636  040440  041503  051505
5384  042644  020123  051105  047522
5385  042652  020122  047503  051122
5386  042660  041505  046124  000131
5387  042666  044504  020104  047516  EM31:   .ASCIZ  /DID NOT LOCKUP CORRECT VIRTUAL ADDR./
5388  042674  020124  047514  045503
5389  042702  050125  041440  051117
5390  042710  042522  052103  053040
5391  042716  051111  052524  046101
5392  042724  040440  042104  027122
5393  042732     000
5394  042733     120  043501  020105  EM32:   .ASCIZ  /PAGE LGTH. ABORT OCCURRED WHEN IT SHOULDN'T HAVE/
5395  042740  043514  044124  020056
5396  042746  041101  051117  020124
5397  042754  041517  052503  051122
5398  042762  042105  053440  042510
5399  042770  020116  052111  051440
5400  042776  047510  046125  047104
5401  043004  052047  044040  053101
5402  043012  000105
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5403  043014  040520  042507  046040  EM33:   .ASCIZ  /PAGE LGTH. ABORT DID NOT OCCUR WHEN IT SHOULD HAVE/
5404  043022  052107  027110  040440
5405  043030  047502  052122  042040
5406  043036  042111  047040  052117
5407  043044  047440  041503  051125
5408  043052  053440  042510  020116
5409  043060  052111  051440  047510
5410  043066  046125  020104  040510
5411  043074  042526     000
5412  043077     123  030122  042040  EM34:   .ASCIZ  /SR0 DID NOT REPORT PAGE LGTH. ABORT CORRECTLY/
5413  043104  042111  047040  052117
5414  043112  051040  050105  051117
5415  043120  020124  040520  042507
5416  043126  046040  052107  027110
5417  043134  040440  047502  052122
5418  043142  041440  051117  042522
5419  043150  052103  054514     000
5420  043155     123  030122  047440  EM37:   .ASCIZ  /SR0 OR SR2 CHANGED BY A SECOND ABORT/
5421  043162  020122  051123  020062
5422  043170  044103  047101  042507
5423  043176  020104  054502  040440
5424  043204  051440  041505  047117
5425  043212  020104  041101  051117
5426  043220  000124
5427  043222  051123  020060  051117  EM40:   .ASCIZ  /SR0 OR SR2 WERE NOT 'RESET' BY A RESET/
5428  043230  051440  031122  053440
5429  043236  051105  020105  047516
5430  043244  020124  051042  051505
5431  043252  052105  020042  054502
5432  043260  040440  051040  051505
5433  043266  052105     000
5434  043271     123  031122  047040  EM41:   .ASCIZ  /SR2 NOT TRACKING CORRECTLY/
5435  043276  052117  052040  040522
5436  043304  045503  047111  020107
5437  043312  047503  051122  041505
5438  043320  046124  000131
5439  043324  044504  020104  047516  EM42:   .ASCIZ  /DID NOT TRAP THRU KERNEL SPACE/
5440  043332  020124  051124  050101
5441  043340  052040  051110  020125
5442  043346  042513  047122  046105
5443  043354  051440  040520  042503
5444  043362     000
5445  043363     113  020124  051105  EM43:   .ASCIZ  /KT ERROR NOT SERVICED ON TIMEOUT ERROR/
5446  043370  047522  020122  047516
5447  043376  020124  042523  053122
5448  043404  041511  042105  047440
5449  043412  020116  044524  042515
5450  043420  052517  020124  051105
5451  043426  047522  000122
5452  043432  051123  020060  051117  EM44:   .ASCIZ  /SR0 OR SR2 CHANGED BY TIMEOUT ERROR/
5453  043440  051440  031122  041440
5454  043446  040510  043516  042105
5455  043454  041040  020131  044524
5456  043462  042515  052517  020124
5457  043470  051105  047522  000122
5458  043476  051105  047522  020122  EM45:   .ASCIZ  /ERROR DURING 'DOUBLE ERROR'' (KT & TIMEOUT)/
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 5459  043504  052504  044522  043516
 5460  043512  021040  047504  041125
 5461  043520  042514  042440  051122
 5462  043526  051117  020042  045450
 5463  043534  020124  020046  044524
 5464  043542  042515  052517  024524
 5465  043550     000
 5466  043551     115  050106  020111  EM46:   .ASCIZ  /MFPI INSTRUCTION PUSHED WRONG DATA/
 5467  043556  047111  052123  052522
 5468  043564  052103  047511  020116
 5469  043572  052520  044123  042105
 5470  043600  053440  047522  043516
 5471  043606  042040  052101  000101
 5472  043614  052115  044520  044440  EM47:   .ASCIZ  /MTPI INSTRUCTION LOADED WRONG DATA/
 5473  043622  051516  051124  041525
 5474  043630  044524  047117  046040
 5475  043636  040517  042504  020104
 5476  043644  051127  047117  020107
 5477  043652  040504  040524     000
 5478  043657     123  040524  045503  EM50:   .ASCIZ  /STACK NOT PUSHED BY MFPI-MTPI/
 5479  043664  047040  052117  050040
 5480  043672  051525  042510  020104
 5481  043700  054502  046440  050106
 5482  043706  026511  052115  044520
 5483  043714     000
 5484  043715     113  051105  042516  EM51:   .ASCIZ  /KERNEL PAGE ACCESS INSTEAD OF USER: MFPI-MTPI/
 5485  043722  020114  040520  042507
 5486  043730  040440  041503  051505
 5487  043736  020123  047111  052123
 5488  043744  040505  020104  043117
 5489  043752  052440  042523  035122
 5490  043760  046440  050106  026511
 5491  043766  052115  044520     000
 5492  043773     127  047522  043516  EM52:   .ASCIZ  /WRONG PDR'S REFERENCED WHILE IN RELOCATE MODE/
 5493  044000  050040  051104  051447
 5494  044006  051040  043105  051105
 5495  044014  047105  042503  020104
 5496  044022  044127  046111  020105
 5497  044030  047111  051040  046105
 5498  044036  041517  052101  020105
 5499  044044  047515  042504     000
 5500  044051     115  050106  020104  EM53:   .ASCIZ  /MFPD INSTRUCTION PUSHED WRONG DATA/
 5501  044056  047111  052123  052522
 5502  044064  052103  047511  020116
 5503  044072  052520  044123  042105
 5504  044100  053440  047522  043516
 5505  044106  042040  052101  000101
 5506  044114  052123  041501  020113  EM54:   .ASCIZ  /STACK NOT PUSHED BY MFPD-MTPD/
 5507  044122  047516  020124  052520
 5508  044130  044123  042105  041040
 5509  044136  020131  043115  042120
 5510  044144  046455  050124  000104
 5511  044152  040520  020122  051117  EM55:   .ASCIZ  /PAR OR PDR CHANGED BY A RESET/
 5512  044160  050040  051104  041440
 5513  044166  040510  043516  042105
 5514  044174  041040  020131  020101
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 5515  044202  042522  042523  000124
 5516  044210  051520  020127  044103  EM56:   .ASCIZ  /PSW CHANGED BY AN RTI IN USER MODE/
 5517  044216  047101  042507  020104
 5518  044224  054502  040440  020116
 5519  044232  052122  020111  047111
 5520  044240  052440  042523  020122
 5521  044246  047515  042504     000
 5522
 5523  044253     117  042114  050040  DH1:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  TESTNO  ERRORPC/
 5524  044260  020103  047440  042114
 5525  044266  050040  053523  051040
 5526  044274  020066  040527  020123
 5527  044302  052040  051505  047124
 5528  044310  020117  042440  051122
 5529  044316  051117  041520     000
 5530  044323     117  042114  050040  DH2:    .ASCIZ  /OLD PC  OLD PSW R6 WAS  SR0     SR2     TESTNO  ERRORPC/
 5531  044330  020103  047440  042114
 5532  044336  050040  053523  051040
 5533  044344  020066  040527  020123
 5534  044352  051440  030122  020040
 5535  044360  020040  051440  031122
 5536  044366  020040  020040  052040
 5537  044374  051505  047124  020117
 5538  044402  042440  051122  051117
 5539  044410  041520     000
 5540  044413     127  047522  042524  DH3:    .ASCIZ  /WROTE   READ    TESTNO  ERRORPC/
 5541  044420  020040  051040  040505
 5542  044426  020104  020040  052040
 5543  044434  051505  047124  020117
 5544  044442  042440  051122  051117
 5545  044450  041520     000
 5546  044453     101  042104  042522  DH7:    .ASCIZ  /ADDRESS TESTNO  ERRORPC/
 5547  044460  051523  052040  051505
 5548  044466  047124  020117  042440
 5549  044474  051122  051117  041520
 5550  044502     000
 5551  044503     122  043505  051511  DH10:   .ASCII  /REGISTER-ADDRS  NUM  OF/<CRLF>
 5552  044510  042524  026522  042101
 5553  044516  051104  020123  047040
 5554  044524  046525  020040  043117
 5555  044532     200
 5556  044533     101  042116  042455          .ASCIZ  /AND-ED  OR-ED   TIMOUTS TESTNO  ERRORPC/
 5557  044540  020104  047440  026522
 5558  044546  042105  020040  052040
 5559  044554  046511  052517  051524
 5560  044562  052040  051505  047124
 5561  044570  020117  042440  051122
 5562  044576  051117  041520     000
 5563  044603     122  043505  051511  DH11:   .ASCII  /REGISTR READ    READ-(BINARY)/<CRLF>
 5564  044610  051124  051040  040505
 5565  044616  020104  020040  051040
 5566  044624  040505  026504  041050
 5567  044632  047111  051101  024531
 5568  044640     200
 5569  044641     101  042104  042522          .ASCIZ  /ADDRESS (OCTAL) 5432109876543210  TESTNO  ERRORPC/
 5570  044646  051523  024040  041517
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 5571  044654  040524  024514  032440
 5572  044662  031464  030462  034460
 5573  044670  033470  032466  031464
 5574  044676  030462  020060  052040
 5575  044704  051505  047124  020117
 5576  044712  042440  051122  051117
 5577  044720  041520     000
 5578  044723     122  043505  051511  DH12:   .ASCII  /REGISTR WROTE   READ    READ-(BINARY)/<CRLF>
 5579  044730  051124  053440  047522
 5580  044736  042524  020040  051040
 5581  044744  040505  020104  020040
 5582  044752  051040  040505  026504
 5583  044760  041050  047111  051101
 5584  044766  024531     200
 5585  044771     101  042104  042522          .ASCIZ  /ADDRESS (OCTAL) (OCTAL) 5432109876543210  TESTNO  ERRORPC/
 5586  044776  051523  024040  041517
 5587  045004  040524  024514  024040
 5588  045012  041517  040524  024514
 5589  045020  032440  031464  030462
 5590  045026  034460  033470  032466
 5591  045034  031464  030462  020060
 5592  045042  052040  051505  047124
 5593  045050  020117  042440  051122
 5594  045056  051117  041520     000
 5595  045063     122  040505  020104  DH13:   .ASCIZ  /READ    TESTNO  ERRORPC/
 5596  045070  020040  052040  051505
 5597  045076  047124  020117  042440
 5598  045104  051122  051117  041520
 5599  045112     000
 5600  045113     120  051101  050055  DH16:   .ASCII  /PAR-PDR PAR-PDR/<CRLF>
 5601  045120  051104  050040  051101
 5602  045126  050055  051104     200
 5603  045133     103  042514  051101          .ASCIZ  /CLEARED EFFECTD EXPECTD RECEIVD TESTNO  ERRORPC/
 5604  045140  042105  042440  043106
 5605  045146  041505  042124  042440
 5606  045154  050130  041505  042124
 5607  045162  051040  041505  044505
 5608  045170  042126  052040  051505
 5609  045176  047124  020117  042440
 5610  045204  051122  051117  041520
 5611  045212     000
 5612  045213     120  054510  044523  DH17:   .ASCII  /PHYSICL VIRTUAL/<CRLF>
 5613  045220  046103  053040  051111
 5614  045226  052524  046101     200
 5615  045233     101  042104  042522          .ASCIZ  /ADDRESS ADDRESS KIPAR4  TESTNO  ERRORPC/
 5616  045240  051523  040440  042104
 5617  045246  042522  051523  045440
 5618  045254  050111  051101  020064
 5619  045262  052040  051505  047124
 5620  045270  020117  042440  051122
 5621  045276  051117  041520     000
 5622  045303     120  054510  044523  DH20:   .ASCII  /PHYSICL PAR 4   PAR 5/<CRLF>
 5623  045310  046103  050040  051101
 5624  045316  032040  020040  050040
 5625  045324  051101  032440     200
 5626  045331     101  042104  042522          .ASCIZ  /ADDRESS VBA     VBA     PAR 4   PAR 5   PSW     TESTNO  ERRORPC/
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5627  045336  051523  053040  040502
5628  045344  020040  020040  053040
5629  045352  040502  020040  020040
5630  045360  050040  051101  032040
5631  045366  020040  050040  051101
5632  045374  032440  020040  050040
5633  045402  053523  020040  020040
5634  045410  052040  051505  047124
5635  045416  020117  042440  051122
5636  045424  051117  041520     000
5637  045431     120  051104  020040  DH21:   .ASCII  /PDR     VIRTUAL/<CRLF>
5638  045436  020040  053040  051111
5639  045444  052524  046101     200
5640  045451     124  051505  042524          .ASCIZ  /TESTED  ADDRESS TESTNO  ERRORPC/
5641  045456  020104  040440  042104
5642  045464  042522  051523  052040
5643  045472  051505  047124  020117
5644  045500  042440  051122  051117
5645  045506  041520     000
5646  045511     120  051104  044440  DH22:   .ASCII  /PDR IN  PDR     VIRTUAL/
5647  045516  020116  050040  051104
5648  045524  020040  020040  053040
5649  045532  051111  052524  046101
5650  045540  051105  047522  020122          .ASCIZ  /ERROR   TESTED  ADDRESS TESTNO  ERRORPC/
5651  045546  020040  042524  052123
5652  045554  042105  020040  042101
5653  045562  051104  051505  020123
5654  045570  042524  052123  047516
5655  045576  020040  051105  047522
5656  045604  050122  000103
5657  045610  042120  020122  020040  DH23:   .ASCIZ  /PDR     TESTNO  ERRORPC/
5658  045616  020040  042524  052123
5659  045624  047516  020040  051105
5660  045632  047522  050122  000103
5661  045640  042120  020122  040527  DH24:   .ASCIZ  /PDR WAS EXPECTD TESTNO  ERRORPC/
5662  045646  020123  054105  042520
5663  045654  052103  020104  042524
5664  045662  052123  047516  020040
5665  045670  051105  047522  050122
5666  045676  000103
5667  045700  042120  020122  020064  DH26:   .ASCIZ  /PDR 4   PSW     TESTNO  ERRORPC/
5668  045706  020040  051520  020127
5669  045714  020040  020040  042524
5670  045722  052123  047516  020040
5671  045730  051105  047522  050122
5672  045736  000103
5673  045740  051123  020060  040527  DH30:   .ASCIZ  /SR0 WAS EXPECTD PDR 4   PSW     TESTNO  ERRORPC/
5674  045746  020123  054105  042520
5675  045754  052103  020104  042120
5676  045762  020122  020064  020040
5677  045770  051520  020127  020040
5678  045776  020040  042524  052123
5679  046004  047516  020040  051105
5680  046012  047522  050122  000103
5681  046020  051123  020062  040527  DH31:   .ASCIZ  /SR2 WAS EXPECTD PDR 4   PSW     TESTNO  ERRORPC/
5682  046026  020123  054105  042520
```

```
 5683  046034  052103  020104  042120
 5684  046042  020122  020064  020040
 5685  046050  051520  020127  020040
 5686  046056  020040  042524  052123
 5687  046064  047516  020040  051105
 5688  046072  047522  050122  000103
 5689  046100  027126  027102  027101  DH32:   .ASCIZ  /V.B.A.  KIPDR4  SR0 WAS SR2 WAS TESTNO  ERRORPC/
 5690  046106  020040  044513  042120
 5691  046114  032122  020040  051123
 5692  046122  020060  040527  020123
 5693  046130  051123  020062  040527
 5694  046136  020123  042524  052123
 5695  046144  047516  020040  051105
 5696  046152  047522  050122  000103
 5697  046160  027126  027102  027101  DH33:   .ASCIZ  /V.B.A.  KIPDR4  TESTNO  ERRORPC/
 5698  046166  020040  044513  042120
 5699  046174  032122  020040  042524
 5700  046202  052123  047516  020040
 5701  046210  051105  047522  050122
 5702  046216  000103
 5703  046220  027126  027102  027101  DH34:   .ASCIZ  /V.B.A.  KIPDR4  SR0 WAS EXPECTD TESTNO  ERRORPC/
 5704  046226  020040  044513  042120
 5705  046234  032122  020040  051123
 5706  046242  020060  040527  020123
 5707  046250  054105  042520  052103
 5708  046256  020104  042524  052123
 5709  046264  047516  020040  051105
 5710  046272  047522  050122  000103
 5711  046300  027126  027102  027101  DH35:   .ASCIZ  /V.B.A.  KIPDR4  SR2 WAS EXPECTD TESTNO  ERRORPC/
 5712  046306  020040  044513  042120
 5713  046314  032122  020040  051123
 5714  046322  020062  040527  020123
 5715  046330  054105  042520  052103
 5716  046336  020104  042524  052123
 5717  046344  047516  020040  051105
 5718  046352  047522  050122  000103
 5719  046360  051123  020062  040527  DH36:   .ASCIZ  /SR2 WAS EXPECTD TESTNO  ERRORPC/
 5720  046366  020123  054105  042520
 5721  046374  052103  020104  042524
 5722  046402  052123  047516  020040
 5723  046410  051105  047522  050122
 5724  046416  000103
 5725  046420  044506  051522  020124  DH37:   .ASCII  /FIRST ABORT     SECOND ABORT/<CRLF>
 5726  046426  041101  051117  020124
 5727  046434  020040  020040  042523
 5728  046442  047503  042116  040440
 5729  046450  047502  052122     200
 5730  046455     123  030122  053440          .ASCIZ  /SR0 WAS SR2 WAS SR0 WAS SR2 WAS TESTNO  ERRORPC/
 5731  046462  051501  051440  031122
 5732  046470  053440  051501  051440
 5733  046476  030122  053440  051501
 5734  046504  051440  031122  053440
 5735  046512  051501  052040  051505
 5736  046520  047124  020117  042440
 5737  046526  051122  051117  041520
 5738  046534     000
```

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 5739  046535     123  030122  053440  DH40:   .ASCIZ  /SR0 WAS SR2 WAS TESTNO  ERRORPC/
 5740  046542  051501  051440  031122
 5741  046550  053440  051501  052040
 5742  046556  051505  047124  020117
 5743  046564  042440  051122  051117
 5744  046572  041520     000
 5745  046575     120  053523  053440  DH42:   .ASCIZ  /PSW WAS R6 WAS  TESTNO  ERRORPC/
 5746  046602  051501  051040  020066
 5747  046610  040527  020123  052040
 5748  046616  051505  047124  020117
 5749  046624  042440  051122  051117
 5750  046632  041520     000
 5751  046635     105  050130  041505  DH44:   .ASCII  /EXPECTED         RECEIVED/<CRLF>
 5752  046642  042524  020104  020040
 5753  046650  020040  020040  020040
 5754  046656  042522  042503  053111
 5755  046664  042105     200
 5756  046667     123  030122  020040          .ASCIZ  /SR0      SR2      SR0 WAS SR2 WAS TESTNO  ERRORPC/
 5757  046674  020040  051440  031122
 5758  046702  020040  020040  051440
 5759  046710  030122  053440  051501
 5760  046716  051440  031122  053440
 5761  046724  051501  052040  051505
 5762  046732  047124  020117  042440
 5763  046740  051122  051117  041520
 5764  046746     000
 5765  046747     105  050130  041505  DH45:   .ASCII  /EXPECTED:/<CRLF>
 5766  046754  042524  035104     200
 5767  046761     120  053523  020040          .ASCII  /PSW      PC       SR0      SR2/<CRLF>
 5768  046766  020040  050040  020103
 5769  046774  020040  020040  051440
 5770  047002  030122  020040  020040
 5771  047010  051440  031122     200
 5772  047015     061  030067  030460          .ASCII  /170017  (3$+4)  020147  (3$)/<CRLF>
 5773  047022  020067  024040  022063
 5774  047030  032053  020051  030040
 5775  047036  030062  032061  020067
 5776  047044  024040  022063  100051
 5777  047052  042522  042503  053111          .ASCII  /RECEIVED:/<CRLF>
 5778  047060  042105  100072
 5779  047064  051520  020127  020040          .ASCIZ  /PSW      PC       SR0      SR2      TESTNO  ERRORPC/
 5780  047072  020040  041520  020040
 5781  047100  020040  020040  051123
 5782  047106  020060  020040  020040
 5783  047114  051123  020062  020040
 5784  047122  020040  042524  052123
 5785  047130  047516  020040  051105
 5786  047136  047522  050122  000103
 5787  047144  040504  040524  020040  DH46:   .ASCII  /DATA     DATA/<CRLF>
 5788  047152  020040  040504  040524
 5789  047160     200
 5790  047161     105  050130  041505          .ASCIZ  /EXPECTD RECEIVD TESTNO  ERRORPC/
 5791  047166  042124  051040  041505
 5792  047174  044505  042126  052040
 5793  047202  051505  047124  020117
 5794  047210  042440  051122  051117
```

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 5795  047216  041520     000
 5796  047221     124  051505  047124  DH50:   .ASCIZ  /TESTNO  ERRORPC/
 5797  047226  020117  042440  051122
 5798  047234  051117  041520     000
 5799  047241     123  030122  053440  DH51:   .ASCIZ  /SR0 WAS SR2 WAS TESTNO  ERRORPC/
 5800  047246  051501  051440  031122
 5801  047254  053440  051501  052040
 5802  047262  051505  047124  020117
 5803  047270  042440  051122  051117
 5804  047276  041520     000
 5805  047301     120  054510  044523  DH52:   .ASCII  /PHYSICL PAR 4/<CRLF>
 5806  047306  046103  050040  051101
 5807  047314  032040     200
 5808  047317     101  042104  042522          .ASCIZ  /ADDRESS V.B.A.  PAR 4   SR0 WAS SR2 WAS PSW     TESTNO  ERRORPC/
 5809  047324  051523  053040  041056
 5810  047332  040456  020056  050040
 5811  047340  051101  032040  020040
 5812  047346  051440  030122  053440
 5813  047354  051501  051440  031122
 5814  047362  053440  051501  050040
 5815  047370  053523  020040  020040
 5816  047376  052040  051505  047124
 5817  047404  020117  042440  051122
 5818  047412  051117  041520     000
 5819  047417     120  053523  053440  DH56:   .ASCIZ  /PSW WAS EXPECTD TESTNO  ERRORPC/
 5820  047424  051501  042440  050130
 5821  047432  041505  042124  052040
 5822  047440  051505  047124  020117
 5823  047446  042440  051122  051117
 5824  047454  041520     000
 5825
 5826          047460                          .EVEN
 5827
 5828  047460  001266  001270  001264  DT1:    .WORD   TRAPPC,TRAPPS,WASR6,TESTNO,$ERRPC,0
 5829  047466  001262  001116  000000
 5830  047474  001266  001270  001264  DT2:    .WORD   TRAPPC,TRAPPS,WASR6,WASSR0,WASSR2,TESTNO,$ERRPC,0
 5831  047502  001272  001274  001262
 5832  047510  001116  000000
 5833  047514  001162  001164  001262  DT3:    .WORD   $REG0,$REG1,TESTNO,$ERRPC,0
 5834  047522  001116  000000
 5835  047526  001162  001262  001116  DT7:    .WORD   $REG0,TESTNO,$ERRPC,0
 5836  047534  000000
 5837  047536  001300  001302  001304  DT10:   .WORD   ANDADR,ORADR,TONUM,TESTNO,$ERRPC,0
 5838  047544  001262  001116  000000
 5839  047552  001162  001164  001164  DT11:   .WORD   $REG0,$REG1,$REG1,TESTNO,$ERRPC,0
 5840  047560  001262  001116  000000
 5841  047566  001162  001164  001166  DT12:   .WORD   $REG0,$REG1,$REG2,$REG2,TESTNO,$ERRPC,0
 5842  047574  001166  001262  001116
 5843  047602  000000
 5844  047604  001162  001262  001116  DT13:   .WORD   $REG0,TESTNO,$ERRPC,0
 5845  047612  000000
 5846  047614  001162  001164  001174  DT16:   .WORD   $REG0,$REG1,$REG5,$REG2,TESTNO,$ERRPC,0
 5847  047622  001166  001262  001116
 5848  047630  000000
 5849  047632  001312  001306  001172  DT17:   .WORD   PBALO,VIRT1,$REG4,TESTNO,$ERRPC,0
 5850  047640  001262  001116  000000
```

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5851  047646  001312  001306  001310  DT20:   .WORD   PBALO,VIRT1,VIRT2,$REG4,$REG5,$TMP0,TESTNO,$ERRPC,0
5852  047654  001172  001174  001176
5853  047662  001262  001116  000000
5854  047670  001174  001170  001262  DT21:   .WORD   $REG5,$REG3,TESTNO,$ERRPC,0
5855  047676  001116  000000
5856  047702  001162  001174  001170  DT22:   .WORD   $REG0,$REG5,$REG3,TESTNO,$ERRPC,0
5857  047710  001262  001116  000000
5858  047716  001174  001262  001116  DT23:   .WORD   $REG5,TESTNO,$ERRPC,0
5859  047724  000000
5860  047726  001166  001164  001262  DT24:   .WORD   $REG2,$REG1,TESTNO,$ERRPC,0
5861  047734  001116  000000
5862  047740  001166  001176  001262  DT26:   .WORD   $REG2,$TMP0,TESTNO,$ERRPC,0
5863  047746  001116  000000
5864  047752  001272  001170  001166  DT30:   .WORD   WASSR0,$REG3,$REG2,$TMP0,TESTNO,$ERRPC,0
5865  047760  001176  001262  001116
5866  047766  000000
5867  047770  001274  001172  001166  DT31:   .WORD   WASSR2,$REG4,$REG2,$TMP0,TESTNO,$ERRPC,0
5868  047776  001176  001262  001116
5869  050004  000000
5870  050006  001162  001172  001272  DT32:   .WORD   $REG0,$REG4,WASSR0,WASSR2,TESTNO,$ERRPC,0
5871  050014  001274  001262  001116
5872  050022  000000
5873  050024  001162  001172  001262  DT33:   .WORD   $REG0,$REG4,TESTNO,$ERRPC,0
5874  050032  001116  000000
5875  050036  001162  001172  001272  DT34:   .WORD   $REG0,$REG4,WASSR0,$REG2,TESTNO,$ERRPC,0
5876  050044  001166  001262  001116
5877  050052  000000
5878  050054  001162  001172  001274  DT35:   .WORD   $REG0,$REG4,WASSR2,$REG3,TESTNO,$ERRPC,0
5879  050062  001170  001262  001116
5880  050070  000000
5881  050072  001274  001164  001262  DT36:   .WORD   WASSR2,$REG1,TESTNO,$ERRPC,0
5882  050100  001116  000000
5883  050104  001176  001202  001272  DT37:   .WORD   $TMP0,$TMP2,WASSR0,WASSR2,TESTNO,$ERRPC,0
5884  050112  001274  001262  001116
5885  050120  000000
5886  050122  001272  001274  001262  DT40:   .WORD   WASSR0,WASSR2,TESTNO,$ERRPC,0
5887  050130  001116  000000
5888  050134  001164  001166  001262  DT42:   .WORD   $REG1,$REG2,TESTNO,$ERRPC,0
5889  050142  001116  000000
5890  050146  001162  001164  001272  DT44:   .WORD   $REG0,$REG1,WASSR0,WASSR2,TESTNO,$ERRPC,0
5891  050154  001274  001262  001116
5892  050162  000000
5893  050164  001164  001170  001272  DT45:   .WORD   $REG1,$REG3,WASSR0,WASSR2,TESTNO,$ERRPC,0
5894  050172  001274  001262  001116
5895  050200  000000
5896  050202  001162  001164  001262  DT46:   .WORD   $REG0,$REG1,TESTNO,$ERRPC,0
5897  050210  001116  000000
5898  050214  001262  001116  000000  DT50:   .WORD   TESTNO,$ERRPC,0
5899  050222  001272  001274  001262  DT51:   .WORD   WASSR0,WASSR2,TESTNO,$ERRPC,0
5900  050230  001116  000000
5901  050234  001312  001306  001172  DT52:   .WORD   PBALO,VIRT1,$REG4,WASSR0,WASSR2,$TMP0,TESTNO,$ERRPC,0
5902  050242  001272  001274  001176
5903  050250  001262  001116  000000
5904  050256  001164  001166  001262  DT56:   .WORD   $REG1,$REG2,TESTNO,$ERRPC,0
5905  050264  001116  000000
5906
```

```
5907  050270  000  000  000  DF1:    .BYTE   0,0,0,0,0
5908  050273  000  000
5909  050275  000  000  000  DF2:    .BYTE   0,0,0,0,0,0,0
5910  050300  000  000  000
5911  050303  000
5912  050304  000  000  000  DF3:    .BYTE   0,0,0,0
5913  050307  000
5914  050310  000  000  000  DF7:    .BYTE   0,0,0
5915  050313  000  000  001  DF10:   .BYTE   0,0,1,0,0
5916  050316  000  000
5917  050320  000  000  002  DF11:   .BYTE   0,0,2,0,0
5918  050323  000  000
5919  050325  000  000  000  DF12:   .BYTF   0,0,0,2,0,0
5920  050330  002  000  000
5921  050333  000  000  000  DF13:   .BYTE   0,0,0
5922  050336  000  000  000  DF16:   .BYTE   0,0,0,0,0,0
5923  050341  000  000  000
5924  050344  003  000  000  DF17:   .BYTE   3,0,0,0,0
5925  050347  000  000
5926  050351  003  000  000  DF20:   .BYTE   3,0,0,0,0,0,0,0
5927  050354  000  000  000
5928  050357  000  000
5929  050361  000  000  000  DF21:   .BYTE   0,0,0,0
5930  050364  000
5931  050365  000  000  000  DF22:   .BYTE   0,0,0,0,0
5932  050370  000  000
5933  050372  000  000  000  DF23:   .BYTE   0,0,0
5934  050375  000  000  000  DF24:   .BYTE   0,0,0,0
5935  050400  000
5936  050401  000  000  000  DF30:   .BYTE   0,0,0,0,0,0
5937  050404  000  000  000
5938  050407  000  000  000  DF46:   .BYTE   0,0,0,0
5939  050412  000
5940  050413  000  000       DF50:   .BYTE   0,0
5941  050415  000  000  000  DF51:   .BYTE   0,0,0,0
5942  050420  000
5943  050421  003  000  000  DF52:   .BYTE   3,0,0,0,0,0,0,0
5944  050424  000  000  000
5945  050427  000  000
5946  050431  000  000  000  DF56:   .BYTE   0,0,0,0
5947  050434  000
5948
5949          000001                       .END
```

```
ABASE = 000000            857
ACDW1 = 000000            857
ACDW2 = 000000            857
ACPUOP= 000000            857     872
ADDW0 = 000000            857
ADDW1 = 000000            857
ADDW10= 000000            857
ADDW11= 000000            857
ADDW12= 000000            857
ADDW13= 000000            857
ADDW14= 000000            857
ADDW15= 000000            857
ADDW2 = 000000            857
ADDW3 = 000000            857
ADDW4 = 000000            857
ADDW5 = 000000            857
ADDW6 = 000000            857
ADDW7 = 000000            857
ADDW8 = 000000            857
ADDW9 = 000000            857
ADEVCT= 000000            857     863
ADEVM = 000000            857
AENV  = 000000            857     868
AENVM = 000000            857     869
AFATAL= 000000            857     860
AMADR1= 000000            857     885
AMADR2= 000000            857
AMADR3= 000000            857
AMADR4= 000000            857
AMAMS1= 000000            857     879
AMAMS2= 000000            857
AMAMS3= 000000            857
AMAMS4= 000000            857
AMSGAD= 000000            857     865
AMSGLG= 000000            857     866
AMSGTY= 000000            857     859
AMTYP1= 000000            857     880
AMTYP2= 000000            857
AMTYP3= 000000            857
AMTYP4= 000000            857
ANDADR  001300            897#    1516*   1540*   1558*   1580*   1598*   1620*   1638*   1660*   1678*   1700*   5837
APASS = 000000            857     862
APRIOR= 000000            857
APTCSU= 000040           4762    4884#
APTENV= 000001           4216    4755    4840    4882#
APTSIZ= 000200           1334    4881#
APTSPO= 000100           4757    4842    4883#
ASWREG= 000000            857     870
ATESTN= 000000            857     861
AUNIT = 000000            857     864
AUSWR = 000000            857     871
AVECT1= 000000            857
AVECT2= 000000            857
BIT0  = 000001            670#    2151    2178    2205    2233    2257    2300    2327    2354    2381    2453
BIT00 = 000001            660#    670
BIT01 = 000002            659#    669
```

```
BIT02 = 000004   658#  668
BIT03 = 000010   657#  667
BIT04 = 000020   656#  666
BIT05 = 000040   655#  665
BIT06 = 000100   654#  664
BIT07 = 000200   653#  663
BIT08 = 000400   652#  662  4144
BIT09 = 001000   651#  661  4152  4227
BIT1  = 000002   669#
BIT10 = 002000   650#  4204
BIT11 = 004000   649#  4159
BIT12 = 010000   648#  4099
BIT13 = 020000   647#  4211
BIT14 = 040000   646#  4130
BIT15 = 100000   645#  1736
BIT2  = 000004   668#
BIT3  = 000010   667#
BIT4  = 000020   666#  744  2204  2256  2299  2326  2353  2380  2452  4508
BIT5  = 000040   665#
BIT6  = 000100   664#  745
BIT7  = 000200   663#
BIT8  = 000400   662#
BIT9  = 001000   661#
BPTVEC= 000014   677#
CKSWR = 104410  4129  4193  4226  5177#
CMPREG  035426  2017  2025  2033  2041  4408#
CMSG    037031  4712  4723#
CNTRLC  036752  4558  4646  4710#
CR    = 000015   585#  4818  4828
CRLF  = 000200   586#  1360  4772  4828  5551  5563  5578  5600  5612  5622  5637  5725  5751
                5765  5767  5772  5777  5787  5805
DALTB1  027132  2901  2967#
DALTB2  027166  2916  2985#
DALTB3  027500  3014  3080#
DALTB4  027534  3029  3098#
DDISP = 177570   592#  824  1322
DF1     050270   924  5907#
DF10    050313   967  5915#
DF11    050320   974  1206  5917#
DF12    050325   981  1000  5919#
DF13    050333   987  993  5921#
DF16    050336  1007  5922#
DF17    050344  1014  5924#
DF2     050275   930  5909#
DF20    050351  1021  5926#
DF21    050361  1028  5929#
DF22    050365  1035  5931#
DF23    050372  1041  1137  5933#
DF24    050375  1047  1053  1059  1065  1089  1106  1119  1125  1131  5934#
DF3     050304   936  942  948  954  5912#
DF30    050401  1071  1077  1083  1095  1100  1113  1144  1154  5936#
DF46    050407  1161  1168  1193  5938#
DF50    050413  1174  1199  5940#
DF51    050415  1180  5941#
DF52    050421  1187  5943#
DF56    050431  1212  5946#
```

```
DF7     050310   960  5914#
DH1     044253   922  5523#
DH10    044503   964  5551#
DH11    044603   971  1203  5563#
DH12    044723   978   997  5578#
DH13    045063   985   991  5595#
DH16    045113  1004  5600#
DH17    045213  1011  5612#
DH2     044323   928  5530#
DH20    045303  1018  5622#
DH21    045431  1025  5637#
DH22    045511  1032  5646#
DH23    045610  1039  1135  5657#
DH24    045640  1045  1051  5661#
DH26    045700  1057  1063  5667#
DH3     044413   934   940   946   952  5540#
DH30    045740  1069  5673#
DH31    046020  1075  5681#
DH32    046100  1081  5689#
DH33    046160  1087  5697#
DH34    046220  1093  5703#
DH35    046300  1098  5711#
DH36    046360  1104  1123  5719#
DH37    046420  1110  5725#
DH40    046535  1117  5739#
DH42    046575  1129  5745#
DH44    046635  1141  5751#
DH45    046747  1148  5765#
DH46    047144  1158  1165  1190  5787#
DH50    047221  1172  1197  5796#
DH51    047241  1178  5799#
DH52    047301  1184  5805#
DH56    047417  1210  5819#
DH7     044453   958  5546#
DISPLA  001142   824#  1322*  1330*  4174*  4203*
DISPRE  000174   760#  1330
DOAGIN  034176  4079  4090#
DSWR  = 177570   591#   823  1321
DT1     047460   923  5828#
DT10    047536   966  5837#
DT11    047552   973  1205  5839#
DT12    047566   980   999  5841#
DT13    047604   986   992  5844#
DT16    047614  1006  5846#
DT17    047632  1013  5849#
DT2     047474   929  5830#
DT20    047646  1020  5851#
DT21    047670  1027  5854#
DT22    047702  1034  5856#
DT23    047716  1040  1136  5858#
DT24    047726  1046  1052  5860#
DT26    047740  1058  1064  5862#
DT3     047514   935   941   947   953  5833#
DT30    047752  1070  5864#
DT31    047770  1076  5867#
DT32    050006  1082  5870#
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DT33	050024	1088	5873#			
DT34	050036	1094	5875#			
DT35	050054	1099	5878#			
DT36	050072	1105	1124	5881#		
DT37	050104	1112	5883#			
DT40	050122	1118	5886#			
DT42	050134	1130	5888#			
DT44	050146	1143	5890#			
DT45	050164	1153	5893#			
DT46	050202	1160	1167	1192	5896#	
DT50	050214	1173	1198	5898#		
DT51	050222	1179	5899#			
DT52	050234	1186	5901#			
DT56	050256	1211	5904#			
DT7	047526	959	5835#			
EMTVEC=	000030	680#	1291*	1292*		
EM1	041162	921	5236#			
EM10	041541	963	5281#			
EM11	041605	970	5288#			
EM12	041645	977	5294#			
EM13	041714	984	5301#			
EM14	041751	990	5306#			
EM15	042004	996	5311#			
EM16	042060	1003	5319#			
EM17	042122	1010	5325#			
EM2	041222	927	5242#			
EM20	042160	1017	5330#			
EM21	042232	1024	5337#			
EM22	042267	1031	5342#			
EM23	042326	1038	5348#			
EM24	042372	1044	5354#			
EM25	042432	1050	5360#			
EM26	042475	1056	5366#			
EM27	042545	1062	5373#			
EM3	041271	933	5249#			
EM30	042614	1068	5380#			
EM31	042666	1074	1097	1103	5387#	
EM32	042733	1080	5394#			
EM33	043014	1086	5403#			
EM34	043077	1092	5412#			
EM37	043155	1109	5420#			
EM4	041330	939	5255#			
EM40	043222	1116	5427#			
EM41	043271	1122	5434#			
EM42	043324	1128	5439#			
EM43	043363	1134	5445#			
EM44	043432	1140	5452#			
EM45	043476	1147	5458#			
EM46	043551	1157	5466#			
EM47	043614	1164	5472#			
EM5	041363	945	5260#			
EM50	043657	1171	5478#			
EM51	043715	1177	5484#			
EM52	043773	1183	5492#			
EM53	044051	1189	5500#			
EM54	044114	1196	5506#			

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EM55    044152          1202  5511#
EM56    044210          1209  5516#
EM6     041436           951  5268#
EM7     041503           957  5275#
ERRTYP  035022          4213  4259#
ERRVEC= 000004           673# 1319  1320* 1331* 1364* 1365* 2694* 2707* 4135  4136* 4138* 4141*
FORMPA  035620          2160  2187  2214  2242  2266  2309  2336  2363  2390  2467  2520  4485#
GNS   = ****** U         759  1359  5168  5169  5170  5171  5172  5173  5175  5177  5178  5179  5180
                        5181
GTSWR = 104407          1354  4719  5175#
HT    = 000011           583# 4770  4828
IOTVEC= 000020           678# 1289* 1290*
KERSTK= 001100           746# 1473  1477  1479  2015  2023  2031  2039  2696  2906  2928  3019  3041
                        3143  3205  3210  3273  3292  3351  3411  3505  3837  3969
KIPAR0= 172340           733# 1556  1829  1919  2022  2076  2130  3469* 4385  4423  4488
KIPAR1= 172342           734# 3470*
KIPAR2= 172344           735# 3471*
KIPAR3= 172346           736# 2554  2735* 3130* 3472*
KIPAR4= 172350           737# 2148* 2175* 2202* 2230* 2255* 2297* 2324* 2351* 2378* 2436* 2487* 2497*
                        2506* 2736* 3131* 3473* 3493* 3645* 3823*
KIPAR5= 172352           738# 2437* 2488* 2498* 2507* 3180*
KIPAR6= 172354           739# 2706*
KIPAR7= 172356           740# 3474*
KIPDR0= 172300           722# 1596  1873  1963  2013  2065  2137  2558  2562  2576  3478  4381  4409
KIPDR1= 172302           723#
KIPDR2= 172304           724#
KIPDR3= 172306           725# 2739* 2899* 3132*
KIPDR4= 172310           726# 2485* 2499* 2503* 2746* 2813* 2909* 2921* 3022* 3034* 3133* 3160* 3181*
                        3251* 3492* 3498* 3643* 3669* 3671* 3686* 3688* 3701* 3703* 3717* 3719* 3735*
                        3737* 3752* 3754* 3771* 3773* 3822*
KIPDR5= 172312           727# 2486* 2500* 2504* 2900* 3182* 3252*
KIPDR6= 172314           728# 2693* 2697  2705*
KIPDR7= 172316           729# 2682* 2685  3342* 3371*
LF    = 000012           584# 4822  4828
LOOP    020464          1363#
MGMERR  002150          1254# 1366  2510  2793  2854  2962  3075  3161  3253  3370  3444  3611  3782
                        3938
MGMFLG  002152          1255# 1270* 1370*
MMVEC = 000250           689# 1366* 1367* 2451* 2510* 2745* 2793* 2812* 2854* 2904* 2919* 2962* 3017*
                        3032* 3075* 3136* 3161* 3202* 3208* 3253* 3497* 3611* 3647* 3782* 3830* 3938*
OKADR   001302           898# 1517* 1538* 1559* 1578* 1599* 1618* 1639* 1658* 1679* 1698* 5837
PBAHI   001314           903# 4507* 4510*
PBALO   001312           902# 4498* 4499* 4504* 5849  5851  5901
PDRTB1  027150          2902  2976#
PDRTB2  027202          2917  2993#
PDRTB3  027516          3015  3089#
PDRTB4  027550          3030  3106#
PIRQ  = 177772           590#
PIRQVE= 000240           684#
PR0   = 000000           607#
PR1   = 000040           608#
PR2   = 000100           609#
PR3   = 000140           610#
PR4   = 000200           611#
PR5   = 000240           612#
PR6   = 000300           613#
```

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PR7     = 000340   614#
PS      = 177776   587#  588
PSW     = 177776   588#  1409*  1410*  1411   1415*  1423*  1434*  1436*  1437   1442*  1448*  1450*  1451
                   1455*  1472*  1474*  1476*  1773*  1783*  2226   2251   2433*  2458   2479   2489*  2491*
                   2551*  2617*  2665*  2750   2783*  2789*  2791*  2817   2850*  2852*  3272*  3277*  3284
                   3286*  3291*  3294*  3296*  3312*  3316   3318*  3401*  3410*  3412*  3414*  3502*  3523*
                   3535*  3547*  3558*  3572*  3586*  3599*  3650*  3661*  3682*  3698*  3713*  3730*  3748*
                   3765*  3821*  3832*  3851*  3864*  3876*  3887*  3900*  3914*  3927*  3939*  3966*  4009*
                   4343   4345   4489
PWRMSG  041120     5217   5226#
PWRVEC= 000024     679#   1295*  1296*  5186*  5187*  5196*  5202*  5214*  5215*
RDCHR   104411     4639   5178#
RDLIN   104412     5179#
RESREG= 104414     5124   5181#
RESTRT  020464     1362#  4110   5219
RESVEC= 000010     674#   1306*  1313*
SAVREG= 104413     5109   5180#
SETREG  035334     2014   2063   4380#
SR0     = 177572   693#   1266   1268*  1372*  1514   1717   1774*  1776   1782*  2151*  2153*  2178*  2180*
                   2205*  2207*  2233*  2235*  2257*  2259*  2300*  2302*  2327*  2329*  2354*  2356*  2381*
                   2383*  2453*  2521   2523*  2683   2684*  2764   2779*  2831   2846*  2929   2945*  2950
                   2952*  3042   3058*  3063   3065*  3151*  3206   3211   3227   3241*  3352   3368*  3407
                   3409*  3618   3620*  3788   3790*  3946   3948*
SR1     = 177574   694#   1795
SR2     = 177576   695#   1267   1727   1748   2522   2765   2832   2930   2951   3043   3064   3144   3184
                   3193   3207   3212   3231   3242   3353   3408   3619   3789   3947
SR3     = 172516   696#   1801*  1802   1809*  1812   2150*  2177*  2204*  2232*  2256*  2299*  2326*  2353*
                   2380*  2452*  4508
STACK   = 001100   578#   746    747    1287   1363   4010   4029
START   = 020000   763    1280#
STKLMT= 177774     589#
SWR     = 001140   823#   1285   1321*  1323   1329*  1336*  1352   4099   4130   4144   4146   4152   4159
                   4204   4211   4223   4227   4527   4572*  5194   5207*
SWREG   = 000176   761#   1329   1352   4527   4540
SW0     = 000001   642#
SW00    = 000001   632#   642
SW01    = 000002   631#   641
SW02    = 000004   630#   640
SW03    = 000010   629#   639
SW04    = 000020   628#   638
SW05    = 000040   627#   637
SW06    = 000100   626#   636
SW07    = 000200   625#   635
SW08    = 000400   624#   634
SW09    = 001000   623#   633
SW1     = 000002   641#
SW10    = 002000   622#
SW11    = 004000   621#
SW12    = 010000   620#
SW13    = 020000   619#
SW14    = 040000   618#
SW15    = 100000   617#
SW2     = 000004   640#
SW3     = 000010   639#
SW4     = 000020   638#
SW5     = 000040   637#
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SW6     = 000100            636#
SW7     = 000200            635#
SW8     = 000400            634#
SW9     = 001000            633#
TBIT    = 000020            744#  4343   4348   4361
TBITPS  001276              896#  1371*  4346*  4361   4363   4364*
TBITVE= 000014              675#  1303*  1304*
TESTNO  001262              890#  4200*  5828   5830   5833   5835   5837   5839   5841   5844   5846   5849   5851
                           5854   5856   5858   5860   5862   5864   5867   5870   5873   5875   5878   5881   5883
                           5886   5888   5890   5893   5896   5898   5899   5901   5904
TIMERR  002076             1226#  1364   1529   1569   1609   1649   1689   2707   3297   3369   3442
TIMFLG  002100             1227#  1239*  1369*
TKVEC   = 000060            682#
TOFF    035246             2552   2618   2679   3270   3391   4343#
TON     035302             2598   2664   2709   3299   3447   4361#
TONUM   001304              899#  1518*  1526   1541*  1560*  1566   1581*  1600*  1606   1621*  1640*  1646   1661*
                           1680*  1686   1701*  5837
TPVEC   = 000064            683#
TRAPPC  001266              892#  1235*  1241   1263*  1272   2514*  2530   2948*  2958   3061*  3071   3616*  3626
                           3786*  3796   3944*  3954   5828   5830
TRAPPS  001270              893#  1236*  1240   1264*  1271   2515*  2529   2949*  2957   3062*  3070   3617*  3625
                           3787*  3795   3945*  3953   5828   5830
TRAPVE= 000034              681#  1293*  1294*
TRTVEC= 000014              676#
TST1    020546             1383#
TST10   021516             1610   1632#
TST11   021650             1650   1672#
TST12   022002             1690   1715#
TST13   022144             1771#
TST14   022202             1793#
TST15   022274             1814   1827#
TST16   022412             1871#
TST17   022534             1917#
TST2    020620             1406#
TST20   022664             1961#
TST21   023014             2009#
TST22   023220             2056#
TST23   023404             2128#
TST24   024176             2288#
TST25   024626             2431#
TST26   025352             2512   2550#
TST27   025554             2616#
TST3    020704             1432#
TST30   025762             2677#
TST31   026130             2732#
TST32   026424             2805#
TST33   026634             2898#
TST34   027216             2964   3013#
TST35   027564             3077   3129#
TST36   027756             3179#
TST37   030360             3269#
TST4    021026             1471#
TST40   030546             3308#
TST41   030630             3340#
TST42   031000             3390#
TST43   031322             3468#
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TST44   032170          3613    3642#
TST45   033050          3783    3813#
TST46   033614          3941    3965#
TST47   033720          4008#
TST5    021074          1478    1510#
TST6    021232          1530    1552#
TST7    021364          1570    1592#
TYPBN = 104406          4308    5173#
TYPDS = 104405          4062    4076    4301    4718    5172#
TYPE  = 104401          1346    4053    4063    4077    4206    4214    4260    4277    4279    4282    4284    4316    4321
                        4327    4538    4539    4542    4553    4563    4574    4593    4643    4652    4658    4663    4667
                        4672    4673    4675    4678    4682    4712    4716    4775    4901    4969    5044    5168#   5216
TYPOC = 104402          4268    4294    4541    4715    5169#
TYPON = 104404          5171#
TYPOS = 104403          5170#
UIPAR0= 177640           711#   1636    1858    1949    2038    2099    2438    3274*   3293*   3485*   4393    4451    4491
UIPAR1= 177642           712#   3486*
UIPAR2= 177644           713#   3487*
UIPAR3= 177646           714#   2620    2737*   3392*   3488*
UIPAR4= 177650           715#   2456*   2481*   2508*   2738*   3393*   3494*   3646*   3824*
UIPAR5= 177652           716#   2457*   2482*   2509*
UIPAR6= 177654           717#
UIPAR7= 177656           718#   1856    1947    3489*
UIPDR0= 177600           700#   1676    1903    1993    2030    2087    2445    2624    2628    2642    3482    3817    4389
                        4437
UIPDR1= 177602           701#
UIPDR2= 177604           702#
UIPDR3= 177606           703#   2740*   3394*   3445*
UIPDR4= 177610           704#   2454*   2483*   2747*   2814*   3395*   3644*   3831*
UIPDR5= 177612           705#   2455*   2484*
UIPDR6= 177614           706#
UIPDR7= 177616           707#   1901    1991
USESTK= 000700           747#   1475    3278    3295    3413    3508    3662    3834    3972    3995
VIRT1   001306           900#   2159*   2186*   2213*   2241*   2265*   2308*   2335*   2362*   2389*   2466*   2474    2519*
                        4492    4498    5849    5851    5901
VIRT2   001310           901#   2465*   5851
WASR6   001264           891#   1237*   1265*   5828    5830
WASSR0  001272           894#   1266*   2521*   2764*   2766    2831*   2833    2929*   2932    2950*   3042*   3045    3063*
                        3211*   3213    3227*   3228    3352*   3355    3407*   3426    3618*   3788*   3946*   5830    5864
                        5870    5875    5883    5886    5890    5893    5899    5901
WASSR2  001274           895#   1267*   1727*   1729    1748*   1749    2522*   2765*   2773    2832*   2840    2930*   2939
                        2951*   3043*   3052    3064*   3144*   3145    3184*   3186    3193*   3195    3212*   3216    3231*
                        3232    3242*   3244    3353*   3362    3408*   3429    3619*   3789*   3947*   5830    5867    5870
                        5878    5881    5883    5886    5890    5893    5899    5901
WBIT  = 000100           745#   2568    2577    2588    2634    2643    2654
$APTHD  000204           783     789#
$ASTAT= ****** U        4862    4877
$ATYC   037462          4833    4835#
$ATY1   037436          4831#
$ATY3   037444          4760    4832#
$ATY4   037454          4219    4834#
$AUTOB  001134           820#   1356*   4535    4699
$BDADR  001122           815#
$BDDAT  001126           817#
$BELL   001216           849#   4206    4239
$BIN    037756          4897*   4900*   4901    4908#
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$CHARC  037432          4777* 4787* 4794  4820* 4825#
$CKSWR  035760          4527# 5177
$CLR.T  034164          4081  4084#
$CMTAG  001100           803# 1282  1283  1291  1297  1298  1299
$CM1  = 000006           835#  836#  837#  838#  839#  840#  841#
$CM2  = 000014           835#  836#  837#  838#  839#  840#  841#
$CM3  = 000006           833#  835
$CM4  = 000006           841#  842#  843#  844#  845#  846#  847#
$CNTLC  036710          4553  4643  4692#
$CNTLG  036722          4538  4694#
$CNTLU  036715          4563  4667  4693#
$CPUOP  001254           872#
$CRLF   001223           851#  4077  4214  4239  4260  4279  4284  4327  4574  4672  4692  4776  4828
$DBLK   040422          5010  5044  5052#
$DB20   040526          4313  5109#
$DEVCT  001236           863#
$DOAGN  034234          4049  4096#
$DTBL   040412          5013  5048#
$ENDAD  034166           770  1344  4085#  4234
$ENDCT  034016          1297  4051#
$ENULL  034300          4112#
$ENV    001246           868#  1350  1805  2059  4216  4755  4840  4864
$ENVM   001247           869#  1334  4757  4762  4842
$EOP    033762          4041#  4720
$EOPCT  034010          1297*  4048#  4052
$ERFLG  001103           806#  4119  4148  4150  4156*  4178  4201*  4239
$ERMAX  001115           812#  1300*  4150  4173*  4178
$ERROR  034564          1291  4192#
$ERRPC  001116           813#  4208*  4209*  4210  4239  4266  5828  5830  5833  5835  5837  5839  5841
                        5844  5846  5849  5851  5854  5856  5858  5860  5862  5864  5867  5870  5873
                        5875  5878  5881  5883  5886  5888  5890  5893  5896  5898  5899  5901  5904
$ERRTB  001316           918#  4274
$ERTTL  001112           810#  1339*  4074  4207*  4239
$ESCAP  001214           848#  1299*  4172*  4230  4232  4239
$ETABL  001246           867#
$ETEND  001262           795   887#
$FATAL  001230           860#  4868*
$FFLG   037702          4831*  4834*  4862  4871*  4879#
$FILLC  001156           831#  4780  4828
$FILLS  001155           830#  4828
$GDADR  001120           814#
$GDDAT  001124           816#
$GET42  034146          4078#
$GTSWR  036030          4539#  5175
$HD   = 000000           563
$HIBTS  000204           790#
$ICNT   001104           807#  4163*  4164  4166*  4177
$ILLUP  041112          5186  5202  5223#
$INTAG  001135           821#  4555  4575  4699
$ITEMB  001114           811#  4210*  4218  4239  4263
$LF     001224           852#  4239  4682  4692  4828
$LFLG   037701          4872*  4878#
$LOOP   034272          4104  4108#
$LPADR  001106           808#  1315*  4154*  4170*  4175  4177
$LPERR  001110           809#  1316*  1384*  1399*  1407*  1422*  1433*  1447*  1460*  1512*  1525*  1554*  1565*
                        1594*  1605*  1634*  1645*  1674*  1685*  1726*  1735*  1759*  1831*  1840*  1860*  1875*
```

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                    1884* 1905* 1920* 1933* 1951* 1964* 1977* 1995* 2011* 2020* 2028* 2036* 2044*
                    2143* 2170* 2197* 2225* 2250* 2274* 2292* 2319* 2346* 2373* 2400* 2450* 2511*
                    2561* 2597* 2627* 2663* 2681* 2692* 2708* 2748* 2792* 2815* 2853* 2905* 2918*
                    2961* 3018* 3031* 3074* 3137* 3159* 3183* 3192* 3201* 3250* 3271* 3298* 3310*
                    3325* 3345* 3372* 3400* 3446* 3490* 3501* 3521* 3534* 3546* 3557* 3571* 3585*
                    3598* 3612* 3665* 3681* 3697* 3712* 3729* 3747* 3764* 3781* 3820* 3850* 3863*
                    3875* 3886* 3899* 3913* 3926* 3940* 3984* 3997* 4154  4171* 4177  4229
$MADR1  001260       885# 2493
$MAIL   001226       791   795  858# 1333 1350 4169 4216 4755
$MAMS1  001256       879#
$MBADR  000206       791#
$MFLG   037700      4832* 4838 4873* 4877#
$MNEW   036740      4542  4697#
$MSGAD  001242       865# 4848* 4851
$MSGLG  001244       866# 4853*
$MSGTY  001226       859# 1229* 1257* 4846 4854* 4866 4870*
$MSWR   036727      4539  4695#
$MTYP1  001257       880#
$MXCNT  034562      4167  4177#
$NULL   C01154       829# 4782 4828
$NWTST= 000001      1376# 1378 1401# 1403 1425# 1427 1462# 1464 1500# 1502 1544# 1546 1584#
                    1586  1624# 1626  1664# 1666 1704# 1706 1761# 1763 1785# 1787 1819# 1821
                    1862# 1864  1909# 1911  1953# 1955 1997# 1999 2046# 2048 2111# 2113 2276#
                    2278  2402# 2404  2534# 2536 2600# 2602 2667# 2669 2723# 2725 2796# 2798
                    2886# 2888  3001# 3003  3115# 3117 3165# 3167 3257# 3259 3301# 3303 3328#
                    3330  3375# 3377  3456# 3458 3630# 3632 3801# 3803 3957# 3959 3999# 4001
$OCNT   040202      4941* 4970* 4983#
$OCTVL  040630      5111  5136#
$OMODE  040204      4936* 4940* 4945  4948* 4959* 4985#
$OVER   034546      4131  4147  4155  4165  4174#
$PASS   001234       862# 1333* 1807  2061  4045* 4046* 4060 4161 4178 4710
$PASTM  000212       793#
$PWRAD  041074      5219#
$PWRDN  040734      1295  5186# 5214
$PWRMG  041070      5217#
$PWRUP  041006      5196  5202#
$QUES   001222       850# 4239  4593  4675  4692  4828
$RDCHR  036302      4606# 5178
$RDDEC= ****** U    5180
$RDLIN  036422      4634# 5179
$RDOCT= ****** U    5180
$RDSZ = 000010      4627#
$REGAD  001160       833#
$REG0   001162       835# 4194* 5833 5835 5839 5841 5844 5846 5856 5870 5873 5875 5878
                    5890  5896
$REG1   001164       836# 4195* 5833 5839 5841 5846 5860 5881 5888 5890 5893 5896 5904
$REG2   001166       837# 4196* 5841 5846 5860 5862 5864 5867 5875 5888 5904
$REG3   001170       838# 4197* 5854 5856 5864 5878 5893
$REG4   001172       839# 4198* 5849 5851 5867 5870 5873 5875 5878 5901
$REG5   001174       840# 4199* 5846 5851 5854 5856 5858
$RESRE  040470      5086# 5181
$RTNAD  034274      4110#
$RTRN   034270      1303  1305* 1310* 4082  4105#
$R2A  = ****** U    5182
$SAVRE  040432      5070# 5180
$SAVR6  041116      5195* 5203  5204* 5205* 5225#
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$SCOPE  034304  1289  4128#
$SETUP= 000137   753#  1288  1289  1291  1293  1295  1297  1298  1299  1301  1315  1344  1347
                4129  4193  4226  4234  4522  4699  5221
$STUP = 177777   753#
$SVLAD  034512  4139  4168#
$SVPC = 000204   768#   773
$SWR  = 177400   553#   563   567   568   569   570   571   572   573   574   847   848   849
                1298  1299  1301  1315  1316  1384  1407  1433  1472  1511  1553  1593  1633
                1673  1716  1772  1794  1828  1872  1918  1962  2010  2057  2129  2289  2432
                2551  2617  2678  2733  2306  2899  3014  3130  3180  3270  3309  3341  3391
                3469  3643  3814  3966  4009  4120  4121  4122  4123  4124  4130  4142  4144
                4145  4148  4149  4150  4157  4158  4159  4171  4174  4177  4184  4185  4186
                4187  4188  4204  4211  4223  4227  4239  5220
$SWREG  001250   870#  1336
$SWRMK= 000000   574   575  4124  4125  4146
$TBIT   034276  1314*  4101*  4111#  5221*
$TESTN  001232   861#  4169*
$TIMES  001212   847#  1298*  4044*  4157*  4164  4167*  4177
$TKB    001146   826#  4520  4531  4548  4610  4616  4801  4808  4828
$TK     001144   825#  4520  4529  4545  4557*  4577*  4608  4614  4799  4806  4828
$TMP0   001176   841#  2149*  2155  2176*  2182  2203*  2209  2298*  2304  2325*  2331  2352*  2358
                2379*  2385  2458*  2750*  2780  2817*  2847  3206*  3213  3415*  3421*  3425*  3428*
                3432*  3433  4090*  4095  5851  5862  5864  5867  5883  5901
$TMP1   001200   842#  3203*  3215*  3218*  3219  3225*  3230*  3234*  3235
$TMP2   001202   843#  3207*  3216  3573*  3574  3600*  3601  3732  3733*  3767*  3769  3901*  3902
                3928*  3929  5883
$TMP3   001204   844#
$TMP4   001206   845#
$TMP5   001210   846#  4710*  4711*  4717
$TN   = 000050   553#   563  1376  1384#  1401  1407#  1425  1433#  1462  1472#  1478  1500  1511#
                1530  1544  1553#  1570  1584  1593#  1610  1624  1633#  1650  1664  1673#  1690
                1704  1716#  1761  1772#  1785  1794#  1814  1819  1828#  1862  1872#  1909  1918#
                1953  1962#  1997  2010#  2046  2057#  2111  2129#  227o  2289#  2402  2432#  2512
                2534  2551#  2600  2617#  2667  2678#  2723  2733#  2796  2806#  2886  2899#  3001
                3014#  3115  3130#  3165  3180#  3257  3270#  3301  3309#  3328  3341#  3375  3391#
                3456  3469#  3613  3630  3643#  3783  3801  3814#  3941  3957  3966#  3999  4009#
$TPB    001152   828#  4817*  4828
$TPFLG  001157   832#  4749  4828
$TPS    001150   827#  4815  4828
$TRAP   040646  1293  5145#
$TRAP2  040670  5156#  5167
$TRP  = 000015  5160#  5169#  5170#  5171#  5172#  5173#  5174#  5175  5176#  5177  5178#  5179#  5180#
                5181#  5182#
$TRPAD  040702  5150  5167#
$TSTM   000210   792#
$TSTNM  001102   805#  4043*  4119  4146  4168*  4169  4174  4178  4200  4203  4239  4713
$TTYIN  036700  4636  4637  4655  4673  4687  4691#
$TYPBN  037704  4894#  5173
$TYPDS  040206  4998#  5172
$TYPE   037102  4749#  4859  5160  5168
$TYPEC  037314  4579  4779  4786  4793  4798#
$TYPEX  037434  4821  4823  4826#
$TYPOC  040004  4939#  5169
$TYPON  040020  4938  4941#  5171
$TYPOS  037760  4934#  5170
$UNIT   001240   864#
```

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$UNITM  000214            794#
$USWR   001252            871#
$XOFF = 000023           4803    4828
$XON  = 000021           4810    4828
$XTSTR  034316           4133#
$OFILL  040203           4935*   4939*   4949    4984#
$40CAT= ****** U         4130    4213
.     = 050435            755#    759#    768     769#    771#    773#    779     780#    782#    784#    802#    853     1278#
                         1286    1315    1316    1360#   4058#   4072#   4113#   4177    4178    4239    4330#   4520    4691#
                         4692    4699#   4828    4880#   5052#   5136#   5198    5224    5232#   5826#
.$ASTA= ****** U         4832    4835
.$X   = 000204            779#    784
```

```
ADDTST    752#  2143  2170  2197  2292  2319  2346  2373
COMMEN    685#
ENDCOM    685#
ERROR     579#  1238  1269  1392  1416  1443  1456  1481  1528  1533  1568  1573  1608  1613  1648
         1653  1688  1693  1722  1731  1743  1752  1778  1797  1804  1815  1835  1847  1879  1892
         1929  1941  1973  1985  2070  2081  2092  2104  2161  2188  2215  2243  2267  2310  2337
         2364  2391  2468  2524  2570  2581  2590  2636  2647  2656  2688  2701  2752  2760  2768
         2775  2819  2827  2835  2842  2923  2934  2941  2953  3036  3047  3054  3066  3147  3188
         3197  3221  3237  3246  3287  3321  3347  3357  3364  3435  3511  3516  3529  3541  3552
         3564  3579  3592  3607  3621  3657  3675  3692  3707  3723  3741  3758  3777  3791  3840
         3845  3858  3870  3881  3893  3907  3920  3934  3949  3975  3980  3991  4018  4025  4417
         4431  4445  4459
ESCAPE    685#
GETPRI    685#
GETSWR    685#  1347#
MSG1     1376#  1378
MSG10    1624#  1626
MSG11    1664#  1666
MSG12    1704#  1706
MSG13    1761#  1763
MSG14    1785#  1787
MSG15    1817#  1821
MSG16    1862#  1864
MSG17    1909#  1911
MSG2     1401#  1403
MSG20    1953#  1955
MSG21    1997#  1999
MSG21A   2046#  2048
MSG22    2111#  2113
MSG23    2276#  2278
MSG24    2402#  2404
MSG25    2534#  2536
MSG26    2600#  2602
MSG27    2667#  2669
MSG3     1425#  1427
MSG30    2723#  2725
MSG31    2796#  2798
MSG32    2885#  2888
MSG33    3000#  3003
MSG34    3114#  3117
MSG35    3164#  3167
MSG36    3256#  3259
MSG36A   3301#  3303
MSG37    3327#  3330
MSG4     1462#  1464
MSG40    3374#  3377
MSG41    3456#  3458
MSG42    3630#  3632
MSG43    3801#  3803
MSG44    3957#  3959
MSG45    3999#  4001
MSG5     1499#  1502
MSG6     1544#  1546
MSG7     1584#  1586
MULT      685#
NEWTST    685#  1376  1401  1425  1462  1500  1544  1584  1624  1664  1704  1761  1785  1819  1862
```

```
        1909  1953  1997  2046  2111  2276  2402  2534  2600  2667  2723  2796  2886  3001  3115
        3165  3257  3301  3328  3375  3456  3630  3801  3957  3999
POP      553#  685#  4511  4874  4875  5039  5091  5207  5208
PUSH     553#  685#  4485  4835  4837  4858  4998  5071  5188  5194
REPORT   685#
SAVR     752#  4194
SCOPE    580#  1383  1406  1432  1471  1510  1552  1592  1632  1672  1715  1771  1793  1827  1871
        1917  1961  2009  2056  2128  2288  2431  2550  2616  2677  2732  2805  2898  3013  3129
        3179  3269  3308  3340  3390  3468  3642  3813  3965  4008  4042
SETPRI   685#
SETTRA  5160#  5169  5170  5171  5172  5173  5175  5177  5178  5179  5180  5181
SETUP    685#  1280
SKIP     685#  1478  1530  1570  1610  1650  1690  1813  2512  3613  3783  3941
SLASH    685#
SPACE    685#
STARS    685#   766   776   778   785   798   853   856  1218  1225  1246  1253  1376  1382  1401
        1405  1425  1431  1462  1470  1486  1497  1500  1509  1544  1551  1584  1591  1624  1631
        1664  1671  1704  1714  1761  1770  1785  1792  1819  1826  1862  1870  1909  1916  1953
        1960  1997  2008  2046  2055  2111  2127  2276  2287  2402  2430  2534  2549  2600  2615
        2667  2676  2711  2721  2723  2731  2796  2804  2867  2882  2886  2897  3001  3012  3115
        3128  3165  3178  3257  3268  3301  3307  3328  3339  3375  3389  3448  3453  3456  3467
        3630  3641  3801  3812  3957  3964  3999  4007  4116  4180  4241  4335  4342  4354  4360
        4370  4378  4399  4407  4468  4483  4519  4522  4598  4627  4734  4830  4887  4911  4988
        5055  5100  5139  5184  5200
SWRSU    685#  1317#
TIMMSG   752#  1546  1586  1626  1666
TIMTST   752#  1553  1593  1633  1673
TRMTRP  5160#
TYPBIN   685#  4307
TYPDEC   685#  4300  4717
TYPNAM   685#  1340
TYPNUM   685#
TYPOCS   685#
TYPOCT   685#  4266  4293  4540  4714
TYPTXT   685#
USER     752#   889
WMSG     752#  2536  2602
WTST     752#  2552  2618
$$CMRE   796#   835   836   837   838   839   840
$$CMTM   796#   841   842   843   844   845   846
$$ESCA   685#
$$NEWT   685#  1376  1401  1425  1462  1500  1544  1584  1624  1664  1704  1761  1785  1819  1862
        1909  1953  1997  2046  2111  2276  2402  2534  2600  2667  2723  2796  2886  3001  3115
        3165  3257  3301  3328  3375  3456  3630  3801  3957  3999
$$SET   5160#  5169  5170  5171  5172  5173  5175  5177  5178  5179  5180  5181
$$SETM  1333#
$$SETU  1301#
$$SKIP   685#  1478  1530  1570  1610  1650  1690  1814  2512  3613  3783  3941
.EQUAT   553#   575
.HEADE   553#   554
.KT11    553#   685
.SETUP   553#   753
.SWRHI   553#   563
.SWRLO   575#
.$ACT1   553#   764
.$APTB   553#   854#
```

```
.$APTH     553#    774
.$APTY     553#   4828
.$CATC     553#    753
.$CMTA     553#    796
.$DB20     553#   5098
.$EOP      553#
.$ERRO     553#   4178
.$ERRT     553#
.$POWE     553#   5182
.$READ     553#   4517
.$SAVE     553#   5053
.$SCOP     553#   4114
.$TRAP     553#   5137
.$TYPB     553#   4885
.$TYPD     553#   4986
.$TYPE     553#   4732
.$TYPO     553#   4909


. ABS.  C50435     000


 ERRORS DETECTED:  0

 DSK2:CJKDAD,DSK2:CJKDAD/CRF/SOL/NL:TOC-CJKDAD.P11
 RUN-TIME: 95 56 4 SECONDS
 RUN-TIME RATIO: 239/156=1.5
 CORE USED:  32K  (63 PAGES)
```