PDP11

UNIBUS EXERCISER MODULE

MD-11-DZKUB-A

EP-DZKUB-A-DL-A

FICHE 1 OF 1

NOV 1976

digital

MADE IN USA

```
$PEEP890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012LPT
DSTART* User DAVIES, TOM [4302,224] Job DISKJBA Seq. 3435 Date 13-Oct-76 15:25:17 Monitor IPC-D 507B [1A3] *START*
D   D   A   A  V   V   I   E      S          T    O   O  MM MM
D   D   A   A  V   V   I   E      S          T    O   O  M M M
D   D   A   A  V   V   I   EEEE    SSS       T    O   O  M   M
D   D   AAAAA  V   V   I   E          S      T    O   O  M   M
D   D   A   A   V V    I   E          S  ..  T    O   O  M   M
DDDD    A   A    V    III  EEEEE  SSSS   .   T     OOO   M   M

MTO:ML21-4:DAVIES2-- distribution to MU21-4, slot 134     1     333   4  4     >
MM MM  L     2  2   11          4  4       <       11    3   3  4  4      >
M M M  L       2    1           4  4      <         1        3  4  4       >
M   M  L      2     1    -----  44444    <          1       3   44444       >
M   M  L     2      1               4     <         1        3      4      >
M   M  L    2       1               4      <        1    3   3      4     >
M   M  LLLLL 22222  111             4       <      111    333       4    >
```

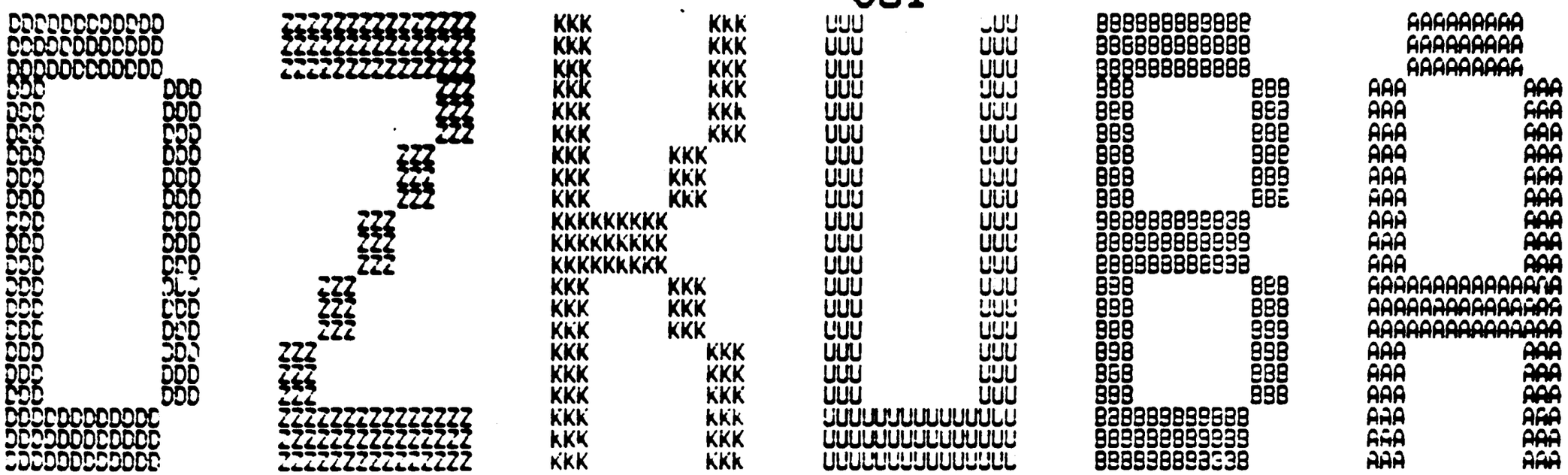
```
/STARTED-UsDAVIES,TOM[4302,224]eJobDISKJBAeSeq3435 Date 13-Oct-76 15:25:17 Monitor IPC-D 507B [1A3] *START*
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111111111111111
000000000111111111112222222222233333333334444444444555555555566666666667777777777788988889998899999999999000000000011111111111222222222223331
$PEEP890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567899012 *S
```



```
D   D   A   A  V   V   I   E      S          T    O   O  MM MM
D   D   A   A  V   V   I   E      S          T    O   O  M M M
D   D   A   A  V   V   I   EEEE    SSS       T    O   O  M   M
D   D   AAAAA  V   V   I   E          S      T    O   O  M   M
D   D   A   A   V V    I   E          S  ..  T    O   O  M   M
DDDD    A   A    V    III  EEEEE  SSSS   .   T     OOO   M   M

MTO:ML21-4:DAVIES2-- distribution to MU21-4, slot 134     1     333   4  4     >
MM MM  L     2  2   11          4  4       <       11    3   3  4  4      >
M M M  L       2    1           4  4      <         1        3  4  4       >
M   M  L      2     1    -----  44444    <          1       3   44444       >
M   M  L     2      1               4     <         1        3      4      >
M   M  L    2       1               4      <        1    3   3      4     >
M   M  LLLLL 22222  111             4       <      111    333       4    >
```

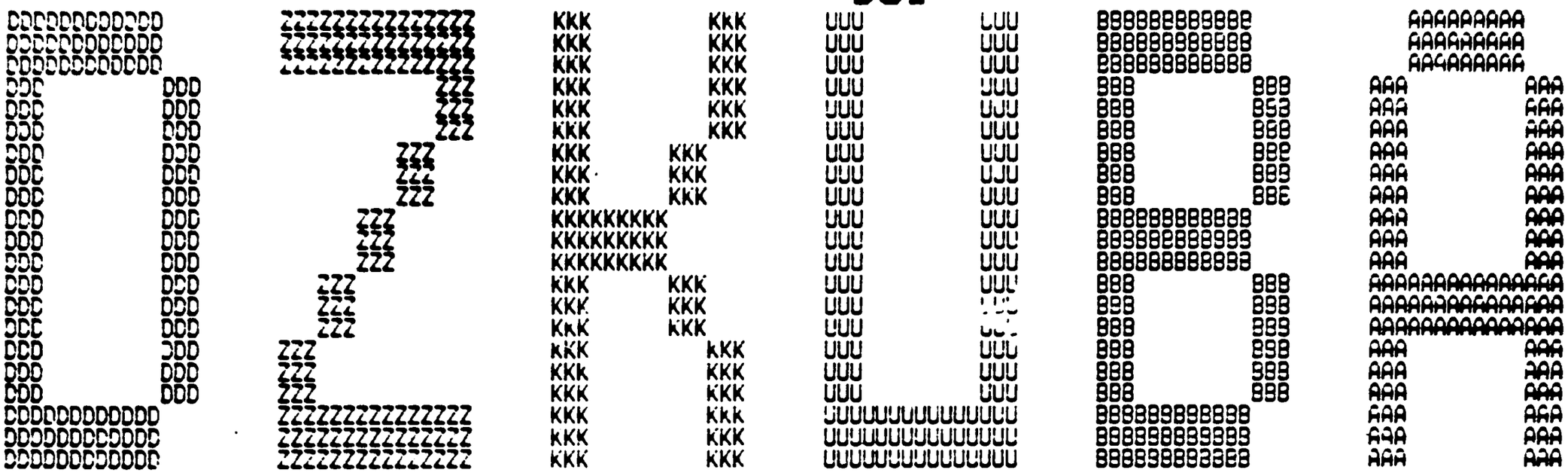
```
/STARTED-UsDAVIES,TOM[4302,224]eJobDISKJBAeSeq3435 Date 13-Oct-76 15:25:17 Monitor IPC-D 507B [1A3] *START*
```

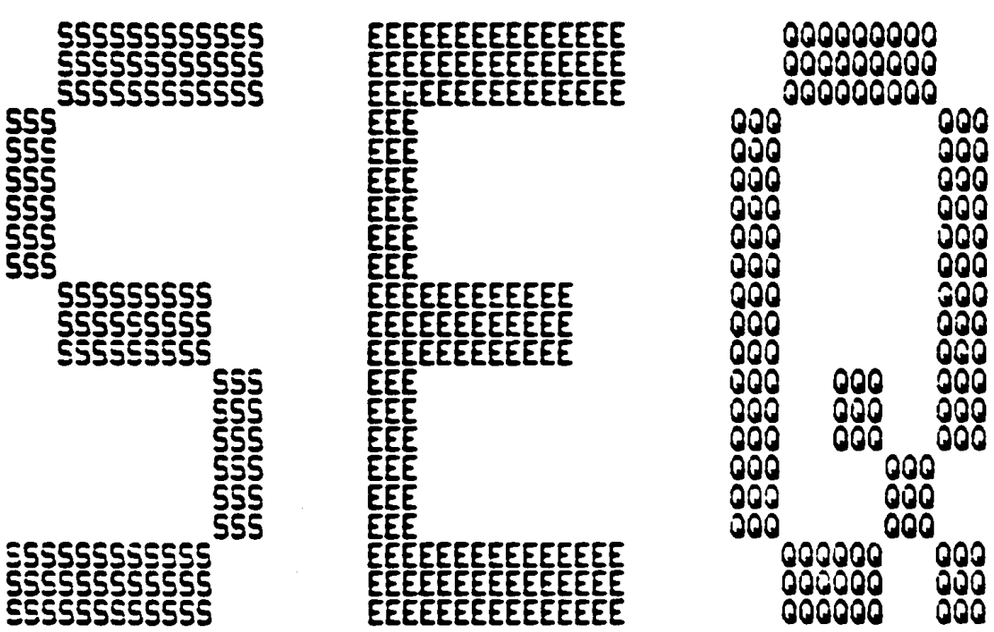


LPTSPL Version 6(100344) Running on MTA1
 START User DAVIES,TOM [400,2704] Job DZKJBA Seq. 35 Date 13-Oct-76 15:25:17 Monitor IPC-D 507B [1A3] *START*
Request created: 13-Oct-76 14:51:19   /TO:ML21-4:DAVIES -- distribution to ML21-4, slot 134

[illegible] 15:25:18
File will be RENAMEd to <057> protection

D01





LPTSPL Version 6(100344) Running on MTA1
 START User DAVIES,TOM [400,2704] Job DZKUBA Seg. 35 Date 13-Oct-76 15:25:17 Monitor IPC-D 5078 [1A3] *START*
Request created: 13-Oct-76 14:51:19   /TO:ML21-4:DAVIES -- distribution to ML21-4, slot 134

[illegible] 15:25:19
File will be RENAMEd to <057> protection

```
                        .REM [
```

IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZKUB-A-D
PRODUCT NAME:	UNIBUS EXERCISOR MODULE DIAGNOSTIC
DATE CREATED:	FEB 3, 1975
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	WARREN SALTZ

TABLE OF CONTENTS

1.0 ABSTRACT

THE UNIBUS EXERCISOR (UBE) MODULE DIAGNOSTIC IS COMPRISED OF A SERIES OF TESTS THAT CHECK ALL PROGRAMMATICALLY ACCESSABLE AREAS OF THE EXERCISORS (95%). THE TESTS ARE ARRANGED IN A LOGICAL ORDER SUCH THAT SIMPLER FUNCTIONS ARE EXAMINED FIRST FOLLOWED BY THE MORE COMPLEX ONES. THE TESTS BUILD ON ONE ANOTHER SUCH THAT THE PRESENT TEST WILL USE HARDWARE PREVIOUSLY TESTED. THIS SHOULD PROVIDE A VERY EFFECTIVE DEGREE OF FAULT ISOLATION.

THE PROGRAM IS WRITTEN TO TEST A MAXIMUM OF FOUR UBE'S AT ONE TIME AND IS INTENDED TO RUN IN A STAND-ALONE ENVIRONMENT.

2.0 REQUIREMENTS

2.1 EQUIPMENT

1. A WORKING PDP-11 AND UNIBUS
2. A WORKING TELETYPE
3. A GOOD 6K OF MEMORY
4. A MINIMUM OF 1 TO A MAXIMUM OF 4 UBE ON THE SYSTEM

2.2 PRELIMINARY REQUIREMENTS

IT IS EXPECTED THAT THE MODULE WILL HAVE BEEN TESTED ON A QR OR SIMILAR TESTER. THIS IS TO ENSURE THAT THOSE AREAS THAT CAN NOT BE THOUROUGHLY EXERCISED BY THIS PROGRAM ARE WORKING. THESE AREAS ARE:

1. WRONG GRANT ERROR BIT
2. NO, NO SACK TIME OUT ERROR BIT
3. WRONG A LINES ERROR BIT
4. NO GRANT OR NOT ONE GRANT ERROR BIT
5. NO INTERRUPT SSYN ERROR BIT
6. INHIBIT SACK LOGIC.

IN ADDITION THE PASSING OF GRANTS CAN NOT BE TESTED IF ONLY ONE EXERCISOR IS PRESENT (SEE SECTION 6.0). ON THOSE MACHINES THAT DON'T HAVE A PARITY TRAP (11/05, 11/20), THE PARITY HARDWARE IS NOT CHECKED.ALSO,THE POWER DOWN TEST SHOULD NOT BE RUN ON THE 11/05.

2.3 EXECUTION TIME

FOR AN ERROR FREE, FIRST PASS RUN ON AN 11/45 WITH CORE MEMORY, IT

```
   141                          TAKES APPROXIMATELY 15 SECONDS PER UBE TESTED.
```

3.0 STARTING ADDRESS

200 - FOR NORMAL STARTUP AND RESTART
1100 - IF HALTED IN INTERRUPT TEST AND WISH TO RESTART

4.0 PROGRAM CONTROL AND OPERATOR ACTION

4.1

THE PAPER TAPE IS LOADED USING THE STANDARD PROCEDURE FOR ABS. TAPES.

4.2

LOAD ADDRESS 200

4.3

IF THE POWER DOWN SEQUENCE IS TO BE TESTED SET SW4=1.

4.4

IF MORE THAN ONE EXERCISOR IS PRESENT AND IT IS DESIRED TO INHIBIT TESTING ONE OR MORE OF THEM, SET THE CORRESPONDING SW0,1,2,3=1. SWITCH 0 CORRESPONDS TO THE UBE WHICH HAS THE LOWEST ADDRESS ON THE BUS. SWITCH 1 TO THE NEXT HIGHEST ETC.. ALL UBE SHOULD NOT BE INHIBITED. IF THIS IS DONE THE PROGRAM WILL TRAP TO 4 AFTER SEVERAL END OF PASSES. IF ALL EXERCISORS ARE TO BE TESTED SW0,1,2,3=0.

4.5

START TEST

5.0 SWITCH OPTIONS

SW<15>=1 HALT ON ERROR
SW<14>=1 LOOP ON TEST

```
   198                                  SW<13>=1   INHIBIT ERROR TYPOUTS
   199                                  SW<12>=1   INHIBIT MOST TYPEOUTS EXCEPT ERROR
```

```
                        SW<11>=1   INHIBIT TEST ITERATIONS
                        SW<10>=1   BELL ON ERROR
                        SW<09>=1   LOOP ON ERROR
                        SW<04>=1   TEST POWER DOWN
                        SW<03>=1   INHIBIT TEST OF UBE4
                        SW<02>=1   INHIBIT TEST OF UBE3
                        SW<01>=1   INHIBIT TEST OF UBE2
                        SW<00>=1   INHIBIT TEST OF UBE1
```

5.1 SW<15>

THE PROGRAM HALTS ON ENCOUNTERING AN ERROR AFTER PRINTING OUT THE ERROR MESSAGE. PRESSING 'CONTINUE' RESTORES NORMAL PROGRAM OPERATION.

5.2 SW<14>

THE PROGRAM LOOPS ON THE SUBTEST THAT IS BEING EXECUTED WHEN THE SWITCH IS PUT ON.

5.3 SW<13>

THIS SWITCH INHIBITS ALL ERROR TYPEOUTS

5.4 SW<12>

THIS SWITCH INHIBITS MOST TYPEOUTS EXCEPT ERROR TYPEOUTS.

5.5 SW<11>

WHEN ONE ITERATIONS OF EACH TEST IS INHIBITED.

5.6 SW<10>

THE BELL IS RUNG UPON ENCOUNTERING AN ERROR.

5.7 SW<09>

UPON FINDING AN ERROR, THE PROGRAM WILL CYCLE FROM THE POINT OF ERROR TO THE PREVIOUS SCOPE STATEMENT (SEE SEC. 8.2).

5.8 SW<04>

WHEN SET THIS SWITCH ENABLES THE TEST OF THE POWER DOWN SEQUENCE AND THE TEST THAT DCLO CLEARS BECC, BEBA, BECR2 AND BECR1 REGISTERS. THIS SWITCH SHOULD NOT BE SET WHEN RUNNING UNDER ACT11 SINCE A POWER DOWN WILL CAUSE AN ERROR STATEMENT FROM ACT.

5.9 SW<03>

WHEN SET THIS SWITCH INHIBITS TESTING OF THE FOURTH UBE ON THE BUS. THE FOURTH EXERCISOP IS DEFINED AS THE EXERCISOR THAT RESPONDS TO THE FOURTH LOWEST ADDRESS OF THE FOUR EXERCISORS. IF THERE ARE LESS THAN FOUR THIS SWITCH HAS NO EFFECT ON THE PROGRAM.

5.10 SW<02>

WHEN SET THIS SWITCH INHIBITS TEST OF THAT UBE WITH THE THIRD LOWEST ADDRESS. IF THERE ARE LESS THAN THREE, THIS SWITCH HAS NO EFFECT ON THE PROGRAM.

5.11 SW<01>

WHEN SET THIS SWITCH INHIBITS TEST OF THAT UBE WITH THE SECOND LOWEST ADDRESS. IF THERE ARE LESS THAN TWO, THIS SWITCH HAS NO EFFECT ON E PROGRAM.

5.12 SW<00>

WHEN SET THIS SWITCH INHIBITS TESTING THE LOWEST ADDRESS EXERCISOR ON THE BUSS. IF THERE IS ONE EXERCISOR, THIS SWITCH SHOULD NOT BE SET.

6.0 PROGRAM DESCRIPTION

UPON START OF THE PROGRAM, A MAP, CALLED EMAP, OF ALL THE EXERCISORS PRESENT IS TYPED OUT IN OCTAL. EACH BIT SET IN THE MAP CORRESPONDS TO A UBE PRESENT. THE LEAST SIGNIFICANT BIT REPRESENTS THE UBE WHOSE BEBD ADDRESS IS 770000. THE SECOND BIT REPRESENTS THE UBE WHOSE BEBD ADDRESS IS 770020 AND SO ON.A MAXIMUM OF 4 CONSECUTIVE UBES ARE ALLOWED UP TO THE MAXIMUM ADDRESS OF 770076. THE ADDRESSES OF THE FIRST UBE TO BE EXAMINED ARE THEN CALCULATED AND TESTS 1-37 ARE RUN.

THE PROGRAM THEN CHECKS IF MORE EXERCISORS ARE TO BE TESTED UP TO A

```
   312                          MAXIMUM  OF FOUR.  WHEN THESE ARE DONE AND IF THERE WERE MORE THAN ONE
   313                          UBE, THE LAST TEST IS EXECUTED.  THIS  TESTS  THE  PASSING  OF  GRANTS
```

BETWEEN THE EXERCISORS.

7.0 ERROR REPORTING

ERROR CALLS ARE MADE VIA THE EMT INSTRUCTION. THE LOWER BYTE OF THE INSTRUCTION IS ENCODED TO INDICATE THE ERROR NUMBER. FOR EXAMPLE ERROR 1 WOULD BE (EMT+1) OR 104001. ONCE AN ERROR INSTRUCTION IS EXECUTED, AN ERROR HANDLER ROUTINE WILL THEN PROCESS THE ERROR CALL. THE ERROR MESSAGE TO BE TYPED IS DETERMINED FROM THE ITEM TABLE AT THE BEGINNING OF THE PROGRAM. ITEM 1 CORRESPONDS TO ERROR 1 AND SO ON. THE ITEM TABLE CONTAINS A SERIES OF POINTERS TO THE MESSAGE TO BE TYPED.

EVERY TIME AN ERROR OCCURS, THE PC OF THE ERROR CALL IS TYPED OUT. THIS WILL TELL THE USER THE EXACT TEST WHERE THE ERROR OCCURRED. MANY TIMES OTHER PERTINENT INFORMATION IS TYPED OUT AS THE CONTENTS OF REGISTERS AND BAD ADDRESSES.

ALL MESSAGES REFER TO THE UBE. FOR EXAMPLE, THE MESSAGE "DATI FAILED TO SET READY" MEANS THAT THE UBE WHEN IT DID A DATI FAILED TO SET ITS READY.

IT SHOULD BE POINTED OUT WHEN TROUBLE SHOOTING A FAILING BOARD, THAT THE FIRST ERROR REPORTED SHOULD BE THE FIRST ONE FIXED. THIS IS BECAUSE THE NATURE OF THE HARDWARE AND SOFTWARE CAN CAUSE ADDITIONAL, FALSE OR MISLEADING ERROR MESSAGES TO APPEAR AFTER THE FIRST ONE. SINCE THE TESTS BUILD ON ONE ANOTHER AND INVOLVE PREVIOUSLY TESTED HARDWARE, IT WILL AID IN THE FAULT ISOLATION TO LOOK UP THE TESTS PREVIOUSLY RUN TO KNOW WHICH HARDWARE HAS BEEN TESTED.ALSO,WHEN MULTIPLE UBES ARE BEING TESTED,A UBE CAN FAIL IN SUCH A WAY AS TO CAUSE FALSE ERROR REPORTS ON A GOOD BOARD.THIS IS ESPECIALLY TRUE WHEN THE FIRST FAILING UBE REPORTS A "FATAL ERROR".DUE TO THIS,IT IS SUGGESTED THAT THE FIRST FAILING BOARD REPORTED SHOULD BE REPAIRED BEFORE PROCEEDING TO TEST THE OTHERS.

8.0 HANDLERS AND COMMON ROUTINES

8.1 TRAP HANDLER

THIS HANDLER USES THE TRAP INSTRUCTION. THE LOWER BYTE OF THE INSTRUCTION IS ENCODED DIFFERENTLY FOR EACH OF THE DIFFERENT ROUTINES THAT USE IT. WHEN A CALL FOR A ROUTINE IS EXECUTED A TRAP OCCURS TO THE HANDLER LOCATED AT $TRAP. THE HANDLER THEN DETERMINES BY LOOKING AT THE LOWER BYTE WHICH ADDRESS TO GO TO FOR SERVICING THE CALL. THE FOLLOWING ROUTINES USE THIS HANDLER:

```
370
371
```

1. TYPE - THIS ROUTINE IS USED TO TYPE ASCIZ MESSAGES.

2. TYPOC,TYPOS,TYPON - THESE ROUTINES ARE USED TO CHANGE A BINARY NUMBER TO A 6 DIGIT OCTAL NUMBER AND TYPE IT.

3. TYPDS - THIS ROUTINE CONVERTS A BINARY NUMBER TO DECIMAL NUMBER AND TYPES IT.

8.2 SCOPE HANDLER

THIS HANDLER IS CALLED VIA THE 'IOT' TRAP. WHEN 'SCOPE' IS EXECUTED AN 'IOT' TRAP OCCURS TO THE MEMORY LOCATION '$SCOPE'. DEPENDING ON THE SWITCH SETTINGS, THE HANDLER THEN DECIDES TO LOOP ON TEST, LOOP ON ERROR ETC. THE SCOPE STATEMENT THAT IS LOCATED AT THE FIRST INSTRUCTION OF THE FOLLOWING TEST IS THE ONE THAT ENABLES THE DESIRED ACTION (LOOPING ETC.) FOR THE PRESENT TEST.

8.3 ERROR HANDLER

THIS HANDLER USES THE 'EMT' TRAP. THE LOWER BYTE OF THE INSTRUCTION IS ENCODED TO INDICATE THE ERROR NUMBER. FOR EXAMPLE ERROR 1 WOULD BE (EMT+1) OR 104001. ONCE AN ERROR INSTRUCTION IS EXECUTED THE ERROR HANDLER DETERMINES THE MESSAGE TO BE TYPED. AN ITEM TABLE AT THE BEGINNING OF THE PROGRAM CONTAINS POINTERS FOR EACH MESSAGE TO BE TYPED. EACH ITEM CORRESPONDS TO EACH ERROR (ITEM 1 CORRESPONDS TO ERROR 1). THE 'ERRTYP' ROUTINE THEN PROCESSES THE TABLE FOR THE FINAL ERROR TYPE OUT.

8.4 TRAP CATCHER

THIS IS A SERIES OF INSTRUCTIONS STARTING IN LOCATION 0 TO DETECT UNEXPECTED TRAPS AND INTERRUPTS TO THE TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

EACH VECTOR PC ADDRESS IS LOADED WITH THE ADDRESS OF THE NEXT LOCATION. THE NEXT LOCATION IS LOADED WITH A HALT. THUS AN ILLEGAL TRAP OR INTERRUPT WILL CAUSE A HALT AT THE TRAP PSW LOCATION PLUS 2.

ONCE A HALT OCCURS, BY EXAMINING THE CONTENTS OF THE ADDRESS POINTED TO BY THE STACK, THE VALUE OF THE PC WHEN THE TRAP OR INTERRUPT OCCURRED CAN BE DETERMINED.

8.5 POWER DOWN AND UP ROUTINES

WHEN A POWER FAIL CONDITION OCCURS, THE CONTENTS OF REGISTERS R0-R7 ARE SAVED ON THE STACK. WHEN THE POWER RETURNS, THE SAME REGISTERS ARE RESTORED.

8.6 CLRREG ROUTINE

THIS SUBROUTINE WILL CLEAR ALL THE REGISTERS AND ERROR CONDITIONS OF THE UBE PRESENTLY BEING TESTED.

8.7 RCATCH ROUTINE

THIS ROUTINE RESTORES THE TRAP CATCHER TO THE VECTOR AREA OF THE UBE PRESENTLY BEING TESTED.

9.8 CRDY ROUTINE

THIS ROUTINE CHECKS FOR THE READY BIT TO SET FROM THE UBE PRESENTLY BEING TESTED. IF READY FAILS TO SET IN A TIME > 100 MICROSECONDS, THE LSB OF REGISTER R4 IS SET TO A ONE.

9.9 DINT ROUTINE

THIS ROUTINE IS USED TO DISREGARD INTERRUPTS FROM THE UBE UNDER TEST. IT PLACES THE ADDRESS OF THE NEXT LOCATION IN THE UBE'S VECTOR AREA. THE NEXT LOCATION THEN CONTAINS AN 'RTI' INSTRUCTION.

8.10 RVEC ROUTINE

THIS SUBROUTINE RESTORES THE VECTOR AREA 0-56 FROM THE STACK AND PUTS THE TRAP CATCHER IN THE REMAINING LOCATIONS.

9.11 TERRPC ROUTINE

THIS ROUTINE IS USED ANY TIME AN ERROR OCCURS. IT TYPES OUT THE PC OF THE ERROR MESSAGE.

```
[
.TITLE  UNIBUS EXERCISOR MODULE DIAGNOSTIC
;*COPYRIGHT (C) OCT 29,1974
;*DIGITAL EQUIPMENT CORP.
;*MAYNARD, MASS. 01754
;*
;*PROGRAM BY WARREN SALTZ
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-C2), SEPT 14, 1976.
;*
$TN=1
```

```
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            INHIBIT MOST TYPEOUTS EXCEPT ERROR
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         4            TEST POWER DOWN
                                ;*         3            INHIBIT TEST OF UBE 4
                                ;*         2            INHIBIT TEST OF UBE 3
                                ;*         1            INHIBIT TEST OF UBE 2
                                ;*         0            INHIBIT TETS OF UBE 1
                                .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
  000100                        PR2=    100             ;;PRIORITY LEVEL 2
  000140                        PR3=    140             ;;PRIORITY LEVEL 3
  000200                        PR4=    200             ;;PRIORITY LEVEL 4
  000240                        PR5=    240             ;;PRIORITY LEVEL 5
  000300                        PR6=    300             ;;PRIORITY LEVEL 6
  000340                        PR7=    340             ;;PRIORITY LEVEL 7
```

```
                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
                        .EQUIV  SW08,SW8
                        .EQUIV  SW07,SW7
                        .EQUIV  SW06,SW6
                        .EQUIV  SW05,SW5
                        .EQUIV  SW04,SW4
                        .EQUIV  SW03,SW3
                        .EQUIV  SW02,SW2
                        .EQUIV  SW01,SW1
                        .EQUIV  SW00,SW0

                        ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
100000                  BIT15=  100000
040000                  BIT14=  40000
020000                  BIT13=  20000
010000                  BIT12=  10000
004000                  BIT11=  4000
002000                  BIT10=  2000
001000                  BIT09=  1000
000400                  BIT08=  400
000200                  BIT07=  200
000100                  BIT06=  100
000040                  BIT05=  40
000020                  BIT04=  20
000010                  BIT03=  10
000004                  BIT02=  4
000002                  BIT01=  2
000001                  BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .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
170000                          DB=170000               ;DATA BUFFER OF LOWEST ADDRESS UBE
                                .SBTTL  TRAP CATCHER

000000                                  .=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
000174                                  .=174
000174  000000                  DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                  SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
                                .SBTTL  STARTING ADDRESS(ES)
000200  000137  002632                  JMP     @#START ;;JUMP TO STARTING ADDRESS OF PROGRAM
001100                                  .=1100
001100  012737  000137  000200  RSTART: MOV     #000137,@#200   ;RESTART HERE IF HALTED IN INTERRUPT TEST
001106  012737  002632  000202          MOV     #START,@#202
001114  020627  001020                  CMP R6,#1020            ;WAS VECTOR AREA DESTROYED IN INT. TEST?
001120  101002                          BHI B                   ;BRANCH IF NO
001122  004767  015132                  JSR PC,RVEC             ;RESTORE VECTOR AREA
001126  000137  002632          B:      JMP     @#START         ;GO TO BEGINNING OF PROGRAM
                                .SBTTL  ACT11 HOOKS

                                ;;**************************************************************
                                ;HOOKS REQUIRED BY ACT11
001132                                  $SVPC=.                 ;SAVE PC
000046                                  .=46
000046  016100                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
000052                                  .=52
000052  000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
001132                                  .=$SVPC                 ;; RESTORE PC
```

```
                                .SBTTL  COMMON TAGS

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

                        001132          .=1132
001132                  $CMTAG:                         ;;START OF COMMON TAGS
001132  000000          $PASS:  .WORD   0               ;;CONTAINS PASS COUNT
001134     000          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
001135     000          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
001136  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
001140  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
001142  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
001144  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
001146     000          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
001147     001          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
001150  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001152  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
001154  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
001156  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
001160  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
001162  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
001164  000000                  .WORD   0
001166     000          $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
001167     000          $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
001170  000000                  .WORD   0
001172  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
001174  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
001176  177560          $TKS:   177560                  ;;TTY KBD STATUS
001200  177562          $TKB:   177562                  ;;TTY KBD BUFFER
001202  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
001204  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
001206     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
001207     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001210     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001211     000          $TPFLG: .BYTE   0               ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001212  000000          $REGAD: .WORD   0               ;;CONTAINS THE ADDRESS FROM
                                                        ;;WHICH  ($REG0) WAS OBTAINED
001214  000000          $REG0:  .WORD   0               ;;CONTAINS (($REGAD)+0)
001216  000000          $REG1:  .WORD   0               ;;CONTAINS (($REGAD)+2)
001220  000000          $REG2:  .WORD   0               ;;CONTAINS (($REGAD)+4)
001222  000000          $REG3:  .WORD   0               ;;CONTAINS (($REGAD)+6)
001224  000000          $TMP0:  .WORD   0               ;;USER DEFINED
001226  000000          $TMP1:  .WORD   0               ;;USER DEFINED
001230  000000          $TMP2:  .WORD   0               ;;USER DEFINED
001232  000000          $TMP3:  .WORD   0               ;;USER DEFINED
001234  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
001236  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
001240  177607  000377  $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001244     077          $QUES:  .ASCII  /?/             ;;QUESTION MARK
001245     015          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
001246  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
                                ;;*****************************************************************
```

```
                                .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

001250                          $ERRTB:
                                ;ITEM1
001250  020576                          EM1
001252  000000                          0
001254  000000                          0
001256  000000                          0
                                ;ITEM2
001260  020660                          EM2
001262  020720                          DH2
001264  020746                          DT2
001266  000000                          0
                                ;ITEM3
001270  020754                          EM3
001272  021021                          DH3
001274  021030                          DT3
001276  000000                          0
                                ;ITEM 4
001300  021034                          EM4
001302  021102                          DH4
001304  021142                          DT4
001306  000000                          0
                                ;ITEM 5
001310  021152                          EM5
001312  021102                          DH4
001314  021142                          DT4
001316  000000                          0
                                ;ITEM 6
001320  021220                          EM6
001322  021102                          DH4
001324  021142                          DT4
001326  000000                          0
                                ;ITEM 7
001330  021270                          EM7
001332  021332                          DH7
001334  021410                          DT7
001336  000000                          0
                                ;ITEM 8
001340  021416                          EM8
001342  000000                          0
001344  000000                          0
001346  000000                          0
                                ;ITEM 9
```

```
  749  001350  021503                    EM9
  750  001352  000000                    0
  751  001354  000000                    0
  752  001356  000000                    0
  753                              ;ITEM 10
  754  001360  021544                    EM10
  755  001362  000000                    0
  756  001364  000000                    0
  757  001366  000000                    0
  758                              ;ITEM 11
  759  001370  021605                    EM11
  760  001372  000000                    0
  761  001374  000000                    0
  762  001376  000000                    0
  763                              ;ITEM 12
  764  001400  021651                    EM12
  765  001402  000000                    0
  766  001404  000000                    0
  767  001406  000000                    0
  768                              ;ITEM 13
  769  001410  000000                    0
  770  001412  000000                    0
  771  001414  000000                    0
  772  001416  000000                    0
  773                              ;ITEM 14
  774  001420  021716                    EM14
  775  001422  000000                    0
  776  001424  000000                    0
  777  001426  000000                    0
  778                              ;ITEM 15
  779  001430  021747                    EM15
  780  001432  022033                    DH15
  781  001434  021030                    DT3
  782  001436  000000                    0
  783                              ;ITEM 16
  784  001440  022055                    EM16
  785  001442  000000                    0
  786  001444  000000                    0
  787  001446  000000                    0
  788                              ;ITEM 17
  789  001450  022150                    EM17
  790  001452  022207                    DH17
  791  001454  020746                    DT2
  792  001456  000000                    0
  793                              ;ITEM 18
  794  001460  022234                    EM18
  795  001462  022323                    DH18
  796  001464  021030                    DT3
  797  001466  000000                    0
  798                              ;ITEM 19
  799  001470  022336                    EM19
  800  001472  022417                    DH19
  801  001474  021030                    DT3
  802  001476  000000                    0
  803                              ;ITEM 20
  804  001500  022440                    EM20
```

```
  805  001502  000000                    0
  806  001504  000000                    0
  807  001506  000000                    0
  808                            ;ITEM 21
  809  001510  022507                    EM21
  810  001512  000000                    0
  811  001514  000000                    0
  812  001516  000000                    0
  813                            ;ITEM 22
  814  001520  022545                    EM22
  815  001522  000000                    0
  816  001524  000000                    0
  817  001526  000000                    0
  818                            ;ITEM 23
  819  001530  022610                    EM23
  820  001532  000000                    0
  821  001534  000000                    0
  822  001536  000000                    0
  823                            ;ITEM 24
  824  001540  022654                    EM24
  825  001542  022723                    DH24
  826  001544  023000                    DT24
  827  001546  000000                    0
  828                            ;ITEM 25
  829  001550  023012                    EM25
  830  001552  022723                    DH24
  831  001554  023000                    DT24
  832  001556  000000                    0
  833                            ;ITEM 26
  834  001560  023052                    EM26
  835  001562  022723                    DH24
  836  001564  023000                    DT24
  837  001566  000000                    0
  838                            ;ITEM 27
  839  001570  023113                    EM27
  840  001572  022723                    DH24
  841  001574  023000                    DT24
  842  001576  000000                    0
  843                            ;ITEM 28
  844  001600  023153                    EM28
  845  001602  000000                    0
  846  001604  000000                    0
  847  001606  000000                    0
  848                            ;ITEM 29
  849  001610  023202                    EM29
  850  001612  000000                    0
  851  001614  000000                    0
  852  001616  000000                    0
  853                            ;ITEM 30
  854  001620  023231                    EM30
  855  001622  000000                    0
  856  001624  000000                    0
  857  001626  000000                    0
  858                            ;ITEM 31
  859  001630  023261                    EM31
  860  001632  000000                    0
```

```
  861  001634  000000                    0
  862  001636  000000                    0
  863                          ;ITEM 32
  864  001640  023311                    EM32
  865  001642  022723                    DH24
  866  001644  023000                    DT24
  867  001646  000000                    0
  868                          ;ITEM 33
  869  001650  023360                    EM33
  870  001652  022723                    DH24
  871  001654  023000                    DT24
  872  001656  000000                    0
  873                          ;ITEM 34
  874  001660  023415                    EM34
  875  001662  023465                    DH34
  876  001664  021030                    DT3
  877  001666  000000                    0
  878                          ;ITEM 35
  879  001670  023504                    EM35
  880  001672  023561                    DH35
  881  001674  020746                    DT2
  882  001676  000000                    0
  883                          ;ITEM 36
  884  001700  023607                    EM36
  885  001702  023656                    DH36
  886  001704  021030                    DT3
  887  001706  000000                    0
  888                          ;ITEM 37
  889  001710  023666                    EM37
  890  001712  023561                    DH35
  891  001714  020746                    DT2
  892  001716  000000                    0
  893                          ;ITEM 38
  894  001720  023725                    EM38
  895  001722  023561                    DH35
  896  001724  020746                    DT2
  897  001726  000000                    0
  898                          ;ITEM 39
  899  001730  024015                    EM39
  900  001732  000000                    0
  901  001734  000000                    0
  902  001736  000000                    0
  903                          ;ITEM 40
  904  001740  024073                    EM40
  905  001742  000000                    0
  906  001744  000000                    0
  907  001746  000000                    0
  908                          ;ITEM 41
  909  001750  024151                    EM41
  910  001752  000000                    0
  911  001754  000000                    0
  912  001756  000000                    0
  913                          ;ITEM 42
  914  001760  024213                    EM42
  915  001762  000000                    0
  916  001764  000000                    0
```

```
   917  001766  000000                          0
   918                                  ;ITEM 43
   919  001770  024252                      EM43
   920  001772  024336                      DH43
   921  001774  020746                      DT2
   922  001776  000000                      0
   923                                  ;ITEM 44
   924  002000  024367                      EM44
   925  002002  000000                      0
   926  002004  000000                      0
   927  002006  000000                      0
   928                                  ;ITEM 45
   929  002010  024433                      EM45
   930  002012  000000                      0
   931  002014  000000                      0
   932  002016  000000                      0
   933                                  ;ITEM 46
   934  002020  024460                      EM46
   935  002022  024530                      DH46
   936  002024  021142                      DT4
   937  002026  000000                      0
   938                                  ;ITEM 47
   939  002030  024566                      EM47
   940  002032  024336                      DH43
   941  002034  020746                      DT2
   942  002036  000000                      0
   943                                  ;ITEM 48
   944  002040  024566                      EM47
   945  002042  000000                      0
   946  002044  000000                      0
   947  002046  000000                      0
   948                                  ;ITEM 49
   949  002050  024644                      EM49
   950  002052  000000                      0
   951  002054  000000                      0
   952  002056  000000                      0
   953                                  ;ITEM 50
   954  002060  024644                      EM49
   955  002062  024336                      DH43
   956  002064  020746                      DT2
   957  002066  000000                      0
   958                                  ;ITEM 51
   959  002070  024723                      EM51
   960  002072  000000                      0
   961  002074  000000                      0
   962  002076  000000                      0
   963                                  ;ITEM 52
   964  002100  024754                      EM52
   965  002102  000000                      0
   966  002104  000000                      0
   967  002106  000000                      0
   968                                  ;ITEM 53
   969  002110  025007                      EM53
   970  002112  000000                      0
   971  002114  000000                      0
   972  002116  000000                      0
```

```
  973
  974  002120  025061                ;ITEM 54
  975  002122  000000                        EM54
  976  002124  000000                        0
  977  002126  000000                        0
  978                                        0
  979  002130  024252                ;ITEM 55
  980  002132  000000                        EM43
  981  002134  000000                        0
  982  002136  000000                        0
  983                                        0
  984  002140  025330                ;ITEM 56
  985  002142  000000                        EM56
  986  002144  000000                        0
  987  002146  000000                        0
  988                                        0
  989  002150  025407                ;ITEM 57
  990  002152  000000                        EM57
  991  002154  000000                        0
  992  002156  000000                        0
  993                                        0
  994  002160  025437                ;ITEM 58
  995  002162  022033                        EM58
  996  002164  021030                        DH15
  997  002166  000000                        DT3
  998                                        0
  999  002170  025460                ;ITEM 59
 1000  002172  000000                        EM59
 1001  002174  000000                        0
 1002  002176  000000                        0
 1003                                        0
 1004  002200  025526                ;ITEM 60
 1005  002202  000000                        EM60
 1006  002204  000000                        0
 1007  002206  000000                        0
 1008                                        0
 1009  002210  025554                ;ITEM 61
 1010  002212  000000                        EM61
 1011  002214  000000                        0
 1012  002216  000000                        0
 1013                                        0
 1014  002220  025603                ;ITEM 62
 1015  002222  000000                        EM62
 1016  002224  000000                        0
 1017  002226  000000                        0
 1018                                        0
 1019  002230  025633                ;ITEM 63
 1020  002232  022033                        EM63
 1021  002234  021030                        DH15
 1022  002236  000000                        DT3
 1023                                        0
 1024  002240  025663                ;ITEM 64
 1025  002242  000000                        EM64
 1026  002244  000000                        0
 1027  002246  000000                        0
 1028                                        0
                                    ;ITEM 65
```

```
1033  002250  025761                  EM65
1034  002252  026041                  DH65
1035  002254  021030                  DT3
1036  002256  000000                  0
1037
1040                          ;ITEM 66
1041  002260  026060                  EM66
1042  002262  000000                  0
1043  002264  000000                  0
1044  002266  000000                  0
1045
1046                          ;ITEM 67
1047  002270  026106                  EM67
1050  002272  026041                  DH65
1051  002274  021030                  DT3
1052  002276  000000                  0
1053
1054                          ;ITEM 68
1055  002300  000000                  0
1056  002302  026151                  DH65
1057  002304  021030                  DT3
1060  002306  000000                  0
1061
1062                          ;ITEM 69
1063  002310  026150                  EM69
1064  002312  000000                  0
1065  002314  000000                  0
1066  002316  000000                  0
1067
1070                          ;ITEM 70
1071  002320  026201                  EM70
1072  002322  000000                  0
1073  002324  000000                  0
1074  002326  000000                  0
1075
1076                          ;ITEM 71
1077  002330  026262                  EM71
1100  002332  000000                  0
1101  002334  000000                  0
1102  002336  000000                  0
1103
1104                          ;ITEM 72
1105  002340  026310                  EM72
1106  002342  000000                  0
1107  002344  000000                  0
1110  002346  000000                  0
1111
1112                          ;ITEM 73
1113  002350  026340                  EM73
1114  002352  000000                  0
1115  002354  000000                  0
1116  002356  000000                  0
1117
1120                          ;ITEM 74
1121  002360  026405                  EM74
1122  002362  000000                  0
1123  002364  000000                  0
1124  002366  000000                  0
1125
1126                          ;ITEM 75
1127  002370  026427                  EM75
1130  002372  000000                  0
1131  002374  000000                  0
1132  002376  000000                  0
1133
1134                          ;ITEM 76
1135  002400  026447                  EM76
```

```
  1085  002402  000000                          0
  1086  002404  000000                          0
  1087  002406  000000                          0
  1088                              ;ITEM 77
  1089  002410  026474                          EM77
  1090  002412  000000                          0
  1091  002414  000000                          0
  1092  002416  000000                          0
  1093                              ;ITEM 78
  1094  002420  026522                          EM78
  1095  002422  021102                          DH4
  1096  002424  021142                          DT4
  1097  002426  000000                          0
  1098                              ;ITEM 79
  1099  002430  000000                          0
  1100  002432  000000                          0
  1101  002434  000000                          0
  1102  002436  000000                          0
  1103                              ;ITEM 80
  1104  002440  026562                          EM80
  1105  002442  000000                          0
  1106  002444  000000                          0
  1107  002446  000000                          0
  1108                              ;ITEM 81
  1109  002450  026624                          EM81
  1110  002452  024530                          DH46
  1111  002454  021142                          DT4
  1112  002456  000000                          0
  1113                              ;ITEM 82
  1114  002460  026650                          EM82
  1115  002462  000000                          0
  1116  002464  000000                          0
  1117  002466  000000                          0
  1118                              ;ITEM 83
  1119  002470  026715                          EM83
  1120  002472  000000                          0
  1121  002474  000000                          0
  1122  002476  000000                          0
  1123                              ;ITEM 84
  1124  002500  026776                          EM84
  1125  002502  000000                          0
  1126  002504  000000                          0
  1127  002506  000000                          0
  1128  002510  000000  EMAP:    .WORD 0        ;MAP OF UBE PRESENT
  1129  002512  000000  TMAP:    .WORD 0        ;TEMPORARY MAP
  1130  002514  000000  SPTR:    .WORD 0        ;SWITCH POINTER
  1131  002516  000000  BEBD:    .WORD 0        ;BEBD ADDRESS OF UBE UNDER TEST
  1132  002520  000000  BECC:    .WORD 0        ;BECC ADDRESS OF UBE UNDER TEST
  1133  002522  000000  BEBA:    .WORD 0        ;BEBA ADDRESS OF UBE UNDER TEST
  1134  002524  000000  BECR1:   .WORD 0        ;BECR1 ADDRESS OF UBE UNDER TEST
  1135  002526  000000  BECR2:   .WORD 0        ;BECR2 ADDRESS OF UBE UNDER TEST
  1136  002530  000000  BERE:    .WORD 0        ;CLEAR ERROR ADDRESS OF UBE UNDER TEST
  1137  002532  000000  INTVEC:  .WORD 0        ;INTERRUPT VECTOR ADDRESS OF UBE UNDER TEST
  1138  002534  170014  BEGO:    .WORD 170014   ;GO ADDRESS
  1139  002536  000000  BE1BD:   .WORD 0        ;BEBD ADDRESS OF FIRST UBE TESTED
  1140  002540  000000  BE1CC:   .WORD 0        ;BECC ADDRESS OF FIRST UBE TESTED
```

```
1141   002542  000000          BE1BA:  .WORD 0          ;BEBA ADDRESS OF FIRST UBE TESTED
1142   002544  000000          BE1CR1: .WORD 0          ;BECR1 ADDRESS OF FIRST UBE TESTED
1143   002546  000000          BE1CR2: .WORD 0          ;BECR2 ADDRESS OF FIRST UBE TESTED
1144   002550  000000          BE1RE:  .WORD 0          ;CLEAR ERROR ADDRESS OF FIRST UBE TESTED
1145   002552  000000          BE1VEC: .WORD 0          ;INTERRUPT VECTOR ADDRESS OF FIRST UBE TESTED
1146   002554  000000          BE2BD:  .WORD 0          ;BEBD ADDRESS OF SECOND UBE TESTED
1147   002556  000000          BE2CC:  .WORD 0          ;BECC ADDRESS OF SECOND UBE TESTED
1148   002560  000000          BE2BA:  .WORD 0          ;BEBA ADDRESS OF SECOND UBE TESTED
1149   002562  000000          BE2CR1: .WORD 0          ;BECR1 ADDRESS OF SECOND UBE TESTED
1150   002564  000000          BE2CR2: .WORD 0          ;BECR2 ADDRESS OF SECOND UBE TESTED
1151   002566  000000          BE2RE:  .WORD 0          ;CLEAR ERROR ADDRESS OF SECOND UBE TESTED
1152   002570  000000          BE2VEC: .WORD 0          ;INTERRUPT VECTOR ADDRESS OF SECOND UBE TESTED
1153   002572  000000          BE3BD:  .WORD 0          ;BEBD ADDRESS OF THIRD UBE TESTED
1154   002574  000000          BE3CC:  .WORD 0          ;BECC ADDRESS OF THIRD UBE TESTED
1155   002576  000000          BE3BA:  .WORD 0          ;BEBA ADDRESS OF THIRD UBE TESTED
1156   002600  000000          BE3CR1: .WORD 0          ;BECR1 ADDRESS OF THIRD UBE TESTED
1157   002602  000000          BE3CR2: .WORD 0          ;BECR2 ADDRESS OF THIRD UBE TESTED
1158   002604  000000          BE3RE:  .WORD 0          ;CLEAR ERROR ADDRESS OF THIRD UBE TESTED
1159   002606  000000          BE3VEC: .WORD 0          ;INTERRUPT VECTOR ADDRESS OF THIRD UBE TESTED
1160   002610  000000          BE4BD:  .WORD 0          ;BEBD ADDRESS OF FOURTH UBE TESTED
1161   002612  000000          BE4CC:  .WORD 0          ;BECC ADDRESS OF FOURTH UBE TESTED
1162   002614  000000          BE4BA:  .WORD 0          ;BEBA ADDRESS OF FOURTH UBE TESTED
1163   002616  000000          BE4CR1: .WORD 0          ;BECR1 ADDRESS OF FOURTH UBE TESTED
1164   002620  000000          BE4CR2: .WORD 0          ;BECR2 ADDRESS OF FOURTH UBE TESTED
1165   002622  000000          BE4RE:  .WORD 0          ;CLEAR ERROR ADDRESS OF FOURTH UBE TESTED
1166   002624  000000          BE4VEC: .WORD 0          ;INTERRUPT VECTOR ADDRESS OF FOURTH UBE TESTED
1167   002626  000000          UCNT:   .WORD 0          ;COUNT OF UBE TESTED
1168   002630  000000          NO:     .WORD 0          ;INDEX NUMBER FOR ADDRESS OF 1,2,3,4 UBE
1169                           ;;*************************************************************
1170                           ;;*************************************************************
1171   002632                  START:
1172                           .SBTTL  INITIALIZE THE COMMON TAGS
1173                           ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1174   002632  012706  001132          MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
1175   002636  005026                  CLR     (R6)+           ;;CLEAR MEMORY LOCATION
1176   002640  022706  001172          CMP     #SWR,R6 ;;DONE?
1177   002644  001374                  BNE     .-6             ;;LOOP BACK IF NO
1178   002646  012706  001100          MOV     #STACK,SP       ;;SETUP THE STACK POINTER
1179                           ;;INITIALIZE A FEW VECTORS
1180   002652  012737  016370  000020  MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
1181   002660  012737  000340  000022  MOV     #340,@#IOTVEC+2 ;;LEVEL 7
1182   002666  012737  016620  000030  MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1183   002674  012737  000340  000032  MOV     #340,@#EMTVEC+2 ;;LEVEL 7
1184   002702  012737  020014  000034  MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1185   002710  012737  000340  000036  MOV     #340,@#TRAPVEC+2;LEVEL 7
1186   002716  012737  020064  000024  MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
1187   002724  012737  000340  000026  MOV     #340,@#PWRVEC+2 ;;LEVEL 7
1188   002732  016767  013110  013100  MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
1189   002740  005067  176270          CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
1190   002744  005067  176266          CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
1191   002750  112767  000001  176171  MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
1192   002756  012767  002756  176154  MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
1193   002764  012767  002764  176150  MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
1194                           ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1195                           ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
1196   002772  013746  000004          MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
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1197  002776  012737  003032  000004          MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
1198  003004  012767  177570  176160          MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
1199  003012  012767  177570  176154          MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
1200  003020  022777  177777  176144          CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
1201  003026  001012                          BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1202                                                                  ;;AND  THE HARDWARE SWR IS NOT = -1
1203  003030  000403                          BR      65$             ;;BRANCH IF NO TIMEOUT
1204  003032  012716  003040          64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
1205  003036  000002                          RTI
1206  003040  012767  000176  176124  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
1207  003046  012767  000174  176120          MOV     #DISPREG,DISPLAY
1208  003054  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1209
1210  003060  032737  010000  001172          BIT #SW12,@#SWR         ;INHIBIT TYPEOUTS?
1211  003066  001004                          BNE START1              ;BRANCH IF YES
1212  003070  104401  027573                  TYPE ,MSG16             ;UBE MODULE TEST
1213  003074  104401  027274                  TYPE ,MSG12             ;JUMPER W1 SHOULD BE IN TO PREVENT MULTIPLE SSYNS
1214  003100  005067  177404          START1: CLR EMAP                ;INIT. EMAP
1215  003104  012767  000001  177402          MOV #1,SPTR             ;INITIALIZE SWITCH POINTER TO LOOK AT FIRST SWITCH
1216  003112  012767  002632  176022          MOV #START,$LPERR       ;SET UP RETURN FOR ERROR1
1217  003120  012737  003230  000004          MOV #MTRAP,@#4          ;SET UP MAP TRAP
1218  003126  012737  000340  000006          MOV #340,@#6            ;SET PSW PRIORITY=7
1219  003134  012701  170000                  MOV #CB,R1              ;DATA REG ADDR. OF FIRST REG
1220  003140  012700  000001                  MOV #1,R0               ;LD PTER
1221  003144  005711                  LOOP1:  TST (R1)                ;LOOK IF EXER. PRESENT,NO TRAPS
1222  003146  050067  177336                  BIS R0,EMAP             ;YES,INDIC. EXER. PRESENT
1223  003152  062701  000020          LOOP2:  ADD #20,R1              ;LOOK AT NEXT EXER. ADDR.
1224  003156  006100                          ROL R0                  ;UPDATE PTER
1225  003160  020027  000020                  CMP R0,#20              ;AT LAST UBE?
1226  003164  001367                          BNE LOOP1               ;BRANCH IF NOT AT LAST POSSIBLE EXER.
1227  003166  012737  000006  000004  A:      MOV #6,@#4              ;RESTORE TRAP CATCHER
1228  003174  005037  000006                  CLR @#6                 ;
1229  003200  032737  010000  001172          BIT #SW12,@#SWR         ;INHIBIT TYPEOUTS?
1230  003206  001007                          BNE 1$                  ;BRANCH IF YES
1231  003210  104401  020242                  TYPE ,MSG1              ;TYPE MAP
1232  003214  016746  177270                  MOV     EMAP,-(SP)      ;;SAVE EMAP FOR TYPEOUT
1233  003220  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
1234  003222  104401  001245                  TYPE ,$CRLF             ;
1235  003226  000414                  1$:     BR IADD                 ;GO CALC. ADDRESSES OF UBE
1236
1237  003230  020027  000010          MTRAP:  CMP R0,#10              ;AT END OF UBE ADDRESS SPACE?
1238  003234  001346                          BNE LOOP2               ;NO LOOK AT NEXT EXER.
1239  003236  026727  177246  000000          CMP EMAP,#0             ;YES,IS MAP = 0?
1240  003244  001350                          BNE A                   ;NO,BRANCH TO A
1241  003246  104001                          ERROR ^D1               ;NO RESPONSE TO REG ADDRESSES OR NO DEVICE PRESENT
1242  003250  004767  013060                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1243  003254  000167  012532                  JMP $EOP                ;GO TO END OF TEST
1244                                  ;////////////////////////////////////////////////////////////
1245                                  ;       ROUTINE TO CALCULATE ADDRESSES OF UBE TESTED
1246                                  ;////////////////////////////////////////////////////////////
1247  003260  012767  167760  177230  IADD:   MOV #167760, BEBD          ;INITIALIZE BEBD
1248  003266  012767  167762  177224          MOV #167762, BECC       ;INITIALIZE BECC
1249  003274  012767  167764  177220          MOV #167764, BEBA       ;INITIALIZE BEBA
1250  003302  012767  167766  177214          MOV #167766, BECR1      ;INITIALIZE BECR1
1251  003310  012767  167776  177210          MOV #167776, BECR2      ;INITIALIZE BECR2
1252  003316  012767  167770  177204          MOV #167770, BERE       ;INITIALIZE BERE
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1253  003324  012767  170014  177202          MOV #170014, BEGO       ;INITIALIZE BEGO
1254  003332  012767  000504  177152          MOV #504,    INTVEC     ;INITIALIZE INTERRUPT VECTOR
1255  003340  012700  002536                  MOV #BE18D,R0           ;GET POINTER TO PERMANENT VECTOR AREA
1256  003344  005020                  1$:     CLR (R0)+               ;CLEAR PERMANENT VECTOR AREA
1257  003346  020027  002630                  CMP R0,#N0              ;ENTIRE AREA CLEARED?
1258  003352  001374                          BNE 1$                  ;BRANCH IF NO
1259  003354  012767  002536  177246          MOV #BE18D,N0           ;INITIALIZE POINTER TO BE18D
1260  003362  016767  177122  177122          MOV EMAP,TMAP           ;MOVE MAP TO WORK AREA
1261  003370  062767  000020  177120  ACALC:  ADD #20, BEBD          ;CALC. ADDR. OF BEBD TESTING
1262  003376  062767  000020  177114          ADD #20, BECC           ;CALC. ADDR. OF BECC TESTING
1263  003404  062767  000020  177110          ADD #20, BEBA           ;CALC. ADDR. OF BEBA TESTING
1264  003412  062767  000020  177104          ADD #20, BECR1          ;CALC. ADDR. OF BECR1 TESTING
1265  003420  062767  000020  177100          ADD #20, BECR2          ;CALC. ADDR. OF BECR2 TESTING
1266  003426  062767  000020  177074          ADD #20, BERE           ;CALC. ADDR. OF BERE TESTING
1267  003434  062767  000004  177070          ADD #4,  INTVEC         ;CALC. ADDR. OF INTERRUPT VECTOR
1268  003442  000241                          CLC                     ;INIT. CARRY
1269  003444  006267  177042                  ASR TMAP                ;LOOK FOR BIT INDICATING EXERCISOR
1270  003450  042767  100000  177034          BIC #100000,TMAP        ;CLEAR MSB IF SET
1271  003456  103405                          BCS C                   ;IF EXERCISOR PRESENT GO SEE IF TO BE TESTED
1272  003460  005767  177026                  TST TMAP                ;ANY EXERCISORS LEFT?
1273  003464  001341                          BNE ACALC               ;BRANCH IF MORE
1274  003466  000167  010710                  JMP LAST                ;GO TO LAST TEST
1275  003472  032767  000020  177014  C:      BIT #20,SPTR            ;TESTED 4 UBE?
1276  003500  001402                          BEQ D                   ;BRANCH IF NO
1277  003502  000167  010674                  JMP LAST                ;GO TO LAST TEST
1278  003506  036737  177002  001172  D:      BIT SPTR,@#SWR          ;SHOULD THIS UBE BE TESTED?
1279  003514  001403                          BEQ E                   ;BRANCH IF YES
1280  003516  006367  176772                  ASL SPTR                ;ROTATE POINTER TO NEXT SWITCH
1281  003522  000722                          BR ACALC                ;LOOK FOR NEXT UBE
1282  003524  006367  176764          E:      ASL SPTR                ;ROTATE POINTER TO NEXT SWITCH
1283  003530  005267  177072                  INC UCNT                ;UPDATE COUNT OF UBE TESTED
1284  003534  104401  027422                  TYPE ,MSG13             ;TESTING UBE WITH BEBD ADDRESS:
1285  003540  016746  176752                  MOV     BEBD,-(SP)      ;;SAVE BEBD FOR TYPEOUT
1286  003544  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
1287  003546  104401  001245                  TYPE ,$CRLF
1288                                  ;////////////////////////////////////////////////////////////
1289                                  ;ROUTINE TO STORE TEMPORARY ADDRESS OF UBE TESTING IN PERMANENT LOC
1290                                  ;////////////////////////////////////////////////////////////
1291  003552  016701  177052                  MOV N0,R1               ;GET POINTER TO BE18D
1292  003556  012700  002516                  MOV #BEBD,R0            ;GET POINTER FOR BEBD
1293  003562  012021          F:      MOV (R0)+,(R1)+         ;SAVE ADDRESSES
1294  003564  020027  002534                  CMP R0,#BEGO            ;ALL SAVED?
1295  003570  001374                          BNE F                   ;BRANCH IF NO
1296  003572  062767  000016  177030          ADD #16,N0              ;UPDATE PTER TO NEXT UBE
1297
1298  003600  012767  003624  175332          MOV #FIRST,$LPADR       ;INIT. SCOPE WHEN MORE THAN 1 UBE
1299  003606  012767  003624  175326          MOV #FIRST,$LPERR       ;INIT. SCOPE WHEN MORE THAN 1 UBE
1300  003614  105067  175314                  CLRB $TSTNM             ;INIT. TEST NUMBER
1301  003620  000005                          RESET                   ;INIT. ALL UBE FOR LOOPS
1302
1303
1304                                  ;;*****************************************************************
1305                                  ;*TEST 1        TEST ALL UBE REG CAN BE CLEARED
1306                                  ;*
1307                                  ;*R0 CONTAINS ADDRESS OF REG UNDER TEST
1308                                  ;*
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1309                                        :*IF THIS TEST FAILS, ALL FOLLOWING TESTS FOR THIS MODULE ARE ABCRTED.
1310                                        ;;*****************************************************************
1311  003622  000004                        TST1:   SCOPE
1312  003624  012706  001100                FIRST:  MOV #STACK,SP           ;RESTORE STACK
1313  003630  012737  000340  177776                MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1314  003636  012737  004022  000004                MOV #STRAP,@#4          ;SET UP NSSYN TRAP
1315  003644  012737  000340  000006                MOV #340,@#6            ;SET PSW PRIORTY =7
1316  003652  012777  000000  176646                MOV #0,@BECR2           ;DO DATO TO CLEAR PB BIT IF SET
1317  003660  005077  176644                       CLR @BERE               ;CLEAR ERROR CONDITIONS
1318  003664  016700  176626                       MOV BEBD,R0             ;SETUP TO LOOK AT FIRST REG.
1319  003670  005010                        TO1L01: CLR (R0)                ;CLR UBE REG
1320  003672  020067  176626                       CMP R0,BECR1            ;TESTING BECR1?
1321  003676  001425                               BEQ TO1L04              ;BRANCH IF YES
1322  003700  005710                               TST (R0)                ;IS REG CLEARED?
1323  003702  001421                               BEQ TO1L02              ;BRANCH IF YES
1324  003704  010067  175304                TO1L03: MOV R0,$REG0            ;SAVE FAILING ADDRESS
1325  003710  011067  175302                       MOV (R0),$REG1          ;SAVE BAD DATA
1326  003714  104002                               ERROR ^D2               ;FATAL ERROR:REG FAILED TO CLEAR
1327  003716  020067  176604                       CMP R0,BECR2            ;DID BECR2 FAIL?
1328  003722  001006                               BNE TO1L06              ;BRANCH IF NO
1329  003724  032777  020000  176574               BIT #20000,@BECR2       ;WAS CCOVF =1?
1330  003732  001402                               BEQ TO1L06              ;BRANCH IF NO
1331  003734  104401  027464                       TYPE ,MSG14             ;DISREGARD BIT 13=1 OF BECR2
1332  003740  004767  012370                TO1L06: JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1333  003744  000433                               BR TO1L05               ;RESTORE TRAP
1334  003746  005720                        TO1L02: TST (R0)+               ;INC ADDRESS
1335  003750  000747                               BR TO1L01               ;CONTINUE LOOP
1336  003752  022777  000200  176544        TO1L04: CMP #200,@BECR1         ;ALL BITS IN BECR1 0 EXCEPT RDY?
1337  003760  001351                               BNE TO1L03              ;BRANCH TO ERROR IF NO
1338  003762  016700  176540                       MOV BECR2,R0            ;INDICATE LOOKING AT BECR2
1339  003766  005077  176536                       CLR @BERE               ;RESET ERROR CONDITIONS
1340  003772  005077  176530                       CLR @BECR2              ;CLEAR BECR2
1341  003776  032777  157777  176522               BIT #157777,@BECR2      ;IS BECR2 =0 EXECPT CCOVF?
1342  004004  001337                               BNE TO1L03              ;NO, TYPE ADDRESS AND DATA ERROR
1343  004006  012737  000006  000004               MOV #6,@#4              ;RESTORE TRAP CATCHER
1344  004014  005037  000006                       CLR @#6
1345  004020  000414                               BR      TST2            ;;GO TO NEXT TEST
1346
1347  004022  011667  175166                STRAP:  MOV (SP),$REG0          ;SAVE PC FROM STACK
1348  004026  104003                               ERROR ^D3               ;FATAL ERROR:CPU DID NOT RECEIVE SSYN
1349  004030  004767  012300                       JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1350
1351  004034  012737  000006  000004        TO1L05: MOV #6,@#4              ;RESTORE TRAP CATCHER
1352  004042  005037  000006                       CLR @#6
1353  004046  000167  010324                       JMP NUBE1               ;TEST NEXT UBE
1354
1355                                        ;;*****************************************************************
1356                                        ;*TEST 2        TEST BITS 1-6,8-14 OF BECR1 AND BITS 0-3,14 OF BECR2 CHANGE
1357                                        ;*
1358                                        ;*R2, R3 CONTAIN THE TRUE AND COMPLEMENT TEST DATA
1359                                        ;*R4 CONTAINS A POINTER TO THE REG ADDRESS BEING TESTED
1360                                        ;*R5 CONTAINS THE MASKED CONTENTS OF THE REG BEING TESTED
1361                                        ;*$TMP1 CONTAINS THE MASK FOR THE REG
1362                                        ;*
1363                                        ;*IF THIS TEST FAILS, ALL FOLLOWING TESTS FOR THIS MODULE ARE ABORTED
1364                                        ;;*****************************************************************
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1365  004052  000004                  TST2:   SCOPE
1366  004054  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
1367  004060  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1368  004066  012702  052652                  MOV #52652,R2           ;SETUP TEST DATA BECR1
1369  004072  012703  025324                  MOV #25324,R3           ;SETUP COMP. TEST DATA BECR1
1370  004076  012704  002524                  MOV #BECR1,R4           ;LOAD ADDRESS PTER. FOR BECR1
1371  004102  005077  176422                  CLR @BERE               ;CLEAR ERROR CONDITIONS
1372  004106  012767  177777  175112          MOV #177777,$TMP1       ;LOAD MASK TO LOOK AT ALL BECR1
1373  004114  016705  175106          T02L03: MOV $TMP1,R5            ;LOAD R5 WITH MASK
1374  004120  011400                          MOV (R4),R0             ;GET ADDRESS OF BECR TESTING
1375  004122  010210                          MOV R2,(R0)             ;LOAD BECR WITH DATA
1376  004124  011001                          MOV (R0),R1             ;GET CONTENTS OF BECR
1377  004126  005101                          COM R1                  ;ONLY LOOK AT BITS
1378  004130  040105                          BIC R1,R5               ;SET IN MASK =R5
1379  004132  020502                          CMP R5,R2               ;DATA OK?
1380  004134  001424                          BEQ T02L01              ;BRANCH IF YES
1381  004136  011467  175052          T02L02: MOV (R4),$REG0          ;SAVE BECR ADDRESS
1382  004142  011067  175050                  MOV (R0),$REG1          ;SAVE BECR BAD DATA
1383  004146  010267  175046                  MOV R2,$REG2            ;SAVE GOOD DATA
1384  004152  104006                          ERROR 6                 ;FATAL ERROR: CONTROL REG HELD WRONG DATA
1385  004154  021467  176346                  CMP (R4),BECR2          ;DID BECR2 FAIL?
1386  004160  001006                          BNE T02L04              ;BRANCH IF NO
1387  004162  032777  020000  176336          BIT #20000,@BECR2       ;WAS CCOVF=1?
1388  004170  001402                          BEQ T02L04              ;BRANCH IF NO
1389  004172  104401  027464                  TYPE ,MSG14             ;DISREGARD BIT 13=1 OF BECR2
1390  004176  004767  012132          T02L04: JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1391  004202  000167  010164                  JMP NUBE                ;TEST NEXT UBE
1392  004206  010302                  T02L01: MOV R3,R2               ;XFER NEW TEST DATA
1393  004210  010210                          MOV R2,(R0)             ;LOAD BECR WITH COMP.DATA
1394  004212  011001                          MOV (R0),R1             ;GET CONTENTS OF BECR
1395  004214  016705  175006                  MOV $TMP1,R5            ;LOAD R5 WITH MASK
1396  004220  005101                          COM R1                  ;ONLY LOOK AT BITS
1397  004222  040105                          BIC R1,R5               ;SET IN MASK =R5
1398  004224  020502                          CMP R5,R2               ;DATA OK?
1399  004226  001343                          BNE T02L02              ;BRANCH IF NO
1400  004230  012702  040012                  MOV #40012,R2           ;SETUP TEST DATA BECR2
1401  004234  012703  000005                  MOV #5,R3               ;SETUP COMP. TEST DATA BECR2
1402  004240  012704  002526                  MOV #BECR2,R4           ;LOAD ADDRESS PTER. FOR BECR2
1403  004244  012767  157777  174754          MOV #157777,$TMP1       ;HAVE MASK LOOK AT ALL BECR2 EXECPT CCOVF
1404  004252  020067  176250                  CMP R0,BECR2            ;TESTED BECR2?
1405  004256  001316                          BNE T02L03              ;NO, BRANCH TO START TEST OF BECR2
1406
1407                                  ;;*****************************************************************
1408                                  ;*TEST 3        FLOAT A '1' THROUGH BEBD, BECC, BEBA
1409                                  ;*
1410                                  ;*R0 CONTAINS A POINTER TO THE REG ADDRESS BEING TESTED
1411                                  ;*R1 CONTAINS TEST DATA
1412                                  ;*
1413                                  ;*IF THIS TEST FAILS, ALL FOLLOWING TESTS FOR THIS MODULE ARE ABORTED
1414                                  ;;*****************************************************************
1415  004260  000004                  TST3:   SCOPE
1416  004262  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
1417  004266  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1418  004274  012700  002516                  MOV #BEBD,R0            ;GET BEBD ADDRESS PTER.
1419  004300  012701  000001          T03L04: MOV #1,R1               ;SETUP TEST DATA REG
1420  004304  010130                  T03L03: MOV R1,@(R0)+           ;PUT TEST DATA IN REG
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1421  004306  025001                      CMP @-(R0),R1           ;TEST REG
1422  004310  001413                      BEQ T03L01              ;BRANCH IF OK
1423  004312  011067  174676              MOV (R0),$REG0          ;SAVE FAILING REG ADDRESS
1424  004316  010167  174676              MOV R1,$REG2            ;SAVE GOOD DATA
1425  004322  013067  174670              MOV @(R0)+,$REG1        ;SAVE BAD DATA
1426  004326  104004                      ERROR ↑D4               ;FATAL ERROR:REG FAILED TO FLOAT A '1'
1427  004330  004767  012000              JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1428  004334  000167  010032              JMP NUBE                ;TEST NEXT UBE
1429  004340  005701              T03L01: TST R1                  ;TESTED ALL 16 BITS?
1430  004342  100402                      BMI T03L02              ;BRANCH IF YES
1431  004344  006301                      ASL R1                  ;TEST NEXT BIT
1432  004346  000756                      BR T03L03               ;CONTINUE LOOP
1433  004350  022067  176146      T03L02: CMP (R0)+,BEBA          ;TESTED LAST REG? ALSO UPDATE ADDR. PTER.
1434  004354  001351                      BNE T03L04              ;BRANCH IF REGS NOT TESTED
1435
1436                               ;;*****************************************************************
1437                               ;*TEST 4        FLOAT A '0' THROUGH BEBD,BECC,BEBA
1438                               ;*
1439                               ;*R0 CONTAINS A POINTER TO THE REG ADDRESS BEING TESTED
1440                               ;*R1 CONTAINS TEST DATA
1441                               ;*
1442                               ;*IF THIS TEST FAILS, ALL FOLLOWING TESTS FOR THIS MODULE ARE ABORTED
1443                               ;;*****************************************************************
1444  004356  000004              T5T4:   SCOPE
1445  004360  012706  001100              MOV #STACK,SP           ;RESTORE STACK
1446  004364  012737  000340  177776      MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1447  004372  012700  002516              MOV #BEBD,R0            ;GET BEBD ADDRESS PTER.
1448  004376  012701  177776      T04L04: MOV #177776,R1          ;SETUP TEST DATA REG
1449  004402  010130              T04L03: MOV R1,@(R0)+           ;PUT TEST DATA IN REG
1450  004404  025001                      CMP@-(R0),R1            ;TEST REG
1451  004406  001413                      BEQ T04L01              ;BRANCH IF OK
1452  004410  011067  174600              MOV (R0),$REG0          ;SAVE FAILING REG ADDRESS
1453  004414  010167  174600              MOV R1,$REG2            ;SAVE GOOD DATA
1454  004420  013067  174572              MOV @(R0)+,$REG1        ;SAVE BAD DATA
1455  004424  104005                      ERROR ↑D5               ;FATAL ERROR: REG FAILED TO FLOAT A '0'
1456  004426  004767  011702              JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1457  004432  000167  007734              JMP NUBE                ;TEST NEXT UBE
1458  004436  005701              T04L01: TST R1                  ;TESTED ALL 16 BITS?
1459  004440  100002                      BPL T04L02              ;BRANCH IF YES
1460  004442  006001                      ROR R1                  ;TEST NEXT BIT
1461  004444  000756                      BR T04L03               ;CONTINUE LOOP
1462  004446  022067  176050      T04L02: CMP(R0)+,BEBA           ;TESTED LAST REG? ALSO UPDATE ADDR. PTER.
1463  004452  001351                      BNE T04L04              ;BRANCH IF REG NOT TESTED
1464
1465                               ;;*****************************************************************
1466                               ;*TEST 5        TEST FOR DUAL ADDRESSING IN REGS
1467                               ;*
1468                               ;*THIS TEST CLEARS ALL REGS AND THEN WRITES INTO THE
1469                               ;*REG BEING TESTED.  ALL OTHER REGS ARE THEN CHECKED IF THEY WERE
1470                               ;*SIMULTANEOUSLY WRITTEN.  THIS IS THEN REPEATED FOR ALL REGS.
1471                               ;*R0 CONTAINS ADDRESS OF REG BEING WRITTEN
1472                               ;*R1 CONTAINS ADDRESS OF REG BEING EXAMINED
1473                               ;*R2 CONTAINS MASK OF BITS TO BE LOOKED AT
1474                               ;*
1475                               ;*IF THIS TEST FAILS, ALL FOLLOWING TESTS FOR THIS MODULE ARE ABORTED
1476                               ;;*****************************************************************
```

```
1477  004454  000004                    TST5:   SCOPE
1478  004456  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
1479  004462  012737  000340  177776            MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1480  004470  004767  011440                    JSR PC,CLRREG           ;CLEAR ALL REG
1481  004474  016700  176016                    MOV BEBD,R0             ;INITIALIZE TEST ADDRESS
1482  004500  016701  176012            TOSL04: MOV BEBD,R1             ;INITIALIZE PTER.
1483  004504  012710  000002                    MOV #2,(R0)             ;LOAD TEST REG
1484  004510  012702  177777                    MOV #177777,R2          ;INITIALIZE MASK TO LOOK AT ALL BITS
1485  004514  030211                    TOSL03: BIT R2,(R1)             ;IS DATA  IN REG =0?
1486  004516  001422                            BEQ TOSL01              ;BRANCH IF DATA OK(=0)
1487  004520  020100                            CMP R1,R0               ;LOOKING AT REG LOADED?
1488  004522  001420                            BE` TOSL01              ;BRANCH IF YES (DATA OK)
1489  004524  020167  175774                    CMP R1,BECR1            ;LOOKING AT BECR1?
1490  004530  001411                            BEQ TOSL07              ;BRANCH IF YES
1491  004532  010067  174456            TOSL08: MOV R0,$REG0            ;ERROR; SAVE REG ADDRESS LOADED
1492  004536  010167  174454                    MOV R1,$REG1            ;SAVE REG ADDRESS EXAMINED
1493  004542  104007                            ERROR 7                 ;FATAL ERROR: DUAL ADDRESSING ERROR
1494  004544  004767  011564                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1495  004550  000167  007616                    JMP NUBE                ;TEST NEXT UBE
1496  004554  022777  000200  175742  TOSL07: CMP #200,@BECR1          ;ALL BITS IN BECR1 0 EXCEPT RDY?
1497  004562  001363                            BNE TOSL08              ;BRANCH IF NO
1498  004564  020167  175736            TOSL01: CMP R1,BECR2            ;LOOKED AT BECR2?
1499  004570  001412                            BEQ TOSL02              ;BRANCH IF YES
1500  004572  020167  175726                    CMP R1,BECR1            ;PTER UP TO BECR1?
1501  004576  001005                            BNE TOSL06              ;NO, LOOK AT NEXT REG
1502  004600  016701  175722                    MOV BECR2,R1            ;NOW LOOK AT BECR2
1503  004604  012702  157777                    MOV #157777,R2          ;LOOK AT ALL BECR2 EXCEPT CCOVF
1504  004610  000741                            BR TOSL03               ;CONTINUE LOOKING
1505  004612  005721                    TOSL06: TST (R1)+               ;UPDATE PTER.
1506  004614  000737                            BR TOSL03               ;LOOK AT NEXT REG.
1507  004616  004767  011312            TOSL02: JSR PC,CLRREG           ;CLEAR ALL REG
1508  004622  020067  175700                    CMP R0,BECR2            ;LOADED AND TESTED BECR2?
1509  004626  001410                            BEQ     TST6            ;;BRANCH IF YES TO NEXT TEST
1510  004630  020067  175670                    CMP R0,BECR1            ;LOADED BECR1 WITH DATA YET?
1511  004634  001003                            BNE TOSL05              ;BRANCH IF NO
1512  004636  016700  175664                    MOV BECR2,R0            ;YES, NOW LOAD BECR2
1513  004642  000716                            BR TOSL04               ;CONTINUE LOOKING
1514  004644  005720                    TOSL05: TST(R0)+                ;UPDATE ADDRESS OF REG LOADED
1515  004646  000714                            BR TOSL04               ;TEST THIS REG
1516
1517                                      ;;*****************************************************************
1518                                      ;*TEST 6        TEST BUS PARITY BIT PB
1519                                      ;*
1520                                      ;*THIS TEST IS NOT RUN ON THOSE MACHINE
1521                                      ;*WITH NO PARITY TRAP (11/05, 11/20)
1522                                      ;;*****************************************************************
1523  004650  000004                    TST6:   SCOPE
1524  004652  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
1525
1526                                      ;////////////////////////////////////////////////////////////////
1527                                      ;ROUTINE TO DETERMINE IF RUNNING UNDER 11/05 OR 11/20
1528                                      ;       IF 11/05 OR 11/20 BUSS PARITY TEST IS SKIPPED
1529                                      ;////////////////////////////////////////////////////////////////
1530  004656  012737  004752  000010            MOV #ITRAP,@#10         ;SET UP TO GO TO NEXT TEST IF ILLEGAL INST TRAP
1531  004664  012737  000340  000012            MOV #340,@#12
1532  004672  006700                            SXT R0                  ;IF INST TRAPS HAVE 11/05 OR 11/20
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1533
1534  004674  012737  000340  177776          MOV #340,@#PSW          ;SET PSW PRIORITY=7
1535  004702  012737  004736  000114          MOV #PTRAP,@#114        ;SET UP PARITY TRAP
1536  004710  012737  000340  000116          MOV #340,@#116
1537  004716  012777  010000  175602          MOV #10000,@BECR2       ;ENABLE PB PARITY
1538  004724  005777  175576                  TST @BECR2              ;START PARITY TRAP
1539  004730  104010                          ERROR ^D8               ;SETTING PB PARITY FAILED TO CAUSE CPU TO TRAP
1540  004732  004767  011376                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1541  004736  012737  000116  000114  PTRAP:  MOV #116,@#114         ;RESTORE TRAP CATCHER
1542  004744  005037  000116                  CLR @#116               ;RESTORE TRAP CATCHER
1543  004750  000411                          BR T06L01               ;SKIP MSG
1544  004752  032737  010000  001172  ITRAP:  BIT #SW12,@#SWR         ;INHIBIT TYPEOUTS?
1545  004760  001005                          BNE T06L01              ;BRANCH IF YES
1546  004762  012767  000001  174244          MOV #1,$TIMES           ;DO 1 ITERATION WHEN TEST NOT NOT RUN
1547  004770  104401  020511                  TYPE ,MSG5              ;BUS PARITY NOT TESTED ON 11/05 OR 11/20 MACHINES
1548  004774  012737  000012  000010  T06L01: MOV #12,@#10           ;RESTORE TRAP CATCHER
1549  005002  005037  000012                  CLR @#12                ;RESTORE TRAP CATCHER
1550  005006  012777  000000  175512          MOV #0,@BECR2           ;DO DATO TO CLEAR PB BIT
1551
1552                                  ;;*****************************************************************
1553                                  ;*TEST 7        TEST GO WORKS, RDY SETS AND CLEARS, AND THE RELEASE BUS IMMEDIATE WORKS
1554                                  ;*
1555                                  ;*THE READY AND GO BIT ARE CHECKED USING A RELEASE
1556                                  ;*BUSS IMMEDIATE FUNCTION.  FALSE INTERRUPT ARE CHECKED FOR
1557                                  ;*
1558                                  ;*IF THE GO OR READY BITS FAIL, ALL FOLLOWING TESTS FOR THIS MODULE ARE ABORTED.
1559                                  ;;*****************************************************************
1560  005014  000004                  ^ST7:   SCOPE
1561  005016  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
1562  005022  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1563  005030  004767  011100                  JSR PC,CLRREG           ;CLR ALL REG
1564  005034  012777  005154  175470          MOV #FINT1,@INTVEC      ;SET UP FOR FALSE INTERRUPT
1565  005042  016700  175464                  MOV INTVEC,R0           ;GET INTERRUPT VECTOR
1566  005046  012760  000340  000002          MOV #340,2(R0)          ;SET PSW PRIORITY=7
1567  005054  012777  006003  175442          MOV #6003,@BECR1        ;SET GO BIT AND DO RELEASE BUSS IMMEDIATE WITH BR4=1
1568  005062  032777  000200  175434          BIT #200,@BECR1         ;LOOK AT RDY BIT
1569  005070  001035                          BNE T07L08              ;BRANCH IF NOT CLEARED
1570  005072  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
1571  005076  005000                  T07L07: CLR R0                  ;INITIALIZE A COUNT TO WAIT FOR RDY=1
1572  005100  005200                  T07L03: INC R0                  ;UPDATE COUNT AND LOOP
1573  005102  022700  000011                  CMP #11,R0              ;TILL COUNT=10 OR RDY=1
1574  005106  001416                          BEQ T07L04              ;BRANCH IF RDY WAS NOT SET
1575  005110  105777  175410                  TSTB @BECR1             ;READY SET?
1576  005114  100371                          BPL T07L03              ;CONTINUE TO LOOK FOR RDY
1577  005116  032777  000001  175400          BIT #1,@BECR1           ;SEE IF GO BIT CLEARED
1578  005124  001426                          BEQ T07L05              ;PROCEED TO NEXT TEST IF YES
1579  005126  004767  011034                  JSR PC,RCATCH           ;RESTORE TRAP CATCHER
1580  005132  104013                          ERROR ^D11              ;FATAL ERROR: GO BIT FAILED TO CLEAR
1581  005134  004767  011174                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1582  005140  000167  007226                  JMP NUBE                ;TEST NEXT UBE
1583  005144  104014                  T07L04: ERROR ^D12              ;FATAL ERROR: RDY BIT FAILED TO SET
1584  005146  004767  011162                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1585  005152  000407                          BR T07L06               ;ABORT UBE TEST
1586
1587  005154  104123                  FINT1:  ERROR ^D83              ;ERROR: FALSE INTERRUPT WHEN DO RELEASE BUSS IMMED.
1588  005156  004767  011152                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
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1589  005162  000745                          BR T07L07               ;NOW CHECK IF RDY=1 AND GO BIT=0
1590
1591  005164  104020                  T07L09: ERROR ↑D16              ;FATAL ERROR: RDY BIT FAILED TO CLEAR OR GO DID NOT SET
1592  005166  004767  011142                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1593  005172  004767  010770          T07L06: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
1594  005176  000167  007170                  JMP NUBE                ;TEST NEXT UBE
1595  005202  004767  010760          T07L05: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
1596
1597                                          ;;*****************************************************************
1598                                          ;*TEST 10       TEST UBE CAN INTERRUPT ON ALL LEVELS & THE NO INT. SSYN BIT DOESN'T SET
1599                                          ;*
1600                                          ;*THE PSW PRIORITY IS FIRST SET EQUAL TO THE BR
1601                                          ;*LEVEL OF THE UBE.  ALL LEVELS ARE FIRST CHECKED
1602                                          ;*THIS WAY.  IF THE UBE FALSELY INTERRUPTS, A
1603                                          ;*SUBROUTINE, FINT3, WILL DETERMINE THE LEVEL IT
1604                                          ;INTERRUPTED.
1605                                          ;*AFTER THIS, THE UBE IS ALLOWED TO INTERRUPT BY
1606                                          ;*SETTING THE PSW PRIORITY ONE LEVEL BELOW THE BR.
1607                                          ;*ALL LEVELS ARE THEN CHECKED THIS WAY.  THE
1608                                          ;*PROPER INTERRUPT VECTOR IS TESTED FOR BY SETTING UP
1609                                          ;*THE ENTIRE VECTOR AREA 0-776 TO DETECT FOR WRONG
1610                                          ;*INTERRUPTS.
1611                                          ;*
1612                                          ;*NOTE:  IF THIS TEST IS HALTED IN THE MIDDLE
1613                                          ;*       AND IT IS DESIRED TO RESTART THE PROGRAM,
1614                                          ;*       THE PROGRAM SHOULD BE RESTARTED AT 1100 AND
1615                                          ;*       NOT AT 200.
1616                                          ;;*****************************************************************
1617  005206  000004                  T10:    SCOPE
1618  005210  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
1619  005214  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1620  005222  004767  010706                  JSR PC,CLRREG           ;CLEAR ALL UBE REG
1621  005226  010667  173772                  MOV SP,$TMP0            ;SAVE STACK ADDRESS
1622  005232  005000                          CLR R0                  ;INIT. R0
1623  005234  012046                  T08L08: MOV (R0)+,-(SP)         ;SAVE VECTOR AREA 0-56
1624  005236  022700  000060                  CMP #60,R0              ;ALL SAVED?
1625  005242  001374                          BNE T08L08              ;BRANCH  IF NO
1626  005244  012737  000341  000002          MOV #341,@#2            ;SET UP VECTOR AREA TO DETECT WRONG INT. VECTORS
1627  005252  012700  000004                  MOV #4,R0               ;INITIALIZE ADDRESS REG
1628  005256  012720  005670          T08L01: MOV #WINT,(R0)+         ;PUT WRONG INTERRUPT PTER IN ALL VECTOR LOCATIONS
1629  005262  012720  000341                  MOV #341,(R0)+          ;PUT AN ODD PSW IN ALL PSW LOCATIONS
1630  005266  022700  001000                  CMP #1000,R0            ;AT END OF VECTOR AREA?
1631  005272  001371                          BNE T08L01              ;BRANCH IF NO
1632  005274  012777  005552  175230          MOV #FINT3,@INTVEC      ;SET UP UBE VECTOR AREA FOR FALSE INT.
1633  005302  012767  000004  173704          MOV #4,$REG0            ;INDICATE DOING BR=4
1634  005310  012767  000200  173700          MOV #200,$REG1          ;INDICATE PSW PRIORITY=4
1635  005316  012777  000003  175200          MOV #3,@BECR1           ;HAVE UBE DO BR=4
1636  005324  012737  000200  177776          MOV #200,@#PSW          ;SET PRIORITY=4
1637  005332  000240                          NOP                     ;UBE SHOULD NOT INTERRUPT HERE
1638  005334  012767  000005  173652          MOV #5,$REG0            ;INDICATE DOING BR=5
1639  005342  012767  000240  173646          MOV #240,$REG1          ;INDICATE PSW PRIORITY=5
1640  005350  012737  000240  177776          MOV #240,@#PSW          ;SET PRIORITY=5
1641  005356  012777  000005  175140          MOV #5,@BECR1           ;HAVE UBE DO BR=5
1642  005364  000240                          NOP                     ;UBE SHOULD NOT INTERRUPT HERE
1643  005366  012767  000006  173620          MOV #6,$REG0            ;INDICATE DOING BR=6
1644  005374  012767  000300  173614          MOV #300,$REG1          ;INDICATE PRIORITY=6
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1645  005402  012737  000300  177776          MOV #300,@#PSW          ;SET PRIORITY=6
1646  005410  012777  000011  175106          MOV #11,@BECR1          ;HAVE UBE DO BR=6
1647  005416  000240                          NOP                     ;UBE SHOULD NOT INTERRUPT HERE
1648
1649                                  ;NOW TEST UBE WILL INTERRUPT WITH PRIORITY ONE LEVEL BELOW BR
1650
1651  005420  012777  000002  175076          MOV #2,@BECR1           ;INITIALIZE UBE TO DO BR=4
1652  005426  012767  000004  173560          MOV #4,$REG0            ;INITIALIZE INDICATOR FOR BR=4
1653  005434  012767  000003  173554          MOV #3,$REG1            ;INITIALIZE INDICATOR FOR PRIORITY=3
1654  005442  012777  005524  175062          MOV #T08L02,@INTVEC     ;SET RETURN ADDRESS WHEN GET PROPER INTERRJPT
1655  005450  012737  000140  177776          MOV #140,@#PSW          ;INITIALIZE PSW PRIORITY=3   .
1656  005456  000240                          NOP                     ;UBE SHOULD INTERRUPT HERE   .
1657  005460  000413                          BR T08L09               ;BRANCH TO ERROR IF NO INT.
1658  005462  005267  173526        T08L03:   INC $REG0               ;INDICATE BR LEVEL DOING
1659  005466  005267  173524                  INC $REG1               ;INDICATE PSW PRIORITY LEVEL DOING
1660  005472  000257                          CCC                     ;CLEAR N,Z,V,C
1661  005474  062737  000040  177776          ADD #40,@#PSW           ;SET PRIORITY LEVEL BELOW BR LEVEL
1662  005502  005277  175016                  INC @BECR1              ;HAVE UBE DO BR 1 LEVEL ABOVE PRIORITY
1663  005506  000240                          NOP                     ;UBE SHOULD INTERRUPT HERE
1664  005510  004767  010544        T08L09:   JSR PC,RVEC             ;RESTORE TRAP CATCHER AND HANDLER
1665  005514  104021                          ERROR ↑D17              ;ERROR: UBE FAILED TO INTERRUPT
1666  005516  004767  010612                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1667  005522  000472                          BR      T08L06          ;;BRANCH TO TEST NO INT. SSYN ERROR BIT
1668  005524  022626        T08L02:   CMP (SP)+,(SP)+         ;RESTORE STACK AFTER INTERRUPT
1669  005526  032777  000020  174770          BIT #20,@BECR1          ;TESTED LAST BR?
1670  005534  001063                          BNE     T08L07          ;;BRANCH IF YES TO TEST NO INT. SSYN ERROR BIT
1671  005536  006377  174762                  ASL @BECR1              ;SHIFT BECR1 FOR NEXT BR LEVEL
1672  005542  042777  000400  174754          BIC #400,@BECR1         ;CLEAR SHIFTED RDY BIT
1673  005550  000744                          BR T08L03               ;GO TEST NEXT BR
1674
1675  005552  022626        FINT3:    CMP (SP)+,(SP)+         ;RESTORE STACK AFTER INTERRUPT
1676  005554  004767  010500                  JSR PC,RVEC             ;RESTORE VECTOR AREA
1677  005560  104022                          ERROR ↑D18              ;ERROR: UBE INT. WHEN PSW AT SAME PRIORITY LEVEL
1678  005562  004767  010546                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1679  005566  032777  007740  174732          BIT #7740,@BECR2        ;SEE IF ERROR CONDITION OCCURRED IN BECR2
1680  005574  001407                          BEQ T08L04              ;BRANCH IF NO
1681  005576  017767  174724  173410          MOV @BECR2,$REG0        ;SAVE ERROR CONDITIONS
1682  005604  104017                          ERROR ↑D15              ;ERROR: ERROR BITS IN BECR2 SET WHEN SHOULD=0
1683  005606  004767  010522                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1684  005612  000445                          BR      TST11           ;;BRANCH TO NEXT TEST
1685
1686  005614  012777  005622  174710  T08L04: MOV #T08L05,@INTVEC     ;SET UP INTVEC TO FIND BR LEVEL UBE MADE
1687  005622  012706  001100  T08L05:  MOV #STACK,SP            ;RESTORE STACK
1688  005626  062767  000040  173362          ADD #40,$REG1           ;RAISE PRIORITY LEVEL BY 1
1689  005634  005267  173354                  INC $REG0               ;INDICATE NEW LEVEL OF PRICRITY
1690  005640  016737  173352  177776          MOV $REG1,@#PSW         ;SET PSW PRIORITY
1691  005646  005277  174652                  INC @BECR1              ;HAVE UBE INTERRUPT AGAIN
1692  005652  000240                          NOP                     ;IF UBE INT. HERE, INCREMENT PRIORITY
1693  005654  004767  010306                  JSR PC,RCATCH           ;RESTORE TRAP CATCHER
1694  005660  104023                          ERROR ↑D19              ;ERROR: UBE FALSELY INTERRUPTED AT HIGHER LEVEL
1695  005662  004767  010446                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1696  005666  000417                          BR      TST11           ;;BRANCH TO NEXT TEST
1697
1698  005670  022626        WINT:     CMP (SP)+,(SP)+         ;RESTORE STACK AFTER INTERRUPT
1699  005672  004767  010362                  JSR PC,RVEC             ;RESTORE VECTOR AREA
1700  005676  104024                          ERROR ↑D20              ;ERROR: UBE INTERRUPTED TO WRONG VECTOR
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1701  005700  004767  010430                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1702  005704  004767  010350          T08L07:   JSR PC,RVEC             ;RETURN VECTOR AREA WHEN FINISH BR TEST
1703  005710  032777  004000  174610  T08L06:   BIT #4000,@BECR2        ;WAS NO INT. SSYN ERROR BIT SET?
1704  005716  001403                            BEQ     TST11           ;;BRANCH TO NEXT TEST IF NO
1705  005720  104027                            ERROR †D23              ;ERROR: NO INT. SSYN BIT FALSELY SET
1706  005722  004767  010406                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1707
1708                                    ;;*****************************************************************
1709                                    ;*TEST 11       TEST THE NO,NO SACK ERROR BIT DOESN'T SET
1710                                    ;*
1711                                    ;*THE INHIBIT SACK BIT IS SET AND THE UBE IS TOLD TO
1712                                    ;*DO A FUN. 3.THE NO,NO SACK ERROR BIT IS THEN
1713                                    ;*CHECKED TO NOT HAVE SET.
1714                                    ;;*****************************************************************
1715  005726  000004                    †ST11:  SCOPE
1716  005730  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
1717  005734  012737  000340  177776            MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1718  005742  004767  010166                    JSR PC,CLRREG           ;CLEAR ALL UBE REGS.
1719  005746  012777  000010  174552            MOV #10,@BECR2          ;ENABLE INH SACK IN BECR2
1720  005754  012777  006003  174542            MOV #6003,@BECR1        ;DO  FUN. 3 VIA  BR4
1721  005762  005037  177776                    CLR @#PSW               ;ALLOW INTERRUPTS
1722  005766  000240                            NOP                     ;ALLOW UBE TO GET BUSS. CPU SHOULD TIME OUT
1723
1724  005770  005000                            CLR R0                  ;INIT COUNTER
1725  005772  005200                    1$:     INC R0                  ;INC COUNTER
1726  005774  105700                            TSTB R0                 ;WAITED >20 USEC?
1727  005776  100375                            BPL 1$                  ;BRANCH IF NO
1728  006000  032777  000200  174520            BIT #200,@BECR2         ;WAS NO, NO SACK BIT SET?
1729  006006  001403                            BEQ  RTR                ;BRANCH IF NO
1730  006010  104026                            ERROR †D22              ;ERROR: NO, NO SACK BIT FALSELY SET
1731  006012  004767  010316                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1732  006016  004767  010112            RTR:    JSR PC,CLRREG           ;CLEAR ALL UBE REG
1733
1734                                    ;;*****************************************************************
1735                                    ;*TEST 12       TEST DATI,DATIP,DATO,DATOB AND F NCTION 1 WORK PROPERLY
1736                                    ;*
1737                                    ;*ALL DATA TRANSFERS ARE DONE VIA BR TRANSFERS.
1738                                    ;*EACH OPERATION (DATI, DATO, DATIP, DATOB) DOES ONE
1739                                    ;*TRANSFER AND THE DATA IS THEN CHECKED.
1740                                    ;*EACH TIME AN OPERATION IS STARTED THE READY
1741                                    ;*BIT IS TESTED BY THE SUBROUTINE 'RDYS' TO SEE IF IT SETS.
1742                                    ;;*****************************************************************
1743  006022  000004                    †ST12:  SCOPE
1744  006024  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
1745  006030  012737  000340  177776            MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
1746  006036  012767  052525  021634            MOV #052525,BUFF1       ;PUT TEST DATA IN BUFFER
1747  006044  004767  010064                    JSR PC,CLRREG           ;CLEAR ALL UBE REG
1748  006050  012777  177777  174442            MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1749  006056  012777  027700  174436            MOV #BUFF1,@BEBA        ;LOAD UBE WITH BUFFER ADDRESS
1750  006064  012705  006572                    MOV #ERR1,R5            ;INITIALIZE R5 FOR ERROR ADDRESS
1751  006070  012777  002003  174426            MOV #2003,@BECR1        ;HAVE UBE DO DATI VIA BR=4 AND FUNCTION 1
1752  006076  005037  177776                    CLR @#PSW               ;ALLOW DATA XFER
1753  006102  004767  000434                    JSR PC,RDYS             ;GO CHECK FOR RDY TO SET
1754  006106  022777  052525  174402            CMP #052525,@BEBD       ;IS DATA OK?
1755  006114  001421                            BEQ T10L01              ;GO TEST DATO IF YES
1756  006116  017767  174374  173070            MOV @BEBD,$REG0         ;SAVE (BEBD)
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 1757  006124  016767  021550  173064          MOV BUFF1,$REG1         ;SAVE MEM DATA
 1758  006132  012767  027700  173060          MOV #BUFF1,$REG2        ;SAVE MEM ADDRESS
 1759  006140  012767  052525  173054          MOV #52525,$REG3        ;SAVE CORRECT DATA
 1760  006146  104030                          ERROR ^D24              ;ERROR: DATI FAILED TO LOAD PROPER DATA
 1761  006150  004767  010160                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 1762  006154  000167  000450                  JMP TST3                ;GO TO NEXT TEST
 1763  006160  004767  007750          T1CL01: JSR PC,CLRREG           ;CLEAR UBE REG
 1764  006164  005067  021510                  CLR BUFF1               ;CLEAR TEST AREA
 1765  006170  012777  177777  174322          MOV #177777,@#BECC      ;HAVE UBE DO 1 XFER
 1766  006176  012777  027700  174316          MOV #BUFF1,@#BEBA       ;LOAD UBE WITH BUFFER ADDRESS
 1767  006204  012777  052525  174304          MOV #052525,@#BEBD      ;LOAD UBE WITH DATA
 1768  006212  012705  006602                  MOV #ERR2,R5            ;INITIALIZE R5 FOR ERROR ADDRESS
 1769  006216  012777  003003  174300          MOV #3003,@#BECR1       ;HAVE UBE DO DATO VIA BR=4 AND FUNCTION 1
 1770  006224  004767  000312                  JSR PC,RDYS             ;GO CHECK FOR RDY TO SET
 1771  006230  022767  052525  021442          CMP #052525,BUFF1       ;WAS BUFFER LOADED PROPERLY?
 1772  006236  001420                          BEQ     T10L02          ;GO TEST DATIP IF YES
 1773  006240  017767  174252  172746          MOV @#BEBD,$REG0        ;SAVE (BEBD)
 1774  006246  016767  021426  172742          MOV BUFF1,$REG1         ;SAVE MEM DATA
 1775  006254  012767  027700  172736          MOV #BUFF1,$REG2        ;SAVE MEM ADDRESS
 1776  006262  012767  052525  172732          MOV #052525,$REG3       ;SAVE CORRECT DATA
 1777  006270  104031                          ERROR ^D25              ;ERROR: DATO FAILED TO LOAD PROPER DATA
 1778  006272  004767  010036                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 1779  006276  000554                          BR      TST13           ;;BRANCH TO NEXT TEST
 1780
 1781  006300  004767  007630          T10L02: JSR PC,CLRREG           ;CLEAR UBE REG
 1782  006304  012767  052525  021366          MOV #052525,BUFF1       ;PUT TEST DATA IN BUFFER
 1783  006312  012777  177777  174200          MOV #177777,@#BECC      ;HAVE UBE DO 1 XFER
 1784  006320  012777  027700  174174          MOV #BUFF1,@#BEBA       ;LOAD UBE WITH BUFFER ADDRESS
 1785  006326  012705  006612                  MOV #ERR3,R5            ;INITIALIZE R5 FOR ERROR ADDRESS
 1786  006332  012777  002403  174164          MOV #2403,@#BECR1       ;HAVE UBE DO DATIP VIA BR=4 AND FUNCTION 1
 1787  006340  004767  000176                  JSR PC,RDYS             ;GO CHECK FOR RDY SET
 1788  006344  022777  125252  174144          CMP #125252,@#BEBD      ;HAS UBE SHIFTED DATA?
 1789  006352  301004                          BNE T10L06              ;BRANCH IF NO
 1790  006354  022767  125252  021316          CMP #125252,BUFF1       ;HAS MEM LOC BEEN SHIFTED?
 1791  006362  001420                          BEQ T10L03              ;GO TEST DATOB IF YES
 1792  006364  017767  174126  172622  T10L06: MOV @#BEBD,$REG0        ;SAVE (BEBD)
 1793  006372  016767  021302  172616          MOV BUFF1,$REG1         ;SAVE MEM DATA
 1794  006400  012767  027700  172612          MOV #BUFF1,$REG2        ;SAVE MEM ADDRESS
 1795  006406  012767  125252  172606          MOV #125252,$REG3       ;SAVE CORRECT DATA
 1796  006414  104032                          ERROR ^D26              ;ERROR: DATIP FAILED TO LOAD PROPER DATA
 1797  006416  004767  007712                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 1798  006422  000502                          BR      TST13           ;;BRANCH TO NEXT TEST
 1799
 1800  006424  012767  000377  021246  T10L03: MOV #377,BUFF1          ;INITIALIZE BUFFER
 1801  006432  012705  006622                  MOV #ERR4,R5            ;INITIALIZE R5 FOR ERROR ADDRESS
 1802  006436  012777  177400  174052          MOV #177400,@#BEBD      ;LOAD HIGH BYTE OF LBE WITH 1'S
 1803  006444  012777  027701  174050          MOV #BUFF1+1,@#BEBA     ;LOAD HIGH BYTE BUFF ADDR. INTO LBE
 1804  006452  012777  177777  174040          MOV #177777,@#BECC      ;HAVE UBE DO 1 XFER
 1805  006460  012777  003403  174036          MOV #3403,@#BECR1       ;HAVE UBE DO DATOB VIA BR=4 AND FUNCTION 1
 1806  006466  004767  000050                  JSR PC,RDYS             ;GO CHECK FOR RDY SET
 1807  006472  022767  177777  021200          CMP #177777,BUFF1       ;TEST IF DATOB DONE CORRECTLY
 1808  006500  001453                          BEQ     TST13           ;;BRANCH IF YES TO NEXT TEST
 1809
 1810  006502  017767  174010  172504          MOV @#BEBD,$REG0        ;SAVE (BEBD)
 1811  006510  016767  021164  172500          MOV BUFF1,$REG1         ;SAVE NEW DATA
 1812  006516  012767  027700  172474          MOV #BUFF1,$REG2        ;SAVE MEM ADDRESS
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```
1813  006524  012767  177777  172470          MOV #177777,$REG3       ;SAVE CORRECT DATA
1814  006532  104033                          ERROR ↑D27              ;ERROR: DATOB FAILED TO LOAD DATA PROPERLY
1815  006534  004767  007574                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1816  006540  000433                          BR      TST13           ;;BRANCH TO NEXT TEST
1817
1818                                  ;SUBROUTINE TO TEST IF RDY BIT SET
1819
1820  006542  005004                  RDYS:   CLR R4                  ;INITIALIZE R4
1821  006544  032777  000200  173752  TIOL05: BIT #200,@BECR1         ;IS RDY SET?
1822  006552  001006                          BNE TIOL04              ;BRANCH IF YES
1823  006554  005204                          INC R4                  ;UPDATE COUNT
1824  006556  032704  000020                  BIT #20,R4              ;COUNT=16?
1825  006562  001770                          BEQ TIOL05              ;IF NO, GO TEST RDY AGAIN
1826  006564  005726                          TST (SP)+               ;RETURN STACK PTER
1827  006566  000115                          JMP (R5)                ;GO INDICATE ERROR
1828  006570  000207                  TIOL04: RTS PC                  ;RETURN AND CHECK DATA
1829  006572  104034                  ERR1:   ERROR ↑D28              ;ERROR: DATI FAILED TO SET RDY
1830  006574  004767  007534                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1831  006600  000413                          BR      TST13           ;;GO TO NEXT TEST
1832  006602  104035                  ERR2:   ERROR ↑D29              ;ERROR: DATO FAILED TO SET RDY
1833  006604  004767  007524                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1834  006610  000407                          BR      TST13           ;;GO TO NEXT TEST
1835  006612  104036                  ERR3:   ERROR ↑D30              ;ERROR: DATIP FAILED TO SET RDY
1836  006614  004767  007514                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1837  006620  000403                          BR      TST13           ;;GO TO NEXT TEST
1838  006622  104037                  ERR4:   ERROR ↑D31              ;ERROR: DATOB FAILED TO SET RDY
1839  006624  004767  007504                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1840
1841  006630                          TSTA:
1842
1843                                  ;;*****************************************************************
1844                                  ;*TEST 13       TEST INHIBIT DATA SHIFT ON DATIP
1845                                  ;;*****************************************************************
1846  006630  000004                  TST13:  SCOPE
1847  006632  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
1848  006636  004767  007272                  JSR PC,CLRREG           ;CLEAR UBE REG
1849  006642  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
1850  006646  012767  052525  021C24          MOV #052525,BUFF1       ;PUT TEST DATA IN BUFFER
1851  006654  012777  177777  173636          MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1852  006662  012777  027700  173632          MOV #BUFF1,@BEBA        ;LOAD UBE WITH BUFFER ADDRESS
1853  006670  012777  022403  173626          MOV #22403,@BECR1       ;HAVE UBE DO DATIP WITH INH DATA SHIFT
1854  006676  004767  007306                  JSR PC,CRDY             ;CHECK FOR RDY BIT
1855  006702  005704                          TST R4                  ;DID RDY SET?
1856  006704  001404                          BEQ     T11L01          ;BRANCH IF YES
1857  006706  104036                          ERROR ↑D30              ;ERROR: DATIP FAILED TO SET RDY
1858  006710  004767  007420                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1859  006714  000427                          BR      TST14           ;;BRANCH TO NEXT TEST
1860  006716  022777  052525  173572  T11L01: CMP #052525,@BEBD       ;IS (BEBD) OK?
1861  006724  001004                          BNE T11L02              ;BRANCH IF NO
1862  006726  022767  052525  020744          CMP #052525,BUFF1       ;IS MEM OK?
1863  006734  001417                          BEQ     TST14           ;;BRANCH IF YES TO NEXT TEST
1864  006736  017767  173554  172250  T11L02: MOV @BEBD,$REG0         ;SAVE (BEBD)
1865  006744  016767  020730  172244          MOV BUFF1,$REG1         ;SAVE MEM DATA
1866  006752  012767  027700  172240          MOV #BUFF1,$REG2        ;SAVE MEM ADDRESS
1867  006760  012767  052525  172234          MOV #052525,$REG3       ;SAVE CORRECT DATA
1868  006766  104040                          ERROR ↑D32              ;ERROR: INH. DATA SHIFT ON DATIP FAILED
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1869  006770  004767  007340                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1870
1871                                  ;;*****************************************************************
1872                                  ;*TEST 14       TEST DATOB ON DATIP
1873                                  ;;*****************************************************************
1874  006774  000004                 TST14:  SCOPE
1875  006776  012706  001100                 MOV #STACK,SP           ;RESTORE STACK
1876  007002  004767  007126                 JSR PC,CLRREG           ;CLEAR UBE REG
1877  007006  005037  177776                 CLR @#PSW               ;ALLOW INTERRUPTS
1878  007012  012767  177525  020660         MOV #177525,BUFF1       ;LOAD TEST DATA IN BUFFER
1879  007020  012777  027700  173474         MOV #BUFF1,@BEBA        ;LOAD UBE WITH LOW BYTE ADDRESS
1880  007026  012777  177777  173464         MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1881  007034  012777  042403  173462         MOV #42403,@BECR1       ;HAVE UBE DO DATOB ON DATIP
1882  007042  004767  007142                 JSR PC,CRDY             ;CHECK FOR RDY SET
1883  007046  022777  177253  173442         CMP #177253,@BEBD       ;CHECK (BEBD) OK
1884  007054  001004                         BNE T12L01              ;BRANCH IF NO
1885  007056  022767  177653  020514         CMP #177653,BUFF1       ;CHECK BUFFER OK
1886  007064  001417                         BEQ     TST15           ;;BRANCH IF YES TO NEXT TEST
1887  007066  017767  173424  172120  T12L01: MOV @BEBD,$REG0         ;SAVE (BEBD)
1888  007074  016767  020600  172114         MOV BUFF1,$REG1         ;SAVE MEM DATA
1889  007102  012767  027700  172110         MOV #BUFF1,$REG2        ;SAVE MEM ADDRESS
1890  007110  012767  177653  172104         MOV #177653,$REG3       ;SAVE CORRECT DATA
1891  007116  104041                         ERROR !D33              ;ERROR: DATOB ON DATIP FAILED
1892  007120  004767  007210                 JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1893
1894
1895                                  ;;*****************************************************************
1896                                  ;*TEST 15       TEST ADDRESS REG COUNTS BY 2 AND 1
1897                                  ;*
1898                                  ;*R0 CONTAINS THE TEST DATA
1899                                  ;;*****************************************************************
1900  007124  000004                 TST15:  SCOPE
1901  007126  012706  001100                 MOV #STACK,SP           ;RESTORE STACK
1902  007132  004767  006776                 JSR PC,CLRREG           ;CLEAR UBE REGS
1903  007136  004767  007076                 JSR PC,DINT             ;DISREGARD UBE INTERRUPTS
1904  007142  005037  177776                 CLR @#PSW               ;ALLOW INTERRUPTS
1905  007146  012700  000002                 MOV #2,R0               ;INITIALIZE TEST COUNTER
1906  007152  012777  177777  173340  T14L02: MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1907  007160  012777  002003  173336         MOV #2003,@BECR1        ;HAVE UBE DO DATI
1908  007166  004767  007016                 JSR PC,CRDY             ;CHECK RDY SET
1909  007172  020077  173324                 CMP R0,@BEBA            ;IS ADDRESS CORRECT?
1910  007176  001057                         BNE T14L01              ;BRANCH TO ERROR IF NO
1911  007200  005200                         INC R0                  ;UPDATE R0
1912  007202  005200                         INC R0                  ;UPDATE R0
1913  007204  022700  000002                 CMP #2,R0               ;HAVE ALL ADRESSES BEEN TESTED?
1914  007210  001360                         BNE T14L02              ;LOOK AT NEXT ADDRESS IF NO
1915  007212  012777  177776  173302         MOV #177776,@BEBA       ;LOAD MAX ADDRESS IN LOWER 16 BITS UBE
1916  007220  012777  000003  173300         MOV #3,@BECR2           ;LOAD A16,A17 OF UBE WITH 1
1917  007226  012777  177777  173264         MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1918  007234  005277  173264                 INC @BECR1              ;HAVE UBE DO DATI
1919  007240  004767  006744                 JSR PC,CRDY             ;CHECK RDY SET
1920  007244  032777  000003  173254         BIT #3,@BECR2           ;TEST A16,A17=0
1921  007252  001042                         BNE T14L03              ;BRANCH TO ERROR IF NO
1922
1923                                  ;NOW TEST ADDRESS COUNTS BY 1
1924
```

```
 1925  007254  012777  027701  173240          MOV #BUFF1+1,@BEBA      ;PUT ODD ADD OF BUFFER IN UBE
 1926  007262  012777  177777  173230          MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
 1927  007270  012777  003403  173226          MOV #3403,@BECR1        ;HAVE UBE DO DATOB
 1928  007276  004767  006706                  JSR PC,CRDY             ;CHECK RDY
 1929  007302  022777  027702  173212          CMP #BUFF1+2,@BE:       ;DID ADDRESS UPDATE BY 1?
 1930  007310  001434                          BEQ     T14L04          ;;BRANCHIF YES TO RESTORE TRAPS
 1931  007312  017767  173204  171674          MOV @BEBA,$REG0         ;SAVE BAD ADDRESS
 1932  007320  012767  027702  171670          MOV     #BUFF1+2,$REG1  ;SAVE GOOD ADDRESS
 1933  007326  104045                          ERROR ↑D37              ;ERROR: BEBA DID NOT COUNT BY 1
 1934  007330  004767  007000                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 1935  007334  000422                          BR      T14L04          ;;GO TO RESTORE TRAPS
 1936  007336  017767  173160  171650  T14L01: MOV @BEBA,$REG0         ;SAVE BAD ADDRESS
 1937  007344  010067  171646                  MOV R0,$REG1            ;SAVE CORRECT ADDRESS
 1938  007350  104043                          ERROR ↑D35              ;ERROR: BEBA DID NOT COUNT BY 2
 1939  007352  004767  006756                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 1940  007356  000411                          BR      T14L04          ;;GO TO RESTORE TRAPS
 1941  007360  017700  173142          T14L03: MOV @BECR2,R0           ;GET ADDRESS BITS FROM UBE
 1942  007364  042700  177774                  BIC #177774,R0          ;JUST LOOK AT A16,A17
 1943  007370  010067  171620                  MOV R0,$REG0            ;SAVE ADDRESS
 1944  007374  104044                          ERROR ↑D36              ;ERROR: BEBA BITS A16,A17 DID NOT COUNT = 0
 1945  007376  004767  006732                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 1946  007402  004767  006560          T14L04: JSR     PC,RCATCH       ;RESTORE TRAPS AND GO TO NEXT TEST
 1947
 1948                                  ;;*****************************************************************
 1949                                  ;*TEST 16      TEST BUS ADDRESS BITS WILL CHANGE
 1950                                  ;*
 1951                                  ;*THE UBE BUS ADDRESS BITS ARE CHECKED TO
 1952                                  ;*SEE IF THEY CAN CHANGE FROM 0,1. SEVERAL DATIS
 1953                                  ;*ARE DONE FROM LOCATION 0, THE HIGHEST LOC IN THE FIRST
 1954                                  ;*8K AND FROM THE UBE SIMULTANEOUS GO ADDRESS.
 1955                                  ;;*****************************************************************
 1956  007406  000004                  TST16:  SCOPE
 1957  007410  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
 1958  007414  004767  006514                  JSR PC,CLRREG           ;CLEAR UBE REG
 1959  007420  004767  006514                  JSR PC,DINT             ;DISREGARD INTERRUPTS
 1960  007424  005037  177776                  CLR @#PSW               ;ALLOW DATA TRANSFERS
 1961
 1962                                  ;SIZE MEMORY FROM 4K TO 8K
 1963
 1964  007430  012737  007460  000004          MOV #T13L01,@#4         ;SET UP TIME OUT TRAP
 1965  007436  012700  017776                  MOV #17776,R0           ;SET R0=LAST ADDRESS IN 1ST 4K OF MEM
 1966  007442  062700  004000          T13L02: ADD #4000,R0            ;UPDATE R0 TO NEXT 1K OF MEM
 1967  007446  005710                          TST (R0)                ;TEST IF 1K PRESENT. TIMES OUT IF NOT.
 1968  007450  022700  037776                  CMP #37776,R0           ;AT 8K
 1969  007454  001372                          BNE T13L02              ;LOOK AT NEXT 1K IF NOT
 1970  007456  000402                          BR T13L03
 1971  007460  162700  004000          T13L01: SUB #4000,R0            ;GET ADDRESS OF LAST 1K OF MEM PRESENT
 1972
 1973  007464  012737  000006  000004  T13L03: MOV #6,@#4              ;RESTORE TRAP
 1974  007472  011001                          MOV (R0),R1             ;SAVE CONTENTS OF LAST LOC IN FIRST 8K
 1975  007474  010010                          MOV R0,(R0)             ;PUT ADDRESS OF LOC IN MEM LOC
 1976  007476  012737  000000  000000          MOV #0,@#0              ;PUT 0 IN LOC 0
 1977  007504  012777  177777  173006          MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
 1978  007512  012777  002003  173004          MOV #2003,@BECR1        ;HAVE UBE DO DATI FROM MEM LOC 0
 1979  007520  004767  006464                  JSR PC,CRDY             ;CHECK FOR RDY SET
 1980  007524  005777  172766                  TST @BE8D               ;SEE IF UBE READ 0 FROM LOC 0
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```
1981  007530  001034                          BNE T13L04              ;BRANCH TO ERROR IF DATA NOT = 0
1982  007532  010077  172764                  MOV R0,@BEBA            ;HAVE UBE ADDRESS HIGHEST MEMORY IN 4K-8K LOCATIONS
1983  007536  012777  177777  172754          MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1984  007544  005277  172754                  INC @BECR1              ;HAVE UBE DO DATI FROM HIGHEST MEMORY IN 4K-8K LOCATIONS
1985  007550  004767  006434                  JSR PC,CRDY             ;CHECK FOR RDY SET
1986  007554  020077  172736                  CMP R0,@BEBD            ;DID UBE READ FROM PROPER LOCATION?
1987  007560  001020                          BNE T13L04              ;BRANCH IF DATA  NOT = R0
1988  007562  016777  172746  172732          MOV BEGO,@BEBA          ;HAVE UBE ADDRESS ITS GO ADDRESS
1989  007570  012777  000003  172730          MOV #3,@BECR2           ;HAVE UBE ADDRESS ITS GO ADDRESS
1990  007576  012777  177777  172714          MOV #177777,@BECC       ;HAVE UBE DO 1 XFER
1991  007604  005277  172714                  INC @BECR1              ;HAVE UBE DO DATI FROM GO ADDRESS
1992  007610  004767  006374                  JSR PC,CRDY             ;CHECK FOR RDY SET
1993  007614  005777  172676                  TST @BEBD               ;DID UBE READ PROPER LOCATION?
1994  007620  001411                          BEQ T13L05              ;BRANCH IF YES
1995  007622  017767  172674  171364  T13L04: MOV @BEBA,$REG0        ;GET ADDRESS+2 TRIED TO READ FROM
1996  007630  162767  000002  171356          SUB #2,$REG0            ;CALC. ADDRESS TRIED TO READ FROM
1997  007636  104042                          ERROR †D34              ;ERROR: UBE DID DATI FROM WRONG LOCATION
1998  007640  004767  006470                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
1999  007644  004767  006316          T13L05: JSR PC,RCATCH           ;RESTORE TRAPS
2000  007650  010110                          MOV R1,(R0)             ;RESTORE CONTENTS OF LAST LOC OF FIRST 8K
2001
2002                                  ;;**************************************************************
2003                                  ;*TEST 17       TEST CYCLE COUNT COUNTS BY 1 AND INCREMENTS WITH EACH INTERRUPT
2004                                  ;*
2005                                  ;*THE BECC REG IS CYCLED FROM 0 TO 177777 BY INTERRUPTING THE
2006                                  ;*CPU.  AFTER EACH INTERRUPT, THE REG IS COMPARED WITH R0 WHICH
2007                                  ;*CONTAINS THE PROPER DATA.
2008                                  ;;**************************************************************
2009  007652  000004                  †ST17:  SCOPE
2010  007654  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
2011  007660  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2012  007666  004767  006242                  JSR PC,CLRREG           ;CLEAR UBE REG
2013  007672  005000                          CLR R0                  ;INITIALIZE TEST COUNTER
2014  007674  012777  007716  172630          MOV #T15L01,@INTVEC     ;SET UP INT VECTOR AREA
2015  007702  012777  000003  172614  T15L03: MOV #3,@BECR1           ;HAVE UBE INT.VIA BR=4
2016  007710  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
2017  007714  000240                          NOP                     ;UBE WILL INTERRUPT HERE
2018  007716  022626                  T15L01: CMP (SP)+,(SP)+         ;RESTORE STACK AFTER INTERRUPT
2019  007720  005200                          INC R0                  ;UPDATE TEST COUNTER
2020  007722  005700                          TST R0                  ;IS R0=0?
2021  007724  001423                          BEQ T15L02              ;RESTORE TRAPS IF YES
2022  007726  020077  172566                  CMP R0,@BECC            ;DID CYCLE COUNT UPDATE PROPERLY?
2023  007732  001763                          BEQ T15L03              ;INCREMENT BECC IF YES
2024  007734  017767  172560  171252          MOV @BECC,$REG0         ;SAVE BAD DATA
2025  007742  010067  171250                  MOV R0,$REG1            ;SAVE GOOD DATA
2026  007746  104046                          ERROR †D38              ;ERROR: INTERRUPT FAILED TO UPDATE BECC TO CORRECT VALUE
2027  007750  004767  006360                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2028  007754  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2029  007762  012777  006003  172534          MOV #6003,@BECR1        ;HAVE UBE CYCLE SO IT SETS RDY
2030  007770  005037  177776                  CLR @#PSW               ;ALLOW UBE TO CYCLE
2031  007774  004767  006166          T15L02: JSR PC,RCATCH           ;RESTORE TRAPS
2032
2033                                  ;;**************************************************************
2034                                  ;*TEST 20       TEST INHIBIT INCREMENT OF BECC AND BEBA
2035                                  ;*
2036                                  ;*A DATI IS DONE VIA BR ARBITRATION AND THE BECC AND BEBA REGS
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2037                                    ;*ARE CHECKED TO NOT INCREMENT.
2038                                    ;;*****************************************************************
2039  010000  000004                    ↑T20:   SCOPE
2040  010002  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
2041  010006  012737  000340  177776            MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2042  010014  004767  006114                    JSR PC,CLRREG           ;CLEAR UBE REG
2043  010020  012777  027700  172474            MOV #BUFF1,@BEBA        ;LOAD UBE WITH TEST ADDRESS
2044  010026  012777  177777  172464            MOV #177777,@BECC       ;LOAD TEST DATA INTO BECC
2045  010034  012767  000001  017636            MOV #1,BUFF1            ;SETUP BUFFER DATA
2046  010042  012777  000004  172456            MOV #4,@BECR2           ;HAVE UBE INH. INC. OF BECC AND BEBA
2047  010050  012777  002003  172446            MOV #2003,@BECR1        ;HAVE UBE DO DATI FROM BUFFER AREA
2048  010056  005037  177776                    CLR @#PSW               ;ALLOW DATA XFER
2049  010062  005777  172430          T16L01:   TST @BEBD               ;WAS DATA XFERED?
2050  010066  001775                    BEQ T16L01              ;WAIT TILL DATA IN BEBD
2051  010070  022777  177777  172422            CMP #177777,@BECC       ;CHECK BECC WAS NOT UPDATED
2052  010076  001010                    BNE T16L02              ;BRANCH IF WAS TO ERROR
2053  010100  022777  027700  172414            CMP #BUFF1,@BEBA        ;CHECK BEBA WAS NOT UPDATED
2054  010106  001407                    BEQ T16L03              ;BRANCH IF WAS NOT UPDATED
2055  010110  104047                    ERROR ↑D39              ;ERROR: BEBA INCREMENTED WHEN IT WAS INHIBITED
2056  010112  004767  006216                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2057  010116  000403                    BR T16L03
2058  010120  104050          T16L02:   ERROR ↑D40              ;ERROR: BECC INCREMENTED WHEN IT WAS INHIBITED
2059  010122  004767  006206                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2060  010126  042777  000004  172372  T16L03:   BIC #4,@BECR2           ;ALLOW BEBA AND BECC TO COUNT
2061  010134  004767  006050                    JSR PC,CRDY             ;WAIT TILL UBE IS DONE
2062
2063                                    ;;*****************************************************************
2064                                    ;*TEST 21       TEST INT ENB AND CCOVF WORK AND THAT UBE WILL DO SEVERAL XFERS
2065                                    ;*
2066                                    ;*THE UBE IS SETUP TO DO 4 DATO XFERS VIA BR ARBITRATION AND
2067                                    ;*INTERRUPT WHEN DONE.  THE INTERRUPT IS CHECKED FOR
2068                                    ;*AND THEN A BUFFER AREA IS TESTED TO SEE IF EXACTLY
2069                                    ;*FOUR TRANSFERS WERE DONE.
2070                                    ;;*****************************************************************
2071  010140  000004                    ↑T21:   SCOPE
2072  010142  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
2073  010146  012737  000340  177776            MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2074  010154  004767  005754                    JSR PC,CLRREG           ;CLEAR UBE REG
2075  010160  012700  027700                    MOV #BUFF1,R0           ;GET BUFFER ADDRESS
2076  010164  005020          T17L01:   CLR (R0)+               ;CLEAR BUFFER AREA
2077  010166  020027  027720                    CMP R0,#BUFF1+20        ;AT END OF BUFFER?
2078  010172  001374                    BNE T17L01              ;BRANCH IF NO
2079  010174  012777  000377  172314            MOV #377,@BEBD          ;SET UP XFER TEST DATA
2080  010202  012777  027700  172312            MOV #BUFF1,@BEBA        ;LOAD UBE WITH BUFF ADDRESS
2081  010210  012777  177774  172302            MOV #177774,@BECC       ;SET UBE TO DO 4 XFERS
2082  010216  012777  010260  172306            MOV #T17L02,@INTVEC     ;SET UP INT VECTOR
2083  010224  012777  003121  172272            MOV #3121,@BECR1        ;HAVE UBE DO DATO VIA BR=7 AND INTERRUPT ON DONE
2084  010232  005037  177776                    CLR @#PSW               ;ALLOW XFERS
2085  010236  005000                    CLR R0                  ;INITIALIZE COUNT
2086  010240  005200          T17L03:   INC R0                  ;UPDATE COUNT TO WAIT FOR INTERRUPT
2087  010242  022700  001000                    CMP #1000,R0            ;WAITED LONG ENOUGH?
2088  010246  001374                    BNE T17L03              ;BRANCH IF NO
2089  010250  104051                    ERROR ↑D41              ;ERROR: UBE FAILED TO INT. ON DONE
2090  010252  004767  006056                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2091  010256  000470                    BR      T17L09          ;;GO RESTORE TRAPS
2092  010260  012700  027700          T17L02:   MOV #BUFF1,R0           ;GET START OF BUFFER
```

```
2093  010264  005720                    T17L05: TST (R0)+               ;TEST FIRST 4 LOC WRITTEN
2094  010266  001433                            BEQ T17L04              ;BRANCH IF NOT WRITTEN TO ERROR
2095  010270  022700  027710                    CMP #BUFF1+10,R0        ;LOOKED AT ALL WRITTEN LOCS.
2096  010274  001373                            BNE T17L05              ;BRANCH IF NO
2097  010276  005720                    T17L06: TST (R0)+               ;TEST LAST 4 LOC WERE NOT WRITTEN
2098  010300  001027                            BNE T17L10              ;BRANCH TO ERROR IF WERE
2099  010302  022700  027720                    CMP #BUFF1+20,R0        ;AT END OF BUFFER?
2100  010306  001373                            BNE T17L06              ;NO, LOOK AT NEXT LOCATION
2101  010310  032777  000100  172206            BIT #100,@BECR1         ;YES, TEST INT. ON DONE BIT=0
2102  010316  001041                            BNE T17L07              ;BRANCH TO ERROR IF NOT=0
2103  010320  032777  020000  172200            BIT #20000,@BECR2       ;TEST CCOVF=1
2104  010326  001441                            BEQ T17L08              ;BRANCH TO ERROR IF=0
2105  010330  012777  006003  172166            MOV #6003,@BECR1        ;SET GO BIT TO SEE IF CCOVF IS RESET
2106  010336  032777  020000  172162            BIT #20000,@BECR2       ;TEST CCOVF=0
2107  010344  001435                            BEQ     T17L09          ;;GO RESTORE TRAPS IF YES
2108  010346  104052                            ERROR ↑D42              ;ERROR: CCOVF NOT CLEARED BY GO
2109  010350  004767  005760                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2110  010354  000431                            BR      T17L09          ;;GO RESTORE TRAPS
2111  010356  005740                    T17L04: TST -(R0)               ;CALC. LAST ADD. WRITTEN
2112  010360  005740                    T17L10: TST -(R0)               ;CALC. LAST ADD. WRITTEN
2113  010362  022700  027700                    CMP #BUFF1,R0           ;WERE ANY ADD. WRITTEN?
2114  010366  003404                            BLE T17L11              ;BRANCH IF YES
2115  010370  104067                            ERROR ↑D55              ;ERROR: UBE DID NOT DO DATO TO PROPER # OF LOC (4)
2116  010372  004767  005736                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2117  010376  000420                            BR      T17L09          ;;GO RESTORE TRAPS
2118  010400  012767  027700  170606  T17L11: MOV #BUFF1,$REG0          ;SAVE FIRST LOCATION WRITTEN
2119  010406  010067  170604                    MOV R0,$REG1            ;SAVE LAST LOCATION WRITTEN
2120  010412  104053                            ERROR ↑D43              ;ERROR: UBE DID NOT DO DATO TO PROPER # OF LOCATIONS (4)
2121  010414  004767  005714                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2122  010420  000407                            BR      T17L09          ;;GO RESTORE TRAPS
2123  010422  104054                    T17L07: ERROR ↑D44              ;ERROR: INT. ON DONE BIT NOT CLEARED
2124  010424  004767  005704                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2125  010430  000403                            BR      T17L09          ;;GO RESTORE TRAPS
2126  010432  104055                    T17L08: ERROR ↑D45              ;ERROR: CCOVF NOT SET
2127  010434  004767  005674                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2128  010440  004767  005522            T17L09: JSR PC,RCATCH           ;RESTORE TRAPS
2129
2130                                    ;;*****************************************************************
2131                                    ;*TEST 22       TEST DATA XFERS FROM BECC
2132                                    ;*
2133                                    ;*THE UBE IS SET UP TO DO 4 DATO XFERS VIA BR ARBITRATION FROM
2134                                    ;*THE BECC REG TO A BUFFER AREA.  THE AREA IS THEN CHECKED.
2135                                    ;;*****************************************************************
2136  010444  000004                    ↑ST22:  SCOPE
2137  010446  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
2138  010452  004767  005456                    JSR PC,CLRREG           ;CLEAR UBE REG
2139  010456  005037  177776                    CLR @#PSW               ;ALLOW INTERRUPTS
2140  010462  012700  027700                    MOV #BUFF1,R0           ;GET BUFFER ADDRESS
2141  010466  005020                    T18L01: CLR (R0)+               ;CLEAR BUFFER AREA
2142  010470  020027  027720                    CMP R0,#BUFF1+20        ;AT END OF BUFFER?
2143  010474  001374                            BNE T18L01              ;BRANCH IF NO
2144  010476  012777  027700  172016            MOV #BUFF1,@BEBA        ;LOAD STARTING ADDRESS INTO UBE
2145  010504  012777  177774  172006            MOV #177774,@BECC       ;SETUP UBE TO DO 4 XFERS
2146  010512  012777  013003  172004            MOV #13003,@BECR1       ;HAVE UBE DO 4 XFERS FROM BECC
2147  010520  032777  000200  171776  T18L02: BIT #200,@BECR1          ;LOOK FOR RDY SET
2148  010526  001774                            BEQ T18L02              ;BRANCH TILL SET
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2149  010530  012700  027700              MOV #BUFF1,R0          ;GET BUFFER ADDRESS
2150  010534  012701  177774              MOV #177774,R1         ;INITIALIZE R1=TO FIRST DATA WORD
2151  010540  022001              T18L04: CMP (R0)+,R1           ;IS DATA OK?
2152  010542  001005                      BNE T18L03             ;NO, GO TO ERROR
2153  010544  005201                      INC R1                 ;UPDATE FOR NEXT DATA
2154  010546  020027  027710              CMP R0,#BUFF1+10       ;LOOKED AT ALL DATA?
2155  010552  001372                      BNE T18L04             ;NO, LOOK AT NEXT WORD
2156  010554  000412                      BR      TST23          ;;GO TO NEXT TEST
2157
2158  010556  005740              T18L03: TST -(R0)              ;CALC. ADDRESS OF FAILURES
2159  010560  010067  170430              MOV R0,$REG0           ;SAVE ADDRESS
2160  010564  011067  170426              MOV (R0),$REG1         ;SAVE BAD DATA
2161  010570  010167  170424              MOV R1,$REG2           ;SAVE GOOD DATA
2162  010574  104056                      ERROR ^D46             ;ERROR: DATO FROM BECC NOT DONE PROPERLY
2163  010576  004767  005532              JSR PC,TERRPC          ;TYPE PC OF ERROR MSG
2164
2165                                ;;*****************************************************************
2166                                ;*TEST 23     TEST UBE CAN DO 2 XFERS PER BUS REQUEST
2167                                ;*
2168                                ;*THE UBE IS SET UP TO DO 2 DATO XFERS PER REQUEST VIA
2169                                ;*BR ARBITRATION.  THE CYCLE COUNT IS SET TO DO A TOTAL OF
2170                                ;*FOUR XFERS.  THE UBE IS TOLD TO GO. THE FIRST TIME
2171                                ;*THE CPU GETS THE BUS, AFTER THIS, THE PSW PRIORITY IS
2172                                ;*SET FOR 7 HOLDING OFF FURTHER UBE ACTION.  A BUFFER
2173                                ;*AREA IS THEN CHECKED THAT THE UBE DID EXACTLY 2 XFERS
2174                                ;*PER REQUEST.
2175                                ;;*****************************************************************
2176  010602  000004              TST23:  SCOPE
2177  010604  012706  001100              MOV #STACK,SP          ;RESTORE STACK
2178  010610  012737  000340  177776      MOV #340,@#PSW         ;LOCK ON INTERRUPTS
2179  010616  004767  005312              JSR PC,CLRREG          ;CLEAR UBE REGS
2180  010622  012700  027700              MOV #BUFF1,R0          ;GET BUFFER ADDRESS
2181  010626  005020              T19L01: CLR (R0)+              ;CLEAR BUFFER AREA
2182  010630  020027  027720              CMP R0,#BUFF1+20       ;AT END OF BUFFER?
2183  010634  001374                      BNE T19L01             ;CONTINUE TO CLEAR IF NO
2184  010636  012777  027700  171656      MOV #BUFF1,@BEBA       ;LOAD BUFFER ADDRESS INTO UBE
2185  010644  012777  177774  171646      MOV #177774,@BECC      ;SET UBE TO DO 4 XFERS
2186  010652  012777  000377  171636      MOV #377,@BEBD         ;LOAD TEST DATA INTO UBE
2187  010660  012777  005003  171636      MOV #5003,@BECR1       ;HAVE UBE DO 2 DATO/REQUEST VIA BR=4
2188  010666  005037  177776              CLR @#PSW              ;ALLOW UBE TO DO XFERS
2189  010672  000240                      NOP                    ;UBE SHOULD DO 2 XFERS HERE
2190  010674  012737  000340  177776      MOV #340,@#PSW         ;SET PRIORITY=7 TO STOP LAST 2 XFERS
2191  010702  012700  027700              MOV #BUFF1,R0          ;GET BUFF ADDRESS
2192  010706  005720              T19L03: TST (R0)+              ;WAS BUFF WRITTEN?
2193  010710  001411                      BEQ T19L09             ;BRANCH TO ERROR IF NO
2194  010712  020027  027704              CMP R0,#BUFF1+4        ;LOOKED AT FIRST 2 LOCATIONS?
2195  010716  001373                      BNE T19L03             ;BRANCH IF NO
2196  010720  005720              T19L04: TST (R0)+              ;TEST BUFF LOC NOT WRITTEN
2197  010722  001005                      BNE T19L02             ;BRANCH TO ERROR IF WRITTEN
2198  010724  020027  027710              CMP R0,#BUFF1+10       ;LOOKED AT FOURTH LOC?
2199  010730  001373                      BNE T19L04             ;BRANCH IF NO
2200  010732  000421                      BR      T19L05         ;;GO TO END OF TEST
2201  010734  005740              T19L09: TST -(R0)              ;CALC LAST ADDRESS WRITTEN
2202  010736  005740              T19L02: TST -(R0)              ;CALC LAST ADDRESS WRITTEN
2203  010740  022700  027700              CMP #BUFF1,R0          ;WERE ANY ADDRESS WRITTEN?
2204  010744  101404                      BLOS T19L07            ;BRANCH IF YES
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2205  010746  104060                          ERROR ↑D48              ;ERROR: UBE DID NOT DO 2 XFERS/REQUEST
2206  010750  004767  005360                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2207  010754  000410                          BR      T19L05          ;;GO TO END OF TEST
2208  010756  012767  027700  170230  T19L07: MOV #BUFF1,$REG0        ;SAVE FIRST ADDRESS WRITTEN
2209  010764  010067  170226                  MOV R0,$REG1            ;SAVE LAST ADDRESS WRITTEN
2210  010770  104057                          ERROR ↑D47              ;ERROR: UBE DID NOT DO 2 XFERS FOR EACH REQUEST
2211  010772  004767  005336                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2212  010776  005037  177776          T19L05: CLR @#PSW               ;ALLOW LAST 2 XFERS
2213  011002  000240                          NOP                     ;ALLOW UBE TO GET BUS
2214  011004  004767  005200                  JSR PC,CRDY             ;WAIT TILL UBE FINISHES XFERS
2215
2216                                  ;;*****************************************************************
2217                                  ;*TEST 24       TEST UBE CAN DO 2 DATIP XFERS PER REQUEST
2218                                  ;*
2219                                  ;*THE UBE IS SET UP TO DO 2 DATIP XFERS PER REQUEST VIA
2220                                  ;*BR ARBITRATION.  THE CYCLE COUNT IS SET TO DO A TOTAL OF
2221                                  ;*FOUR XFERS.  THE UBE IS TOLD TO GO. THE FIRST TIME
2222                                  ;*THE CPU GETS THE BUS, AFTER THIS, THE PSW PRIORITY IS
2223                                  ;*SET FOR 7 HOLDING OFF FURTHER UBE ACTION.  A BUFFER
2224                                  ;*AREA IS THEN CHECKED THAT THE UBE DID EXACTLY 2 XFERS
2225                                  ;*PER REQUEST.
2226                                  ;;*****************************************************************
2227  011010  000004                  ↑ST24:  SCOPE
2228  011012  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
2229  011016  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2230  011024  004767  005104                  JSR PC,CLRREG           ;CLEAR UBE REG
2231  011030  012700  027700                  MOV #BUFF1,R0           ;GET BUFFER ADDRESS
2232  011034  012720  125252          T20L01: MOV #125252,(R0)+       ;LOAD TEST DATA
2233  011040  020027  027710                  CMP R0,#BUFF1+10        ;LOADED FIRST 4 LOCS?
2234  011044  001373                          BNE T20L01              ;BRANCH IF NO
2235  011046  012777  027700  171446          MOV #BUFF1,@BEBA        ;LOAD BUFFER ADDRESS INTO UBE
2236  011054  012777  177774  171436          MOV #177774,@BECC       ;SET UBE TO DO 4 CYCLES
2237  011062  012777  004403  171434          MOV #4403,@BECR1        ;HAVE UBE DO 2 DATIP/REQUEST VIA BR=4
2238  011070  005037  177776                  CLR @#PSW               ;ALLOW UBE TO DO CYCLES
2239  011074  000240                          NOP                     ;UBE SHOULD DO XFERS HERE
2240  011076  012737  000340  177776          MOV #340,@#PSW          ;SET PRIORITY = 7 TO STOP LAST 2 CYCLES
2241  011104  012700  027700                  MOV #BUFF1,R0           ;GET BUFF ADDRESS
2242  011110  022720  052525          T20L03: CMP #052525,(R0)+       ;TEST BUFF LOCS WRITTEN
2243  011114  001012                          BNE T20L02              ;BRANCH TO ERROR IF NOT DONE PROPERLY
2244  011116  022700  027704                  CMP #BUFF1+4,R0         ;LOOKED AT 2 WRITTEN LOCS?
2245  011122  001372                          BNE T20L03              ;BRANCH IF NO
2246  011124  022720  125252          T20L04: CMP #125252,(R0)+       ;TEST BUFF LOCS NOT WRITTEN
2247  011130  001005                          BNE T20L08              ;BRANCH TO ERROR IF WRITTEN
2248  011132  020027  027710                  CMP R0,#BUFF1+10        ;LOOKED AT FOURTH LOC?
2249  011136  001372                          BNE T20L04              ;BRANCH IF NO
2250  011140  000421                          BR      T20L05          ;;GO TO END OF TEST
2251  011142  005740                  T20L02: TST -(R0)               ;CALC LAST ADDRESS WRITTEN
2252  011144  005740                  T20L08: TST -(R0)               ;CALC LAST ADDRESS WRITTEN
2253  011146  022700  027700                  CMP #BUFF1,R0           ;WERE ANY LOC WRITTEN?
2254  011152  101404                          BLOS T20L06             ;BRANCH IF YES
2255  011154  104061                          ERROR ↑D49              ;ERROR: DID NOT DO 2 DATIP/REQUEST
2256  011156  004767  005152                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2257  011162  000410                          BR      T20L05          ;;GO TO END OF TEST
2258  011164  012767  027700  170022  T20L06: MOV #BUFF1,$REG0        ;SAVE FIRST ADDRESS WRITTEN
2259  011172  010067  170020                  MOV R0,$REG1            ;SAVE LAST ADDRESS WRITTEN
2260  011176  104062                          ERROR ↑D50              ;ERROR: UBE DID NOT DO 2 DATIP REQUEST
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2261  011200  004767  005130                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2262  011204  005037  177776          T20L05: CLR @#PSW               ;ALLOW LAST 2 CYCLES
2263  011210  000240                          NOP                     ;ALLOW UBE TO GET BUS
2264  011212  004767  004772                  JSR PC,CRDY             ;WAIT FOR UBE TO FINISH XFERS
2265
2266                                          ;;*****************************************************************
2267                                          ;*TEST 25       TEST DATA XFERS VIA NPR AND INT ON DONE WORK
2268                                          ;*
2269                                          ;*THIS IS THE FIRST TEST WHERE THE NPR IS EXERCISED.  ONE
2270                                          ;*DATO NPR IS DONE TO A BUFFER AREA.  THE READY BIT IS
2271                                          ;*THEN CHECKED FOR SETTING.  NEXT, THE SAME OPERATION IS
2272                                          ;*REPEATED ONLY THE INTERRUPT ON DONE BIT IS SET.
2273                                          ;*THE PROGRAM TESTS FOR THE INTERRUPT AND THEN EXAMINES
2274                                          ;*THE BUFFER AREA TO SEE THAT ONLY ONE > _R WAS DONE.
2275                                          ;*****************************************************************
2276  011216  000004                  TST25:  SCOPE
2277  011220  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
2278  011224  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2279  011232  004767  004676                  JSR PC,CLRREG           ;CLEAR UBE REG
2280  011236  005067  016436                  CLR BUFF1               ;CLEAR BUFFER LOC
2281  011242  012777  177777  171246          MOV #177777,@BEBD       ;LOAD L E DATA REG WITH TEST DATA
2282  011250  012777  027700  171244          MOV #BUFF1,@BEBA        ;LOAD UBE ADDRESS REG WITH BUFF ADD.
2283  011256  012777  177777  171234          MOV #177777,@BECC       ;SET UBE TO DO 1 CYCLE
2284  011264  012777  003041  171232          MOV #3041,@BECR1        ;HAVE UBE DO DATO VIA NPR
2285  011272  000240                          NOP                     ;ALLOW UBE TO SET BUS
2286  011274  004767  004710                  JSR PC,CRDY             ;CHECK RDY SET
2287  011300  005704                          TST R4                  ;DID RDY SET?
2288  011302  001042                          BNE T21L01              ;BRANCH TO ERROR IF RDY DID NOT SET
2289  011304  005767  016370                  TST BUFF1               ;WAS DATO DONE?
2290  011310  001452                          BEQ T21L02              ;BRANCH TO ERROR IF NPR NOT DONE
2291  011312  005067  016362                  CLR BUFF1               ;CLEAR BUFF LOC
2292  011316  005067  016360                  CLR BUFF1+2             ;CLEAR BUFF LOC +2
2293  011322  012777  011372  171202          MOV #T21L03,@INTVEC     ;SET UP FOR INTERRUPT
2294  011330  012777  027700  171164          MOV #BUFF1,@BEBA        ;LOAD TEST ADDRESS
2295  011336  012777  177777  171154          MOV #177777,@BECC       ;SET LBE TO DO 1 CYCLE
2296  011344  012777  003143  171152          MOV #3143,@BECR1        ;HAVE UBE DO DATO NPR AND INT WHEN DONE VIA BR=4
2297  011352  005037  177776                  CLR @#PSW               ;ALLOW UBE TO INTERRUPT
2298  011356  004767  004626                  JSR PC,CRDY             ;WAIT FOR INT. OR RDY TO SET
2299  011362  104065                          ERROR ↑D53              ;ERROR: UBE DID NOT INT WHEN NPR DONE
2300  011364  004767  004744                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2301  011370  000425                          BR T21L04               ;RESTORE TRAPS
2302  011372  005767  016304          T21L03: TST BUFF1+2             ;DID NPR WRITE MORE THAN 1 LOC?
2303  011376  001422                          BEQ     T21L04          ;;GO TO END OF TEST
2304  011400  104066                          ERROR ↑D54              ;ERROR: UBE WROTE 2 LOC WHEN 1 NPR AND INT DONE
2305  011402  004767  004726                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2306  011406  000416                          BR T21L04               ;RESTORE TRAPS
2307  011410  104064                  T21L01: ERROR ↑D52              ;ERROR: NPR DID NOT SET RDY
2308  011412  004767  004716                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2309  011416  012777  006003  171100          MOV #6003,@BECR1        ;HAVE UBE SET ITS RDY
2310  011424  005037  177776                  CLR @#PSW               ;
2311  011430  004767  004554                  JSR PC,CRDY             ;WAIT TILL SET
2312  011434  000403                          BR T21L04               ;RESTORE TRAPS
2313  011436  104063                  T21L02: ERROR ↑D51              ;ERROR: NPR DATO NOT DONE
2314  011440  004767  004670                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2315  011444  004767  004516          T21L04: JSR PC,RCATCH           ;RESTORE TRAPS
2316
```

```
2317                                    ;;*****************************************************************
2318                                    ;*TEST 26       TEST UBE WILL NOT INTERRUPT DURING AN NPR AND GO BIT SETS
2319                                    ;*
2320                                    ;*IF THIS TEST FAILS AND THE UBE DOES INTERRUPT AFTER
2321                                    ;*TRYING TO DO AN NPR, THE CPU WILL GO DOWN
2322                                    ;;*****************************************************************
2323  011450  000004                    T$T26:  SCOPE
2324  011452  012767  000001  167554            MOV     #1,$TIMES       ;;DO 1 ITERATION
2325  011460  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
2326  011464  004767  004444                    JSR PC,CLRREG           ;CLEAR UBE REG
2327  011470  032737  010000  001172            BIT #SW12,@#SWR         ;INHIBIT TYPEOUTS?
2328  011476  001002                            BNE 1$                  ;BRANCH IF YES
2329  011500  104401  025157                    TYPE ,MSG3              ;TESTING UBE WILL NOT INTERRUPT
2330                                            ;DURING NPR. IF DOES, CPU WILL GO DOWN
2331  011504  012777  177777  171006  1$:      MOV #177777,@BECC       ;SET UBE TO DO 1 CYCLE
2332  011512  012777  000043  171004            MOV #0043,@BECR1        ;HAVE UBE DO DATI NPR AND INT. (FUN.=0)
2333  011520  005037  177776                    CLR @#PSW
2334  011524  000240                            NOP                     ;UBE SHOULD NOT GET BUSS HERE
2335  011526  032777  000001  170770            BIT #1,@BECR1           ;IS GO BIT SET?
2336  011534  001003                            BNE T22L01              ;BRANCH IF YES
2337  011536  104011                            ERROR ↑D9               ;ERROR: GO BIT FAILED TO LOAD '1'
2338  011540  004767  004570                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2339  011544  005077  170754            T22L01: CLR @BECR1              ;RESET GO BIT, NPR AND INTERRUPT
2340  011550  032737  010000  001172            BIT #SW12,@#SWR         ;INHIBIT TYPEOUTS?
2341  011556  001002                            BNE     T$T27           ;;BRANCH IF YES
2342  011560  104401  025307                    TYPE ,MSG4              ;EXITING TEST
2343
2344                                    ;;*****************************************************************
2345                                    ;*TEST 27       TEST NO SSYN ERROR BIT WORKS & FUN A,B BITS RESET BY ERROR INTERRUPT
2346                                    ;*
2347                                    ;*A DATI NPR IS DONE TO A MEM LOC (760000) THAT RETURNS
2348                                    ;*NO SSYN.  THE NO SSYN ERROR BIT AND BIT 15 OF BECR1
2349                                    ;*ARE CHECKED TO SET.  THE ERROR INTERRUPT IS THEN TESTED.
2350                                    ;*AFTER THIS THE ERROR IS CLEARED BY THE CLEAR ERROR
2351                                    ;*ADDRESS.  FINALLY THE FUN A,B BITS (BITS 10,11 OF BECR1)
2352                                    ;*ARE EXAMINED TO SEE IF THEY RESET WHEN AN ERROR
2353                                    ;*INTERRUPT OCCURS.
2354                                    ;;*****************************************************************
2355  011564  000004                    T$T27:  SCOPE
2356  011566  012706  001100                    MOV #STACK,SP           ;RESTORE STACK
2357  011572  012737  000340  177776            MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2358  011600  004767  004330                    JSR PC,CLRREG           ;CLEAR UBE REG
2359  011604  012777  011732  170720            MOV #T23L01,@INTVEC     ;SET UP FOR INTERRUPTS
2360  011612  012777  160000  170702            MOV #160000,@BEBA       ;LOAD UBE WITH TEST ADDRESS WHICH RETURNS NO SSYN
2361  011620  012777  000003  170700            MOV #3,@BECR2           ;LOAD UBE WITH TEST ADDRESS WHICH RETURNS NO SSYN
2362  011626  012777  177777  170664            MOV #177777,@BECC       ;HAVE UBE DO 1 CYCLE
2363  011634  012777  002041  170662            MOV #2041,@BECR1        ;HAVE DATI NPR DONE
2364  011642  004767  004342                    JSR PC,CRDY             ;WAIT TILL RDY SET
2365  011646  032777  000400  170652            BIT #400,@BECR2         ;WAS NSSYN ERROR BIT SET?
2366  011654  001004                            BNE T23L02              ;BRANCH IF YES
2367  011656  104073                            ERROR ↑D59              ;ERROR: TEST OF NSSYN ERROR BIT FAILED
2368  011660  104074                            ERROR ↑D60              ;TO SET BIT 8 OF BECR2
2369  011662  004767  004446                    JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2370  011666  032777  100000  170630  T23L02: BIT #100000,@BECR1       ;WAS ERROR BIT SET?
2371  011674  001004                            BNE T23L03              ;BRANCH IF YES
2372  011676  104073                            ERROR ↑D59              ;ERROR: TEST OF NSSYN ERROR BIT FAILED
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2373  011700  104075                          ERROR ↑D61          ;TO SET BIT 15 OF BECR1
2374  011702  004767  004426                  JSR PC,TERRPC       ;TYPE PC OF ERROR MSG
2375  011706  005037  177776        T23L03:   CLR @#PSW           ;ALLOW UBE TO INTERRUPT
2376  011712  000240                          NOP                 ;UBE SHOULD INTERRUPT HERE
2377  011714  017767  170606  167272          MOV @BECR2,$REG0    ;SAVE BECR2
2378  011722  104073                          ERROR ↑D59          ;ERROR: TEST OF NSSYN ERROR BIT FAILED
2379  011724  104072                          ERROR ↑D58          ;TO INTERRUPT CPU
2380  011726  004767  004402                  JSR PC,TERRPC       ;TYPE PC OF ERROR MSG
2381  011732  005077  170572        T23L01:   CLR @BERE           ;CLEAR ERROR BITS
2382  011736  032777  000400  170562          BIT #400,@BECR2     ;WAS NSSYN ERROR BIT CLEARED?
2383  011744  001404                          BEQ T23L05          ;BRANCH IF YES TO TEST FUN A, B BITS
2384  011746  104073                          ERROR ↑D59          ;ERROR: TEST OF NSSYN ERROR BIT FAILED
2385  011750  104076                          ERROR ↑D62          ;TO CLEAR BIT 8 OF BECR2
2386  011752  004767  004356                  JSR PC,TERRPC       ;TYPE PC OF ERROR MSG
2387  011756  032777  002000  170540  T23L05: BIT #2000,@BECR1    ;WAS FUN A BIT RESET?
2388  011764  001404                          BEQ T23L06          ;BRANCH IF YES
2389  011766  104073                          ERROR ↑D59          ;ERROR: TEST OF NSSYN ERROR BIT FAILED
2390  011770  104016                          ERROR ↑D14          ;TO CLEAR BIT 10 OF BECR1
2391  011772  004767  004336                  JSR PC,TERRPC       ;TYPE PC OF ERROR MSG
2392  011776  012777  160000  170516  T23L06: MOV #160000,@BEBA   ;LOAD UBE WITH TEST ADDRESS WHICH RETURNS NO SSYN
2393  012004  012777  000003  170514          MOV #3,@BECR2       ;LOAD UBE WITH TEST ADDRESS WHICH RETURNS NO SSYN
2394  012012  012777  177772  170500          MOV #177772,@BECC   ;DO 2 CYCLES
2395  012020  012777  012040  170504          MOV #T23L07,@INTVEC ;SET UP FOR INT
2396  012026  012777  004041  170470          MOV #4041,@BECR1    ;HAVE UBE DO FUN2 DATI VIA NPR
2397  012034  004767  004150                  JSR PC,CRDY         ;WAIT TILL RDY SETS
2398  012040  032777  004000  170456  T23L07: BIT #4000,@BECR1    ;WAS FUN B BIT RESET
2399  012046  001404                          BEQ T23L04          ;RESTORE TRAP
2400  012050  104073                          ERROR ↑D59          ;ERROR: TEST OF NSSYN ERROR BIT FAILED
2401  012052  104105                          ERROR ↑D69          ;TO CLEAR BIT 11 OF BECR1
2402  012054  004767  004254                  JSR PC,TERRPC       ;TYPE PC OF ERROR MSG
2403  012060  004767  004102        T23L04:   JSR PC,RCATCH       ;RESTORE TRAP
2404  012064  005077  170440                  CLR @BERE           ;CLEAR ALL ERROR CONDITIONS
2405
2406                                  ;;*****************************************************************
2407                                  ;*TEST 30       TEST WRONG A LINE ERROR BIT DOES NOT SET
2408                                  ;*
2409                                  ;*A DATI NPR IS DONE FROM THE UBE GO ADDRESS
2410                                  ;*THE ERROR BIT IS TESTED NOT TO HAVE SET AND NOT TO HAVE INTERRUPTED.
2411                                  ;*THE ADDRESS BITS 14,15,16,17 ARE NEXT TESTED SEPARATELY
2412                                  ;*AND THE ERROR BIT IS CHECKED NOT TO HAVE SET.
2413                                  ;;*****************************************************************
2414  012070  000004                  ↑ST30:    SCOPE
2415  012072  012706  001100                    MOV #STACK,SP       ;RESTORE STACK
2416  012076  012737  000340  177776            MOV #340,@#PSW      ;LOCK OUT INTERRUPTS
2417  012104  004767  004024                    JSR PC,CLRREG       ;CLEAR UBE REGS
2418  012110  016777  170420  170404            MOV BEGO,@BEBA      ;HAVE UBE ADDRESS ITS GO ADDRESS
2419  012116  012777  000003  170402            MOV #3,@BECR2       ;HAVE UBE ADDRESS ITS GO ADDRESS
2420  012124  012777  177777  170366            MOV #177777,@BECC   ;SET UP TO DO 1 CYCLE
2421  012132  012777  012202  170372            MOV #T24_01,@INTVEC ;SET UP FOR INT.
2422  012140  012777  002041  170356            MOV #2041,@BECR1    ;HAVE DATI NPR DONE FROM GO ADDRESS
2423  012146  004767  004036                    JSR PC,CRDY         ;CHECK FOR RDY SET
2424  012152  032777  001000  170346            BIT #1000,@BECR2    ;WAS ADDRESS ERROR SET?
2425  012160  001404                            BEQ T24L02          ;BRANCH IF NO
2426  012162  104070                            ERROR ↑D56          ;ERROR: TEST OF WRONG A LINES ERROR BIT FAILED
2427  012164  104071                            ERROR ↑D57          ;BECR2 BIT 9 FALSELY SET
2428  012166  004767  004142                    JSR PC,TERRPC       ;TYPE PC OF ERROR MSG
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2429  012172  005037  177776          T24L02: CLR @#PSW               ;ALLOW ANY INTERRUPTS
2430  012176  000240                          NOP                     ;UBE SHOULD NOT INTERRUPT HERE
2431  012200  000410                          BR T24L06               ;GO TEST INDIVIDUAL ADDRESS BITS
2432  012202  017767  170320  167004  T24L01: MOV @BECR2,$REG0        ;SAVE BECR2
2433  012210  104070                          ERROR ↑D56              ;ERROR:TEST OF WRONG A LINES ERROR BIT FAILED
2434  012212  104077                          ERROR ↑D63              ;FALSELY INTERRUPTED CPU
2435  012214  004767  004114                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2436  012220  000447                          BR T24L03               ;GO RESTORE TRAP
2437  012222  004767  004012          T24L06: JSR PC,DINT             ;DISREGARD INTERRUPTS
2438  012226  005077  170270                  CLR @BEBA               ;CLEAR ADDRESS 0-15
2439  012232  012777  000001  170266          MOV #1,@BECR2           ;TEST ADDRESS 16
2440  012240  012777  177777  170252  T24L05: MOV #177777,@BECC      ;DO 1 CYCLE
2441  012246  062777  040000  170246          ADD #40000,@BEEA        ;TEST NEXT ADDRESS
2442  012254  032777  140000  170240          BIT #140000,@BEBA       ;HAVE ADDRESS BITS 14,15 BEEN EXERCISED?
2443  012262  001011                          BNE T24L04              ;TEST NEXT ADDRESS IF NO
2444  012264  032777  000003  170234          BIT #3,@BECR2           ;HAVE ADDRESS BITS 16,17 BEEN EXERCISED?
2445  012272  001422                          BEQ T24L03              ;GO RESTORE TRAPS IF YES
2446  012274  005277  170226                  INC @BECR2              ;INC ADDRESS BITS 16,17
2447  012300  042777  000004  170220          BIC #4,@BECR2           ;CLEAR BIT 2 OF BECR2 IF SET
2448  012306  012777  002041  170210  T24L04: MOV #2041,@BECR1        ;DO DATI NPR TO ADDRESS
2449  012314  004767  003670                  JSR PC,CRDY             ;WAIT TILL RDY SET
2450  012320  032777  001000  170200          BIT #1000,@BECR2        ;WAS WRONG ADDRESS LINES ERROR BIT SET?
2451  012326  001744                          BEQ T24L05              ;TEST NEXT ADDRESS IF NO
2452  012330  104070                          ERROR ↑D56              ;ERROR: TEST OF WRONG A LINES ERROR BIT FAILED
2453  012332  104071                          ERROR ↑D57              ;BECR2 BIT 9 FALSELY SET
2454  012334  004767  003774                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2455  012340  004767  003622          T24L03: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
2456
2457                                  ;;*****************************************************************
2458                                  ;*TEST 31       TEST WRONG GRANT  AND NO GRANT OR NOT ONE GRANT ERROR BITS DO NOT SET
2459                                  ;*
2460                                  ;*THE UBE IS SET UP TO DO ONE DATI XFER/REQUEST.  ALL
2461                                  ;*THE POSSIBLE COMBINATIONS OF BR AND NPR LEVELS ARE THEN
2462                                  ;*EXERCISED.  AFTER EACH, THE ERROR BITS AND INTERRUPTS ARE
2463                                  ;*CHECKED FOR.  FINALLY, A DATI NPR IS DONE FROM A BUFFER
2464                                  ;*AREA WITH THE INTERRUPT ON DONE BIT SET.  UPON INTERRUPT, THE
2465                                  ;*ERROR BITS ARE CHECKED.
2466                                  ;;*****************************************************************
2467  012344  000004                  ↑ST31:  SCOPE
2468  012346  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
2469  012352  004767  003556                  JSR PC,CLRREG           ;CLEAR UBE REG
2470  012356  012777  002000  170140          MOV #2000,@BECR1        ;SET UP UBE TO DO 1 DATI XFER/REQ.
2471  012364  012777  012456  170140          MOV #T25L01,@INTVEC     ;SET UP FOR INTERRUPTS
2472  012372  005037  177776                  CLR @#PSW               ;ALLOW DATA XFERS VIA BR AND NPR LEVELS
2473  012376  012777  177777  170114  T25L05: MOV #177777,@BECC      ;SET UBE TO DO 1 CYCLE
2474  012404  012777  027700  170110          MOV #BUFF1,@BEBA        ;SET UBE TO ADDRESS BUFFER AREA
2475  012412  062777  000003  170104          ADD #3,@BECR1           ;HAVE UBE DO NEXT LEVEL OF REQUEST
2476  012420  004767  003564                  JSR PC,CRDY             ;WAIT TILL RDY SET
2477  012424  032777  000076  170072          BIT #76,@BECR1          ;HAVE ALL REQUEST LEVELS BEEN EXERCISED
2478  012432  001425                          BEQ T25L02              ;BRANCH IF YES
2479  012434  032777  000040  170064          BIT #40,@BECR2          ;WAS WRONG GRANT ERROR BIT SET?
2480  012442  001062                          BNE T25L03              ;BRANCH TO ERROR IF SET
2481  012444  032777  002000  170054          BIT #2000,@BECR2        ;WAS NO GRANT OR NOT ONE GRANT ERROR BIT SET?
2482  012452  001066                          BNE T25L04              ;BRANCH TO ERROR IF YES
2483  012454  000750                          BR T25L05               ;GO TEST NEXT LEVEL
2484  012456  104100          T25L01: ERROR ↑D64              ;ERROR: TEST OF WRONG GRANT OR NOT ONE GRANT FAILED
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 2485  012460  017767  170042  166526          MOV @BECR2,$REGO        ;SAVE ERROR BITS
 2486  012466  104077                          ERROR !D63              ;FALSELY INTERRUPTED CPU
 2487  012470  017767  170030  166516          MOV @BECR1,$REGO        ;SAVE BECR1
 2488  012476  104104                          ERROR !D68              ;WITH BECR1=
 2489  012500  004767  003630                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2490  012504  000460                          BR T25L08               ;GO RESTORE TRAPS
 2491  012506  012777  012524  170016  T25L02: MOV #T25L06,@INTVEC    ;SET UP NEW INT. AREA
 2492  012514  012777  002143  170002          MOV #2143,@BECR1        ;HAVE UBE DO 1 DATI NPR AND INT ON DONE
 2493  012522  000001                          WAIT                    ;WAIT TO BE INTERRUPTED
 2494  012524  032777  000040  167774  T25L06: BIT #40,@BECR2          ;WAS WRONG GRANT ERROR BIT SET?
 2495  012532  001015                          BNE T25L07              ;BRANCH TO ERROR IF WAS
 2496  012534  032777  002000  167764          BIT #2000,@BECR2        ;WAS NO GRANT OR NOT ONE GRANT BIT SET?
 2497  012542  001441                          BEQ T25L08              ;GO RESTORE TRAPS IF WAS NOT
 2498  012544  104100                          ERROR !D64              ;ERROR: TEST OF WRONG GRANT OR NOT ONE GRANT FAILED
 2499  012546  017767  167752  166440          MOV @BECR1,$REGO        ;SAVE BECR1
 2500  012554  104101                          ERROR !D65              ;NO GRANT OR NOT ONE GRANT ERROR BIT FALSELY SET
 2501  012556  104102                          ERROR !D66              ;WITH INT ON DONE = 1
 2502  012560  004767  003550                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2503  012564  000430                          BR T25L08               ;GO RESTORE TRAPS
 2504  012566  104100                  T25L07: ERROR !D64              ;ERROR: TEST OF WRONG GRANT OR NOT ONE GRANT FAILED
 2505  012570  017767  167730  166416          MOV @BECR1,$REGO        ;SAVE BECR1
 2506  012576  104103                          ERROR !D67              ;WRONG GRANT ERROR BIT FALSELY SET
 2507  012600  104102                          ERROR !D66              ;WITH INT ON DONE = 1
 2508  012602  004767  003526                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2509  012606  000417                          BR T25L08               ;GO RESTORE TRAPS
 2510  012610  104100                  T25L03: ERROR !D64              ;ERROR: TEST OF WRONG GRANT OR NOT ONE GRANT FAILED
 2511  012612  017767  167706  166374          MOV @BECR1,$REGO        ;SAVE BECR1
 2512  012620  104103                          ERROR !D67              ;WRONG GRANT ERROR BIT FALSELY SET
 2513  012622  004767  003506                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2514  012626  000407                          BR T25L08               ;GO RESTORE TRAPS
 2515  012630  104100                  T25L04: ERROR !D64              ;ERROR: TEST OF WRONG GRANT OR NOT ONE GRANT FAILED
 2516  012632  017767  167656  166354          MOV @BECR1,$REGO        ;SAVE BECR1
 2517  012640  104101                          ERROR !D65              ;NO GRANT OR NOT ONE GRANT ERROR BIT FALSELY SET
 2518  012642  004767  003466                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2519  012646  004767  003314          T25L08: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
 2520
 2521                                  ;;*****************************************************************
 2522                                  ;*TEST 32       TEST TIME DELAY AND BUSS LATENCY ERROR BITS
 2523                                  ;*
 2524                                  ;*THE BUS LATENCY ERROR BIT IS SET BY DOING A RELEASE
 2525                                  ;*BUS IMMEDIATE FUNCTION AND SETTING THE TIME DELAY BIT.  THE
 2526                                  ;*ERROR BIT AND BIT 15 OF BECR1 ARE CHECKED TO SET.  THE
 2527                                  ;*ERROR INTERRUPT IS THEN CHECKED FOR AND THE ERROR CONDITION
 2528                                  ;*IS TESTED TO CLEAR.
 2529                                  ;;*****************************************************************
 2530  012652  000004                  TST32:  SCOPE
 2531  012654  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
 2532  012660  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
 2533  012666  004767  003242                  JSR PC,CLRREG           ;CLEAR UBE REG
 2534  012672  012777  040000  167626          MOV #40000,@BECR2       ;SET TIME DELAY BIT
 2535  012700  012777  013006  167624          MOV #T26L01,@INTVEC     ;SET UP FOR INTERRUPTS
 2536  012706  012777  006003  167610          MOV #6003,@BECR1        ;DO RELEASE BUS IMMED.
 2537  012714  005000                          CLR R0                  ;INITIALIZE R0
 2538  012716  005200                  T26L02: INC R0                  ;DELAY TO WAIT FOR
 2539  012720  022700  000400                  CMP #400,R0             ;BUSS LATENCY ERROR BIT
 2540  012724  001374                          BNE T26L02              ;TO SET
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 2541  012726  032777  000100  167572          BIT #100,@BECR2         ;WAS BUSS LATENCY ERROR BIT SET?
 2542  012734  001004                          BNE T26L03              ;BRANCH IF YES
 2543  012736  104106                          ERROR ↑D70              ;ERROR: TEST OF TIME DALAY AND BUSS LATENCY FAILED
 2544  012740  104107                          ERROR ↑D71              ;TO SET BIT 6 OF BECR2
 2545  012742  004767  003366                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2546  012746  032777  100000  167552  T26L03: BIT #100000,@BECR1      ;WAS ERROR BIT SET?
 2547  012754  001004                          BNE T26L04              ;BRANCH IF YES
 2548  012756  104106                          ERROR ↑D70              ;ERROR: TEST OF TIME DELAY AND BUSS LATENCY FAILED
 2549  012760  104075                          ERROR ↑D61              ;TO SET BIT 15 OF BECR1
 2550  012762  004767  003346                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2551  012766  005037  177776          T26L04: CLR @#PSW               ;ALLOW ERROR INTERRUPTS
 2552  012772  000240                          NOP                     ;UBE SHOULD INTERRUPT
 2553  012774  104106                          ERROR ↑D70              ;ERROR: TEST OF TIME DELAY AND BUSS LATENCY FAILED
 2554  012776  104072                          ERROR ↑D58              ;TO INTERRUPT CPU
 2555  013000  004767  003330                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2556  013004  000412                          BR T26L05               ;GO TO END OF TEST
 2557  013006  005077  167516          T26L01: CLR @BERE               ;CLEAR ERROR CONDITION
 2558  013012  032777  000100  167506          BIT #100,@BECR2         ;WAS ERROR CLEARED?
 2559  013020  001404                          BEQ T26L05              ;BRANCH IF YES
 2560  013022  104106                          ERROR ↑D70              ;ERROR: TEST OF TIME DELAY AND BUSS LATENCY FAILED
 2561  013024  104110                          ERROR ↑D72              ;TO CLEAR BIT 6 OF BECR2
 2562  013026  004767  003302                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2563  013032  004767  003076          T26L05: JSR PC,CLRREG           ;CLEAR ALL UBE REG
 2564  013036  004767  003176                  JSR PC,DINT             ;DISREGARD ERROR INTERRUPTS
 2565  013042  012777  177777  167450          MOV #177777,@BECC       ;HAVE UBE DO DATI
 2566  013050  012777  027700  167444          MOV #BUFF1,@BEBA        ;SO BUSS LATENCY REG
 2567  013056  012777  002041  167440          MOV #2041,@BECR1        ;HOLD FLOP CLEARED
 2568  013064  004767  003120                  JSR PC,CRDY             ;WAIT FOR RDY SET
 2569  013070  005077  167434                  CLR @BERE               ;CLEAR LATENCY ERROR IF SET
 2570  013074  004767  003066                  JSR PC,RCATCH           ;RESTORE TRAPS
 2571
 2572                                  ;;*****************************************************************
 2573                                  ;*TEST 33       TEST MULTIPLE INTERRUPTS SET RDY BIT
 2574                                  ;;*****************************************************************
 2575  013100  000004                  TST33:  SCOPE
 2576  013102  012706  001100                  MOV #STACK,SP           ;INITIALIZE STACK
 2577  013106  004767  003022                  JSR  PC,CLRREG          ;CLEAR ALL UBE REG
 2578  013112  004767  003122                  JSR  PC,DINT            ;DISREGARD INTERRUPTS
 2579  013116  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
 2580  013122  012777  177776  167370          MOV #177776,@BECC       ;HAVE UBE DO 2 CYCLES
 2581  013130  012777  040000  167370          MOV #40000,@BECR2       ;DO TIME DLY
 2582  013136  012777  000003  167360          MOV #3,@BECR1           ;HAVE UBE INT. VIA BR4
 2583  013144  004767  003040                  JSR PC,CRDY             ;CHECK FOR RDY SET
 2584  013150  005704                          TST R4                  ;WAS RDY SET?
 2585  013152  001403                          BEQ T31L01              ;BRANCH IF YES
 2586  013154  104124                          ERROR  ↑D84             ;ERROR:TEST OF MULTIPLE INTERRUPTS FAILED TO SET RDY
 2587  013156  004767  003152                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
 2588  013162  004767  003000          T31L01: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
 2589
 2590                                  ;;*****************************************************************
 2591                                  ;*TEST 34       TEST POWER DOWN SEQUENCE
 2592                                  ;*
 2593                                  ;*THE POWER DOWN TEST IS ONLY DONE IF SW4=1.
 2594                                  ;*THE POWER DOWN IS TESTED FOR AND THEN THE POWER UP
 2595                                  ;*IS TESTED.  AN INTERNAL REG RO COUNTS FOR A TIME >150
 2596                                  ;*MS TO SEE IF THE CPU GETS POWERED UP.  THE PROGRAM
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                                        ;*THEN WAITS FOR A TIME >150MS TO SEE IF THE CPU
                                        ;*GETS POWERED DOWN AGAIN.
                                        ;;*****************************************************************
013166  000004                        T3T34:  SCOPE
013170  012767  000001  166036                MOV     #1,$TIMES       ;;DO 1 ITERATION
013176  032737  000020  001172                BIT #20,@#SWR           ;SEE IF POWER DOWN TO BE TESTED
013204  001516                                BEQ     T3T35           ;;GO TO NEXT TEST IF SWR4 = 0
013206  012737  000340  177776                MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
013214  012706  001100                        MOV #STACK,SP           ;INITIALIZE STACK
013220  013746  000024                        MOV @#24,-(SP)          ;SAVE POWER FAIL VECTOR ON STACK
013224  013746  000026                        MOV @#26,-(SP)          ;SAVE POWER FAIL VECTOR ON STACK
013230  012737  013266  000024                MOV #T27L01,@#24        ;SET UP FOR POWER FAIL
013236  012737  000340  000026                MOV #340,@#26           ;SET UP FOR POWER FAIL
013244  012777  000020  157254                MOV #20,@BECR2          ;HAVE UBE DO POWER FAIL
013252  000240                                NOP                     ;SHOULD POWER FAIL HERE
013254  104111                                ERROR ^D73              ;ERROR: TEST OF POWER DOWN BIT FAILED
013256  104112                                ERROR ^D74              ;TO POWER DOWN CPU
013260  004767  003050                        JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
013264  000450                                BR T27L02               ;RESTORE TRAPS
013266  022626                        T27L01: CMP (SP)+,(SP)+         ;RESTORE STACK
013270  012737  013332  000024                MOV #T27L03,@#24        ;SET UP FOR POWER UP SEQUENCE
013276  005000                                CLR R0                  ;INITIALIZE COUNTER
013300  005001                                CLR R1                  ;INITIALIZE COUNTER
013302  005200                        T27L04: INC R0                  ;COUNT FOR A TIME
013304  005700                                TST R0                  ;GREATER THAN 150 MS
013306  001375                                BNE T27L04
013310  005201                                INC R1
013312  022701  000004                        CMP #4,R1               ;IS TIME > 150 MS?
013316  001371                                BNE T27L04              ;BRANCH IF NO
013320  104111                                ERROR ^D73              ;ERROR: TEST OF POWER DOWN BIT FAILED
013322  104113                                ERROR ^D75              ;TO POWER UP CPU
013324  004767  003004                        JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
013330  000426                                BR T27L02               ;RESTORE TRAPS
013332  012737  013374  000024        T27L03: MOV #T27L05,@#24        ;SET UP TO POWER DOWN AGAIN
013340  005000                                CLR R0
013342  005001                                CLR R1
013344  005200                        T27L06: INC R0                  ;COUNT FOR A TIME
013346  005700                                TST R0                  ;GREATER THAN 150 MS
013350  001375                                BNE T27L06
013352  005201                                INC R1
013354  022701  000004                        CMP #4,R1               ;IS TIME > 150 MS?
013360  001371                                BNE T27L06              ;BRANCH IF NO
013362  104111                                ERROR ^D73              ;ERROR: TEST OF POWER DOWN BIT FAILED
013364  104114                                ERROR ^D76              ;TO REPOWER DOWN CPU
013366  004767  002742                        JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
013372  000405                                BR T27L02               ;GO CHECK POWER DOWN BIT
013374  022626                        T27L05: CMP (SP)+,(SP)+         ;RESTORE STACK
013376  012737  013406  000024                MOV #T27L02,@#24        ;SET UP TO POWER UP AGAIN
013404  000001                                WAIT                    ;WAIT TO POWER UP AGAIN
013406  032777  000020  167112        T27L02: BIT #20,@BECR2          ;WAS POWER DOWN BIT SET?
013414  001004                                BNE T27L07              ;BRANCH IF YES
013416  104111                                ERROR ^D73              ;ERROR: TEST OF POWER DOWN BIT FAILED
013420  104115                                ERROR ^D77              ;TO SET BIT 4 OF BECR2
013422  004767  002706                        JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
013426  012637  000026        T27L07: MOV (SP)+,@#26          ;RESTORE POWER FAIL VECTOR
013432  012637  000024                MOV (SP)+,@#24
```

```
2653  013436  005077  167064                  CLR @BECR2              ;CLEAR POWER DOWN BIT
2654
2655                                          ;;*****************************************************************
2656                                          ;*TEST 35       TEST DCLO CLEARS BECC, BEBA, BECR2 AND BITS 0-6, 7-15 OF BECR1
2657                                          ;*
2658                                          ;*THIS TEST IS ONLY DONE IF SW4=1.
2659                                          ;;*****************************************************************
2660  013442  000004                  TST35:  SCOPE
2661  013444  012767  000001  165562          MOV     #1,$TIMES       ;;DO 1 ITERATION
2662  013452  032737  000020  001172          BIT #20,@#SWR           ;SEE IF POWER DOWN TO BE TESTED
2663  013460  001002                          BNE T28L10              ;BRANCH IF SW4=1
2664  013462  000167  000410                  JMP TST8                ;GO TO NEXT TEST
2665  013466  012777  177777  167024  T28L10: MOV #177777,@BECC      ;HAVE UBE DO 1 CYCLE
2666  013474  012777  000003  167024          MOV #3,@BECR2           ;SET ADDRESS BITS 16, 17
2667  013502  012777  160000  167012          MOV #160000,@BEBA       ;LOAD UBE WITH ADDRESS THAT RETURNS NO SSYN
2668  013510  004767  002524                  JSR PC,DINT             ;DISREGARD INTERRUPTS
2669  013514  012777  002041  167002          MOV #2041,@BECR1        ;HAVE UBE DO DATI SO CCOVF=1 AND NSSYN ERROR = 1
2670  013522  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
2671  013526  000001                          WAIT                    ;WAIT TILL ERROR INTERRUPT
2672  013530  013746  000024                  MOV @#24,-(SP)          ;STORE POWER VECTOR ON STACK
2673  013534  013746  000026                  MOV @#26,-(SP)          ;STORE POWER VECTOR ON STACK
2674  013540  012777  177777  166754          MOV #177777,@BEBA       ;LOAD ADDRESS REG WITH ALL "1"
2675  013546  012777  177777  166744          MOV #177777,@BECC       ;LOAD CYCLE COUNT REG WITH ALL "1"
2676  013554  012777  077776  166742          MOV #77776,@BECR1       ;LOAD BECR1 WITH ONES
2677  013562  012737  013600  000024          MOV #T28L01,@#24        ;SET UP FOR POWER DOWN
2678  013570  012777  040037  16673C          MOV #40037,@BECR2       ;LOAD BECR2 WITH ONES AND DO POWER DOWN
2679  013576  000001                          WAIT                    ;CPU SHOULD POWER DOWN
2680  013600  022626                  T28L01: CMP (SP)+,(SP)+         ;RESTORE STACK
2681  013602  012737  013612  000024          MOV #T28L05,@#24        ;SETUP FOR POWER UP
2682  013610  000001                          WAIT                    ;CPU SHOULD POWER UP
2683  013612  042777  000020  166706  T28L05: BIC #20,@BECR2         ;CLEAR POWER DOWN BIT
2684  013620  016767  166674  165366          MOV BECC,$REG0          ;SAVE BECC ADDRESS
2685  013626  005067  165366                  CLR $REG2               ;SAVE CORRECT DATA
2686  013632  005777  166662                  TST @BECC               ;(BECC)=0?
2687  013636  001026                          BNE T29L02              ;BRANCH IF NO
2688  013640  016767  166656  165346          MOV BEBA,$REG0          ;SAVE BEBA ADDRESS
2689  013646  005777  166650                  TST @BEBA               ;(BEBA)=0?
2690  013652  001020                          BNE T28L02              ;BRANCH IF NO
2691  013654  016767  166646  165332          MOV BECR2,$REG0         ;SAVE BECR2 ADDRESS
2692  013662  005777  166640                  TST @BECR2              ;WAS BECR2 CLEARED?
2693  013666  001012                          BNE T28L02              ;BRANCH IF NO
2694  013670  016767  166630  165316          MOV BECR1,$REG0         ;SAVE BECR1 ADDRESS
2695  013676  012767  000200  165314          MOV #200,$REG2          ;SAVE CORRECT DATA (BECR1)
2696  013704  022777  000200  166612          CMP #200,@BECR1         ;WAS BECR1 CLEARED?
2697  013712  001407                          BEQ T28L03              ;BRANCH IF YES
2698  013714  017767  165274  165274  T28L02: MOV @$REG0,$REG1        ;SAVE BAD DATA
2699  013722  104116                          ERROR ^D78              ;ERROR: DCLO FAILED TO CLEAR REG
2700  013724  004767  002404                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2701  013730  000454                          BR T28L04               ;GO RESTORE VECTORS
2702  013732  012737  000340  177776  T28L03: MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2703  013740  012777  040000  166560          MOV #40000,@BECR2       ;SET TIME DLY BIT
2704  013746  012777  006003  166550          MOV #6003,@BECR1        ;DO RELEASE BUSS IMMED. TO SET LATENCY ERROR BIT
2705  013754  032777  000100  166544  T28L06: BIT #100,@BECR2         ;TEST LATENCY ERROR BIT
2706  013762  001774                          BEQ T28L06              ;WAIT TILL IT SETS
2707  013764  005037  177776                  CLR @#PSW               ;ALLOW LATENCY ERROR INTERRUPT
2708  013770  000240                          NOP                     ;ALLOW INTERRUPT TO BE IGNORED
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2709  013772  012737  014010  000024          MOV #T28L08,@#24        ;SET UP FOR POWER DOWN
2710  014000  052777  000020  166520          BIS #20,@BECR2          ;SET POWER DOWN BIT
2711  014006  000001                          WAIT                    ;WAIT FOR POWER DOWN
2712  014010  022626                  T28L08: CMP (SP)+,(SP)+         ;RESTORE STACK
2713  014012  012737  014022  000024          MOV #T28L09,@#24        ;SETUP FOR POWER UP
2714  014020  000001                          WAIT                    ;CPU SHOULD POWER UP
2715  014022  005077  166500          T28L09: CLR @BECR2              ;CLEAR POWER DOWN BIT
2716  014026  005777  166474                  TST @BECR2              ;WAS BUSS LATENCY ERROR BIT CLEARED?
2717  014032  001413                          BEQ T28L04              ;BRANCH IF YES
2718  014034  016767  166466  165152          MOV BECR2,$REG0         ;SAVE REG ADDRESS
2719  014042  017767  166460  165146          MOV @BECR2,$REG1        ;SAVE REG DATA
2720  014050  005067  165144                  CLR $REG2               ;SAVE CORRECT DATA
2721  014054  104116                          ERROR ↑D78              ;ERROR: DCLO FAILED TO CLEAR REG
2722  014056  004767  002252                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2723  014062  004767  002100          T28L04: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
2724  014066  012637  000026                  MOV (SP)+,@#26          ;RESTORE POWER VECTOR
2725  014072  012637  000024                  MOV (SP)+,@#24          ;RESTORE POWER VECTOR
2726
2727  014076                          TST8:
2728
2729                                  ;;*****************************************************************
2730                                  ;*TEST 36       TEST SIMULTANEOUS GO ADDRESS
2731                                  ;*
2732                                  ;*THE UBE IS SETUP TO INTERRUPT ON LEVEL 7 AND
2733                                  ;*THEN TOLD TO GO VIA THE SIMULTANEOUS GO.  NO
2734                                  ;*INTERRUPT INDICATES AN ERROR.
2735                                  ;;*****************************************************************
2736  014076  000004                  ↑ST36:  SCOPE
2737  014100  012706  001100                  MOV #STACK,SP           ;RESTORE STACK
2738  014104  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INTERRUPTS
2739  014112  004767  002016                  JSR PC,CLRREG           ;CLEAR ALL UBE REGS.
2740  014116  012777  014154  166406          MOV #T09L01,@INTVEC     ;SETUP TO RECEIVE INTERRUPT
2741  014124  012777  000020  166372          MOV #20,@BECR1          ;SETUP TO DO BR=7
2742  014132  005277  166376                  INC @BEGO               ;START SIMULTANEOUS GO
2743  014136  012737  000300  177776          MOV #300,@#PSW          ;ALLOW INTERRUPTS
2744  014144  000240                          NOP                     ;UBE SHOULD INTERRUPT HERE
2745  014146  104025                          ERROR ↑D21              ;ERROR: SIMULTANEOUS GO FAILED
2746  014150  004767  002160                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2747  014154  004767  002006          T09L01: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
2748
2749
2750                                  ;;*****************************************************************
2751                                  ;*TEST 37       DYNAMIC TEST OF UBE
2752                                  ;*
2753                                  ;*THIS TEST EXERCISES THE MOST HARDWARE IN THE
2754                                  ;*UBE AT ONE TIME.  THE EXERCISOR IS SET UP TO DO EIGHT
2755                                  ;*DATOB ON DATIP XFERS VIA NPR AND INTERRUPT ON DONE.
2756                                  ;*AFTER INTERRUPTING, A BUFFER AREA IS EXAMINED TO SEE IF
2757                                  ;*THE OPERATIONS WERE DONE PROPERLY.  THE ABOVE IS THEN
2758                                  ;*REPEATED 100 TIMES.
2759                                  ;;*****************************************************************
2760  014160  000004                  ↑ST37:  SCOPE
2761  014162  012767  000001  165044          MOV     #1,$TIMES       ;;DO 1 ITERATION
2762  014170  004767  001740                  JSR PC,CLRREG           ;CLEAR UBE REG
2763  014174  005002                          CLR R2                  ;INITIALIZE COUNT
2764  014176  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
```

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2765  014202  012700  027700          T29L04: MOV #BUFF1,R0           ;GET BUFFER ADDRESS
2766  014206  012720  052525          T29L01: MOV #52525,(R0)+        ;LOAD BUFFER
2767  014212  020027  027722                  CMP R0,#BUFF1+22        ;ENTIRE BUFFER LOADED?
2768  014216  001373                          BNE T29L01              ;BRANCH IF NO
2769  014220  012777  014300  166304          MOV #T29L02,@INTVEC     ;SET UP FOR INTERRUPTS
2770  014226  012777  027700  166266          MOV #BUFF1,@BEBA        ;LOAD BUFF ADDRESS IN UBE
2771  014234  012777  177760  166256          MOV #177760,@BECC       ;SET UBE TO DO 16 CYCLES
2772  014242  012777  042561  166254          MOV #42561,@BECR1       ;DO DATOB ON DATIP, AND INT. VIA BR7 WHEN DONE
2773  014250  005000                          CLR R0                  ;INITIALIZE COUNTER
2774  014252  016767  013442  013440  T29L06: MOV BUFF1+20,BUFF1+20   ;DO BACKGROUND NOISE PATTERN
2775  014260  005200                          INC R0                  ;WAIT FOR COUNTER R0
2776  014262  005700                          TST R0                  ;TO OVERFLOW. IF DOES
2777  014264  001372                          BNE T29L06              ;UBE FAILED TO INTERRUPT
2778  014266  104120                          ERROR ↑D80              ;ERROR: DYNAMIC TEST OF UBE FAILED
2779  014270  104072                          ERROR ↑D58              ;TO INTERRUPT CPU
2780  014272  004767  002036                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2781  014276  000432                          BR T29L07               ;GO RESTORE TRAPS CATCHER
2782  014300  022626                  T29L02: CMP (SP)+,(SP)+         ;RESTORE STACK
2783  014302  012700  027700                  MOV #BUFF1,R0           ;GET BUFFER ADDRESS
2784  014306  022710  125652          T29L05: CMP #125652,(R0)        ;WAS DATA SHIFTED PROPERLY?
2785  014312  001011                          BNE T29L03              ;BRANCH TO ERROR IF NO
2786  014314  005720                          TST (R0)+               ;INC R0 BY 2
2787  014316  022700  027720                  CMP #BUFF1+20,R0        ;AT END OF BUFFER?
2788  014322  001371                          BNE T29L05              ;BRANCH IF NO
2789  014324  005202                          INC R2                  ;UPDATE COUNT
2790  014326  020227  000100                  CMP R2,#100             ;WAS UBE EXERCISED 100 TIMES?
2791  014332  001323                          BNE T29L04              ;BRANCH IF NO
2792  014334  000413                          BR T29L07               ;RESTORE TRAPS
2793  014336  010067  164652          T29L03: MOV R0,$REG0            ;SAVE ADDRESS
2794  014342  011067  164650                  MOV (R0),$REG1          ;SAVE BAD DATA
2795  014346  012767  125652  164644          MOV #125652,$REG2       ;SAVE CORRECT DATA
2796  014354  104120                          ERROR ↑D80              ;ERROR: DYNAMIC TEST OF UBE FAILED
2797  014356  104121                          ERROR ↑D81              ;TO LOAD PROPER DATA
2798  014360  004767  001750                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
2799  014364  004767  001576          T29L07: JSR PC,RCATCH           ;RESTORE TRAP CATCHER
2800
2801                                  ;////////////////////////////////////////////////////////////////
2802                                  ;RETURN ROUTINE TO TEST NEXT UBE BEFORE DO LAST TEST
2803                                  ;////////////////////////////////////////////////////////////////
2804  014370  000004                          SCOPE                   ;SCOPE FOR PREVIOUS TEST
2805  014372  004767  001536          NUBE:   JSR PC,CLRREG           ;CLEAR UBE SO NO INT.
2806  014376  000167  166766          NUBE1:  JMP ACALC               ;GO SEE IF MORE UBE
2807
2808  014402  012767  014424  164530  LAST:   MOV #LAST1,$LPADR       ;SETUP LOOP ADDRESS FOR LAST TEST
2809  014410  012767  014424  164524          MOV #LAST1,$LPERR       ;SETUP LOOP ON ERROR ADDRESS FOR LAST TEST
2810  014416  105367  164512                  DECB $TSTNM             ;ADJUST TEST NUMBER
2811
2812
2813
2814                                  ;;**************************************************************
2815                                  ;*TEST 40       TEST PASSING OF GRANTS
2816                                  ;*
2817                                  ;*THIS TEST IS ONLY RUN IF THERE ARE MORE THAN ONE
2818                                  ;*UBE.IT IS COMPOSED OF TWO PARTS.THE FIRST PART CHECKS THAT
2819                                  ;*A HIGHER ELECTRICAL PRIORITY UBE WITH ALL BR LEVELS =1
2820                                  ;*AND GO BIT =0 WILL PASS A GRANT TO THE NEXT LOWER ONE.
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                                        ;*THEN THIS SAME UBE IS CHECKED TO ALSO PASS A GRANT WHEN ALL BR=0
                                        ;*AND THE GO BIT IS ENABLED.
                                        ;*      THE SECOND PART VERIFIES THAT A UBE WITH A HIGHER ELECTRICAL PRIORITY
                                        ;*BUT DOING A LOWER BR THAN A UBE OF LOWER ELECTRICAL
                                        ;*PRIORITY, WILL PASS THE GRANT TO THE UBE OF LOWER ELECTRICAL
                                        ;*PRIORITY.
                                        ;*
                                        ;*NOTE:  THE UBE WITH THE LOWEST ELECTRICAL PRIORITY
                                        ;*       ON THE BUS MUST BE SWAPPED WITH A HIGHER
                                        ;*       ONE AND THEN THE ENTIRE PROGRAM RERUN INORDER
                                        ;*       THAT ITS PASSING GRANT LOGIC IS TESTED.
                                        ;;*****************************************************************
014422  000004                  TST40:  SCOPE
014424  005767  166124          LAST1:  TST BE2BD               ;IS THERE MORE THAN ONE EXERCISOR?
014430  001013                          BNE T30L01              ;BRANCH IF YES
014432  032737  010000  001172          BIT #SW12,@#SWR         ;INHIBIT TYPEOUTS?
014440  001005                          BNE 1$                  ;BRANCH IF YES
014442  104401  027210                  TYPE ,MSG11             ;PASSING OF GRANTS NOT TESTED WITH 1 EXERCISOR
014446  012767  000001  164560          MOV #1,$TIMES           ;DO 1 ITERATION IF THIS TEST NOT DONE
014454  000167  001332          1$:     JMP $EOP                ;GO TO END OF TEST

                                        ;DETERMINE ELECTRICAL PRIORITY OF EXERCISORS

014460  012706  001100          T30L01: MOV #STACK,SP           ;INITIALIZE STACK
014464  012777  014672  166060          MOV #T30L02,@BE1VEC     ;SET UP UBE1 INTERRUPT HANDLER
014472  016700  166054                  MOV BE1VEC,R0
014476  012760  000340  000002          MOV #340,2(R0)
014504  012777  014706  166056          MOV #T30L03,@BE2VEC     ;SET UP UBE2 INTERRUPT HANDLER
014512  016700  166052                  MOV BE2VEC,R0
014516  012760  000340  000002          MOV #340,2(R0)
014524  005767  166056                  TST BE3VEC              ;ARE THERE 3 UBE?
014530  001423                          BEQ T30L21              ;BRANCH IF NO
014532  012777  014722  166046          MOV #T30L04,@BE3VEC     ;SET UP UBE3 INTERRUPT HANDLER
014540  016700  166042                  MOV BE3VEC,R0
014544  012760  000340  000002          MOV #340,2(R0)
014552  005767  166046                  TST BE4VEC              ;ARE THERE 4 UBE?
014556  001410                          BEQ T30L21              ;BRANCH IF NO
014560  012777  014736  166036          MOV #T30L05,@BE4VEC     ;SET UP UBE4 INTERRUPT HANDLER
014566  016700  166032                  MOV BE4VEC,R0
014572  012760  000340  000002          MOV #340,2(R0)
014600  012700  027700          T30L21: MOV #BUFF1,R0           ;GET BUFFER ADDRESS
014604  005001                          CLR R1                  ;INITIALIZE COUNT OF INTERRUPTS
014606  012737  000340  177776          MOV #340,@#PSW          ;SET PSW PRIORITY=7
014614  012777  000020  165722          MOV #20,@BE1CR1         ;LOAD FIRST UBE TO DO INT. VIA BR7
014622  012777  000020  165732          MOV #20,@BE2CR1         ;LOAD SECOND UBE TO DO INT. VIA BR7
014630  005767  165744                  TST BE3CR1              ;TEST IF 3 EXERCISORS
014634  001411                          BEQ T30L07              ;BRANCH IF NO
014636  012777  000020  165734          MOV #20,@BE3CR1         ;LOAD THIRD UBE TO DO INT. VIA BR7
014644  005767  165746                  TST BE4CR1              ;TEST IF 4 EXERCISORS
014650  001403                          BEQ T30L07              ;BRANCH IF NO
014652  012777  000020  165736          MOV #20,@BE4CR1         ;LOAD FOURTH UBE TO DO INT. VIA BR7
014660  005277  165650          T30L07: INC @BEGO               ;LET ALL EXERCISORS INTERRUPT
014664  005037  177776                  CLR @#PSW               ;ALLOW INTERRUPTS
014670  000001                          WAIT                    ;WAIT FOR 1ST INTERRUPT
014672  012720  002536          T30L02: MOV #BE1BD,(R0)+        ;LOAD BUFFER WITH POINTER TO ADDRESS OF UBE
014676  012777  006002  165640          MOV #6002,@BE1CR1       ;SETUP FIRST UBE TO DO A FUN 3
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2877  014704  000421                          BR T30L06               ;GO SEE IF ALL UBE INTERRUPTED
2878  014706  012720  002554          T30L03: MOV #BE2BD,(R0)+        ;LOAD BUFFER WITH POINTER TO UBE ADDRESSES
2879  014712  012777  006002  165642          MOV #6002,@BE2CR1       ;SETUP SECOND UBE TO DO A FUN3
2880  014720  000413                          BR T30L06               ;GO SEE IF ALL UBE INTERRUPED
2881  014722  012720  002572          T30L04: MOV #BE3BD,(R0)+        ;LOAD BUFFER WITH POINTER TO UBE ADDRESS
2882  014726  012777  006002  165644          MOV #6002,@BE3CR1       ;SETUP THIRD UBE TO DO A FUN3
2883  014734  000405                          BR T30L06               ;GO SEE IF ALL UBE INTERRUPTED
2884  014736  012720  002610          T30L05: MOV #BE4BD,(R0)+        ;LOAD BUFFER WITH POINTER TO UBE ADDRESS
2885  014742  012777  006002  165646          MOV #6002,@BE4CR1       ;SETUP FOURTH UBE TO DO A FUN3
2886  014750  022626                  T30L06: CMP (SP)+,(SP)+         ;RESTORE STACK
2887  014752  005201                          INC R1                  ;COUNT INTERRUPTS
2888  014754  020167  165646                  CMP R1,LCNT             ;HAVE ALL EXERCISORS INTERRUPTED?
2889  014760  001403                          BEQ T30L22              ;BRANCH IF YES
2890  014762  005037  177776                  CLR @#PSW               ;ALLOW NEXT UBE TO INTERRUPT
2891  014766  000001                          WAIT                    ;WAIT FOR INTERRUPT
2892  014770  024040                  T30L22: CMP -(R0),-(R0)         ;DECREMENT R0 BY 4
2893  014772  011067  012712                  MOV (R0),BUFF1+10       ;PUT NEXT TO LOWEST PRIORITY POINTER IN BUFF1+10
2894
2895                                  ;BUFFER NOW CONTAINS VECTORS IN ORDER OF ELECTRICAL PRIORITY
2896
2897                                  ;PART 1
2898
2899  014776  016700  165624                  MOV UCNT,R0             ;GET COUNT OF UBE
2900  015002  005300                          DEC R0                  ;ADJUST COUNT
2901  015004  005001                          CLR R1                  ;CLEAR INDEX REG
2902  015006  016102  027700          T30L28: MOV BUFF1(R1),R2        ;GET PTER TO ADDRESS OF HIGHER PRIORITY UBE
2903  015012  012772  000036  000006          MOV #36,@6(R2)          ;SET ALL BR =1 IN THIS UBE
2904  015020  005721                          TST (R1)+               ;UPDATE INDEX
2905  015022  016103  027700                  MOV BUFF1(R1),R3        ;GET PTER TO ADDRESS OF NEXT LOWER PRIORITY UBE
2906  015026  012773  015144  000014          MOV #T30L25,@14(R3)     ;SET UP FOR INT.
2907  015034  012773  000002  000006  T30L30: MOV #2,@6(R3)           ;SETUP LOWER PRIORITY UBE FOR BR4
2908  015042  005273  000006          T30L26: INC @6(R3)              ;HAVE UBE INT.
2909  015046  005037  177776                  CLR @#PSW               ;ALLOW INT.
2910  015052  000240                          NOP                     ;SHOULD INT. HERE
2911  015054  012737  000340  177776          MOV #340,@#PSW          ;LOCK OUT INT.
2912  015062  104122                  T30L29: ERROR †D22              ;ERROR:TEST OF PASSING GRANTS FAILED
2913  015064  032737  020000  001172          BIT #SW13,@#SWR         ;INHIBIT ERROR TYPEOUTS?
2914  015072  001022                          BNE 1$                  ;BRANCH IF YES
2915  015074  016367  000014  164112          MOV 14(R3),$REG0        ;SAVE INT. VECTOR
2916  015102  104401  027062                  TYPE ,MSG7              ;UBE WITH INT. VECTOR:
2917  015106  016746  164102                  MOV     $REG0,-(SP)     ;;SAVE $REG0 FOR TYPEOUT
2918  015112  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2919  015114  017367  000006  164074          MOV @6(R3),$REG1        ;SAVE (BECR1)
2920  015122  104401  026041                  TYPE ,DH65              ;WITH BECR1=
2921  015126  016746  164064                  MOV     $REG1,-(SP)     ;;SAVE $REG1 FOR TYPEOUT
2922  015132  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2923  015134  104401  027155                  TYPE ,MSG10             ;SHOULD HAVE INT.
2924  015140  000167  000474          1$:     JMP T30L12              ;GO TO END OF TEST
2925  015144  006373  000006          T30L25: ASL @6(R3)              ;DO NEXT BR LEVEL
2926  015150  042773  000400  000006          BIC #400,@6(R3)         ;CLEAR SHIFTED RDY BIT
2927  015156  032773  000040  000006          BIT #40,@6(R3)          ;ALL BR TESTED?
2928  015164  001726                          BEQ T30L26              ;BRANCH IF NO
2929
2930  015166  012773  015212  000014          MOV #T30L27,@14(R3)     ;SETUP FOR INT.
2931  015174  012772  015062  000014          MOV #T30L29,@14(R2)     ;SETUP FOR ERROR INT.
2932  015202  012772  000001  000006          MOV #1,@6(R2)           ;HAVE HIGHER UBE TRY TO INT.
```

```
2933  015210  000711                          BR T30L30               ;LET LOWER UBE INT.
2934
2935  015212  006373  000006          T30L27: ASL @6(R3)              ;DO NEXT LEVEL BR
2936  015216  042773  000400  000006        BIC #400,@6(R3)           ;CLEAR SHIFTED RDY
2937  015224  032773  000040  000006        BIT #40,@6(R3)            ;ALL BR TESTED?
2938  015232  001703                        BEQ T30L26                ;BRANCH IF NO
2939  015234  012772  006003  000006        MOV #6003,@6(R2)          ;HAVE HIGHER UBE DO FUN3
2940  015242  005037  177776                CLR @#PSW                 ;ALLOW REQUESTS
2941  015246  105772  000006          1$:   TSTB @6(R2)               ;IS UBE DONE?
2942  015252  100375                        BPL 1$                    ;BRANCH IF NO
2943  015254  012737  000340  177776        MOV #340,@#PSW            ;SET LEVEL =7
2944  015262  005300                        DEC R0                    ;ADJUST UBE COUNT
2945  015264  005700                        TST R0                    ;ALL UBE TESTED?
2946  015266  001247                        BNE T30L28                ;BRANCH IF NO
2947
2948                                  ;PART 2
2949
2950  015270  012700  000510                MOV #510,R0               ;GET FIRST POSSIBLE VECTOR AREA
2951  015274  012720  015450          T30L09: MOV #T30L08,(R0)+       ;SET UP VECTOR AREA TO HANDLE DOUBLE INTERRUPTS
2952  015300  012720  000340                MOV #340,(R0)+            ;SET PRIORITY = 7
2953  015304  022700  001000                CMP #1000,R0              ;AT END OF AREA?
2954  015310  001371                        BNE T30L09                ;BRANCH IF NO
2955  015312  016700  012362                MOV BUFF1,R0              ;GET HIGHEST PRIORITY UBE ADDRESS POINTER
2956  015316  016701  012360                MOV BUFF1+2,R1            ;GET NEXT PRIORITY UBE ADDRESS POINTER
2957  015322  012770  000002  000006  T30L14: MOV #2,@6(R0)            ;HAVE HIGHER PRIORITY UBE DO BR4
2958  015330  012771  000004  000006        MOV #4,@6(R1)             ;HAVE NEXT LOWER ELEC. PRIORITY UBE DO BR5
2959  015336  012770  015450  000014        MOV #T30L08,@14(R0)       ;SET UP HIGHER PRIORITY UBE VECTOR FOR DOUBLE INT.
2960  015344  012771  015364  000014        MOV #T30L10,@14(R1)       ;SET UP FOR INTERRUPT FROM NEXT LOWER ELEC. PRIORITY UBE
2961  015352  005277  165156          T30L11: INC @BEG0               ;START INTERRUPT
2962  015356  005037  177776                CLR @#PSW                 ;ALLOW INTERRUPTS
2963  015362  000001                        WAIT
2964  015364  022626                T30L10: CMP (SP)+,(SP)+           ;RESTORE STACK
2965  015366  006371  000006                ASL @6(R1)                ;HAVE NEXT PRIORITY UBE INT. ONE LEVEL HIGHER
2966  015372  042771  000400  000006        BIC #400,@6(R1)           ;CLEAR SHIFTED RDY
2967  015400  032771  000040  000006        BIT #40,@6(R1)            ;TESTED ALL BR LEVELS?
2968  015406  001761                        BEQ T30L11                ;BRANCH IF NO
2969  015410  020067  012274                CMP R0,BUFF1+10           ;TESTED ALL UBE POSSIBLE?
2970  015414  001511                        BEQ T30L12                ;BRANCH IF YES TO CLEAR BECR1 AND RESTORE TRAPS
2971  015416  020067  012256                CMP R0,BUFF1              ;JUST TESTED FIRST UBE?
2972  015422  001005                        BNE T30L13                ;BRANCH IF NO
2973  015424  016700  012252                MOV BUFF1+2,R0            ;TEST SECOND HIGHEST PRIORITY UBE
2974  015430  016701  012250                MOV BUFF1+4,R1            ;GET THIRD HIGHEST PRIORITY UBE
2975  015434  000732                        BR T30L14                 ;GO TEST SECOND HIGHEST PRIORITY UBE
2976  015436  016700  012242          T30L13: MOV BUFF1+4,R0          ;TEST THIRD HIGHEST PRIORITY UBE
2977  015442  016701  012240                MOV BUFF1+6,R1            ;GET FOURTH HIGHEST PRIORITY UBE
2978  015446  000725                        BR T30L14                 ;GO TEST THIRD HIGH PRIORITY UBE
2979  015450  022626                T30L08: CMP (SP)+,(SP)+           ;RESTORE STACK
2980  015452  016067  000014  163534        MOV 14(R0),$REG0          ;SAVE INTERRUPT VECTOR OF BAD UBE
2981  015460  012767  000004  163530        MOV #4,$REG1              ;SAVE BAD BR LEVEL
2982  015466  016167  000014  163524        MOV 14(R1),$REG2          ;SAVE NEXT HIGHER PRIORITY UBE VECTOR
2983  015474  032771  000004  000006        BIT #4,@6(R1)             ;WAS BR=5?
2984  015502  001404                        BEQ T30L15                ;BRANCH IF NO
2985  015504  012767  000005  163510        MOV #5,$REG3              ;BR=5
2986  015512  000413                        BR T30L17                 ;GO INDICATE ERROR
2987  015514  032771  000010  000006  T30L15: BIT #10,@6(R1)           ;WAS BR=6?
2988  015522  001404                        BEQ T30L16                ;BRANCH IF NO
```

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2989  015524  012767  000006  163470          MOV #6,$REG3            ;INDICATE BR=6
2990  015532  000403                          BR T30L17               ;GO INDICATE ERROR
2991  015534  012767  000007  163460  T30L16: MOV #7,$REG3            ;INDICATE BR=7
2992  015542  104122                  T30L17: ERROR !D82              ;ERROR: TEST OF PASSING GRANTS FAILED
2993  015544  032737  020000  001172          BIT #SW13,@#SWR         ;INHIBIT ERROR TYPEOUTS?
2994  015552  001032                          BNE T30L12              ;BRANCH IF YES
2995  015554  104401  027062                  TYPE ,MSG7              ;TYPE FAILING UBE VECTOR
2996  015560  016746  163430                  MOV     $REG0,-(SP)     ;;SAVE $REG0 FOR TYPEOUT
2997  015564  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2998  015566  104401  027104                  TYPE ,MSG8              ;TYPE FAILING UBE BR LEVEL
2999  015572  016746  163420                  MOV     $REG1,-(SP)     ;;SAVE $REG1 FOR TYPEOUT
3000  015576  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3001  015600  104401  027121                  TYPE ,MSG9
3002  015604  104401  027062                  TYPE ,MSG7              ;TYPE UBE USED TO TEST FAILING ONE
3003  015610  016746  163404                  MOV     $REG2,-(SP)     ;;SAVE $REG2 FOR TYPEOUT
3004  015614  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3005  015616  104401  027104                  TYPE ,MSG8              ;TYPE BR LEVEL TESTING
3006  015622  016746  163374                  MOV     $REG3,-(SP)     ;;SAVE $REG3 FOR TYPEOUT
3007  015626  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
3008  015630  104401  027155                  TYPE ,MSG10
3009  015634  004767  000474                  JSR PC,TERRPC           ;TYPE PC OF ERROR MSG
3010  015640  012777  006003  164676  T30L12: MOV #6003,@BE1CR1       ;SETUP UBE TO DO A FUN3
3011  015646  012777  006003  164706          MOV #6003,@BE2CR1       ;SETUP UBE TO DO A FUN3
3012  015654  005767  164720                  TST BE3CR1              ;ARE THERE 3 UBE?
3013  015660  001411                          BEQ 1$                  ;BRANCH IF NO
3014  015662  012777  006003  164710          MOV #6003,@BE3CR1       ;SETUP UBE TO DO A FUN3
3015  015670  005767  164722                  TST BE4CR1              ;ARE THERE 4 UBE?
3016  015674  001403                          BEQ 1$                  ;BRANCH IF NO
3017  015676  012777  006003  164712          MOV #6003,@BE4CR1       ;SETUP UBE TO DO A FUN3
3018  015704  005037  177776          1$:     CLR @#PSW               ;ALLOW ALL UBE TO DO FUN3
3019  015710  105777  164630          2$:     TSTB @BE1CR1            ;FIRST UBE DONE?
3020  015714  100375                          BPL 2$                  ;BRANCH IF NO
3021  015716  105777  164640          3$:     TSTB  @BE2CR1           ;SECOND UBE DONE?
3022  015722  100375                          BPL 3$                  ;BRANCH IF NO
3023  015724  005767  164650                  TST BE3CR1              ;ARE THERE THREE UBE?
3024  015730  001411                          BEQ 6$                  ;BRANCH IF NO
3025  015732  105777  164642          4$:     TSTB @BE3CR1            ;THIRD UBE DONE?
3026  015736  100375                          BPL 4$                  ;BRANCH IF NO
3027  015740  005767  164652                  TST BE4CR1              ;ARE THERE 4 UBE?
3028  015744  001403                          BEQ 6$                  ;BRANCH IF NO
3029  015746  105777  164644          5$:     TSTB @BE4CR1            ;FOURTH UBE DONE?
3030  015752  100375                          BPL 5$                  ;BRANCH IF NO
3031
3032                                  ;RESTORE TRAP CATCHER
3033
3034  015754  012700  000510          6$:     MOV #510,R0             ;GET FIRST VECTOR ADDRESS
3035  015760  012701  000512                  MOV #512,R1
3036  015764  010120                  T30L20: MOV R1,(R0)+            ;PUT ADDRESS OF NEXT LOC IN THIS ONE
3037  015766  005020                          CLR (R0)+               ;PUT HALT IN NEXT LOCATION
3038  015770  022121                          CMP (R1)+,(R1)+         ;INC R1 BY 4
3039  015772  020027  001000                  CMP R0,#1000            ;AT END OF VECTOR AREA?
3040  015776  001372                          BNE T30L20              ;BRANCH IF NO
3041  016000  005767  163126                  TST $PASS               ;FIRST PASS OF PROGRAM?
3042  016004  001002                          BNE $EOP                ;BRANCH IF NO
3043  016006  104401  020253                  TYPE ,MSG2              ;ALL EXERCISORS TESTED
3044                                                                  ;NOTE:TO TEST PASSING OF GRANTS FOR
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                                                                ;THE LAST UBE,IT SHOULD BE
                                                                ;SWAPPED WITH A UBE OF HIGHER
                                                                ;ELECTRICAL PRIORITY


                                .SBTTL  END OF PASS ROUTINE

                                ;;**********************************************************************
                                ;*INCREMENT THE PASS NUMBER ($PASS)
                                ;*TYPE "END PASS #XXXXX" (WHERE XXXXX IS A DECIMAL NUMBER)
                                ;*IF THERES A MONITOR GO TO IT
                                ;*IF THERE ISN'T JUMP TO START1

016012                          $EOP:
016012  000004                          SCOPE
016014  005067  163114                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
016020  005067  163210                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
016024  005267  163102                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
016030  042767  100000  163074          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
016036  005327                          DEC     (PC)+           ;;LOOP?
016040  000001                  $EOPCT: .WORD   1
016042  003022                          BGT     $DOAGN          ;;YES
016044  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
016046  000001                  $ENDCT: .WORD   1
016050  016040                          $EOPCT
016052  104401  016117                  TYPE    ,$ENDMG         ;;TYPE "END PASS #"
016056  016746  163050                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
016062  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
016064  104401  016114                  TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
016070  013700  000042          $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
016074  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
016076  000005                          RESET                   ;;CLEAR THE WORLD
016100  004710                  $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
016102  000240                          NOP                     ;;SAVE ROOM
016104  000240                          NOP                     ;;FOR
016106  000240                          NOP                     ;;ACT11
016110                          $DOAGN:
016110  000137                          JMP     @(PC)+          ;;RETURN
016112  003100                  $RTNAD: .WORD   START1
016114     377     377     000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
016117     015  042412  042116  $ENDMG: .ASCIZ  <15><12>/END PASS #/
016124  050040  051501  020123
016132  000043

                                ;////////////////////////////////////////////////////////////////////////
                                ;SUBROUTINE TO CLEAR ALL UBE REG
                                ;////////////////////////////////////////////////////////////////////////
016134  005077  164370          CLRREG: CLR @BERE               ;CLEAR ERROR CONDITIONS
016140  005077  164362                  CLR @BECR2              ;CLEAR BECR2 REG
016144  005077  164354                  CLR @BECR1              ;CLEAR BECR1 REG, EXCEPT RDY
016150  005077  164346                  CLR @BEBA               ;CLEAR BEBA REG
016154  005077  164340                  CLR @BECC               ;CLEAR BECC REG
016160  005077  164332                  CLR @BEBD               ;CLEAR BEBD REG
016164  000207                          RTS PC                  ;RETURN
                                ;////////////////////////////////////////////////////////////////////////
                                ;SUBROUTINE TO RESTORE TRAP CATCHER TO UBE VECTOR AREA
                                ;////////////////////////////////////////////////////////////////////////
```

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3101  016166  010546                  RCATCH: MOV R5,-(SP)            ;SAVE R5 ON STACK
3102  016170  016705  164336                  MOV INTVEC,R5           ;GET INT. VECTOR
3103  016174  005725                          TST(R5)+                ;CALC. INTVEC+2
3104  016176  010577  164330                  MOV R5,@INTVEC          ;PUT INTVEC+2 IN INTVEC
3105  016202  005015                          CLR (R5)                ;PUT HALT IN INTVEC+2
3106  016204  012605                          MOV (SP)+,R5            ;RESTORE R5
3107  016206  000207                          RTS PC
3108
3109
3110
3111                                    ;////////////////////////////////////////////////////////////////////
3112                                    ;SUBROUTINE TO CHECK IF RDY BIT SET
3113                                    ;////////////////////////////////////////////////////////////////////
3114  016210  005004                  CRDY:   CLR R4
3115  016212  005005                          CLR R5
3116  016214  005205                  2$:     INC R5                  ;UPDATE COUNT
3117  016216  105777  164302                  TSTB @BECR1             ;SEE IF RDY SET
3118  016222  100405                          BMI 1$                  ;BRANCH IF SET
3119  016224  032705  000200                  BIT #200,R5             ;WAITED >100 MICROSECS?
3120  016230  001771                          BEQ     2$              ;CONTINUE TO LOOK FOR RDY IF R5 NOT =128
3121  016232  012704  000001                  MOV     #1,R4           ;SET R4=1 TO INDICATE ERROR
3122  016236  000207                  1$:     RTS     PC              ;RETURN
3123
3124                                    ;////////////////////////////////////////////////////////////////////
3125                                    ;SUBROUTINE TO DISREGARD UBE INTERRUPTS
3126                                    ;////////////////////////////////////////////////////////////////////
3127  016240  016705  164266          DINT:   MOV     INTVEC,R5       ;GET INTVEC AND
3128  016244  005725                          TST     (R5)+           ;CALC. INTVEC+2
3129  016246  010577  164260                  MOV R5,@INTVEC          ;PUT ADDRESS OF NEXT LOC IN THIS ONE
3130  016252  012715  000002                  MOV     #2,(R5)         ;PUT AN RTI IN INTVEC+2
3131  016256  000207                          RTS PC
3132                                    ;////////////////////////////////////////////////////////////////////
3133                                    ;SUBROUTINE TO RESTORE VECTOR AREA 0-56 FROM STACK AREA AND PUT TRAP CATCHER IN REST
3134                                    ;////////////////////////////////////////////////////////////////////
3135  016260  016705  162740          RVEC:   MOV $TMP0,R5            ;GET AREA WHERE VECTOR STORED
3136  016264  005004                          CLR R4                  ;SET R4 =TO FIRST LOC
3137  016266  014524                  1$:     MOV -(R5),(R4)+         ;RESTORE VECTORS
3138  016270  022704  000060                  CMP #60,R4              ;AT END OF AREA?
3139  016274  001374                          BNE 1$                  ;BRANCH IF NO
3140  016276  012705  000062                  MOV #62,R5              ;SET R5=TO FIRST TRAP CATCHER ADDRESS
3141  016302  019524                  2$:     MOV R5,(R4)+            ;PUT ADDRESS OF NEXT LOC IN THIS ONE
3142  016304  005024                          CLR(R4)+                ;PUT HALT IN NEXT LOC
3143  016306  022525                          CMP (R5)+,(R5)+         ;INC R5 BY 4
3144  016310  022704  001000                  CMP #1000,R4            ;AT END OF ENTIRE VECTOR AREA?
3145  016314  001372                          BNE 2$                  ;BRANCH IF NO
3146  016316  012737  000137  000200          MOV #137,@#200          ;RESTORE JMP @#START TC LQC 200
3147  016324  012737  002632  000202          MOV #START,@#202        ;
3148  016332  000207                          RTS PC                  ;RETURN
3149                                    ;////////////////////////////////////////////////////////////////////
3150                                    ;SUBROUTINE TO TYPE PC OF ERROR MESSAGE
3151                                    ;////////////////////////////////////////////////////////////////////
3152  016334  032737  020000  001172  TERRPC: BIT #SW13,@#SWR           ;INHIBITS ERROR TYPOUTS?
3153  016342  001011                          BNE 1$                  ;BRANCH IF YES
3154  016344  104401  027535                  TYPE ,MSG15             ;PC OF ERROR MSG WAS:
3155  016350  016746  162574                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
3156  016354  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
```

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3157  016356  104401  001245                  TYPE ,$CRLF
3158  016362  104401  001245                  TYPE ,$CRLF
3159  016366  000207                  1$:     RTS PC
3160
3161                                  .SBTTL  SCOPE HANDLER ROUTINE
3162
3163                                  ;;**********************************************************************
3164                                  ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
3165                                  ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
3166                                  ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
3167                                  ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
3168                                  ;*SW14=1        LOOP ON TEST
3169                                  ;*SW11=1        INHIBIT ITERATIONS
3170                                  ;*SW09=1        LOOP ON ERROR
3171                                  ;*CALL
3172                                  ;*      SCOPE           ;;SCOPE=IOT
3173
3174  016370                          $SCOPE:
3175  016370  032777  040000  162574  1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
3176  016376  001101                          BNE     $OVER           ;;YES IF SW14=1
3177                                  ;*****START OF CODE FOR THE XOR TESTER*****
3178  016400  000416                  $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
3179                                                                  ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
3180  016402  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
3181  016406  012737  016426  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
3182  016414  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
3183  016420  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
3184  016424  000453                          BR      $SVLAD          ;;GO TO THE NEXT TEST
3185  016426  022626                  5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
3186  016430  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
3187  016434  000413                          BR      7$              ;;LOOP ON THE PRESENT TEST
3188  016436                          6$:;*****END OF CODE FOR THE XOR TESTER*****
3189  016436  105767  162473          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
3190  016442  001421                          BEQ     3$              ;;BR IF NO
3191  016444  126767  162477  162463          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
3192  016452  101015                          BHI     3$              ;;BR IF NO
3193  016454  032777  001000  162510          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
3194  016462  001404                          BEQ     4$              ;;BR IF NO
3195  016464  016767  162452  162446  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
3196  016472  000443                          BR      $OVER
3197  016474  105067  162435          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
3198  016500  005067  162530                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
3199  016504  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
3200  016506  032777  004000  162456  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
3201  016514  001011                          BNE     1$              ;;BR IF YES
3202  016516  005767  162410                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
3203  016522  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
3204  016524  005267  162405                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
3205  016530  026767  162500  162400          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
3206  016536  002021                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
3207  016540  012767  000001  162370  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
3208  016546  016767  000044  162460          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
3209  016554  105267  162354          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
3210  016560  011667  162354                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
3211  016564  011667  162352                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
3212  016570  005067  162442                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
```

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                                        MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
                                $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
                                        MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
                                        RTI                     ;;FIXES PS
                                $MXCNT: 10.                     ;;MAX. NUMBER OF ITERATIONS
                                .SBTTL  ERROR HANDLER ROUTINE

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

016620                          $ERROR:
016620  105267  162311          7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
016624  001775                          BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
016626  016777  162302  162340          MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
016634  032777  002000  162330          BIT     #BIT10,@SWR     ;;BELL ON ERROR?
016642  001402                          BEQ     1$              ;;NO - SKIP
016644  104401  001240                  TYPE    ,$BELL          ;;RING BELL
016650  005267  162270          1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
016654  011667  162270                  MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
016660  162767  000002  162262          SUB     #2,$ERRPC
016666  117767  162256  162252          MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
016674  032777  020000  162270          BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
016702  001004                          BNE     20$             ;;SKIP TYPEOUTS
016704  004767  000056                  JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
016710  104401  001245                  TYPE    ,$CRLF
016714                          20$:
016714  005777  162252          2$:     TST     @SWR            ;;HALT ON ERROR
016720  100001                          BPL     3$              ;;SKIP IF CONTINUE
016722  000000                          HALT                    ;;HALT ON ERROR!
016724  032777  001000  162240  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
016732  001402                          BEQ     4$              ;;BR IF NO
016734  016716  162232                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
016740  005767  162272          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
016744  001402                          BEQ     5$              ;;BR IF NONE
016746  016716  162264                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
016752                          5$:
016752  022737  016100  000042          CMP     @$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
016760  001001                          BNE     6$              ;;BRANCH IF NO
016762  000000                          HALT?                   ;;YES
016764                          6$:
016764  000002                          RTI                     ;;RETURN
                                .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

                                ;;**********************************************************************
                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                                ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
```

```
                                ;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 $ERRPC FOR TYPEOUT
                                                                ;;ERROR ADDRESS
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        BR      6$              ;;GET OUT
                                1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WI__
                                        ASL     R0              ;;      WORK FOR THE ERROR TABLE
                                        ASL     R0
                                        ASL     R0
                                        ADD     #$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$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
                                        BNE     7$              ;;GO TYPE THE DATA
                                6$:     MOV     (SP)+,R0        ;;RESTORE R0
                                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
                                        RTS     PC              ;;RETURN
                                7$:
                                        MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        TST     (R0)            ;;IS THERE ANOTHER NUMBER?
                                        BEQ     6$              ;;BR IF NO
                                        TYPE    ,8$             ;;TYPE TWO(2) SPACES
                                        BR      7$              ;;LOOP
                                8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
                                        .EVEN
                                .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

                                $TYPDS:
                                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
                                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
```

```
 3325  017126  010245                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
 3326  017130  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
 3327  017132  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
 3328  017134  012746  020200                MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
 3329  017140  016605  000020                MOV     20(SP),R5       ;;GET THE INPUT NUMBER
 3330  017144  100004                        BPL     1$              ;;BR IF INPUT IS POS.
 3331  017146  005405                        NEG     R5              ;;MAKE THE BINARY NUMBER POS.
 3332  017150  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
 3333  017156  005000                1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
 3334  017160  012703  017336                MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
 3335  017164  112723  000040                MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
 3336  017170  005002                2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
 3337  017172  016001  017326                MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
 3338  017176  160105                3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
 3339  017200  002402                        BLT     4$              ;;BR IF DONE
 3340  017202  005202                        INC     R2              ;;INCREASE THE BCD DIGIT BY 1
 3341  017204  000774                        BR      3$
 3342  017206  060105                4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
 3343  017210  005702                        TST     R2              ;;CHECK IF BCD DIGIT=0
 3344  017212  001002                        BNE     5$              ;;FALL THROUGH IF 0
 3345  017214  105716                        TSTB    (SP)            ;;STILL DOING LEADING 0'S?
 3346  017216  100407                        BMI     7$              ;;BR IF YES
 3347  017220  106316                5$:     ASLB    (SP)            ;;MSD?
 3348  017222  103003                        BCC     6$              ;;BR IF NO
 3349  017224  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
 3350  017232  052702  000060          6$:   BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
 3351  017236  052702  000040          7$:   BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
 3352  017242  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
 3353  017244  005720                        TST     (R0)+           ;;JUST INCREMENTING
 3354  017246  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
 3355  017252  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
 3356  017254  003002                        BGT     8$              ;;GO TO EXIT
 3357  017256  010502                        MOV     R5,R2           ;;GET THE LSD
 3358  017260  000764                        BR      6$              ;;GO CHANGE TO ASCII
 3359  017262  105726                9$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
 3360  017264  100003                        BPL     9$              ;;BR IF NO
 3361  017266  116663  177777  177776        MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
 3362  017274  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
 3363  017276  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
 3364  017300  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
 3365  017302  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
 3366  017304  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
 3367  017306  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
 3368  017310  104401  017336                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
 3369  017314  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
 3370  017322  012616                        MOV     (SP)+,(SP)
 3371  017324  000002                        RTI                     ;;RETURN TO USER
 3372  017326  023420                $DTBL:  10000.
 3373  017330  001750                        1000.
 3374  017332  000144                        100.
 3375  017334  000012                        10.
 3376  017336  000004                $DBLK:  .BLKW   4
 3377                                  .SBTTL  TYPE ROUTINE
 3378
 3379                                  ;;**************************************************************************
 3380                                  ;*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
                                        ;*

017346  105767  161637          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
017352  100002                          BPL     1$              ;;BR IF YES
017354  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
017356  000407                          BR      3$              ;;LEAVE
017360  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
017362  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
017366  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
017370  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
017372  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
017374  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
017376  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
017402  000002                          RTI                     ;;RETURN
017404  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
017410  001430                          BEQ     8$
017412  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
017416  001006                          BNE     5$
017420  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
017422  104401                          TYPE                    ;;TYPE A CR AND LF
017424  001245                          $CRLF
017426  105067  000130                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
017432  000755                          BR      2$              ;;GET NEXT CHARACTER
017434  004767  000056          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
017440  126726  161544          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
017444  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
017446  016746  161534                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
017452  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
017456  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
017460  004767  000032                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
017464  105367  000072                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
017470  000770                          BR      7$              ;;LOOP

                                ;HORIZONTAL TAB PROCESSOR

017472  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
017476  004767  000014          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
017502  132767  000007  000052          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
017510  001372                          BNE     9$              ;;TAB STOP
017512  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
017514  000724                          BR      2$              ;;GET NEXT CHARACTER
017516  105777  161460          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
017522  100375                          BPL     $TYPEC
017524  116677  000002  161452          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
```

```
3437  017532  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
3438  017540  001003                          BNE     1$              ;;BRANCH IF NO
3439  017542  105067  000014                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
3440  017546  000406                          BR      $TYPEX          ;;EXIT
3441  017550  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
3442  017556  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
3443  017560  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
3444  017562  000000                  $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
3445  017564  000207                  $TYPEX: RTS     PC
3446
3447                                  .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
3448
3449                                  ;;**************************************************************
3450                                  ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
3451                                  ;*OCTAL (ASCII) NUMBER AND TYPE IT.
3452                                  ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
3453                                  ;*CALL:
3454                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3455                                  ;*      TYPOS                   ;;CALL FOR TYPEOUT
3456                                  ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
3457                                  ;*      .BYTE   M               ;;M=1 OR 0
3458                                  ;*                                      ;;1=TYPE LEADING ZEROS
3459                                  ;*                                      ;;0=SUPPRESS LEADING ZEROS
3460                                  ;*
3461                                  ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
3462                                  ;*$TYPOS OR $TYPOC
3463                                  ;*CALL:
3464                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3465                                  ;*      TYPON                   ;;CALL FOR TYPEOUT
3466                                  ;*
3467                                  ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
3468                                  ;*CALL:
3469                                  ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
3470                                  ;*      TYPOC                   ;;CALL FOR TYPEOUT
3471
3472  017566  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
3473  017572  116667  000001  000211          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
3474  017600  112667  000207                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
3475  017604  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
3476  017610  000406                          BR      $TYPON
3477  017612  112767  000001  000171  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
3478  017620  112767  000006  000165          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
3479  017626  112767  000005  000154  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
3480  017634  010346                          MOV     R3,-(SP)        ;;SAVE R3
3481  017636  010446                          MOV     R4,-(SP)        ;;SAVE R4
3482  017640  010546                          MOV     R5,-(SP)        ;;SAVE R5
3483  017642  116704  000145                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
3484  017646  005404                          NEG     R4
3485  017650  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
3486  017654  110467  000132                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
3487  017660  116704  000125                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
3488  017664  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
3489  017670  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
3490  017672  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
3491  017674  000404                          BR      3$              ;;GO DO MSB
3492  017676  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
```

```
3493  017700  006105                          ROL     R5
3494  017702  006105                          ROL     R5
3495  017704  010503                          MOV     R5,R3
3496  017706  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
3497  017710  105367  000076                  DECB    $OMODE          ;;TYPE THIS DIGIT?
3498  017714  100016                          BPL     7$              ;;BR IF NO
3499  017716  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
3500  017722  001002                          BNE     4$              ;;TEST FOR 0
3501  017724  005704                          TST     R4              ;;SUPPRESS THIS 0?
3502  017726  001403                          BEQ     5$              ;;BR IF YES
3503  017730  005204                  4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
3504  017732  052703  000060                  BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
3505  017736  052703  000040          5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
3506  017742  110367  000040                  MOVB    R3,8$           ;;SAVE FOR TYPING
3507  017746  104401  020006                  TYPE    ,8$             ;;GO TYPE THIS DIGIT
3508  017752  105367  000032          7$:     DECB    $OCNT           ;;COUNT BY 1
3509  017756  003347                          BGT     2$              ;;BR IF MORE TO DO
3510  017760  002402                          BLT     6$              ;;BR IF DONE
3511  017762  005204                          INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
3512  017764  000744                          BR      2$              ;;GO DO THE LAST DIGIT
3513  017766  012605                  6$:     MOV     (SP)+,R5        ;;RESTORE R5
3514  017770  012604                          MOV     (SP)+,R4        ;;RESTORE R4
3515  017772  012603                          MOV     (SP)+,R3        ;;RESTORE R3
3516  017774  016666  000002  000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
3517  020002  012616                          MOV     (SP)+,(SP)
3518  020004  000002                          RTI                     ;;RETURN
3519  020006     000                  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
3520  020007     000                          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
3521  020010     000                  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
3522  020011     000                  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
3523  020012  000000                  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
3524                                  .SBTTL  TRAP DECODER
3525
3526                                  ;;**************************************************************
3527                                  ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
3528                                  ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
3529                                  ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
3530                                  ;*GO TO THAT ROUTINE.
3531
3532  020014  010046                  $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
3533  020016  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
3534  020022  005740                          TST     -(R0)           ;;BACKUP BY 2
3535  020024  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
3536  020026  006300                          ASL     R0              ;;POSITION FOR INDEXING
3537  020030  016000  020050                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
3538  020034  000200                          RTS     R0              ;;GO TO ROUTINE
3539
3540
3541                                  ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
3542
3543  020036  011646                  $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
3544  020040  016666  000004  000002          MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
3545  020046  000002                          RTI                     ;;RESTORE THE PSW
3546
3547                                  .SBTTL  TRAP TABLE
3548
```

```
                                        ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                        ;*BY THE "TRAP" INSTRUCTION.
                                        ;
                                        ;       ROUTINE
                                        ;       -------
020050  020036                          $TRPAD: .WORD   $TRAP2
020052  017346                                  $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
020054  017612                                  $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
020056  017566                                  $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
020060  017626                                  $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
020062  017122                                  $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

                                        .SBTTL  POWER DOWN AND UP ROUTINES

                                        ;;**************************************************************
                                        ;POWER DOWN ROUTINE
020064  012737  020224  000024          $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
020072  012737  000340  000026                  MOV     #340,@#PWRVEC+2 ;;PRIO:7
020100  010046                                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
020102  010146                                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
020104  010246                                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
020106  010346                                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
020110  010446                                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
020112  010546                                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
020114  017746  161052                          MOV     @$WR,-(SP)      ;;PUSH @$WR ON STACK
020120  010667  000104                          MOV     SP,$$AVR6       ;;SAVE SP
020124  012737  020136  000024                  MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
020132  000000                                  HALT
020134  000776                                  BR      .-2             ;;HANG UP

                                        ;;**************************************************************
                                        ;POWER UP ROUTINE
020136  012737  020224  000024          $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
020144  016706  000060                          MOV     $SAVR5,SP       ;;GET SP
020150  005067  000054                          CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
020154  005267  000050                  1$:     INC     $SAVR6          ;;WAIT FOR THE INC
020160  001375                                  BNE     1$              ;;OF  WORD
020162  012677  161004                          MOV     (SP)+,@$WR      ;;POP STACK INTO @$WR
020166  012605                                  MOV     (SP)+,R5        ;;POP STACK INTO R5
020170  012604                                  MOV     (SP)+,R4        ;;POP STACK INTO R4
020172  012603                                  MOV     (SP)+,R3        ;;POP STACK INTO R3
020174  012602                                  MOV     (SP)+,R2        ;;POP STACK INTO R2
020176  012601                                  MOV     (SP)+,R1        ;;POP STACK INTO R1
020200  012600                                  MOV     (SP)+,R0        ;;POP STACK INTO R0
020202  012737  020064  000024                  MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
020210  012737  000340  000026                  MOV     #340,@#PWRVEC+2 ;;PRIO:7
020216  104401                                  TYPE                    ;REPORT THE POWER FAILURE
020220  020232                          $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
020222  000002                                  RTI
020224  000000                          $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
020226  000776                                  BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
020230  000000                          $SAVR6: 0                       ;;PUT THE SP HERE
020232  005015  047520  042527          $POWER: .ASCIZ  <15><12>"POWER"
020240  000122
                                                .EVEN
```

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                                                ;;*****************************************************************
                                                ;;*****************************************************************
020242  005015  046505  050101  MSG1:   .ASCIZ<15><12>/EMAP: /
020250  020072      000
020253     015  040412  046114  MSG2:   .ASCII<15><12>/ALL EXERCISORS TESTED/<15><12>
020260  042440  042530  041522
020266  051511  051117  020123
020274  042524  052123  042105
020302  005015
020304  020040  047040  052117          .ASCII/   NOTE:TO TEST PASSING OF GRANTS FOR THE LAST UBE/<15><12>
020312  035105  047524  052040
020320  051505  020124  040520
020326  051523  047111  020107
020334  043117  043440  040522
020342  052116  020123  047506
020350  020122  044124  020105
020356  040514  052123  052440
020364  042502  005015
020370  020040  020040  020040          .ASCII/        IT SHOULD BE SWAPPED WITH A UBE/<15><12>
020376  020040  052111  051440
020404  047510  046125  020104
020412  042502  051440  040527
020420  050120  042105  053440
020426  052111  020110  020101
020434  041125  006505      012
020441     040  020040  020040          .ASCIZ/        OF HIGHER ELECTRICAL PRIORITY/<15><12>
020446  020040  047440  020106
020454  044510  044107  051105
020462  042440  042514  052103
020470  044522  040503  020114
020476  051120  047511  044522
020504  054524  005015      000
020511     015  041012  051525  MSG5:   .ASCIZ<15><12>*BUS PARITY NOT TESTED ON 11/05 OR 11/20 MACHINES*<15><12>
020516  050040  051101  052111
020524  020131  047516  020124
020532  042524  052123  042105
020540  047440  020116  030461
020546  030057  020065  051117
020554  030440  027461  030062
020562  046440  041501  044510
020570  042516  006523  000012
020576  047516  051040  051505  EM1:    .ASCIZ/NO RESPONSE TO REG ADDRESSES OR NO DEVICE PRESENT/
020604  047520  051516  020105
020612  047524  051040  043505
020620  040440  042104  042522
020626  051523  051505  047440
020634  020122  047516  042040
020642  053105  041511  020105
020650  051120  051505  047105
020656  000124
020660  040506  040524  020114  EM2:    .ASCIZ/FATAL ERROR:REG FAILED TO CLEAR/
020666  051105  047522  035122
020674  042522  020107  040506
020702  046111  042105  052040
020710  020117  046103  040505
020716  000122
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3661  020720  042522  020107  042101  DH2:    .ASCIZ*REG ADD/REG CONTENTS *
3662  020726  027504  042522  020107
3663  020734  047503  052116  047105
3664  020742  051524  000040
3665                                  .EVEN
3666  020746  001214  001216  000000  DT2:    .WORD $REG0,$REG1,0
3667  020754  040506  040524  020114  EM3:    .ASCIZ/FATAL ERROR:CPU DID NOT RECEIVE SSYN/
3668  020762  051105  047522  035122
3669  020770  050103  020125  044504
3670  020776  020104  047516  020124
3671  021004  042522  042503  053111
3672  021012  020105  051523  047131
3673  021020     000
3674  021021     120  020103  040527  DH3:    .ASCIZ/PC WAS/
3675  021026  000123
3676                                  .EVEN
3677  021030  001214  000000          DT3:    .WORD $REG0,0
3678  021034  040506  040524  020114  EM4:    .ASCIZ/FATAL ERROR:REG FAILED TO FLOAT A '1'/
3679  021042  051105  047522  035122
3680  021050  042522  020107  040506
3681  021056  046111  042105  052040
3682  021064  020117  046106  040517
3683  021072  020124  020101  030447
3684  021100  000047
3685  021102  042522  020107  042101  DH4:    .ASCIZ*REG ADD/DATA IS/DATA SHOULD BE*
3686  021110  027504  040504  040524
3687  021116  044440  027523  040504
3688  021124  040524  051440  047510
3689  021132  046125  020104  042502
3690  021140     000
3691          021142                  .EVEN
3692  021142  001214  001216  001220  DT4:    .WORD $REG0,$REG1,$REG2,0
3693  021150  000000
3694  021152  040506  040524  020114  EM5:    .ASCIZ/FATAL ERROR:REG FAILED TO FLOAT A '0'/
3695  021160  051105  047522  035122
3696  021166  042522  020107  040506
3697  021174  046111  042105  052040
3698  021202  020117  046106  040517
3699  021210  020124  020101  030047
3700  021216  000047
3701  021220  040506  040524  020114  EM6:    .ASCIZ/FATAL ERROR:CONTROL REG HELD WRONG DATA/
3702  021226  051105  047522  035122
3703  021234  047503  052116  047522
3704  021242  020114  042522  020107
3705  021250  042510  042114  053440
3706  021256  047522  043516  042040
3707  021264  052101  000101
3708  021270  040506  040524  020114  EM7:    .ASCIZ/FATAL ERROR:DUAL ADDRESSING ERROR/
3709  021276  051105  047522  035122
3710  021304  052504  046101  040440
3711  021312  042104  042522  051523
3712  021320  047111  020107  051105
3713  021326  047522  000122
3714  021332  042522  020107  042101  DH7:    .ASCIZ*REG ADD/REG ADD WERE SIMULATANEOUSLY WRITTEN*
3715  021340  027504  042522  020107
3716  021346  042101  020104  042527
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3717  021354  042522  051440  046511
3718  021362  046125  052101  047101
3719  021370  047505  051525  054514
3720  021376  053440  044522  052124
3721  021404  047105     000
3722          021410                          .EVEN
3723  021410  001214  001216  000000  DT7:    .WORD $REG0,$REG1,0
3724  021416  051105  047522  035122  EM8:    .ASCIZ/ERROR: SETTING PB PARITY FAILED TO CAUSE CPU TO TRAP/
3725  021424  051440  052105  044524
3726  021432  043516  050040  020102
3727  021440  040520  044522  054524
3728  021446  043040  044501  042514
3729  021454  020104  047524  041440
3730  021462  052501  042523  041440
3731  021470  052520  052040  020117
3732  021476  051124  050101     000
3733  021503     105  051122  051117  EM9:    .ASCIZ/ERROR: GO BIT FAILED TO LOAD '1'/
3734  021510  020072  047507  041040
3735  021516  052111  043040  044501
3736  021524  042514  020104  047524
3737  021532  046040  040517  020104
3738  021540  030447  000047
3739  021544  051105  047522  035122  EM10:   .ASCIZ/ERROR: GO BIT FAILED TO LOAD '0'/
3740  021552  043440  020117  044502
3741  021560  020124  040506  046111
3742  021566  042105  052040  020117
3743  021574  047514  042101  023440
3744  021602  023460     000
3745  021605     106  052101  046101  EM11:   .ASCIZ/FATAL ERROR: GO BIT FAILED TO CLEAR/
3746  021612  042440  051122  051117
3747  021620  020072  047507  041040
3748  021626  052111  043040  044501
3749  021634  042514  020104  047524
3750  021642  041440  042514  051101
3751  021650     000
3752  021651     106  052101  046101  EM12:   .ASCIZ/FATAL ERROR: READY BIT FAILED TO SET/
3753  021656  042440  051122  051117
3754  021664  020072  042522  042101
3755  021672  020131  044502  020124
3756  021700  040506  046111  042105
3757  021706  052040  020117  042523
3758  021714  000124
3759  021716  047524  041440  042514  EM14:   .ASCIZ/TO CLEAR BIT 10 OF BECR1/
3760  021724  051101  041040  052111
3761  021732  030440  020060  043117
3762  021740  041040  041505  030522
3763  021746     000
3764  021747     105  051122  051117  EM15:   .ASCIZ/ERROR: ERROR BITS IN BECR2 SET WHEN SHOULD BE CLEAR/
3765  021754  020072  051105  047522
3766  021762  020122  044502  051524
3767  021770  044440  020116  042502
3768  021776  051103  020062  042523
3769  022004  020124  044127  047105
3770  022012  051440  047510  046125
3771  022020  020104  042502  041440
3772  022026  042514  051101     000
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3773  022033    103  047117  042524  DH15:   .ASCIZ/CONTENTS OF BECR2/
3774  022040 052116  020123  043117
3775  022046 041040  041505  031122
3776  022054    000
3777  022055    106  052101  046101  EM16:   .ASCIZ/FATAL ERROR: READY BIT FAILED TO CLEAR OR GO FAILED TO SET/
3778  022062 042440  051122  051117
3779  022070 020072  042522  042101
3780  022076 020131  044502  020124
3781  022104 040506  046111  042105
3782  022112 052040  020117  046103
3783  022120 040505  020122  051117
3784  022126 043440  020117  040506
3785  022134 046111  042105  052040
3786  022142 020117  042523  000124
3787  022150 051105  047522  035122  EM17:   .ASCIZ/ERROR: UBE FAILED TO INTERRUPT/
3788  022156 052440  042502  043040
3789  022164 044501  042514  020104
3790  022172 047524  044440  052116
3791  022200 051105  052522  052120
3792  022206    000
3793  022207    102  020122  051511  DH17:   .ASCIZ*BR I3  / PRIORITY IS*
3794  022214 020040  020057  051120
3795  022222 047511  044522  054524
3796  022230 044440  000123
3797  022234 051105  047522  035122  EM18:   .ASCIZ/ERROR: UBE INTERRUPTED WHEN PSW AT SAME PRIORITY LEVEL/
3798  022242 052440  042502  044440
3799  022250 052116  051105  052522
3800  022256 052120  042105  053440
3801  022264 042510  020116  051520
3802  022272 020127  052101  051440
3803  022300 046501  020105  051120
3804  022306 047511  044522  054524
3805  022314 046040  053105  046105
3806  022322    000
3807  022323    125  042502  041040  DH18:   .ASCIZ/UBE BR WAS/
3808  022330 020122  040527  000123
3809  022336 051105  047522  035122  EM19:   .ASCIZ/ERROR: UBE FALSELY INTERRUPTED AT A HIGHER LEVEL/
3810  022344 052440  042502  043040
3811  022352 046101  042523  054514
3812  022360 044440  052116  051105
3813  022366 052522  052120  042105
3814  022374 040440  020124  020101
3815  022402 044510  044107  051105
3816  022410 046040  053105  046105
3817  022416    000
3818  022417    110  043511  042510  DH19:   .ASCIZ/HIGHER LEVEL WAS/
3819  022424 020122  042514  042526
3820  022432 020114  040527  000123
3821  022440 051105  047522  035122  EM20:   .ASCIZ/ERROR: UBE INTERRUPTED TO WRONG VECTOR/
3822  022446 052440  042502  044440
3823  022454 052116  051105  052522
3824  022462 052120  042105  052040
3825  022470 020117  051127  047117
3826  022476 020107  042526  052103
3827  022504 051117    000
3828
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3829  022507    105  051122  051117  EM21:   .ASCIZ/ERROR: SIMULTANEOUS GO FAILED/
3830  022514  020072  044523  052515
3831  022522  052114  047101  047505
3832  022530  051525  043440  020117
3833  022536  040506  046111  042105
3834  022544    000
3835  022545    105  051122  051117  EM22:   .ASCIZ/ERROR. NO, NO SACK BIT FALSELY SET/
3836  022552  020072  047516  020054
3837  022560  047516  051440  041501
3838  022566  020113  044502  020124
3839  022574  040506  051514  046105
3840  022602  020131  042523  000124
3841  022610  051105  047522  035122  EM23:   .ASCIZ/ERROR: NO INT. SSYN BIT FALSELY SET/
3842  022616  047040  020117  047111
3843  022624  027124  051440  054523
3844  022632  020116  044502  020124
3845  022640  040506  051514  046105
3846  022646  020131  042523  000124
3847  022654  051105  047522  035122  EM24:   .ASCIZ/ERROR: DATI FAILED TO LOAD PROPER DATA/
3848  022662  042040  052101  020111
3849  022670  040506  046111  042105
3850  022676  052040  020117  047514
3851  022704  042101  050040  047522
3852  022712  042520  020122  040504
3853  022720  040524    000
3854  022723    102  041105  020104  DH24:   .ASCIZ*BEBD /MEM DATA/MEM ADD/DATA SHOULD BE IN MEM*
3855  022730  046457  046505  042040
3856  022736  052101  027501  042515
3857  022744  020115  042101  027504
3858  022752  040504  040524  051440
3859  022760  047510  046125  020104
3860  022766  042502  044440  020116
3861  022774  042515  000115
3862                                  .EVEN
3863  023000  001214  001216  001220  DT24:   .WORD   $REG0,$REG1,$REG2,$REG3,0
3864  023006  001222  000000
3865  023012  040504  047524  043040  EM25:   .ASCIZ/DATO FAILED TO LOAD PROPER DATA/
3866  023020  044501  042514  020104
3867  023026  047524  046040  040517
3868  023034  020104  051120  050117
3869  023042  051105  042040  052101
3870  023050  000101
3871  023052  040504  044524  020120  EM26:   .ASCIZ/DATIP FAILED TO LOAD PROPER DATA/
3872  023060  040506  046111  042105
3873  023066  052040  020117  047514
3874  023074  042101  050040  047522
3875  023102  042520  020122  040504
3876  023110  040524    000
3877  023113    104  052101  041117  EM27:   .ASCIZ/DATOB FILED TO LOAD PROPER DATA/
3878  023120  043040  046111  042105
3879  023126  052040  020117  047514
3880  023134  042101  050040  047522
3881  023142  042520  020122  040504
3882  023150  040524    000
3883  023153    104  052101  020111  EM28:   .ASCIZ/DATI FAILED TO SET RDY/
3884  023160  040506  046111  042105
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3885  023166  052040  020117  042523
3886  023174  020124  042122  000131
3887  023202  040504  047524  043040  EM29:   .ASCIZ/DATO FAILED TO SET RDY/
3888  023210  044501  042514  020104
3889  023216  047524  051440  052105
3890  023224  051040  054504     000
3891  023231     104  052101  050111  EM30:   .ASCIZ/DATIP FAILED TO SET RDY/
3892  023236  043040  044501  042514
3893  023244  020104  047524  051440
3894  023252  052105  051040  054504
3895  023260     000
3896  023261     104  052101  041117  EM31:   .ASCIZ/DATOB FAILED TO SET RDY/
3897  023266  043040  044501  042514
3898  023274  020104  047524  051440
3899  023302  052105  051040  054504
3900  023310     000
3901  023311     105  051122  051117  EM32:   .ASCIZ/ERROR: INH. DATA SHIFT ON DATIP FAILED/
3902  023316  020072  047111  027110
3903  023324  042040  052101  020101
3904  023332  044123  043111  020124
3905  023340  047117  042040  052101
3906  023346  050111  043040  044501
3907  023354  042514  000104
3908  023360  051105  047522  035122  EM33:   .ASCIZ/ERROR: DATOB ON DATIP FAILED/
3909  023366  042040  052101  041117
3910  023374  047440  020116  040504
3911  023402  044524  020120  040506
3912  023410  046111  042105     000
3913  023415     105  051122  051117  EM34:   .ASCIZ/ERROR: UBE DID DATI FROM WRONG LOCATION/
3914  023422  020072  041125  020105
3915  023430  044504  020104  040504
3916  023436  044524  043040  047522
3917  023444  020115  051127  047117
3918  023452  020107  047514  040503
3919  023460  044524  047117     000
3920  023465     115  046505  046040  DH34:   .ASCIZ/MEM LOC WANTED/
3921  023472  041517  053440  047101
3922  023500  042524  000104
3923  023504  051105  047522  035122  EM35:   .ASCIZ/ERROR: BEBA LOWER 16 BITS DID NOT COUNT BY 2/
3924  023512  041040  041105  020101
3925  023520  047514  042527  020122
3926  023526  033061  041040  052111
3927  023534  020123  044504  020104
3928  023542  047516  020124  047503
3929  023550  047125  020124  054502
3930  023556  031040     000
3931  023561     050  042522  024507  DH35:   .ASCIZ*(REG) /DATA SHOULD BE*
3932  023566  027440  040504  040524
3933  023574  051440  047510  046125
3934  023602  020104  042502     000
3935  023607     105  051122  051117  EM36:   .ASCIZ/ERROR: BEBA BIT A16,17 DID NOT COUNT=0/
3936  023614  020072  042502  040502
3937  023622  041040  052111  040440
3938  023630  033061  030454  020067
3939  023636  044504  020104  047516
3940  023644  020124  047503  047125
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3941  023652  036524  000060
3942  023656  030501  026066  030501  EM36:   .ASCIZ/A16,A17/
3943  023664  000067
3944  023666  051105  047522  035122  EM37:   .ASCIZ ERROR: BEBA DID NOT COUNT BY 1/
3945  023674  041040  041105  020101
3946  023702  044504  020134  047516
3947  023710  020134  047503  047125
3948  023716  020124  054502  030440
3949  023724     000
3950  023725     105  051122  051117  EM38:   .ASCIZ/ERROR: INTERRUPT FAILED TO UPDATE BECC TO CORRECT VALUE/
3951  023732  020072  047111  042524
3952  023740  051122  050125  020124
3953  023746  040506  046111  042105
3954  023754  052040  020117  050125
3955  023762  040504  042524  041040
3956  023770  041505  020103  047524
3957  023776  041440  051117  042522
3958  024004  052103  053040  046101
3959  024012  042525     000
3960  024015     105  051122  051117  EM39:   .ASCIZ/ERROR: BEBA INCREMENTED WHEN IT WAS INHIBITED/
3961  024022  020072  042502  040502
3962  024030  044440  041516  042522
3963  024036  042515  052116  042105
3964  024044  053440  042510  020116
3965  024052  052111  053440  051501
3966  024060  044440  044116  041111
3967  024066  052111  042105     000
3968  024073     105  051122  051117  EM40:   .ASCIZ/ERROR: BECC INCREMENTED WHEN IT WAS INHIBITED/
3969  024100  020072  042502  041503
3970  024106  044440  041516  042522
3971  024114  042515  052116  042105
3972  024122  053440  042510  020116
3973  024130  052111  053440  051501
3974  024136  044440  044116  041111
3975  024144  052111  042105     000
3976  024151     105  051122  051117  EM41:   .ASCIZ/ERROR: UBE FAILED TO INT. ON DONE/
3977  024156  020072  041125  020105
3978  024164  040506  046111  042105
3979  024172  052040  020117  047111
3980  024200  027124  047440  020116
3981  024206  047504  042516     000
3982  024213     105  051122  051117  EM42:   .ASCIZ/ERROR: CCOVF NOT CLEARED BY GO/
3983  024220  020072  041503  053117
3984  024226  020106  047516  020124
3985  024234  046103  040505  042522
3986  024242  020104  054502  043440
3987  024250  000117
3988  024252  051105  047522  035122  EM43:   .ASCIZ/ERROR: UBE DID NOT DO DATO TO PROPER # OF LOCS. (4)/
3989  024260  052440  042502  042040
3990  024266  042111  047040  052117
3991  024274  042040  020117  040504
3992  024302  047524  052040  020117
3993  024310  051120  050117  051105
3994  024316  021440  047440  020106
3995  024324  047514  051503  020056
3996  024332  032050  000051
```

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 3997  024336  042101  020104  051106  DM43:   .ASCIZ*ADD FROM TO WERE WRITTEN*
 3998  024344  046517  052057  020117
 3999  024352  042527  042522  053440
 4000  024360  044522  052124  047105
 4001  024366     000
 4002  024367     105  051122  051117  EM44:   .ASCIZ ERROR: INT. ON DONE BIT NOT CLEARED/
 4003  024374  020072  047111  027124
 4004  024402  047440  020116  047504
 4005  024410  042516  041040  052111
 4006  024416  047040  052117  041440
 4007  024424  042514  051101  042105
 4008  024432     000
 4009  024433     105  051122  051117  EM45:   .ASCIZ/ERROR: CCOVF NOT SET/
 4010  024440  020072  041503  053117
 4011  024446  020106  047516  020124
 4012  024454  042523  000124
 4013  024460  051105  047522  035122  EM46:   .ASCIZ/ERROR: DATO FROM BECC NOT DONE PROPERLY/
 4014  024466  042040  052101  020117
 4015  024474  051106  046517  041040
 4016  024502  041505  020103  047516
 4017  024510  020124  047504  042516
 4018  024516  050040  047522  042520
 4019  024524  046122  000131
 4020  024530  042101  020104  020040  DM46:   .ASCIZ*ADD   /DATA   /DATA SHOULD BE*
 4021  024536  042057  052101  020101
 4022  024544  020040  042057  052101
 4023  024552  020101  044123  052517
 4024  024560  042114  041040  000105
 4025  024566  051105  047522  035122  EM47:   .ASCIZ/ERROR: UBE DID NOT DO 2 DATO FOR EACH REQUEST
 4026  024574  052440  042502  042040
 4027  024602  042111  047040  052117
 4028  024610  042040  020117  020062
 4029  024616  040504  047524  043040
 4030  024624  051117  042440  041501
 4031  024632  020110  042522  052521
 4032  024640  051505  000124
 4033  024644  051105  047522  035122  EM49:   .ASCIZ/ERROR: UBE DID NOT DO 2 DATIP FOR EACH REQUEST/
 4034  024652  052440  042502  042040
 4035  024660  042111  047040  052117
 4036  024666  042040  020117  020062
 4037  024674  040504  044524  020120
 4038  024702  047506  020122  040505
 4039  024710  044103  051040  050505
 4040  024716  042525  052123     000
 4041  024723     105  051122  051117  EM51:   .ASCIZ/ERROR: NPR DATO NOT DONE/
 4042  024730  020072  050116  020122
 4043  024736  040504  047524  047040
 4044  024744  052117  042040  047117
 4045  024752  000105
 4046  024754  051105  047522  035122  EM52:   .ASCIZ/ERROR: NPR DID NOT SET RDY/
 4047  024762  047040  051120  042040
 4048  024770  042111  047040  052117
 4049  024776  051440  052105  051040
 4050  025004  054504     000
 4051  025007     105  051122  051117  EM53:   .ASCIZ/ERROR: UBE DID NOT INT. WHEN NPR FINISHED
 4052  025014  020072  041125  020105
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 4053  025022  044504  020104  047516
 4054  025030  020124  047111  027124
 4055  025036  053440  042510  020116
 4056  025044  050116  020122  044506
 4057  025052  044516  044123  042105
 4058  025060     000
 4059  025061     105  051122  051117  EM54:   .ASCIZ/ERROR: TWO LOC. WRITTEN WHEN ONE NPR AND INT. ON DONE ENABLED/
 4060  025066  020072  053524  020117
 4061  025074  047514  027103  053440
 4062  025102  044522  052124  047105
 4063  025110  053440  042510  020116
 4064  025116  047117  020105  050116
 4065  025124  020122  047101  020104
 4066  025132  047111  027124  047440
 4067  025140  020116  047504  042516
 4068  025146  042440  040516  046102
 4069  025154  042105     000
 4070  025157     015  052012  051505  MSG3:   .ASCII<15><12>/TESTING UBE WILL NOT INTERRUPT DURING NPR/<15><12>
 4071  025164  044524  043516  052440
 4072  025172  042502  053440  046111
 4073  025200  020114  047516  020124
 4074  025206  047111  042524  051122
 4075  025214  050125  020124  052504
 4076  025222  044522  043516  047040
 4077  025230  051120  005015
 4078  025234  043111  042040  042517          .ASCIZ*IF DOES, CPU WILL GO DOWN*<15><12>*ENTERING TEST*<15><12>
 4079  025242  026123  041440  052520
 4080  025250  053440  046111  020114
 4081  025256  047507  042040  053517
 4082  025264  006516  042412  052116
 4083  025272  051105  047111  020107
 4084  025300  042524  052123  005015
 4085  025306     000
 4086  025307     015  042412  044530  MSG4:   .ASCIZ<15><12>/EXITING TEST/<15><12>
 4087  025314  044524  043516  052040
 4088  025322  051505  006524  000012
 4089  025330  051105  047522  035122  EM56:   .ASCIZ/ERROR: TEST OF WRONG A  LINES ERROR BIT FAILED/
 4090  025336  052040  051505  020124
 4091  025344  043117  053440  047522
 4092  025352  043516  040440  020040
 4093  025360  044514  042516  020123
 4094  025366  051105  047522  020122
 4095  025374  044502  020124  040506
 4096  025402  046111  042105     000
 4097  025407     102  041505  031122  EM57:   .ASCIZ/BECR2 BIT 9 FALSELY SET/
 4098  025414  041040  052111  034440
 4099  025422  043040  046101  042523
 4100  025430  054514  051440  052105
 4101  025436     000
 4102  025437     124  020117  047111  EM58:   .ASCIZ/TO INTERRUPT CPU/
 4103  025444  042524  051122  050125
 4104  025452  020124  050103  000125
 4105  025460  051105  047522  035122  EM59:   .ASCIZ/ERROR: TEST OF NSSYN ERROR BIT FAILED
 4106  025466  052040  051505  020124
 4107  025474  043117  047040  051523
 4108  025502  047131  042440  051122
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4109  025510  051117  041040  052111
4110  025516  043040  044501  042514
4111  025524  000104
4112  025526  047524  051440  052105  EM60:   .ASCIZ/TO SET BIT 8 OF BECR2/
4113  025534  041040  052111  034040
4114  025542  047440  020106  042502
4115  025550  051103  000062
4116  025554  047524  051440  052105  EM61:   .ASCIZ/TO SET BIT 15 OF BECR1/
4117  025562  041040  052111  030440
4118  025570  020065  043117  041040
4119  025576  041505  030522     000
4120  025603     124  020117  046103  EM62:   .ASCIZ/TO CLEAR BIT 8 OF BECR2/
4121  025610  040505  020122  044502
4122  025616  020124  020070  043117
4123  025624  041040  041505  031122
4124  025632     000
4125  025633     106  046101  042523  EM63:   .ASCIZ/FALSELY INTERRUPTED CPU/
4126  025640  054514  044440  052116
4127  025646  051105  052522  052120
4128  025654  042105  041440  052520
4129  025662     000
4130  025663     105  051122  051117  EM64:   .ASCIZ/ERROR: TEST OF WRONG GRANT OR NOT ONE GRANT ERROR BITS FAILED/
4131  025670  020072  042524  052123
4132  025676  047440  020106  051127
4133  025704  047117  020107  051107
4134  025712  047101  020124  051117
4135  025720  047040  052117  047440
4136  025726  042516  043440  040522
4137  025734  052116  042440  051122
4138  025742  051117  041040  052111
4139  025750  020123  040506  046111
4140  025756  042105     000
4141  025761     116  020117  051107  EM65:   .ASCIZ/NO GRANT OR NOT ONE GRANT ERROR BIT FALSELY SET/
4142  025766  047101  020124  051117
4143  025774  047040  052117  047440
4144  026002  042516  043440  040522
4145  026010  052116  042440  051122
4146  026016  051117  041040  052111
4147  026024  043040  046101  042523
4148  026032  054514  051440  052105
4149  026040     000
4150  026041     040  044527  044124  DH65:   .ASCIZ/ WITH BECR1 = /
4151  026046  041040  041505  030522
4152  026054  036440  000040
4153  026060  044527  044124  044440  EM66:   .ASCIZ/WITH INT. ON DONE = 1/
4154  026066  052116  020056  047117
4155  026074  042040  047117  020105
4156  026102  020075  000061
4157  026106  051127  047117  020107  EM67:   .ASCIZ/WRONG GRANT ERROR BIT FALSELY SET/
4158  026114  051107  047101  020124
4159  026122  051105  047522  020122
4160  026130  044502  020124  040506
4161  026136  051514  046105  020131
4162  026144  042523  000124
4163  026150  047524  041440  042514  EM69:   .ASCIZ/TO CLEAR BIT 11 OF BECR1/
4164  026156  051101  041040  052111
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4165  026164  030440  020061  043117
4166  026172  041040  041505  030522
4167  026200     000
4168  026201     105  051122  051117  EM70:   .ASCIZ/ERROR: TEST OF TIME DELAY AND BUS LATENCY FAILED/
4169  026206  020072  042524  052123
4170  026214  047440  020106  044524
4171  026222  042515  042040  046105
4172  026230  054501  040440  042116
4173  026236  041040  051525  046040
4174  026244  052101  047105  054503
4175  026252  043040  044501  042514
4176  026260  000104
4177  026262  047524  051440  052105  EM71:   .ASCIZ/TO SET BIT 6 OF BECR2/
4178  026270  041040  052111  033040
4179  026276  047440  020106  042502
4180  026304  051103  000062
4181  026310  047524  041440  042514  EM72:   .ASCIZ/TO CLEAR BIT 6 OF BECR2/
4182  026316  051101  041040  052111
4183  026324  033040  047440  020106
4184  026332  042502  051103  000062
4185  026340  051105  047522  035122  EM73:   .ASCIZ/ERROR: TEST OF POWER DOWN BIT FAILED/
4186  026346  052040  051505  020124
4187  026354  043117  050040  053517
4188  026362  051105  042040  053517
4189  026370  020116  044502  020124
4190  026376  040506  046111  042105
4191  026404     000
4192  026405     124  020117  047520  EM74:   .ASCIZ/TO POWER DOWN CPU/
4193  026412  042527  020122  047504
4194  026420  047127  041440  052520
4195  026426     000
4196  026427     124  020117  047520  EM75:   .ASCIZ/TO POWER UP CPU/
4197  026434  042527  020122  050125
4198  026442  041440  052520     000
4199  026447     124  020117  042522  EM76:   .ASCIZ/TO RE POWER DOWN CPU/
4200  026454  050040  053517  051105
4201  026462  042040  053517  020116
4202  026470  050103  000125
4203  026474  047524  051440  052105  EM77:   .ASCIZ/TO SET BIT 4 OF BECR2/
4204  026502  041040  052111  032040
4205  026510  047440  020106  042502
4206  026516  051103  000062
4207  026522  051105  047522  035122  EM78:   .ASCIZ/ERROR: DCLO FAILED TO CLEAR REG/
4208  026530  042040  046103  020117
4209  026536  040506  046111  042105
4210  026544  052040  020117  046103
4211  026552  040505  020122  042522
4212  026560  000107
4213  026562  051105  047522  035122  EM80:   .ASCIZ/ERROR: DYNAMIC TEST OF UBE FAILED/
4214  026570  042040  047131  046501
4215  026576  041511  052040  051505
4216  026604  020124  043117  052440
4217  026612  042502  043040  044501
4218  026620  042514  000104
4219  026624  047524  046040  040517  EM81:   .ASCIZ/TO LOAD PROPER DATA/
4220  026632  020104  051120  050117
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4221  026640  051105  042040  052101
4222  026646  000101
4223  026650  051105  047522  035122  EM82:   .ASCIZ/ERROR: TEST OF PASSING GRANTS FAILED/
4224  026656  052040  051505  020124
4225  026664  043117  050040  051501
4226  026672  044523  043516  043440
4227  026700  040522  052116  020123
4228  026706  040506  046111  042105
4229  026714     000
4230  026715     105  051122  051117  EM83:   .ASCIZ/ERROR:FALSE INTERRUPT WHEN DO RELEASE BUS IMMED./
4231  026722  043072  046101  042523
4232  026730  044440  052116  051105
4233  026736  052522  052120  053440
4234  026744  042510  020116  047504
4235  026752  051040  046105  040505
4236  026760  042523  041040  051525
4237  026766  044440  046515  042105
4238  026774  000056
4239  026776  051105  047522  035122  EM84:   .ASCIZ/ERROR:TEST OF MULTIPLE INTERRUPTS FAILED TO SET RDY/
4240  027004  042524  052123  047440
4241  027012  020106  052515  052114
4242  027020  050111  042514  044440
4243  027026  052116  051105  052522
4244  027034  052120  020123  040506
4245  027042  046111  042105  052040
4246  027050  020117  042523  020124
4247  027056  042122  000131
4248  027062  041125  020105  044527  MSG7:   .ASCIZ/UBE WITH VECTOR: /
4249  027070  044124  053040  041505
4250  027076  047524  035122  000040
4251  027104  040440  042116  041040  MSG8:   .ASCIZ/ AND BR AT: /
4252  027112  020122  052101  020072
4253  027120     000
4254  027121     040  040506  051514  MSG9:   .ASCIZ/ FALSELY INTERRUPTED WHEN/<15><12>
4255  027126  046105  020131  047111
4256  027134  042524  051122  050125
4257  027142  042524  020104  044127
4258  027150  047105  005015     000
4259  027155     040  044123  052517  MSG10:  .ASCIZ/ SHOULD HAVE INTERRUPTED/<15><12>
4260  027162  042114  044040  053101
4261  027170  020105  047111  042524
4262  027176  051122  050125  042524
4263  027204  006504  000012
4264  027210  005015  040520  051523  MSG11:  .ASCIZ<15><12>/PASSING OF GRANTS NOT TESTED WITH ONE EXERCISOR/<15><12>
4265  027216  047111  020107  043117
4266  027224  043440  040522  052116
4267  027232  020123  047516  020124
4268  027240  042524  052123  042105
4269  027246  053440  052111  020110
4270  027254  047117  020105  054105
4271  027262  051105  044503  047523
4272  027270  006522  000012
4273  027274  005015  043111  046440  MSG12:  .ASCII<15><12>/IF MORE THAN ONE UBE PRESENT JUMPER W1/<15><12>
4274  027302  051117  020105  044124
4275  027310  047101  047440  042516
4276  027316  052440  042502  050040
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 4277  027324  042522  042523  052116
 4278  027332  045040  046525  042520
 4279  027340  020122  030527  005015
 4290  027346  044123  052517  042114          .ASCIZ/SHOULD BE INSERTED IN ALL UBE EXCEPT LAST/<15><12>
 4281  027354  041040  020105  047111
 4282  027362  042523  052122  042105
 4283  027370  044440  020116  046101
 4284  027376  020114  041125  020105
 4285  027404  054105  042503  052120
 4286  027412  046040  051501  006524
 4287  027420  000012
 4288  027422  005015  042524  052123  MSG13:  .ASCIZ<15><12>/TESTING UBE WITH BEDB ADDRESS: /
 4289  027430  047111  020107  041125
 4290  027436  020105  044527  044124
 4291  027444  041040  042105  020102
 4292  027452  042101  051104  051505
 4293  027460  035123  000040
 4294  027464  005015  020040  047040  MSG14:  .ASCIZ<15><12>/   NOTE:DISREGARD BIT 13 =1 OF BECR2/<15><12>
 4295  027472  052117  035105  044504
 4296  027500  051123  043505  051101
 4297  027506  020104  044502  020124
 4298  027514  031461  036440  020061
 4299  027522  043117  041040  041505
 4300  027530  031122  005015     000
 4301  027535     015  006412  050012  MSG15:  .ASCIZ<15><12><15><12>/PC OF ERROR MESSAGE WAS: /
 4302  027542  020103  043117  042440
 4303  027550  051122  051117  046440
 4304  027556  051505  040523  042507
 4305  027564  053440  051501  020072
 4306  027572     000
 4307  027573     015  006412  020012  MSG16:  .ASCIZ<15><12><15><12>/     UNIBUS EXERCISOR MODULE DIAGNOSTIC--MAINDEC-11-DZKUB
 4308  027600  020040  020040  047125
 4309  027606  041111  051525  042440
 4310  027614  042530  041522  051511
 4311  027622  051117  046440  042117
 4312  027630  046125  020105  044504
 4313  027636  043501  047516  052123
 4314  027644  041511  026455  040515
 4315  027652  047111  042504  026503
 4316  027660  030461  042055  045532
 4317  027666  041125  040455  005015
 4318  027674  005015     000
 4319
 4320          027700                          .EVEN
 4321                                  ;////////////////////////////////////////////////////////////////////////
 4322                                  ;BUFFER WORK AREA
 4323                                  ;////////////////////////////////////////////////////////////////////////
 4324  027700  000011                  BUFF1:  .BLKW   11
 4325          000001                          .END
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A       003166          1227*  1240
ACALC   003370          1261*  1273   1281   2806
B       001126           626    628*
BEBA    002522          1133*  1249*  1263*  1433   1462   1749*  1766*  1784*  1803*  1852*  1879*  1909   1915*
                        1925*  1929   1931   1936   1982*  1988*  1995   2043*  2053   2080*  2144*  2184*  2235*
                        2282*  2294*  2360*  2392*  2418*  2438*  2441*  2442   2474*  2556*  2667*  2674*  2698
                        2689   2770*  3094*
BEBD    002516          1131*  1247*  1261*  1285   1292   1318   1418   1447   1481   1482   1754   1756   1767*
                        1773   1788   1792   1802*  1810   1860   1864   1883   1887   1980   1986   1993   2049
                        2079*  2186*  2281*  3096*
BECC    002520          1132*  1248*  1262*  1748*  1765*  1783*  1804*  1851*  1880*  1906*  1917*  1926*  1977*
                        1983*  1990*  2022   2024   2044*  2051   2081*  2145*  2185*  2236*  2283*  2295*  2331*
                        2362*  2394*  2420*  2440*  2473*  2565*  2580*  2665*  2675*  2684   2686   2771*  3095*
BECR1   002524          1134*  1250*  1264*  1320   1336   1370   1489   1496   1500   1510   1567*  1568   1575
                        1577   1635*  1641*  1646*  1651*  1662*  1669   1671*  1672*  1691*  1720*  1751*  1769*
                        1786*  1805*  1821   1853*  1881*  1907*  1918*  1927*  1978*  1984*  1991*  2015*  2029*
                        2047*  2093*  2101   2105*  2146*  2147   2187*  2237*  2284*  2296*  2309*  2332*  2335
                        2339*  2363*  2370   2387   2395*  2398   2422*  2448*  2470*  2475*  2477   2487   2492*
                        2499   2505   2511   2516   2536*  2546   2567*  2582*  2669*  2676*  2694   2696   2704*
                        2741*  2772*  3093*  3117
BECR2   002526          1135*  1251*  1265*  1316*  1327   1329   1338   1340*  1341   1385   1387   1402   1404
                        1498   1502   1508   1512   1537*  1538   1550*  1679   1681   1703   1719*  1728   1916*
                        1920   1941   1989*  2046*  2060*  2103   2106   2361*  2365   2377   2382   2393*  2419*
                        2424   2432   2439*  2444   2446*  2447*  2450   2479   2481   2485   2494   2496   2534*
                        2541   2558   2581*  2610*  2646   2653*  2666*  2678*  2683*  2691   2692   2703*  2705
                        2710*  2715*  2716   2718   2719   3092*
BEGO    002534          1138*  1253*  1294   1988   2418   2742*  2872*  2961*
BERE    002530          1136*  1252*  1266*  1317*  1339*  1371*  2381*  2404*  2557*  2569*  3091*
BE1BA   002542          1141*
BE1BD   002536          1139*  1255   1259   2875
BE1CC   002540          1140*
BE1CR1  002544          1142*  2864*  2876*  3010*  3019
BE1CR2  002546          1143*
BE1RE   002550          1144*
BE1VEC  002552          1145*  2845*  2846
BE2BA   002560          1148*
BE2BD   002554          1146*  2834   2878
BE2CC   002556          1147*
BE2CR1  002562          1149*  2865*  2879*  3011*  3021
BE2CR2  002564          1150*
BE2RE   002566          1151*
BE2VEC  002570          1152*  2848*  2849
BE3BA   002576          1155*
BE3BD   002572          1153*  2881
BE3CC   002574          1154*
BE3CR1  002600          1156*  2866   2868*  2882*  3012   3014*  3023   3025
BE3CR2  002602          1157*
BE3RE   002604          1158*
BE3VEC  002606          1159*  2851   2853*  2854
BE4BA   002614          1162*
BE4BD   002610          1160*  2884
BE4CC   002612          1161*
BE4CR1  002616          1163*  2869   2871*  2885*  3015   3017*  3027   3029
BE4CR2  002620          1164*
BE4RE   002622          1165*
BE4VEC  002624          1166*  2856   2858*  2859
```

```
BIT0   = 000001            595#
BIT00  = 000001            585#    595
BIT01  = 000002            584#    594
BIT02  = 000004            583#    593
BIT03  = 000010            582#    592
BIT04  = 000020            581#    591
BIT05  = 000040            580#    590
BIT06  = 000100            579#    589
BIT07  = 000200            578#    588
BIT08  = 000400            577#    587
BIT09  = 001000            576#    586    3193    3251
BIT1   = 000002            594#
BIT10  = 002000            575#   3236
BIT11  = 004000            574#   3200
BIT12  = 010000            573#
BIT13  = 020000            572#   3243
BIT14  = 040000            571#   3175
BIT15  = 100000            570#
BIT2   = 000004            593#
BIT3   = 000010            592#
BIT4   = 000020            591#
BIT5   = 000040            590#
BIT6   = 000100            589#
BIT7   = 000200            588#
BIT8   = 000400            587#
BIT9   = 001000            586#
BPTVEC= 000014             602#
BUFFI   027700            1746*   1749    1757    1758    1764*   1766    1771    1774    1775    1782*   1784    1790    1793
                          1794    1800*   1803    1807    1811    1812    1850*   1852    1862    1865    1866    1878*   1879
                          1885    1888    1899    1925    1929    1932    2043    2045*   2053    2075    2077    2080    2092
                          2095    2099    2113    2118    2140    2142    2144    2149    2154    2180    2182    2184    2191
                          2194    2198    2203    2208    2231    2233    2235    2241    2244    2248    2253    2258    2280*
                          2282    2289    2291*   2292*   2294    2302    2474    2566    2765    2767    2770    2774*   2793
                          2787    2861    2893*   2902    2905    2955    2956    2969    2971    2973    2974    2976    2977
                          4324#
C       003472            1271    1275#
CLRREG  016134            1480    1507    1563    1620    1718    1732    1747    1763    1781    1848    1876    1902    1958
                          2012    2042    2074    2138    2179    2230    2279    2326    2358    2417    2469    2533    2563
                          2577    2739    2762    2805    3091#
CR     = 000015            510#   3437    3447
CRDY    016210            1854    1882    1908    1919    1928    1979    1985    1992    2061    2214    2264    2296    2298
                          2311    2364    2397    2423    2449    2476    2568    2583    3114#
CRLF   = 000200             511#   3408    3447
D       003506            1276    1278#
DB     = 170000             610#   1219
DDISP  = 177570             517#    667    1199
DH15    022033              780     995    1020    3773#
DH17    022207              790    3793#
DH18    022323              795    3807#
DH19    022417              800    3818#
DH2     020720              715    3661#
DH24    022723              825     830     835     840     865     870    3854#
DH3     021021              720    3674#
DH34    023465              875    3920#
DH35    023561              880     890     895    3931#
DH36    023656              885    3942#
```

```
DH4     021102            725    730    735   1095   3685#
DH43    024336            920    940    955   3997#
DH46    024530            935   1110   4020#
DH65    026041           1030   1040   1045   2920   4150#
DH7     021232            740   3714#
DINT    016240           1903   1959   2437   2564   2578   2668   3127#
DISPLA  001174            667#  1199*  1207*  3214*  3235*
DISPRE  000174            618#  1207
DSWR  = 177570            516#   666   1198
DT2     020746            716    791    881    891    896    921    941    956   3666#
DT24    023000            826    831    836    841    866    871   3863#
DT3     021030            721    781    796    801    876    886    996   1021   1031   1041   1046   3677#
DT4     021142            726    731    736    936   1096   1111   3692#
DT7     021410            741   3723#
E       003524           1279   1282#
EMAP    002510           1128#  1214*  1222*  1232   1239   1260
EMTVEC= 000030            605#  1182*  1183*
EM1     020576            709   3646#
EM10    021544            754   3739#
EM11    021605            759   3745#
EM12    021651            764   3752#
EM14    021716            774   3759#
EM15    021747            779   3764#
EM16    022055            784   3777#
EM17    022150            789   3787#
EM18    022234            794   3797#
EM19    022336            799   3809#
EM2     020660            714   3655#
EM20    022440            804   3821#
EM21    022507            809   3829#
EM22    022545            814   3835#
EM23    022610            819   3841#
EM24    022654            824   3847#
EM25    023012            829   3865#
EM26    023052            834   3871#
EM27    023113            839   3877#
EM28    023153            844   3883#
EM29    023202            849   3887#
EM3     020754            719   3667#
EM30    023231            854   3891#
EM31    023261            859   3896#
EM32    023311            864   3901#
EM33    023360            869   3908#
EM34    023415            874   3913#
EM35    023504            879   3923#
EM36    023607            884   3935#
EM37    023666            889   3944#
EM38    023725            894   3950#
EM39    024015            899   3960#
EM4     021034            724   3678#
EM40    024073            904   3968#
EM41    024151            909   3976#
EM42    024213            914   3982#
EM43    024252            919    979   3988#
EM44    024367            924   4002#
EM45    024433            929   4009#
```

```
EM46    024460             934    4013#
EM47    024566             939     944    4025#
EM49    024644             949     954    4033#
EM5     021152             729    3694#
EM51    024723             959    4041#
EM52    024754             964    4046#
EM53    025007             969    4051#
EM54    025061             974    4059#
EM56    025330             984    4089#
EM57    025407             989    4097#
EM58    025437             994    4102#
EM59    025460             999    4105#
EM6     021220             734    3701#
EM60    025526            1004    4112#
EM61    025554            1009    4116#
EM62    025603            1014    4120#
EM63    025633            1019    4125#
EM64    025663            1024    4130#
EM65    025761            1029    4141#
EM66    026060            1034    4153#
EM67    026106            1039    4157#
EM69    026150            1049    4163#
EM7     021270             739    3708#
EM70    026201            1054    4168#
EM71    026262            1059    4177#
EM72    026310            1064    4181#
EM73    026340            1069    4185#
EM74    026405            1074    4192#
EM75    026427            1079    4196#
EM76    026447            1084    4199#
EM77    026474            1089    4203#
EM78    026522            1094    4207#
EM8     021416             744    3724#
EM80    026562            1104    4213#
EM81    026624            1109    4219#
EM82    026650            1114    4223#
EM83    026715            1119    4230#
EM84    026776            1124    4239#
EM9     021503             749    3733#
ERRVEC= 000004             598#   1196    1197*  1208*  3180    3181*  3183*  3186*
ERR1    006572            1750    1829#
ERR2    006602            1768    1832#
ERR3    006612            1785    1835#
ERR4    006622            1801    1838#
F       003562            1293#   1295
FINT1   005154            1564    1587#
FINT3   005552            1632    1675#
FIRST   003624            1298    1299   1312#
GNS   = ****** U           617    3555   3556   3557   3558   3559
HT    = 000011             508#   3406   3447
IADD    003260            1235    1247#
INTVEC  002532            1137#   1254*  1267*  1564*  1565   1632*  1654*  1686*  2014*  2082*  2293*  2359*  2395*
                          2421*   2471*  2491*  2535*  2740*  2769*  3102   3104*  3127   3129*
IOTVEC= 000020             603#   1180*  1181*
ITRAP   004752            1530    1544#
LAST    014402            1274    1277   2808#
```

```
LAST1   014424          2808    2809    2834#
LF    = 000012           509#   3441    3447
LOOP1   003144          1221#   1226
LOOP2   003152          1223#   1238
MSG1    020242          1231    3607#
MSG10   027155          2923    3008    4259#
MSG11   027210          2838    4264#
MSG12   027274          1213    4273#
MSG13   027422          1284    4288#
MSG14   027464          1331    1389    4294#
MSG15   027535          3154    4301#
MSG16   027573          1212    4307#
MSG2    020253          3043    3609#
MSG3    025157          2329    4070#
MSG4    025307          2342    4086#
MSG5    020511          1547    3637#
MSG7    027062          2916    2995    3002    4248#
MSG8    027104          2998    3005    4251#
MSG9    027121          3001    4254#
MTRAP   003230          1217    1237#
NO      002630          1168#   1257    1259#   1291    1296#
NUBE    014372          1391    1428    1457    1495    1582    1594    2805#
NUBE1   014376          1353    2806#
PC    =%000007           529#    627#   1242#   1332#   1349#   1390#   1427#   1456#   1480#   1494#   1507#   1540#   1563#
                        1579#   1581#   1584#   1588#   1592#   1593#   1595#   1620#   1664#   1666#   1676#   1678#   1683#
                        1693#   1695#   1699#   1701#   1702#   1706#   1718#   1731#   1732#   1747#   1753#   1761#   1763#
                        1770#   1778#   1781#   1787#   1797#   1806#   1815#   1828#   1830#   1833#   1836#   1839#   1848#
                        1854#   1858#   1869#   1876#   1882#   1892#   1902#   1903#   1908#   1919#   1928#   1934#   1939#
                        1945#   1946#   1958#   1959#   1979#   1985#   1992#   1998#   1999#   2012#   2027#   2031#   2042#
                        2056#   2059#   2061#   2074#   2090#   2109#   2116#   2121#   2124#   2127#   2128#   2138#   2163#
                        2179#   2206#   2211#   2214#   2230#   2256#   2261#   2264#   2279#   2286#   2298#   2300#   2305#
                        2308#   2311#   2314#   2315#   2326#   2338#   2358#   2364#   2369#   2374#   2380#   2386#   2391#
                        2397#   2402#   2403#   2417#   2423#   2428#   2435#   2437#   2449#   2454#   2455#   2469#   2476#
                        2489#   2502#   2508#   2513#   2518#   2519#   2533#   2545#   2550#   2555#   2562#   2563#   2564#
                        2568#   2570#   2577#   2578#   2583#   2587#   2588#   2614#   2628#   2641#   2650#   2668#   2700#
                        2722#   2723#   2739#   2746#   2747#   2762#   2780#   2798#   2799#   2805#   3009#   3064#   3067#
                        3077#   3082    3097#   3107#   3122#   3131#   3148#   3159#   3245#   3300#   3415#   3422#   3429#
                        3443#   3445#
PIRQ  = 177772           515#
PIRQVE= 000240           609#
PR0   = 000000           532#
PR1   = 000040           533#
PR2   = 000100           534#
PR3   = 000140           535#
PR4   = 000200           536#
PR5   = 000240           537#
PR6   = 000300           538#
PR7   = 000340           539#
PS    = 177776           512#    513
PSW   = 177776           513#   1313#   1367#   1417#   1446#   1479#   1534#   1562#   1570#   1619#   1636#   1640#   1645#
                        1655#   1661#   1690#   1717#   1721#   1745#   1752#   1849#   1877#   1904#   1960#   2011#   2016#
                        2028#   2030#   2041#   2048#   2073#   2084#   2139#   2178#   2188#   2190#   2212#   2229#   2238#
                        2240#   2262#   2278#   2297#   2310#   2333#   2357#   2375#   2416#   2429#   2472#   2532#   2551#
                        2579#   2604#   2670#   2702#   2707#   2738#   2743#   2764#   2863#   2873#   2890#   2909#   2911#
                        2940#   2943#   2962#   3018#
PTRAP   004736          1535    1541#
```

```
                        3420*   3428*   3432    3436    3437    3441    3472*   3473    3474    3475*   3480*   3481*   3492*
                        3499    3513    3514    3515    3516*   3517*   3532*   3533    3543*   3544*   3568*   3569*   3570*
                        3571*   3572*   3573*   3574*   3575    3583*   3587    3588    3589    3590    3591    3592    3593
SPTR    002514          1130*   1215*   1275    1279    1290*   1282*
STACK = 001100           503*   1178    1312    1366    1416    1445    1479    1524    1561    1618    1687    1716    1744
                         1947    1975    1901    1957    2010    2040    2072    2137    2177    2239    2277    2325    2356
                         2415    2468    2531    2576    2605    2737    2844
START   002632            621     624     628    1171*   1216    3147
START1  003100           1211    1214*   3083
STAT4   = 177744          514*
STKAP   004022           1314    1347*
SW      001772            666*   1176    1198*   1200    1206*   1210    1229    1279    1544    2327    2340    2602    2662
                         2836    2913    2993    3152    3175    3193    3200    3236    3243    3248    3251    3574    3597*
SWREG   000176            619*   1206
SW0     = 000001          567*
SW00    = 000001          567*     567
SW01    = 000002          556*     566
SW02    = 000004          555*     565
SW03    = 000010          554*     564
SW04    = 000020          553*     563
SW05    = 000040          552*     562
SW06    = 000100          551*     561
SW07    = 000200          550*     560
SW08    = 000400          549*     559
SW09    = 001000          548*     558
SW1     = 000002          566*
SW10    = 002000          547*
SW11    = 004000          546*
SW12    = 010000          545*   1210    1229    1544    2327    2340    2836
SW13    = 020000          544*   2913    2993    3152
SW14    = 040000          543*
SW15    = 100000          542*
SW2     = 000004          565*
SW3     = 000010          564*
SW4     = 000020          563*
SW5     = 000040          562*
SW6     = 000100          561*
SW7     = 000200          560*
SW8     = 000400          559*
SW9     = 001000          558*
TB.TVE  = 000014          600*
TERRPC  016334           1242    1332    1349    1390    1427    1456    1494    1540    1581    1594    1599    1632    1665
                         1678    1683    1695    1701    1706    1731    1761    1788    1797    1815    1833    1933    1936
                         1839    1858    1869    1892    1934    1939    1945    1989    2021    2056    2059    2090    2139
                         2116    2121    2124    2127    2163    2206    2211    2256    2261    2300    2305    2309    2314
                         2338    2369    2374    2380    2386    2391    2402    2429    2435    2454    2499    2503    2508
                         2513    2518    2545    2550    2555    2562    2587    2614    2629    2641    2653    2733    2737
                         2746    2780    2798    3009    3152*
TKVEC   = 000060          607*
TMAP    002512           1129*   1260*   1269*   1270*   1272
TPVEC   = 000064          608*
TRAPVE  = 000034          606*   1184*   1185*
TRTVEC  = 000014          601*
TST     006630           1762    1841*
TSTE    014276           2654    2727*
TST1    003622           1311*
```

```
TST10   005206          1617#
TST11   005426          1694    1696    1704    1715#
TST12   006022          1743#
TST13   006630          1779    1798    1808    1816    1831    1834    1837    1846#
TST14   006774          1959    1863    1874#
TST15   007124          1886    1900#
TST16   007406          1956#
TST17   007652          2039#
TST2    004052          1345    1365#
TST20   010000          2039#
TST21   010140          2071#
TST22   010444          2136#
TST23   010602          2156    2176#
TST24   011010          2227#
TST25   011216          2276#
TST26   011450          2323#
TST27   011564          2341    2355#
TST3    004260          1415#
TST30   012070          2414#
TST31   012344          2467#
TST32   012652          2530#
TST33   013100          2575#
TST34   013166          2600#
TST35   013442          2603    2660#
TST36   014076          2736#
TST37   014160          2760#
TST4    004356          1444#
TST40   014422          2833#
TST5    004454          1477#
TST6    004650          1509    1523#
TST7    005014          1560#
TYPCS = 104405          3072    3559#
TYPE  = 104401          1212    1213    1231    1234    1284    1287    1331    1389    1547    2329    2342    2938    2916
                        2920    2923    2995    2998    3001    3002    3005    3009    3043    3070    3073    3154    3157
                        3158    3238    3246    3271    3288    3290    3293    3295    3299    3306    3368    3411    3507
                        3555#   3596
TYPCC = 104402          1233    1286    2918    2922    2997    3000    3004    3007    3156    3279    3303    3556#
TYPCN = 104404          3558#
TYPCS = 104403          3557#
TO1L01  003670          1319#   1335
TO1L02  003746          1323    1334#
TO1L03  003704          1324#   1337    1342
TO1L04  003752          1321    1336#
TO1L05  004034          1333    1351#
TO1L06  003740          1328    1330    1332#
TO2L01  004206          1380    1392#
TO2L02  004136          1381#   1399
TO2L03  004114          1373#   1405
TO2L04  004176          1386    1388    1390#
TO3L01  004340          1422    1429#
TO3L02  004350          1430    1433#
TO3L03  004304          1420#   1432
TO3L04  004300          1419#   1434
TO4L01  004436          1451    1458#
TO4L02  004446          1459    1462#
TO4L03  004402          1449#   1461
```

```
T04L04  004376          1448*   1463
T05L01  004564          1486    1489    1498*
T05L02  004616          1499    1507*
T05L03  004514          1485*   1504    1506
T05L04  004500          1482*   1513    1515
T05L05  004644          1511    1514*
T05L06  004612          1501    1505*
T05L07  004554          1490    1496*
T05L08  004532          1491*   1497
T06L01  004774          1543    1545    1548*
T07L03  005100          1572*   1576
T07L04  005144          1574    1583*
T07L05  005202          1578    1595*
T07L06  005172          1585    1593*
T07L07  005076          1571*   1589
T07L08  005164          1569    1591*
T08L01  005256          1629*   1631
T08L02  005524          1654    1668*
T08L03  005462          1658*   1673
T08L04  005614          1680    1686*
T08L05  005622          1686    1687*
T08L06  005710          1667    1703*
T08L07  005704          1670    1702*
T08L08  005234          1623*   1625
T08L09  005510          1657    1664*
T09L01  014154          2740    2747*
T10L01  006160          1755    1763*
T10L02  006300          1772    1781*
T10L03  006424          1791    1800*
T10L04  006570          1822    1828*
T10L05  006544          1821*   1825
T10L06  006364          1789    1792*
T11L01  006716          1856    1860*
T11L02  006736          1861    1864*
T12L01  007066          1884    1887*
T13L01  007460          1964    1971*
T13L02  007442          1966*   1969
T13L03  007464          1970    1973*
T13L04  007622          1981    1987    1995*
T13L05  007644          1994    1999*
T14L01  007336          1910    1936*
T14L02  007152          1906*   1914
T14L03  007360          1921    1941*
T14L04  007402          1930    1935    1940    1946*
T15L01  007716          2014    2018*
T15L02  007774          2021    2031*
T15L03  007702          2015*   2023
T16L01  010062          2049*   2050
T16L02  010120          2052    2058*
T16L03  010126          2054    2057    2060*
T17L01  010164          2076*   2078
T17L02  010260          2082    2092*
T17L03  010240          2086*   2088
T17L04  010356          2094    2111*
T17L05  010264          2093*   2096
T17L06  010276          2097*   2100
```

```
T17L07  010422          2102    2123#
T17L08  010432          2104    2126#
T17L09  010440          2091    2107    2110    2117    2122    2125    2128#
T17L10  010360          2098    2112#
T17L11  010400          2114    2118#
T18L01  010466          2141#   2143
T18L02  010520          2147#   2148
T18L03  010556          2152    2158#
T18L04  010540          2151#   2155
T19L01  010626          2181#   2183
T19L02  010736          2197    2202#
T19L03  010706          2192#   2195
T19L04  010720          2196#   2199
T19L05  010776          2200    2207    2212#
T19L07  010756          2204    2208#
T19L09  010734          2193    2201#
T20L01  011034          2232#   2234
T20L02  011142          2243    2251#
T20L03  011110          2242#   2245
T20L04  011124          2246#   2249
T20L05  011204          2250    2257    2262#
T20L06  011164          2254    2258#
T20L08  011144          2247    2252#
T21L01  011410          2288    2307#
T21L02  011436          2290    2313#
T21L03  011372          2293    2302#
T21L04  011444          2301    2303    2306    2312    2315#
T22L01  011544          2336    2339#
T23L01  011732          2359    2381#
T23L02  011666          2366    2370#
T23L03  011706          2371    2375#
T23L04  012060          2399    2403#
T23L05  011756          2383    2387#
T23L06  011776          2388    2392#
T23L07  012040          2395    2398#
T24L01  012202          2421    2432#
T24L02  012172          2425    2429#
T24L03  012340          2436    2445    2455#
T24L04  012306          2443    2448#
T24L05  012240          2440#   2451
T24L06  012222          2431    2437#
T25L01  012456          2471    2484#
T25L02  012506          2478    2491#
T25L03  012610          2480    2510#
T25L04  012630          2482    2515#
T25L05  012376          2473#   2483
T25L06  012524          2491    2494#
T25L07  012566          2495    2504#
T25L08  012646          2490    2497    2503    2509    2514    2519#
T26L01  013006          2535    2557#
T26L02  012716          2538#   2540
T26L03  012746          2542    2546#
T26L04  012766          2547    2551#
T26L05  013032          2556    2559    2563#
T27L01  013266          2608    2616#
T27L02  013406          2615    2629    2642    2644    2646#
```

```
T27L03  013332          2617    2630#
T27L04  013302          2620#   2622    2625
T27L05  013374          2630    2643#
T27L06  013344          2633#   2635    2638
T27L07  013426          2647    2651#
T28L01  013600          2677    2680#
T28L02  013714          2687    2690    2693    2698#
T28L03  013732          2697    2702#
T28L04  014062          2701    2717    2723#
T28L05  013612          2681    2683#
T28L06  013754          2705#   2706
T28L08  014010          2709    2712#
T28L09  014022          2713    2715#
T28L10  013466          2663    2665#
T29L01  014206          2766#   2768
T29L02  014300          2769    2782#
T29L03  014336          2785    2793#
T29L04  014202          2765#   2791
T29L05  014306          2784#   2788
T29L06  014252          2774#   2777
T29L07  014364          2781    2792    2795#
T30L01  014460          2835    2844#
T30L02  014672          2845    2875#
T30L03  014706          2848    2878#
T30L04  014722          2853    2881#
T30L05  014736          2858    2884#
T30L06  014750          2877    2880    2883    2886#
T30L07  014660          2867    2870    2872#
T30L08  015450          2951    2959    2979#
T30L09  015274          2951#   2954
T30L10  015364          2960    2964#
T30L11  015352          2961#   2968
T30L12  015640          2924    2970    2994    3010#
T30L13  015436          2972    2976#
T30L14  015322          2957#   2975    2978
T30L15  015514          2984    2987#
T30L16  015534          2988    2991#
T30L17  015542          2986    2990    2992#
T30L20  015764          3036#   3040
T30L21  014600          2852    2857    2861#
T30L22  014770          2889    2892#
T30L25  015144          2906    2925#
T30L26  015042          2908#   2928    2938
T30L27  015212          2930    2935#
T30L28  015006          2902#   2946
T30L29  015062          2912#   2931
T30L30  015034          2907#   2933
T31L01  013162          2585    2588#
UCNT    002626          1167#   1223#   2888    2899
WINT    005670          1628    1698#
$AUTOB  001166           663#
$BDADR  001154           658#
$BDDAT  001160           660#
$BELL   001240           688#   3238    3263
$CHARC  017562          3413#   3423#   3430    3439#   3444#
$CKSWR= ****** U        3562
```

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$CMTAG  001132            646*  1173  1174  1182  1188  1189  1190
$CM1   = 000004            678*   679*  680*  681*  682*
$CM2   = 000010            678*   679*  680*  681*  682*
$CM3   = 000004            676*   678
$CM4   = 000004            682*   683*  684*  685*  686*
$CRLF   001245             690*  1234  1287  3157  3158  3246  3263  3271  3290  3295  3299  3412  3447
$DBLK   017336            3334  3368  3376*
$DOAGN  016110            3066  3075  3081*
$DTBL   017326            3337  3372*
$ENDAD  016100             635  3077*  3258
$ENDCT  016046            1198  3069*
$ENDMG  016117            3070  3085*
$ENULL  016114            3073  3084*
$EOP    016012            1243  2840  3042  3058*
$EOPCT  016040            1188*  3065*  3069
$ERFLG  001135             649*  3166  3189  3191  3197*  3218  3233*  3263
$ERMAX  001147             655*  1191*  3191  3213*  3218
$ERROR  016620            1182  3232*
$ERRPC  001150             656*  3155  3240*  3241*  3242  3263  3277
$ERRTB  001250             707*  3285
$ERRTY  016766            3245  3270*
$ERTTL  001144             653*  3239*  3263
$ESCAP  001236             687*  1190*  3212*  3254  3256  3263
$FILLC  001210             674*  3416  3447
$FILLS  001207             673*  3447
$GDADR  001152             657*
$GDDAT  001156             659*
$GET42  016070            3074*
$GTSWR= ****** U          3561
$HD    = 000001            483   484
$ICNT   001136             650*  3204*  3205  3207*  3217
$ILLUP  020224            3566  3582  3599*
$INTAG  001167             664*
$ITEMB  001146             654*  3242*  3263  3274
$LF     001246             691*  3263  3447
$LPADR  001140             651*  1192*  1298*  2808*  3195*  3210*  3215  3217
$LPERR  001142             652*  1193*  1216*  1299*  2809*  3195  3211*  3217  3253
$MAIL  = ****** U          1210  3210  3248  3400
$MXCNT  016616            3208  3217*
$NULL   001206             672*  3418  3447
$NWTST= 000001            1304*  1306  1355*  1357  1407*  1409  1436*  1438  1465*  1467  1517*  1519  1552*
                          1554  1597*  1599  1708*  1710  1734*  1736  1843*  1971*  1895*  1997  1948*  1950
                          2002*  2004  2033*  2035  2063*  2065  2130*  2132  2165*  2167  2216*  2219  2256*
                          2268  2317*  2319  2344*  2346  2406*  2408  2457*  2459  2521*  2523  2572*  2590*
                          2592  2655*  2657  2729*  2731  2750*  2752  2814*  2816
$OCNT   020010            3479*  3508*  3521*
$OMODE  020012            3474*  3478*  3483  3486*  3497*  3523*
$OVER   016602            3176  3196  3206  3214*
$PASS   001132             647*  3041  3062*  3063*  3071  3084  3202  3218
$POWER  020232            3597  3602*
$PWRDN  020064            1186  3566*  3594
$PWRMG  020220            3597*
$PWRUP  020136            3576  3582*
$QUES   001244             689*  3263  3447
$RDCHR= ****** U          3562
$RDDEC= ****** U          3562
```

```
$RDLIN= ****** U        3562
$RDOCT= ****** U        3562
$REGAD  001212           676#
$REGO   001214           678#  1324*  1347*  1381*  1423*  1452*  1491*  1633*  1638*  1643*  1652*  1658*  1681*
                        1689*  1756*  1773*  1792*  1810*  1864*  1887*  1931*  1936*  1943*  1995*  1996*  2024*
                        2118*  2159*  2208*  2258*  2377*  2432*  2485*  2487*  2499*  2505*  2511*  2516*  2684*
                        2688*  2691*  2694*  2698   2718*  2793*  2915*  2917   2980*  2996   3666   3677   3692
                        3723   3863
$REG1   001216           679#  1325*  1382*  1425*  1454*  1492*  1634*  1639*  1644*  1653*  1659*  1688*  1690
                        1757*  1774*  1793*  1811*  1865*  1888*  1932*  1937*  2025*  2119*  2160*  2209*  2259*
                        2698*  2719*  2794*  2919*  2921   2981*  2999   3666   3692   3723   3863
$REG2   001220           680#  1383*  1424*  1453*  1758*  1775*  1794*  1812*  1866*  1989*  2161*  2685*  2695*
                        2720*  2795*  2982*  3003   3692   3863
$REG3   001222           681#  1759*  1776*  1795*  1813*  1867*  1890*  2995*  2989*  2991*  3006   3863
$RTNAD  016112          3083#
$R2A  = ****** U        3562
$SAVRE= ****** U        3562
$SAVR6  020230          3579*  3583   3584*  3585*  3601#
$SCOPE  016370          1180   3174#
$SETUP= 000037           611#  1179   1180   1192   1184   1186   1189   1189   1190   1192   3060   3175   3233
                        3251   3258
$STUP = 177777           611#
$SVLAD  016554          3184   3209#
$SVPC = 001132           633#   638
$SWR  = 167000           473#   483   488   489   490   491   492   493   494   495   686   687   689
                        1189   1190  1192  1193  1312  1366  1416  1445  1478  1524  1561  1618  1716
                        1744   1847  1875  1901  1957  2010  2040  2072  2137  2177  2228  2277  2324
                        2356   2415  2468  2531  2576  2601  2661  2737  2761  2834  3055  3061  3076
                        3082   3084  3167  3168  3169  3170  3171  3175  3187  3189  3190  3191  3198
                        3199   3200  3211  3214  3217  3224  3225  3226  3227  3228  3236  3243  3248
                        3251   3263  3598
$SWRMK= 000000          3171
$TIMES  001234           686#  1189*  1546*  2324*  2601*  2661*  2761*  2839*  3061*  3198*  3205   3208*  3217
$TKB    001200           669#
$TKS    001176           668#
$TMP0   001224           682#  1621*  3135
$TMP1   001226           683#  1372*  1373   1395   1403*
$TMP2   001230           684#
$TMP3   001232           685#
$TN   = 000041           483#  1304   1312*  1345   1355   1366*  1407   1416*  1436   1445*  1465   1478*  1509
                        1517   1524*  1552   1561*  1597   1618*  1684   1696   1704   1708   1716*  1734   1744*
                        1779   1798   1808   1816   1831   1834   1837   1843   1947*  1859   1863   1871   1875*
                        1886   1895   1901*  1948   1957*  2002   2010*  2033   2040*  2063   2072*  2130   2137*
                        2156   2165   2177*  2216   2228*  2266   2277*  2317   2324*  2341   2344   2356*  2406
                        2415*  2457   2468*  2521   2531*  2572   2576*  2590   2601*  2603   2655   2661*  2729
                        2737*  2750   2761*  2814   2834*
$TPB    001204           671#  3436*  3447
$TPFLG  001211           675#  3394   3447
$TPS    001202           670#  3434   3447
$TRAP   020014          1184   3532#
$TRAP2  020036          3543#  3554
$TRP  = 000006          3547#  3556#  3557#  3558#  3559#  3560#
$TRPAD  020050          3537   3554#
$TSTNM  001134           648#  1300*  2810*  3060*  3166   3209*  3214   3218   3235   3263
$TYPBN= ****** U        3560
$TYPDS  017122          3322#  3559
```

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$TYPE   017346            3394#   3547    3555
$TYPEC  017516            3415    3422    3429    3434#   3435
$TYPEX  017564            3440    3442    3445#
$TYPOC  017612            3477#   3556
$TYPON  017626            3476    3479#   3558
$TYPOS  017566            3472#   3557
$XTSTR  016400            3178#
$$GET4= 000000            3076#
$OFILL  020011            3473*   3477*   3487    3522#
$$OCAT= ****** U          3175    3245
.       = 027722           613#    617#    622#    633     634#    636#    639#    645#    692     1177    1192    1193    3084
                          3088    3217    3218    3263    3309#   3376#   3447    3578    3600    3691#   3722#   4320#   4324#
```

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COMMEN      1#    610#
ENDCOM      1#    610#
ERROR     504#   1241   1326   1348   1384   1426   1455   1493   1539   1580   1583   1587   1591   1665   1677
         1682   1694   1700   1705   1730   1760   1777   1796   1814   1829   1832   1835   1838   1857   1868
         1891   1933   1938   1944   1997   2026   2055   2058   2089   2108   2115   2120   2123   2126   2162
         2205   2210   2255   2260   2299   2304   2307   2313   2337   2367   2368   2372   2373   2378   2379
         2384   2385   2389   2390   2400   2401   2426   2427   2433   2434   2452   2453   2484   2486   2498
         2498   2500   2501   2504   2506   2507   2510   2512   2515   2517   2543   2544   2548   2549   2553
         2554   2560   2561   2586   2612   2613   2626   2627   2639   2640   2648   2649   2699   2721   2745
         2778   2779   2796   2797   2912   2992
ESCAPE      1#    610#
GETPRI      1#    610#
GETSWR      1#    610#
MSG      1304#  1306   1355#  1357   1407#  1409   1436#  1438   1465#  1467   1517#  1519   1552#  1554   1597#
         1599   1708#  1710   1734#  1736   1895#  1897   1948#  1950   2002#  2004   2033#  2035   2063#  2065
         2130#  2132   2165#  2167   2216#  2218   2266#  2268   2317#  2319   2344#  2346   2406#  2408   2457#
         2459   2521#  2523   2590#  2592   2655#  2657   2729#  2731   2750#  2752   2814#  2916
MULT        1#    610#
NEWTST      1#    610#  1304   1355   1407   1436   1465   1517   1552   1597   1708   1734   1843   1871   1895
         1948   2002   2033   2063   2130   2165   2216   2266   2317   2344   2406   2457   2521   2572   2590
         2655   2729   2750   2814
POP         1#    610#  3363   3587   3588
PUSH        1#    610#  3322   3568   3574
REPORT      1#    610#
SCOPE     505#   1311   1365   1415   1444   1477   1523   1560   1617   1715   1743   1846   1874   1900   1956
         2009   2039   2071   2136   2176   2227   2276   2323   2355   2414   2467   2530   2575   2600   2660
         2736   2760   2804   2833   3059
SETPRI      1#    610#
SETTRA   3547#  3556   3557   3558   3559
SETUP       1#    610#  1171
SKIP        1#    610#  1345   1509   1667   1670   1684   1696   1704   1779   1798   1808   1816   1831   1834
         1837   1859   1863   1886   1930   1935   1940   2091   2107   2110   2117   2122   2125   2156   2200
         2207   2250   2257   2303   2341   2603
SLASH       1#    610#  1244   1246   1288   1290   1526   1529   2801   2803   3088   3090   3098   3100   3111
         3113   3124   3126   3132   3134   3149   3151   4321   4323
SPACE     610#
STARS       1#    610#   631    641    692   1169   1304   1310   1355   1364   1407   1414   1436   1443   1465
         1476   1517   1522   1552   1559   1597   1616   1708   1714   1734   1742   1843   1845   1871   1873
         1895   1899   1948   1955   2002   2008   2033   2038   2063   2070   2130   2135   2165   2175   2216
         2226   2266   2275   2317   2322   2344   2354   2406   2413   2457   2466   2521   2529   2572   2574
         2590   2599   2655   2659   2729   2735   2750   2759   2814   2832   3052   3163   3220   3265   3312
         3379   3449   3526   3564   3580   3605
SWRSU       1#    610#  1194#
TRMTRP   3547#
TYPBIN      1#    610#
TYPDEC      1#    610#  3071
TYPNAM      1#    610#
TYPNUM      1#    610#
TYPOC       1#    610#
TYPOCT      1#    610#  1232   1285   2917   2921   2996   2999   3003   3006   3155   3277   3301
TYPTXT      1#    610#
$$CMRE    639#   678    679    680    681
$$CMTM    639#   682    683    684    685
$$ESCA      1#    610#
$$NEWT      1#    610#  1304   1355   1407   1436   1465   1517   1552   1597   1708   1734   1843   1871   1895
         1948   2002   2033   2063   2130   2165   2216   2266   2317   2344   2406   2457   2521   2572   2590
```

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        2655    2729    2750    2814
$$SET   3547#   3556    3557    3558    3559
$$SKIP     1#    610#   1345    1509    1684    1696    1704    1779    1798    1808    1816    1831    1834    1837    1859
        1863    1886    2156    2341    2603
.EQUAT     1#    473#    500
.HEADE     1#    473#
.KT11      1#
.SETUP     1#    473#    611
.SWRHI     1#    473#    484
.SWRLO   495#    498
.$ACTI     1#    473#    629
.$APTB     1#
.$APTH     1#
.$APTY     1#
.$ASTA     1#
.$CATC     1#    473#    611
.$CMTA     1#    473#    639
.$DB2D     1#
.$DB2O     1#
.$DIV      1#
.$EOP      1#    473#   3050
.$ERRO     1#    473#   3218
.$ERRT     1#    473#   3263
.$MULT     1#
.$POWE     1#    473#   3562
.$RAND     1#
.$RDDE     1#
.$RDOC     1#
.$READ     1#
.$R2AZ     1#
.$SAVE     1#
.$SB2D     1#
.$SB2O     1#
.$SCOP     1#    473#   3161
.$SIZE     1#
.$SUPR     1#
.$TRAP     1#    473#   3524
.$TYPB     1#
.$TYPD     1#    473#   3310
.$TYPE     1#    473#   3377
.$TYPO     1#    473#   3447
.$4CCA     1#
.1170      1#
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ADD     1223  1261  1262  1263  1264  1265  1266  1267  1296  1661  1688  1966  2441  2475  3285
        3342  3404  3475  3485
ASL     1280  1282  1431  1671  2925  2935  2965  3282  3283  3284  3536
ASLB    3347
ASR     1269
BCC     3348
BCS     1271
BEQ     1276  1279  1321  1323  1330  1380  1388  1422  1451  1486  1488  1490  1499  1509  1574
        1578  1680  1704  1729  1755  1772  1791  1808  1825  1856  1863  1886  1930  1994  2021
        2023  2050  2054  2094  2104  2107  2148  2193  2290  2303  2383  2388  2399  2425  2445
        2451  2478  2497  2559  2585  2603  2697  2706  2717  2852  2857  2867  2870  2889  2928
        2938  2968  2970  2984  2988  3013  3016  3024  3028  3075  3120  3190  3194  3203  3234
        3237  3252  3255  3287  3292  3305  3407  3442  3502
BGE     3206
BGT     3066  3356  3509
BHI      626  3192
BIC     1270  1378  1397  1672  1942  2060  2447  2683  2926  2936  2966  3063  3499
BIS     1222  2710  3350  3351  3504  3505
BISB    3274
BIT     1210  1229  1275  1278  1329  1341  1387  1485  1544  1568  1577  1669  1679  1703  1728
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                2002    2033    2063    2130    2165    2216    2266    2317    2344    2406    2457    2521    2572    2590    2655
                2729    2750    2814    3323    3363    3568    3574    3587    3588
.LIST              1     473     610     611     617     676     678     679     680     681     682     683     684     685     686
                1169    1170    1171    1194    1304    1312    1355    1366    1407    1416    1436    1445    1465    1478    1517
                1524    1552    1561    1597    1618    1708    1716    1734    1744    1843    1847    1871    1875    1895    1901
                1948    1952    2002    2010    2033    2040    2063    2072    2130    2137    2165    2177    2216    2228    2266
                2317    2318    2324    2344    2356    2406    2415    2457    2468    2521    2531    2572    2576    2590    2601
                2655    2661    2729    2737    2750    2761    2814    2834    3060    3076    3171    3258    3547    3555    3556
                3557    3558    3559    3560    3605    3606    3607
.MACRO             1     496     639    1304    1355    1407    1436    1465    1517    1552    1597    1708    1734    1895    1948
                2002    2033    2063    2130    2165    2216    2266    2317    2344    2406    2457    2521    2590    2655    2729
                2750    2814    3547
.MCALL           473     610    1194
.NLIST             1     473     610     611     617     676     678     679     680     681     682     683     684     685     686
                1169    1170    1171    1194    1304    1312    1355    1366    1407    1416    1436    1445    1465    1478    1517
                1524    1552    1561    1597    1618    1708    1716    1734    1744    1843    1847    1871    1875    1895    1901
                1948    1952    2002    2010    2033    2040    2063    2072    2130    2137    2165    2177    2216    2228    2266
                2317    2318    2324    2344    2356    2406    2415    2457    2468    2521    2531    2572    2576    2590    2601
                2655    2661    2729    2737    2750    2761    2814    2834    3060    3076    3171    3258    3547    3555    3556
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.PAGE            639     693
.REM               1
.REPT            617     678     682    1169    3605
.SBTTL           484     500     611     620     629     639     693    1172    1304    1355    1407    1436    1465    1517    1552
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                2344    2406    2457    2521    2572    2590    2655    2729    2750    2814    3050    3161    3218    3263    3310
                3377    3447    3524    3547    3562
.TITLE           473
.WORD            617     618     619     637     647     650     651     652     653     656     657     658     659     660     661
                 662     665     666     667     676     678     679     680     681     682     683     684     685    1128    1129
                1130    1131    1132    1133    1134    1135    1136    1137    1138    1139    1140    1141    1142    1143    1144
                1145    1146    1147    1148    1149    1150    1151    1152    1153    1154    1155    1156    1157    1158    1159
                1160    1161    1162    1163    1164    1165    1166    1167    1168    3065    3069    3083    3289    3294    3444
                3523    3554    3597    3666    3677    3692    3723    3863
```

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

```
*,DZKUBA/SOL/CRF/PAGNUM=SYSMAC.SML[400,10661],DZKUBA[400,4571]
RUN-TIME:  44 61 8 SECONDS
RUN-TIME RATIO: 228/114=2.0
CORE USED:  34K  (67 PAGES)
```

Spooler running 17 Seconds, 74 KCS, 47% disk reads, 3 disk writes, 103 pages