IBV11-A

DIAGNOSTIC (30K)

CVIBBA0

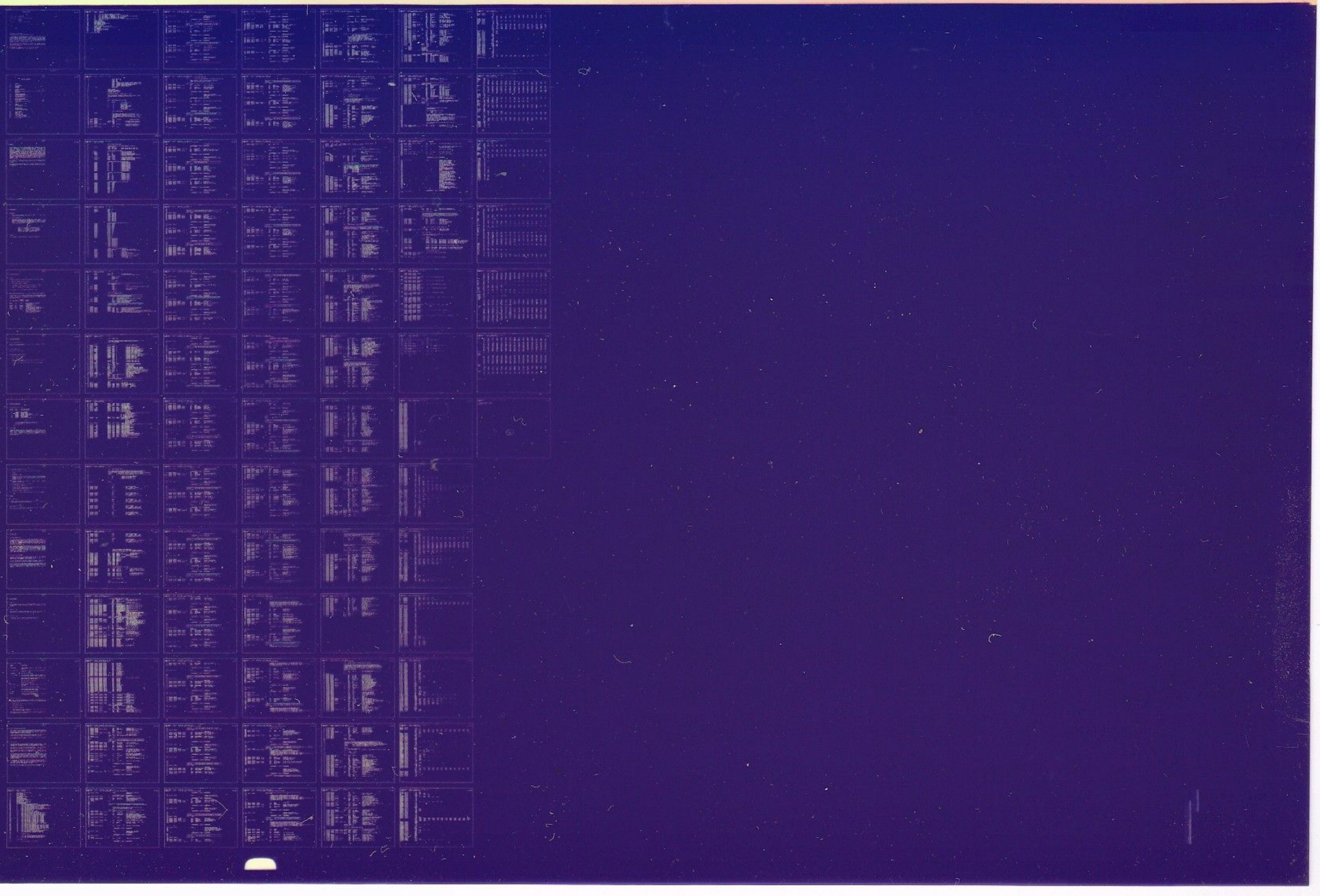
AH-F016A-MC

FICHE 1 OF 1

DEC 1978

digital

MADE IN USA



IDENTIFICATION

Product Code: AC-F015A-MC

Product Name: CVIBBA0 IBV11-A (30K) Diag

Date : AUG 1978

Maintainer: Diagnostic Engineering

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1.0 ABSTRACT

This program is a copy of 'MD-11-DVIBA'' with different bus and vector addresses. this program allows the user to check-out or debug the IBV11-A, LSI/IB interface option. In order to check-out a greater portion of logic on this option, a second IBV11-A is needed. See section 2.1. When a second IBV11-A can be obtained in order to run this diagnostic, the user must inform this diagnostic to exercise the logic on one IBV11-A that requires a KGM (Known Good Module). Please note that the second IBV11-A should be known good. No attempt is made to checkout the KGM and no conclusion that if good passes are made through this diagnostic that the KGM is also good. Signals ''SRQ'', ''er1'', 'BIAKI'', 'DA11'' and 'ER1IHB'' are not tested on the IBV11-A if a KGM is not used.

If the user is unfamilar with an LSI-11 he should review sections 8.4 and 8.5. A software switch register is included with this program.

Every effort was made to make this program conform to LSI-11 programming restrictions. However, the user should read sections 7.1 and 7.2.

SEQ 0004

2.0 REQUIREMENTS

2. Equipment

1. PDP-11 Family Computer with 4K of memory (or more) and console I/O facilities (i.e., TTY).

2. IBV11-A under test.

3. (Optional) Second IBV11-A '%GM'' (known good module). The '%GM'' must be electrically second on the LSI-11-BUS. It must have an intrumentation Bus Cable between it and the first IBV-11. Its base address should be 760160 and vector address of 660 (see section 3.2 if different).

NOTE

While it is generally recommended that a '%GM'' is used, if one is available, deposit a ''000001'' into location ''$CDW1''. No test will be performed that requires the '%GM'' if $CDW1 is zero.

2.2 Storage

This program occupies and uses the lower 4K of memory.

3.0 LOADING PROCEDURE

3.1 Method

Standard procedure for normal binary tapes should be followed.

1. Absolute loader must be in memory.
2. Place binary tape in reader.
3. Type address *7500 (* determine by location of loader).
4. Type "G" (program will be loaded into memory).

The program can also be loaded by XXDP, ACT or APT.

3.2 Non-Standard Address, Vector, or Use of Software Switch Register

This program is set to test a IBV11-A with a standard address and vector. If any of these are different on the IBV11-A you are testing, change the corresponding location in memory before starting this test.

TAG	ADDRESS	CURRENT CONTENTS	COMMENTS
$BASE:	1250	171420	;;BASE ADDRESS OF EQUIPMENT ;; UNDER TEST
$VECT1:	1244	000420	;;INTERRUPT VECTOR #1
SWREG:	176	000000	;;MANUAL SWR.
IBS2:	1366	171430	; ADDRESS OF SECOND IBV11-A.
VECTA2:	1372	660	; VECTOR ADDRESS OF SECOND IBV11-A.
$CDW1:	1254	000000	;;DEVICE DESCRIPTOR WORD #1 (if = 000001 to use "KGM" in testing 1st IBV-11) (Default = 00000 to disable use of KGM in tests.

SEQ 0006

4.0 STARTING PROCEDURE

4.1 Control Switch Setting

Before starting the diagnostic, set all switch register bits as desired. See section 5.1.

4.2 Starting Addresses

200 Start of Logic Tests

4.3 Program and/or Operator Action

1. Load program into memory.
2. Enter keyboard "ODT".
3. Alter location "SWREG" to reflect desired options of a switch register - See section 5.1.
4. Type starting address, followed by "G" to start program.

5.0 OPERATING PROCEDURE

5.1 Switch Register Function

SWR BIT	OCTAL	FUNCTION WHEN SET
15	100000	HALT ON ERROR
14	040000	LOOP ON TEST
13	020000	INHIBIT ERROR TYPEOUT
11	004000	INHIBIT ITERATIONS (SHORT PASS)
10	002000	BELL ON ERROR
09	001000	LOOP ON ERROR
08	000400	LOOP ON TEST IN SWR <7:0>

NOTE

The Switch Register may be changed at any time while the diagnostic is running by typing "^G".

5.2 Scope Loops

If an error occurs and the user wishes to scope the error, "SWREG" should be altered to "100000" at the start of the test to halt on error, then when the program halts on error and the CPU enters "DDT", "$SWREG" should be altered to "060000" to loop on current test and inhibit error typeout, then type "P" to continue program execution.

5.3 Program and/or Operator Action

1. When the program is initially started it will type:

   CVIBB-A

   SWR-000000 NEW=

2. Program now waits for the operator to enter a switch register setting (see section 8.6). If the program is restarted, only "CVIBB-A" is typed. To change the switch register setting, see section 8.6.

3. Program executes first pass of logic tests, subtest iterations inhibited.

4. Program reports any errors it detects.

5. Program reports 'END PASS 1".

6. Program executes second pass of logic tests, only this time it will loop on each test 2000 times.

7. Program the reports 'END PASS 2".

8. Program will continue executing steps 6 and 7 until stoped.

6.0 ERRORS

6.1 Error Printout

Printout varies with the error detected. The error PC typed out is the actual location of the error call.

6.2 Non-Standard Error Halt

Bus errors will cause a Halt in the routine "IOTRD". The address that caused this trap will be in "TRTO".

7.0 RESTRICTIONS

7.1 Starting Restriction

If a free-running clock, such as 60Hz from the power supply, is attached to the "BEVNT" bus line on both RLV level C/D and E systems, an interrupt to location 100 will occur when using the "G" and "L" commands prior to executing the first instruction. Therefore this program can not disable the BEVNT bus line by inhibiting interrupts.

User systems requiring a free-running clock attached to the BEVNT bus line can temporarily avoid this situation by setting the PSW(RS) to 200, loading the PC with the starting address instead of using the "G" command, and then using the "P" command. Before using the "L" command, the PSW(RS) can be set to 200, thereby inhibiting interrupts, to avoid receiving the event interrupt after loading the ABS loader.

7.2 Possible Program "BOMBS"

The first two tests of this program check to see if the IBV11-A responds to the address the program thinks its at. If the IBV11-A does not respond, a bus error occurs.

For more information on the next subject, see JAN. 1976 LSI-11 engineering bulletin issued by the Digital Components Group.

Bus errors may alter the preset contents of locaton 4 before the trap is executed, thereby transferring program control to area in the program that was not set up to handle the trap. If this happens, the program will "BOMB" and possibly rewrite parts of itself.

SEQ 0010

8.0 MISCELLANEOUS

8.1 Power Fail

After a power failure occurs, the program execution will continue at the point where the power occurred. The program will type 'POWER".

8.2 XXDP, ACT, APT

The program is chainable under XXDP, ACT, or APT. Although "APT HOOKS" have been installed, they have not been tested.

8.3 Execution Time

0.1 Minutes (6 sec) Iteration Inhibited - No Errors
0.5 Minutes (30 sec) With Iterations - No Errors

8.4 LSI-11 "ODT" Commands

FORMAT	DESCRIPTION
<CR> RETURN	Close opened location and accept next command.
<LF> LINE FEED	Close current location; open next sequential location.
^(UPARROW)	Open previous location.
< (LEFT ARROW)	Take contents of opened location, indexed by contents of PC, and open that location.
@	Take contents of opened location as absolute address and open that location.
R/	Open the word at location R.
/	Reopen the last location.
$N/ or RN/	Open general register N(0-7) or S(PS register).
R:G or RG	GOTO location R and start program.
NL	Execute Bootstrap loader using N as device CSR. Console device is 177560.
:P or P	Proceed with program execution.
RUBOUT	Erases previous numeric character. Response is a backslash ().

8.5 Entering LSI-11 "ODT"

The halt or ODT microcode state of the KD11F (LSI-11 module) can be entered in five different ways (others are a subset of these) from the run state:

1. Execution of a LSI-11 halt instruction.
2. A double bus error.
3. As a power up option.
4. ASCII break with DLV11 framing error asserting the B halt line (enabled by jumper of DLV11).

Upon entering the halt state, the KD11F responds through the set of command listed in section 8.4.

8.6 Use of Program Software SWR

The software switch register may be changed by typing ^G (control and letter G keys typed simultaneously). When ^G is typed, the program responds by typing "SWR=XXXXXX" where XXXXXX equals the former contents of the switch register.

If you wish to keep the current value, type <CR>. If you wish to change the value, type the new value followed by a <CR>.

It is important to note that the diagnostic is not running after the ^G until a <CR> is typed.

8.7 Trap Catcher

The Trap Catcher in this diagnostic employs a new concept. This concept will enable the user of this diagnostic to gain more knowledge of the events that lead the program to this area.

The Trap Catch consists of PC+2 and JSR PC,R0. (i.e., Location 300 would contain 302 and location 302 would contain 4700).

When a device interrupts to the Trap Catcher, it would pick up the PC+2 of the trap as an address of the interrupt service routine.

The program would then pick up "4700" as the new PSW. Bit 7 of the new PSW having been set, would cause further interrupts from happening. When the CPU attempts to execute "4700" (JSR PC,R0), a Bus-time-out trap will occur to location 4. Location 4 contains a pointer to "IOTRD", a routine that will report the trap as an error.

To guard against "Real" Bus errors routing us through location 4 to "IOTRD", we check to see if the trap that brought us to location 4 really came from the Trap Catcher area. If not we'll halt and leave the Trap Address in "TRTO".

More about the interrupt error can be found in the description of the error in the program listing in the routine "IOTRD".

CVIBB-A MACY11 27(654) 19-SEP-78 11:35
CVIBBA.P11 TABLE OF CONTENTS SEQ 0013

CVIBB-A MACY11 27(654) 19-SEP-78 11:35
CVIBBA.P11 TABLE OF CONTENTS SEQ 0014

```
                                        .NLIST  MC,MD,CND
                                        .LIST   ME
                                        .ENABL  ABS
                                        .ENABL  AMA
                                        .MCALL  .HEADER,.SETUP,.SETTRAP,.TRMTRP,.$TRAP,.$RDOCT
                                        .MCALL  .$TYPBIN,TYPOCS,.$POWER,.$CATCH,.$TYPOCT,.EQUAT
                                        .MCALL  .$CMTAG,.SWRHI,.$FOP,.$ERROR,.$ERRTYP
                                        .MCALL  .$TYPDEC,.$SCOP  .READ,.$TYPE
                                        .MCALL  .$ACT11,.$APT  ,.$APTYPE
 167400                                 $SWR=167400

                                .TITLE  CVIBB-A
(1)                             ;*COPYRIGHT (C) 1978
(1)                             ;*DIGITAL EQUIPMENT CORP.
(1)                             ;*MAYNARD, MASS. 01754
(1)                             ;*
(1)                             ;*PROGRAM BY EDWARD C. BADGER MOD BY R. SHOOP
(1)                             ;*
(1)                             ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
(1)                             ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
(1)                             ;*
(1)  000001                     $TN=1

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
(1)                             ;*
(1)                             ;*      SWITCH                  USE
(1)                             ;*      ------          --------------------
(1)                             ;*        15            HALT ON ERROR
(1)                             ;*        14            LOOP ON TEST
(1)                             ;*        13            INHIBIT ERROR TYPEOUTS
(1)                             ;*        11            INHIBIT ITERATIONS
(1)                             ;*        10            BELL ON ERROR
(1)                             ;*         9            LOOP ON ERROR
(1)                             ;*         8            LOOP ON TEST IN SWR<7:0>

                                        .SBTTL  TRAP CATCHER

        000000                          .=0
                                        ;*ALL UNUSED LOCATIONS FROM 4-776 CONTAIN A ".+2"
                                        ;*AND "JSR PC,R0" SEQUENCE TO CATCH ILLEGAL INTERRUPTS,
                                        ;*AND INTERRUPTS TO THE WRONG VECTOR.
                                        ;*LOCATION 0 CONTAINS A 0 TO CATCH IMPROPERLY LOADED
                                        ;*VECTORS
        000004                          .=4
000004  012102  000200                  .WORD   IOTRD,200               ;HANDLE BUSS ERROR.
        000174                          .=174
000174  000000                 DISPREG:.WORD   0               ;;SOFTWARE DISPLAY REGISTER.
000176  000000                 SWREG:  .WORD   0               ;;SOFTWARE SWITCH REGISTER.
        000100                          .-100
000100  000104  000200  000002          .WORD   104,200,2       ;IF "B EVENT" ON Q-BUS IS
                                                                ;CONNECTED, WE NEED A WAY OF
        000200                          .-200                   ;IGNORING ITS INTERRUPTS.
000200  000137  001422                  JMP     START
```

```
 44                                  .SBTTL  BASIC DEFINITIONS
(1)
(1)                                  ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
(1)          001100                  STACK=  1100
(1)                                  .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
(1)                                  .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL
(1)
(1)                                  ;*MISCELLANEOUS DEFINITIONS
(1)          000011                  HT=     11              ;;CODE FOR HORIZONTAL TAB
(1)          000012                  LF=     12              ;;CODE FOR LINE FEED
(1)          000015                  CR=     15              ;;CODE FOR CARRIAGE RETURN
(1)          000200                  CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
(1)          177776                  PS=     177776          ;;PROCESSOR STATUS WORD
(1)                                  .EQUIV  PS,PSW
(1)          177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
(1)          177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
(1)          177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
(1)          177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER
(1)
(1)                                  ;*GENERAL PURPOSE REGISTER DEFINITIONS
(1)          000000                  R0=     %0              ;;GENERAL REGISTER
(1)          000001                  R1=     %1              ;;GENERAL REGISTER
(1)          000002                  R2=     %2              ;;GENERAL REGISTER
(1)          000003                  R3=     %3              ;;GENERAL REGISTER
(1)          000004                  R4=     %4              ;;GENERAL REGISTER
(1)          000005                  R5=     %5              ;;GENERAL REGISTER
(1)          000006                  R6=     %6              ;;GENERAL REGISTER
(1)          000007                  R7=     %7              ;;GENERAL REGISTER
(1)          000006                  SP=     %6              ;;STACK POINTER
(1)          000007                  PC=     %7              ;;PROGRAM COUNTER
(1)
(1)                                  ;*PRIORITY LEVEL DEFINITIONS
(1)          000000                  PR0=    0               ;;PRIORITY LEVEL 0
(1)          000040                  PR1=    40              ;;PRIORITY LEVEL 1
(1)          000100                  PR2=    100             ;;PRIORITY LEVEL 2
(1)          000140                  PR3=    140             ;;PRIORITY LEVEL 3
(1)          000200                  PR4=    200             ;;PRIORITY LEVEL 4
(1)          000240                  PR5=    240             ;;PRIORITY LEVEL 5
(1)          000300                  PR6=    300             ;;PRIORITY LEVEL 6
(1)          000340                  PR7=    340             ;;PRIORITY LEVEL 7
(1)
(1)                                  ;*''SWITCH REGISTER'' SWITCH DEFINITIONS
(1)          100000                  SW15=   100000
(1)          040000                  SW14=   40000
(1)          020000                  SW13=   20000
(1)          010000                  SW12=   10000
(1)          004000                  SW11=   4000
(1)          002000                  SW10=   2000
(1)          001000                  SW09=   1000
(1)          000400                  SW08=   400
(1)          000200                  SW07=   200
(1)          000100                  SW06=   100
(1)          000040                  SW05-   40
(1)          000020                  SW04    20
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(1)             000010                  SW03=   10
(1)             000004                  SW02=   4
(1)             000002                  SW01=   2
(1)             000001                  SW00=   1
(1)                                     .EQUIV  SW09,SW9
(1)                                     .EQUIV  SW08,SW8
(1)                                     .EQUIV  SW07,SW7
(1)                                     .EQUIV  SW06,SW6
(1)                                     .EQUIV  SW05,SW5
(1)                                     .EQUIV  SW04,SW4
(1)                                     .EQUIV  SW03,SW3
(1)                                     .EQUIV  SW02,SW2
(1)                                     .EQUIV  SW01,SW1
(1)                                     .EQUIV  SW00,SW0
(1)
(1)                                     ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
(1)             100000                  BIT15=  100000
(1)             040000                  BIT14=  40000
(1)             020000                  BIT13=  20000
(1)             010000                  BIT12=  10000
(1)             004000                  BIT11=  4000
(1)             002000                  BIT10=  2000
(1)             001000                  BIT09=  1000
(1)             000400                  BIT08=  400
(1)             000200                  BIT07=  200
(1)             000100                  BIT06=  100
(1)             000040                  BIT05=  40
(1)             000020                  3IT04=  20
(1)             000010                  BIT03=  10
(1)             000004                  BIT02=  4
(1)             000002                  BIT01=  2
(1)             000001                  BIT00=  1
(1)                                     .EQUIV  BIT09,BIT9
(1)                                     .EQUIV  BIT08,BIT8
(1)                                     .EQUIV  BIT07,BIT7
(1)                                     .EQUIV  BIT06,BIT6
(1)                                     .EQUIV  BIT05,BIT5
(1)                                     .EQUIV  BIT04,BIT4
(1)                                     .EQUIV  BIT03,BIT3
(1)                                     .EQUIV  BIT02,BIT2
(1)                                     .EQUIV  BIT01,BIT1
(1)                                     .EQUIV  BIT00,BIT0
(1)
(1)                                     ;*BASIC ''CPU'' TRAP VECTOR ADDRESSES
(1)             000004                  ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
(1)             000010                  RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
(1)             000014                  TBITVEC=14              ;;''T'' BIT
(1)             000014                  TRTVEC= 14              ;;TRACE TRAP
(1)             000014                  BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
(1)             000020                  IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
(1)             000024                  PWRVE^  24              ;;POWER FAIL
(1)             000030                  EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
(1)             000034                  TRAPVEC=34              ;;''TRAP'' TRAP
(1)             000060                  TKVEC=  60              ;;TTY KEYBOARD VECTOR
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(1)           000064                  TPVEC=  64              ;;TTY PRINTER VECTOR
(1)           000240                  PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
 45
 46           171420                          ABASE=  171420
 47           000420                          AVECT1= 420
 48           000200                          APRIOR= 200
 49           000001                          $TN=1
 50
 51                                   .SBTTL  ACT11 HOOKS
(1)
(2)                                  ;;**********************************************************************
(1)                                  ;HOOKS REQUIRED BY ACT11
(1)           000204                         $SVPC=.                 ;SAVE PC
(1)           000046                         .=46
(1)  000046   007066                         $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
(1)           000052                         .-52
(1)  000052   000000                         .WORD   0               ;;2)SET LOC.52 TO ZERO
(1)           000204                         .-$SVPC                 ;; RESTORE PC
 52
 53           001000                         . 1000
 54
 55                                   .SBTTL  APT PARAMETER BLOCK
(1)
(2)                                  ;;**********************************************************************
(1)                                  ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
(2)                                  ;;**********************************************************************
(1)           001000                         .$X=.   ;;SAVE CURRENT LOCATION
(1)           000024                         .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
(1)  000024   000200                         200     ;;FOR APT START UP
(1)           000044                         .-44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
(1)  000044   001000                         $APTHDR ;;POINT TO APT HEADER BLOCK
(1)           001000                         .=.$X   ;;RESET LOCATION COUNTER
(2)                                  ;;**********************************************************************
(1)                                  ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
(1)                                  ;INTERFACE SPEC.
(1)
(1)  001000                          $APTHD:
(1)  001000   000000                 $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
(1)  001002   001174                 $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
(1)  001004   000074                 $TSTM:  .WORD   60.     ;;RUN TIM OF LONGEST TEST
(1)  001006   000170                 $PASTM: .WORD   120.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
(1)  001010   000170                 $UNITM: .WORD   120.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
(1)  001012   000037                         .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
 56
```

```
    57                          .SBTTL  COMMON TAGS
   (1)
   (2)                          ;;*****************************************************************
   (1)                          ;*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS
   (1)                          ;*USED IN THE PROGRAM.
   (1)
   (1)          001100                  .=1100
   (1)  001100                  $CMTAG:                         ;;START OF COMMON TAGS
   (1)  001100  000000                  .WORD   0
   (1)  001102     000          $TSTNM: .BYTE   0               ;;CONTAINS THE TEST NUMBER
   (1)  001103     000          $ERFLG: .BYTE   0               ;;CONTAINS ERROR FLAG
   (1)  001104  000000          $ICNT:  .WORD   0               ;;CONTAINS SUBTEST ITERATION COUNT
   (1)  001106  000000          $LPADR: .WORD   0               ;;CONTAINS SCOPE LOOP ADDRESS
   (1)  001110  000000          $LPERR: .WORD   0               ;;CONTAINS SCOPE RETURN FOR ERRORS
   (1)  001112  000000          $ERTTL: .WORD   0               ;;CONTAINS TOTAL ERRORS DETECTED
   (1)  001114     000          $ITEMB: .BYTE   0               ;;CONTAINS ITEM CONTROL BYTE
   (1)  001115     001          $ERMAX: .BYTE   1               ;;CONTAINS MAX. ERRORS PER TEST
   (1)  001116  000000          $ERRPC: .WORD   0               ;;CONTAINS PC OF LAST ERROR INSTRUCTION
   (1)  001120  000000          $GDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'GOOD' DATA
   (1)  001122  000000          $BDADR: .WORD   0               ;;CONTAINS ADDRESS OF 'BAD' DATA
   (1)  001124  000000          $GDDAT: .WORD   0               ;;CONTAINS 'GOOD' DATA
   (1)  001126  000000          $BDDAT: .WORD   0               ;;CONTAINS 'BAD' DATA
   (1)  001130  000000                  .WORD   0               ;;RESERVED--NOT TO BE USED
   (1)  001132  000000                  .WORD   0
   (1)  001134     000          $AUTOB: .BYTE   0               ;;AUTOMATIC MODE INDICATOR
   (1)  001135     000          $INTAG: .BYTE   0               ;;INTERRUPT MODE INDICATOR
   (1)  001136  000000                  .WORD   0
   (1)  001140  177570          SWR:    .WORD   DSWR            ;;ADDRESS OF SWITCH REGISTER
   (1)  001142  177570          DISPLAY: .WORD  DDISP           ;;ADDRESS OF DISPLAY REGISTER
   (1)  001144  177560          $TKS:   177560                  ;;TTY KBD STATUS
   (1)  001146  177562          $TKB:   177562                  ;;TTY KBD BUFFER
   (1)  001150  177564          $TPS:   177564                  ;;TTY PRINTER STATUS REG. ADDRESS
   (1)  001152  177566          $TPB:   177566                  ;;TTY PRINTER BUFFER REG. ADDRESS
   (1)  001154     000          $NULL:  .BYTE   0               ;;CONTAINS NULL CHARACTER FOR FILLS
   (1)  001155     002          $FILLS: .BYTE   2               ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
   (1)  001156     012          $FILLC: .BYTE   12              ;;INSERT FILL CHARS. AFTER A 'LINE FEED''
   (1)  001157     000          $TPFLG: .BYTE   0               ;;'TERMINAL AVAILABLE'' FLAG (BIT<07> 0-YES)
   (1)  001160  000000          $TIMES: 0                       ;;MAX. NUMBER OF ITERATIONS
   (1)  001162  000000          $ESCAPE:0                       ;;ESCAPE ON ERROR ADDRESS
   (1)  001164  177607  000377  $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
   (1)  001170     077          $QUES:  .ASCII  /?/             ;;QUESTION MARK
   (1)  001171     015          $CRLF:  .ASCII  <15>            ;;CARRIAGE RETURN
   (1)  001172  000012          $LF:    .ASCIZ  <12>            ;;LINE FEED
   (2)                          ;;*****************************************************************
   (2)                          .SBTTL  APT MAILBOX-ETABLE
   (2)
   (3)                          ;;*****************************************************************
   (2)                          .EVEN
   (2)  001174                  $MAIL:                          ;;APT MAILBOX
   (2)  001174  000000          $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
   (2)  001176  000000          $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
   (2)  001200  000000          $TESTN: .WORD   ATESTN          ;;TEST NUMBER
   (2)  001202  000000          $PASS:  .WORD   APASS           ;;PASS COUNT
   (2)  001204  000000          $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
```

```
(2)  001206  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
(2)  001210  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
(2)  001212  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
(2)  001214                        $ETABLE:                ;;APT ENVIRONMENT TABLE
(2)  001214     000                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
(2)  001215     000                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
(2)  001216  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
(2)  001220  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
(2)  001222  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
(2)                                :*                      BITS 15-11=CPU TYPE
(2)                                :*                              11/04=01,11/05=02,11/20-03,11/40=04,11/45 05
(2)                                :*                              11/70=06,PDQ=07,Q=10
(2)                                :*                      BIT 10=REAL TIME CLOCK
(2)                                :*                      BIT  9=FLOATING POINT PROCESSOR
(2)                                :*                      BIT  8=MEMORY MANAGEMENT
(2)  001224     000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
(2)  001225     000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
(2)                                :*                      MEM.TYPE BYTE   --  (HIGH BYTE)
(2)                                :*                              900 NSEC CORE=001
(2)                                :*                              300 NSEC BIPOLAR=002
(2)                                :*                              500 NSEC MOS=003
(2)  001226  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
(2)                                :*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF ''TYPE'' ABOVE
(2)  001230     000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
(2)  001231     000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
(2)  001232  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
(2)  001234     000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
(2)  001235     000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
(2)  001236  000000                $MADR3. .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
(2)  001240     000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
(2)  001241     000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
(2)  001242  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
(2)  001244  000420                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
(2)  001246  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
(2)  001250  171420                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
(2)  001252  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
(2)  001254  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
(2)  001256                        $ETEND:
(2)                                .MEXIT
```

```
(1)                                     .SBTTL  ERROR POINTER TABLE
(1)
(1)                                     ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
(1)                                     ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
(1)                                     ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
(1)                                     ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
(1)                                     ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
(1)
(1)                                     ;*      EM              ;;POINTS TO THE ERROR MESSAGE
(1)                                     ;*      DH              ;;POINTS TO THE DATA HEADER
(1)                                     ;*      DT              ;;POINTS TO THE DATA
(1)                                     ;*      DF              ;;POINTS TO THE DATA FORMAT
(1)
(1)
(1)  001256                             $ERRTB:
 58
 62
 63                                             ;ITEM   1
 64
 65  001256  012232                             EM1                     ;IBS FUNCTION ERROR
 66  001260  012453                             DH1                     ;TEST    ERRPC   IB ADDR
 67  001262  012654                             DT1                     ;$TESTN,$ERRPC,IBS
 68  001264  012724                             DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
 69
 70                                             ;ITEM   2
 71
 72  001266  012260                             EM2                     ;IBD FUNCTION ERROR
 73  001270  012453                             DH1                     ;TEST    ERRPC   IB ADDR
 74  001272  012654                             DT1                     ;$TESTN,$ERRPC,IBS
 75  001274  012724                             DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
 76
 77                                             ;ITEM   3
 78
 79  001276  012306                             EM3                     ;IBS DATA ERROR
 80  001300  012521                             DH3                     ;TEST    ERRPC   GOOD    BAD
 81  001302  012670                             DT3                     ;$TESTN,$ERRPC,$GDDAT,$BDDAT
 82  001304  012724                             DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
 83
 84                                             ;ITEM   4
 85
 86  001306  012330                             EM4                     ;IBD DATA ERROR
 87  001310  012521                             DH3                     ;TEST    ,ERRPC   GOOD    BAD
 88  001312  012670                             DT3                     ;$TESTN,$ERRPC,$GDDAT,$BDDAT
 89  001314  012724                             DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
 90
 91                                             ;ITEM   5
 92
 93  001316  012352                             EM5                     ;IBS/IBD ADDRESS ERROR
 94  001320  012556                             DH5                     ;TEST   ERROR PC   ADDRESS
 95  001322  012702                             DT5                     ;$TSTNM,$ERRPC,IBS
 96  001324  012724                             DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
 97
 98                                             ;ITEM   6
 99
```

```
                                        ;ITEM   6
  100  001326  012402                   EM6                     ;IBWC/IBCA DATA ERROR
  101  001330  012521                   DH3                     ;TEST    ERRPC   GOOD    BAD
  102  001332  012670                   DT3                     ;$TESTN,$ERRPC,$GDDAT,$BDDAT
  103  001334  012724                   DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
  104
  105                                    ;ITEM   7
  106  001336  012431                   EM7                     ;INTERRUPT ERROR
  107  001340  012607                   DH7                     ;TEST    ERRPC   TO      FROM ADDR.
  108  001342  012712                   DT7                     ;TSTNM,#ERRPC,TRTO,TRFRO
  109  001344  012724                   DF0                     ;ALL NUMBERS ARE IN OCTAL FORM.
  110
  125
  136
  140
  148
  154
  174
  175                                    .SBTTL  REG ADDRESS AND COMMON TAGS
  176                                    ;WARNING IF DEVICE # IS AT DIFFERENT ADDRESS OR VECTOR
  177                                    ;DO NOT PATCH THESE LOCATIONS - SEE PROGRAM DOCUMENTATION.
  178
  179  001346  171420           IBS:    .WORD   ABASE   ;>NO            <;CONTROL AND STATUS REGISTER.
  180  001350  171422           IBD:    .WORD   ABASE+2 ;>PATCHES       <;DATA REGISTER.
  181  001352  171424           IBWC:   .WORD   ABASE+4         ;ADDRESS RESERVED FOR
  182  001354  171426           IBCA:   .WORD   ABASE+6         ;FUTURE USE
  183  001356  000420           VECTA:  .WORD   AVECT1  ;>ALLOWED       <;VECTOR ADDRESS.
  184  001360  000424           VECTB:  .WORD   AVECT1+4 ;>HERE!        <;VECTOR ADDR. +4.
  185  001362  000430           VECTC:  .WORD   AVECT1+10
  186  001364  000434           VECTD:  .WORD   AVECT1+14
  187  001366  171430           IBS2:   .WORD   ABASE+10
  188  001370  171432           IBD2:   .WORD   ABASE+12
  189  001372  000660           VECTA2: .WORD   660
  190  001374  000664           VECTB2: .WORD   664
  191  001376  000670           VECTC2: .WORD   670
  192  001400  000674           VECTD2: .WORD   674
  193
  194                                    ;VECTOR ADDRESSES +2 LOCATIONS.
  195
  196  001402  000422           PRA:    .WORD   AVECT1+2        ;NOTE:  DO NOT ATTEMPT TO PATCH
  197  001404  000426           PRB:    .WORD   AVECT1+6        ;       THESE LOCATIONS IF A VECTOR
  198  001406  000432           PRC:    .WORD   AVECT1+12       ;       VARYIES .   ALTER LOCATION
  199  001410  000436           PRD:    .WORD   AVECT1+16       ;       '$VECT1:'.
  200
  201  001412  000442           PRA2:   .WORD   AVECT1+22       ;       IF TEST MODULE VECTOR IS
  202  001414  000446           PRB2:   .WORD   AVECT1+26       ;       DIFFERENT,YOU MUST CHANGE
  203  001416  000452           PRC2:   .WORD   AVECT1+32       ;       LOCATION 'VECTA2:'.
  204  001420  000456           PRD2:   .WORD   AVECT1+36
  205
  206
  207                                    .SBTTL  PROGRAM START
  208
  210
  211  001422                    START:
  (1)                              .SBTTL  INITIALIZE THE COMMON TAGS
```

```
(1)                                         ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
(1)  001422  012706  001100                         MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
(1)  001426  005026                                 CLR     (R6)+           ;;CLEAR MEMORY LOCATION
(1)  001430  022706  001140                         CMP     #SWR,R6 ;;DONE?
(1)  001434  001374                                 BNE     .-6             ;;LOOP BACK IF NO
(1)  001436  012706  001100                         MOV     #STACK,SP       ;;SETUP THE STACK POINTER
(1)                                         ;;INITIALIZE A FEW VECTORS
(1)  001442  012737  007464  000020                 MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
(1)  001450  012737  000340  000022                 MOV     #340,@#IOTVEC+2 ;;LEVEL 7
(1)  001456  012737  007142  000030                 MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
(1)  001464  012737  000340  000032                 MOV     #340,@#EMTVEC+2 ;;LEVEL 7
(1)  001472  012737  012152  000034                 MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
(1)  001500  012737  000340  000036                 MOV     #340,@#TRAPVEC+2;LEVEL 7
(1)  001506  012737  011724  000024                 MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
(1)  001514  012737  000340  000026                 MOV     #340,@#PWRVEC+2 ;;LEVEL 7
(1)  001522  005037  001160                         CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
(1)  001526  005037  001162                         CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
(1)  001532  112737  000001  001115                 MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
(1)  001540  012737  001540  001106                 MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
(1)  001546  012737  001546  001110                 MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
(2)                                         ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
(2)                                         ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
(2)  001554  013746  000004                         MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
(2)  001560  012737  001614  000004                 MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
(2)  001566  012737  177570  001140                 MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
(2)  001574  012737  177570  001142                 MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
(2)  001602  022777  177777  177330                 CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
(2)  001610  001012                                 BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
(2)                                                                         ;;AND  THE HARDWARE SWR IS NOT - -1
(2)  001612  000403                                 BR      65$             ;;BRANCH IF NO TIMEOUT
(2)  001614  012716  001622          64$:          MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
(2)  001620  000002                                 RTI
(2)  001622  012737  000176  001140  65$:          MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
(2)  001630  012737  000174  001142                 MOV     #DISPREG,DISPLAY
(2)  001636  012637  000004          66$:          MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
(1)
(2)  001642  005037  001202                         CLR     $PASS           ;;CLEAR PASS COUNT
(2)  001646  132737  000200  001215                 BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
(2)  001654  001403                                 BEQ     67$             ;;YES,USE NON-APT SWITCH
(2)  001656  012737  001216  001140                 MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
(2)  001664                          67$:
212  001664  012737  012102  000004                 MOV     #IOTRD,ERRVEC   ;SET TO HANDLE BUS ERRORS.
213  001672  012737  000200  000006                 MOV     #200,ERRVEC+2
214
215  001700  013737  001250  001346                 MOV     $BASE,IBS       ;GET BASE ADDR.
216  001706  013737  001346  001350                 MOV     IBS,IBD         ;FIX DATA BUFFER=
217  001714  062737  000002  001350                 ADD     #2,IBD          ;CSR+2
218  001722  013737  001350  001352                 MOV     IBD,IBWC
219  001730  062737  000002  001352                 ADD     #2,IBWC
220  001736  013737  001352  001354                 MOV     IBWC,IBCA
221  001744  062737  000002  001354                 ADD     #2,IBCA
222  001752  013737  001244  001356                 MOV     $VECT1,VECTA    ;GET VECTOR ADDR.
223  001760  042737  170000  001356                 BIC     #170000,VECTA   ;STRIP JUNK
224  001766  013737  001346  012662                 MOV     IBS,IBSA
```

```
   225  001774  013737  001350  012664          MOV     IBD,IBDA
   226  002002  013737  001366  001370          MOV     IBS2,IBD2
   227  002010  062737  000002  001370          ADD     #2,IBD2
   228  002016  013737  001356  001360          MOV     VECTA,VECTB
   229  002024  062737  000004  001360          ADD     #4,VECTB
   230  002032  013737  001360  001362          MOV     VECTB,VECTC
   231  002040  062737  000004  001362          ADD     #4,VECTC
   232  002046  013737  001362  001364          MOV     VECTC,VECTD
   233  002054  062737  000004  001364          ADD     #4,VECTD
   234  002062  013737  001372  001374          MOV     VECTA2,VECTB2
   235  002070  062737  000004  001374          ADD     #4,VECTB2
   236  002076  013737  001374  001376          MOV     VECTB2,VECTC2
   237  002104  062737  000004  001376          ADD     #4,VECTC2
   238  002112  013737  001376  001400          MOV     VECTC2,VECTD2
   239  002120  062737  000004  001400          ADD     #4,VECTD2
   240
   241  002126  013737  001356  001402          MOV     VECTA,PRA       ;SET UP VECTOR+2 ADDRESSES.
   242  002134  062737  000002  001402          ADD     #2,PRA
   243  002142  013737  001402  001404          MOV     PRA,PRB
   244  002150  062737  000004  001404          ADD     #4,PRB
   245  002156  013737  001404  001406          MOV     PRB,PRC
   246  002164  062737  000004  001406          ADD     #4,PRC
   247  002172  013737  001406  001410          MOV     PRC,PRD
   248  002200  062737  000004  001410          ADD     #4,PRD
   249  002206  013737  001372  001412          MOV     VECTA2,PRA2
   250  002214  062737  000002  001412          ADD     #2,PRA2
   251  002222  013737  001412  001414          MOV     PRA2,PRB2
   252  002230  062737  000004  001414          ADD     #4,PRB2
   253  002236  013737  001414  001416          MOV     PRB2,PRC2
   254  002244  062737  000004  001416          ADD     #4,PRC2
   255  002252  013737  001416  001420          MOV     PRC2,PRD2
   256  002260  062737  000004  001420          ADD     #4,PRD2
   257  002266                          RSTART:
   258                                                  ;/-RESV-
(1)  002266  013777  001402  177062          MOV     PRA,@VECTA ;/RESTORE VECTOR FOR
(1)  002274  012777  004700  177100          MOV     #4700,@PRA      ;/ILLEGAL INTRO.
   259                                                  ;/-RESV-
(1)  002302  013777  001404  177050          MOV     PRB,@VECTB ;/RESTORE VECTOR FOR
(1)  002310  012777  004700  177066          MOV     #4700,@PRB      ;/ILLEGAL INTRO.
   260                                                  ;/-RESV-
(1)  002316  013777  001406  177036          MOV     PRC,@VECTC ;/RESTORE VECTOR FOR
(1)  002324  012777  004700  177054          MOV     #4700,@PRC      ;/ILLEGAL INTRO.
   261                                                  ;/-RESV-
(1)  002332  013777  001410  177024          MOV     PRD,@VECTD ;/RESTORE VECTOR FOR
(1)  002340  012777  004700  177042          MOV     #4700,@PRD      ;/ILLEGAL INTRO.
   262                          .SBTTL  TYPE PROGRAM NAME
(1)                             ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
(1)  002346  005227  177777          INC     #-1             ;;FIRST TIME?
(1)  002352  001041                  BNE     64$             ;;BRANCH IF NO
(1)  002354  104401  002422          TYPE    ,65$            ;;TYPE ASCIZ STRING
(2)                          .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
(2)  002360  005737  000042          TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
(2)  002364  001012                  BNE     66$             ;;BRANCH IF YES
(2)  002366  123727  001214  000001          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
```

```
(2)  002374  001406                          BEQ     66$             ;;BRANCH IF YES
(2)  002376  023727  001140  000176          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
(2)  002404  001005                          BNE     67$             ;;BRANCH IF NO
(2)  002406  104406                          GTSWR                   ;;GET SOFT-SWR SETTINGS
(2)  002410  000403                          BR      67$
(2)  002412  112737  000001  001134  66$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
(2)  002420                          67$:
(1)  002420  000416                          BR      64$             ;;GET OVER THE ASCIZ
(1)                                  ;;65$:  .ASCIZ  <CRLF>#CVIBBA IBV11A DIAGNOSTIC#<CRLF>
(1)  002456                          64$:
263  002456  000005                          RESET
264
265                                  ;;*****************************************************************
(3)                                  ;*TEST 1         *TEST THE ADDRESSABILITY OF THE IBS, IBD REGISTERS
(3)                                  ;;*****************************************************************
(2)  002460  000240                  TST1:   NOP
(1)  002462  012737  000050  001160          MOV     #50,$TIMES      ;;DO 50 ITERATIONS
(1)  002470  012737  002520  001106          MOV     #1$,$LPADR      ;;SET SCOPE LOOP ADDRESS
266
267  002476  012737  000001  001102          MOV     #1,$TSTNM       ;SET TEST #1.
268  002504  012737  000001  001200          MOV     #1,$TESTN       ;DON'T FORGET APT!
269  002512  012737  002520  001110          MOV     #1$,$LPERR
270
271  002520  013746  000004          1$:     MOV     ERRVEC,-(SP)    ;SAVE CONTENTS OF ADDR. 4
272  002524  012737  002552  000004          MOV     #2$,ERRVEC      ;SET TIME-OUT TRAP VECTOR TO HANDLE
273                                                                  ;IN CASE WE TIME OUT WHEN
274                                                                  ;WE ADDR. THE IBV-11
275
276  002532  005777  176610                  TST     @IBS            ;ADDR THE IBS, IF NO RESPONSE,
277                                                                  ;WILL TRAP TO 2$ FROM HERE
278  002536  012737  002560  000004          MOV     #3$,ERRVEC      ;CHANGE FOR ADDRESSING THE IBD REG.
279
280  002544  005777  176600                  TST     @IBD            ;ADDR THE IBD REG.
281                                                                  ;WE'LL TRAP TO 3$ FROM HERE IF BAD.
282  002550  000406                          BR      4$
283  002552                          2$:
(1)  002552  062706  000004                  ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
284

                                     ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  002556  104005                          ERROR   5               ;/MODULE FAULT DETECTED:
285                                                                  ;IBS REGISTER COULD NOT BE
286                                                                  ;ADDRESSED

                                     ;;$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$
288  002560                          3$:
(1)  002560  062706  000004                  ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
289

                                     ;;$$$$$$$$$>>> ERROR <<<$$$$$$$$$

(1)
```

```
(1)  002564  104005                        ERROR   5               ;/MODULE FAULT DETECTED:
290                                                                 ;ADDRESSED

                                            ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
292  002566  012637  000004          4$:     MOV     (SP)+,ERRVEC    ;RESTORE CONTENTS OF LOC 4.
293                                                                 ;/PR
(1)  002572  012746  000000                 MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
(1)  002576  012746  002604                 MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  002602  000002                         RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  002604                         64$:                            ;/IN STATUS REG.)
294
302
303                                         ;;**************************************************************
(3)                                         ;*TEST 2         *TEST THAT BASE ADDRESSES +4,+6 RESPOND WHEN ADDRESSED
(4)
(4)                                         ;*
(4)                                         ;*EVEN THOUGH THE BASE ADDRESS +4 AND +6 ARE NOT USED,
(4)                                         ;*THE IBV11A SHOULD RESPOND TO THEM
(4)                                         ;*
(3)                                         ;**************************************************************
(2)  002604  000004                 TST2:   SCOPE
(1)  002606  012737  000010  001160         MOV     #10,$TIMES      ;;DO 10 ITERATIONS
304
305  002614  013746  000004                 MOV     ERRVEC,-(SP)    ;SAVE CONTENTS OF ADDR 4.
306  002620  012737  002646  000004         MOV     #1$,ERRVEC      ;SET TIME OUT TRAP VECTOR TO HANDLE
307                                                                 ;IN CASE WE TIME OUT WHEN WE
308                                                                 ;ADDRESS THE IBV-11 ADDRESSES +4,+6.
309  002626  005777  176520                 TST     @IBWC           ;TEST BASE ADDRESS +4, IF NO RESPONSE
310                                                                 ;WILL TRAP TO 1$ FROM HERE
311
312  002632  012737  002656  000004         MOV     #2$,ERRVEC      ;CHANGE FOR ADDRESSING +6 ADDR.
313
314  002640  005777  176510                 TST     @IBCA           ;ADDR THE +6 ADDR. - TRAP IF BAD.
315  002644  000407                         BR      3$              ;CONTINUE IF GOOD.
316
317  002646                         1$:
(1)  002646  062706  000004                 ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
318

                                            ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  002652  104005                         ERROR   5               ;/MODULE FAULT DETECTED:
319                                                                 ;BASE ADDR+4 COULD NOT
320                                                                 ;BE ADDRESSED.

                                            ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
322  002654  000403                         BR      3$
323
324  002656                         2$:
(1)  002656  062706  000004                 ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
325

                                            ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$
```

```
(1)
(1)  002662  104005                          ERROR   5               ;/MODULE FAULT DETECTED:
326                                                                   ;BASE ADDR+6 COULD NOT
327                                                                   ;BE ADDRESSED.

                                              ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

329
330  002664  012637  000004          3$:     MOV     (SP)+,ERRVEC    ;RESTORE CONTENTS OF LOC 4.
331
332                                           ;;**********************************************************************
(3)                                           ;*TEST 3         *TEST THAT IBS IS CLEAR AT INIT OF TESTING
(3)                                           ;;**********************************************************************
(2)  002670  000004                TST3:    SCOPE
(1)  002672  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
333
334  002700  000005                          RESET                   ;ISSUE SYSTEM INIT.
335
336  002702  005037  001124                  CLR     $GDDAT          ;EXPECT ZERO CSR.
337  002706  017737  176434  001126          MOV     @IBS,$BDDAT     ;READ CSR.
338  002714  001401                          BEQ     TST4            ;;
339

                                              ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  002716  104003                          ERROR   3               ;/MODULE FAULT DETECTED:
340                                                                   ;IBS NOT CLEAR ON INT.

                                              ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

342
343                                           ;;**********************************************************************
(3)                                           ;*TEST 4         *TEST THAT IBD IS CLEAR AT INIT OF TESTING
(3)                                           ;;**********************************************************************
(2)  002720  000004                TST4:    SCOPE
(1)  002722  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
344
345  002730  000005                          RESET                   ;ISSUE SYSTEM INITIALIZE.
346
347  002732  005037  001124                  CLR     $GDDAT          ;EXPECT ZERO CSR.
348  002736  117737  176406  001126          MOVB    @IBD,$BDDAT     ;READ DBR
349  002744  001401                          BEQ     TST5            ;;
350

                                              ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  002746  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
351                                                                   ;IBD NOT CLEAR ON INIT.

                                              ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

353
360
361                                           .;**********************************************************************
```

```
(3)                                     ;*TEST 5        *TEST THAT BASE ADDRESSES +4,+6 RETURN ZERO WHEN READ
(4)                                             ;*
(4)                                             ;*BASE ADDRESS +4 AND +6 SHOULD RETURN A ZERO WHEN
(4)                                             ;*READ, IN THIS TEST WE WILL TRY THAT.
(4)                                             ;*
(3)                                     ;;**************************************************************************
(2)  002750  000004                     TST5:   SCOPE
(1)  002752  012737  000010  001160             MOV     #10,$TIMES      ;;DO 10 ITERATIONS
362
363  002760  005037  001124                     CLR     $GDDAT          ;EXPECT ZERO RETURN
364  002764  017737  176362  001126             MOV     @IBWC,$BDDAT    ;READ BASE ADDRESS+4
365  002772  001402                             BEQ     1$              ;IF ZERO - GOOD.
366

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  002774  104006                             ERROR   6               ;/MODULE FAULT DETECTED:
367                                                                     ;SHOULD HAVE READ BACK ZERO FROM
368                                                                     ;THIS ADDR.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
370  002776  000405                             BR      TST6            ;;
371
372  003000  017737  176350  001126  1$:        MOV     @IBCA,$BDDAT    ;READ BASE ADDR+6, SHOULD BE ZERO
373  003006  001401                             BEQ     TST6            ;;
374

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  003010  104006                             ERROR   6               ;/MODULE FAULT DETECTED:
375                                                                     ;SHOULD HAVE READ BACK ZERO FROM
376                                                                     ;BASE ADDR+6.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

378
379                                     ;;**************************************************************************
(3)                                     ;*TEST 6         *TEST THAT WE CAN SET TCS, TCS SETS CMD
(3)                                     ;;**************************************************************************
(2)  003012  000004                     TST6:   SCOPE
380
381  003014  005077  176326                     CLR     @IBS            ;CLEAR CLR
382  003020  052777  000001  176320             BIS     #BIT0,@IBS      ;SET TCS.
383  003026  052737  002001  001124             BIS     #BIT0!BIT10,$GDDAT ;EXPECT ONLY TCS AND CMD TO SET
384  003034  017737  176306  001126             MOV     @IBS,$BDDAT     ;READ THE IBS.
385  003042  023737  001124  001126             CMP     $GDDAT,$BDDAT   ;DID TCS AND CMD SET?
386  003050  000402                             BR      1$              ;YES - CONTINUE
387

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  003052  104003                             ERROR   3               ;/MODULE FAULT DETECTED:
```

```
                                                        ;TCS AND/OR CMD FAILED TO SET

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 390  003054  000412                    BR      TST7            ;;
 391
 392  003056  042777  000001  176262  1$:   BIC     #BIT0,@IBS      ;CLEAR TCS.
 393  003064  005037  001124            CLR     $GDDAT          ;EXPECT TCS AND CMD TO CLEAR
 394  003070  017737  176252  001126    MOV     @IBS,$BDDAT     ;READ IBS, DID THEY CLEAR?
 395  003076  001401                    BEQ     TST7            ;;
 396

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  003100  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
 397                                                            ;TCS AND/OR CMD FAILED TO CLEAR.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 399
 400                                ;;=====================================================================
 (3)                                ;*TEST 7        *TEST THAT EOP WILL SET
 (3)                                ;;=====================================================================
 (2)  003102  000004                TST7:   SCOPE
 401
 402  003104  005077  176236            CLR     @IBS            ;CLEAR CSR.
 403  003110  052777  000002  176230    BIS     #BIT1,@IBS      ;SET EOP
 404  003116  012737  000002  001124    MOV     #BIT1,$GDDAT    ;EXPECT ONLY EOP TO SET.
 405  003124  017737  176216  001126    MOV     @IBS,$BDDAT     ;READ IBS
 406  003132  023737  001124  001126    CMP     $GDDAT,$BDDAT   ;DID EOP SET?
 407  003140  001402                    BEQ     1$              ;YES - CONTINUE
 408

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  003142  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
 409                                                            ;EOP BIT SETTING ERROR.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 411  003144  000412                    BR      TST10           ;;
 412
 413  003146  042777  000002  176172  1$:   BIC     #BIT1,@IBS      ;CLEAR EOP
 414  003154  005037  001124            CLR     $GDDAT          ;EXPECT A ZERO CSR.
 415  003160  017737  176162  001126    MOV     @IBS,$BDDAT     ;READ IBS, IS IT CLEAR?
 416  003166  001401                    BEQ     TST10           ;;
 417

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  003170  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
 418                                                            ;IBS FAILED TO CLEAR

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
```

```
                                ;;**********************  ********************************************
                                ;*TEST 10        *TEST THAT RE WILL SET + CLEAR
                                ;;**********************************************\*********************
(2) 003172  000004              TST10:  SCOPE

003174  005077  176146          CLR     @IBS            ;CLEAR CSR.
003200  052777  000004  176140  BIS     #BIT02,@IBS     ;SET REM
003206  012737  000004  001124  MOV     #BIT02,$GDDAT   ;EXPECT ONLY REM TO SET.
003214  017737  176126  001126  MOV     @IBS,$BDDAT     ;READ IBS.
003222  023737  001126  001124  CMP     $BDDAT,$GDDAT   ;DID REM AND ONLY REM SET?
003230  001402                  BEQ     1$              ;YES - CONTINUE

                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1) 003232  104003              ERROR   3               ;/MODULE FAULT DETECTED:
                                                        ;REM BIT SETTING ERROR.

                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
003234  000412                  BR      TST11           ;;

003236  042777  000004  176102  1$:     BIC     #BIT02,@IBS     ;CLEAR REM BIT.
003244  005037  001124          CLR     $GDDAT          ;EXPECT ZERO CSR.
003250  017737  176072  001126  MOV     @IBS,$BDDAT     ;READ IBS - IS IT CLEAR?
003256  001401                  BEQ     TST11           ;;

                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1) 003260  104003              ERROR   3               ;/MODULE FAULT DETECTED:
                                                        ;IBS FAILED TO CLEAR.

                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

                                ;;**************************************************************
                                ;*TEST 11        *TEST THAT IBC WILL SET AND CLEAR
                                ;;**************************************************************
(2) 003262  000004              TST11:  SCOPE

003264  005077  176056          CLR     @IBS            ;CLEAR CSR.
003270  052777  000010  176050  BIS     #BIT03,@IBS     ;SET IBC
003276  012737  000010  001124  MOV     #BIT03,$GDDAT   ;EXPECT ONLY IBC TO BE SET
003304  017737  176036  001126  MOV     @IBS,$BDDAT     ;READ IBS.
003312  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;DID IBS SET?
003320  001414                  BEQ     1$              ;YES CONT'NUE
003322  012777  000010  176016  MOV     #BIT03,@IBS     ;TRY SET'ING IBC AGAIN.
003330  017737  176012  001126  MOV     @IBS,$BDDAT     ;MEMORY REFRESH MIGHT HAVE
003336  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;GOT IN THE WAY.
003344  001402                  BEQ     1$
```

```
                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  003346  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
 455                                                            ;IBS BIT SETTING ERROR.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 457  003350  000416                    BR      TST12           ;;
 458
 459  003352  004537  007122      1$:   JSR     R5,DEL50        ;DELAY 150 US.
 460  003356  000006                    .WORD   6
 461
 462  003360  012737  002001  001124    MOV     #BIT10!BIT0,$GDDAT      ;EXP CMD AND TCS.
 463  003366  017737  175754  001126    MOV     @IBS,$BDDAT     ;READ IBS - IS IT CLEAR?
 464  003374  023737  001124  001126    CMP     $GDDAT,$BDDAT
 465  003402  001401                    BEQ     TST12           ;;
 466

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  003404  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
 467                                                            ;IBS NOT CLEAR AFTER IBC

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 469                                    ;;*********************************************************************
 (3)                                    ;*TEST 12        *TEST THAT TON (BIT05) AND TKR SET AND CLEAR
 (3)                                    ;;*********************************************************************
 (2)  003406  000004                TST12:  SCOPE
 470
 471  003410  005077  175732            CLR     @IBS            ;CLEAR THE CSR.
 472  003414  052777  000040  175724    BIS     #BIT5,@IBS      ;SET TON.
 473  003422  012737  001040  001124    MOV     #BIT5!BIT9,$GDDAT ;EXPECT ONLY TON AND TKR TO SET.
 474  003430  017737  175712  001126    MOV     @IBS,$BDDAT     ;READ CSR.
 475  003436  023737  001124  001126    CMP     $GDDAT,$BDDAT   ;DID THEY BOTH SET?
 476  003444  001402                    BEQ     1$              ;YES - CONTINUE.
 477
 478

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  003446  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
 479                                                            ;ERROR IN SETTING TON BIT.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 481  003450  000412                    BR      TST13           ;;
 482
 483  003452  042777  000040  175666  1$:   BIC     #BIT5,@IBS      ;WHEN TON CLEARED, TKR SHOULD CLEAR.
 484  003460  005037  001124            CLR     $GDDAT          ;EXPECT ZERO CSR.
 485  003464  017737  175656  001126    MOV     @IBS,$BDDAT     ;DID IT CLEAR?
 486  003472  001401                    BEQ     TST13           ;;
 487
```

```
                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  003474  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
488                                                             ;CSR FAILED TO CLEAR.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

490
491                             ;;=====================================================================
(3)                             ;*TEST 13       *MAKE SURE WE CAN SET AND CLEAR BIT06 (IE)
(3)                             ;;=====================================================================
(2)  003476  000004             TST13:  SCOPE
492
493                                                             ;/PR
(1)  003500  012746  000340             MOV     #340,-(SP)      ;/SET CPU PRIORITY ON RETURN
(1)  003504  012746  003512             MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  003510  000002                     RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  003512                     64$:                            ;/IN STATUS REG.)
494
495  003512  005077  175630             CLR     @IBS            ;CLEAR CSR.
496
497  003516  052777  000100  175622     BIS     #BIT6,@IBS      ;SET IE.
498  003524  012737  000100  001124     MOV     #BIT6,$GDDAT    ;EXPECT ONLY BIT 6 TO SET.
499  003532  017737  175610  001126     MOV     @IBS,$BDDAT     ;READ IBS.
500  003540  023737  001124  001126     CMP     $GDDAT,$BDDAT   ;DID IE SET?
501  003546  001402                     BEQ     1$              ;YES - CONTINUE.
502

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  003550  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
503                                                             ;ERROR IN SETTING IE BIT.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
505  003552  000412                     BR      TST14           ;;
506
507  003554  005037  001124     1$:     CLR     $GDDAT          ;EXPECT ZERO CSR AFTER.
508  003560  042777  000100  175560     BIC     #BIT6,@IBS      ;IE IS CLEARED.
509  003566  017737  175554  001126     MOV     @IBS,$BDDAT     ;READ CSR - IS IT CLEAR?
510  003574  001401                     BEQ     TST14           ;;
511

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  003576  104003                    ERROR   3               ;/MODULE FAULT DETECTED:
512                                                             ;FAILED TO CLEAR CSR.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

514
515                             ;;=====================================================================
(3)                             ;*TEST 14       *TEST THAT BIT 7 (ACC) CAN BE SET AND CLEARED
(3)                             ;;=====================================================================
```

```
   (2)  003600  000004                    TST14:  SCOPE
   516
   517  003602  005077  175540                    CLR     @IBS              ;CLEAR CSR.
   518  003606  052777  000200  175532            BIS     #BIT7,@IBS        ;SET ACC.
   519  003614  012737  000200  001124            MOV     #BIT7,$GDDAT      ;EXPECT ONLY ACC TO SET.
   520  003622  017737  175520  001126            MOV     @IBS,$BDDAT       ;READ IBS.
   521  003630  023737  001124  001126            CMP     $GDDAT,$BDDAT     ;DID ACC SET?
   522  003636  001402                            BEQ     1$                ;YES - CONTINUE.
   523

                                                 ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  003640  104003                            ERROR   3                 ;/MODULE FAULT DETECTED:
   524                                                                      ;FAILURE IN SETTING BIT 7 (ACC).

                                                 ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   526  003642  000412                            BR      TST15             ;;
   527
   528  003644  042777  000200  175474  1$:      BIC     #BIT7,@IBS        ;TRY CLEARING ACC.
   529  003652  005037  001124                    CLR     $GDDAT            ;EXPECT ZERO CSR.
   530  003656  017737  175464  001126            MOV     @IBS,$BDDAT       ;READ IBS, IS IT CLEAR?
   531  003664  001401                            BEQ     TST15             ;;
   532

                                                 ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  003666  104003                            ERROR   3                 ;/MODULE FAULT DETECTED:
   533                                                                      ;IBS FAILED TO CLEAR.

                                                 ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   535
   562
   563
   (5)                                           ;;*****************************************************************
   (4)                                           ;*TEST 15       *TEST THAT IBD BIT 0 CAN BET SET + CLEARED
   (4)                                           ;;*****************************************************************
   (3)  003670  000004                    TST15:  SCOPE
   (1)
   (1)                                                                      ;/MACRO BDT
   (1)  003672  012777  000060  175446            MOV     #BIT4!BIT5,@IBS ;/SET TON AND LON.
   (1)  003700  012737  000001  001124            MOV     #BIT0,$GDDAT      ;/WE'RE GONNA TEST BIT 0.
   (1)  003706  013777  001124  175434            MOV     $GDDAT,@IBD       ;/SET THE BIT.
   (1)
   (1)  003714  117737  175430  001126            MOVB    @IBD,$BDDAT       ;/READ THE IBD.
   (1)  003722  123737  001124  001126            CMPB    $GDDAT,$BDDAT     ;/DID IT GET THRU OK?
   (1)  003730  001402                            BEQ     1$                ;/YES - CONTINUE.
   (1)
   (2)

                                                 ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (2)
```

```
(2)  003732  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ERROR IN SETTING IBD BIT 0.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  003734  000412                          BR      TST16           ;;
(1)  003736  005037  001124          1$:     CLR     $GDDAT          ;/EXPECT ZERO IBD WHEN
(1)  003742  042777  000001  175400          BIC     #BIT0,@IBD      ;/BIT 0 IS CLEARED.
(1)  003750  117737  175374  001126          MOVB    @IBD,$BDDAT     ;/READ IBD, IS IT CLEAR?
(3)  003756  001401                          BEQ     TST16           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  003760  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;FAILED TO CLEAR IBD.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(1)
564
(5)                                  ;;=====================================================================
(4)                                  ;*TEST 16       *TEST THAT IBD BIT 1 CAN BET SET + CLEARED
(4)                                  ;;=====================================================================
(3)  003762  000004                  TST16:  SCOPE
(1)
(1)                                                                  ;/MACRO BDT
(1)  003764  012777  000060  175354          MOV     #BIT4.BIT5,@IBS ;/SET TON AND LON.
(1)  003772  012737  000002  001124          MOV     #BIT1,$GDDAT    ;/WE'RE GONNA TEST BIT 1.
(1)  004000  013777  001124  175342          MOV     $GDDAT,@IBD     ;/SET THE BIT.
(1)
(1)  004006  117737  175336  001126          MOVB    @IBD,$BDDAT     ;/READ THE IBD.
(1)  004014  123737  001124  001126          CMPB    $GDDAT,$BDDAT   ;/DID IT GET THRU OK?
(1)  004022  001402                          BEQ     1$              ;/YES - CONTINUE.
(1)
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004024  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ERROR IN SETTING IBD BIT 1.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004026  000412                          BR      TST17           ;;
(1)  004030  005037  001124          1$:     CLR     $GDDAT          ;/EXPECT ZERO IBD WHEN
(1)  004034  042777  000002  175306          BIC     #BIT1,@IBD      ;/BIT 1 IS CLEARED.
(1)  004042  117737  175302  001126          MOVB    @IBD,$BDDAT     ;/READ IBD, IS IT CLEAR?
(3)  004050  001401                          BEQ     TST17           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004052  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
```

```
(1)                                                                     ;FAILED TO CLEAR IBD.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
565
(5)                                     ;;*****************************************************************
(4)                                     ;*TEST 17        *TEST THAT IBD BIT 2 CAN BET SET + CLEARED
(4)                                     ;;*****************************************************************
(3)  004054  000004                     TST17:  SCOPE
(1)
(1)                                                                     ;/MACRO BDT
(1)  004056  012777  000060  175262             MOV     #BIT4!BIT5,@IBS ;/SET TON AND LON.
(1)  004064  012737  000004  001124             MOV     #BIT2,$GDDAT    ;/WE'RE GONNA TEST BIT 2.
(1)  004072  013777  001124  175250             MOV     $GDDAT,@IBD     ;/SET THE BIT.
(1)
(1)  004100  117737  175244  001126             MOVB    @IBD,$BDDAT     ;/READ THE IBD.
(1)  004106  123737  001124  001126             CMPB    $GDDAT,$BDDAT   ;/DID IT GET THRU OK?
(1)  004114  001402                             BEQ     1$              ;/YES - CONTINUE.
(1)
(2)

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004116  104004                             ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                     ;/ERROR IN SETTING IBD BIT 2.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004120  000412                             BR      TST20           ;;
(1)  004122  005037  001124             1$:     CLR     $GDDAT          ;/EXPECT ZERO IBD WHEN
(1)  004126  042777  000004  175214             BIC     #BIT2,@IBD      ;/BIT 2 IS CLEARED.
(1)  004134  117737  175210  001126             MOVB    @IBD,$BDDAT     ;/READ IBD, IS IT CLEAR?
(3)  004142  001401                             BEQ     TST20           ;;
(2)

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004144  104004                             ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                     ;FAILED TO CLEAR IBD.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
566
(5)                                     ;;*****************************************************************
(4)                                     ;*TEST 20        *TEST THAT IBD BIT 3 CAN BET SET + CLEARED
(4)                                     ;;*****************************************************************
(3)  004146  000004                     TST20:  SCOPE
(1)
(1)                                                                     ;/MACRO BDT
(1)  004150  012777  000060  175170             MOV     #BIT4!BIT5,@IBS ;/SET TON AND LON.
(1)  004156  012737  000010  001124             MOV     #BIT3,$GDDAT    ;/WE'RE GONNA TEST BIT 3.
(1)  004164  013777  001124  175156             MOV     $GDDAT,@IBD     ;/SET THE BIT.
(1)
```

```
(1)  004172  117737  175152  001126          MOVB    @IBD,$BDDAT     ;/READ THE IBD.
(1)  004200  123737  001124  001126          CMPB    $GDDAT,$BDDAT   ;/DID IT GET THRU OK?
(1)  004206  001402                          BEQ     1$              ;/YES - CONTINUE.
(1)
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004210  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ERROR IN SETTING IBD BIT 3.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004212  000412                          BR      TST21           ;;
(1)  004214  005037  001124          1$:     CLR     $GDDAT          ;/EXPECT ZERO IBD WHEN
(1)  004220  042777  000010  175122          BIC     #BIT3,@IBD      ;/BIT 3 IS CLEARED.
(1)  004226  117737  175116  001126          MOVB    @IBD,$BDDAT     ;/READ IBD, IS IT CLEAR?
(3)  004234  001401                          BEQ     TST21           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004236  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;FAILED TO CLEAR IBD.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(1)
567
(5)                                  ;;=================================================================
(4)                                  ;*TEST 21       *TEST THAT IBD BIT 4 CAN BET SET + CLEARED
(4)                                  ;;=================================================================
(3)  004240  000004                  TST21:  SCOPE
(1)
(1)                                                                  ;/MACRO BDT
(1)  004242  012777  000060  175076          MOV     #BIT4!BIT5,@IBS ;/SET TON AND LON.
(1)  004250  012737  000020  001124          MOV     #BIT4,$GDDAT    ;/WE'RE GONNA TEST BIT 4.
(1)  004256  013777  001124  175064          MOV     $GDDAT,@IBD     ;/SET THE BIT.
(1)
(1)  004264  117737  175060  001126          MOVB    @IBD,$BDDAT     ;/READ THE IBD.
(1)  004272  123737  001124  001126          CMPB    $GDDAT,$BDDAT   ;/DID IT GET THRU OK?
(1)  004300  001402                          BEQ     1$              ;/YES - CONTINUE.
(1)
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004302  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ERROR IN SETTING IBD BIT 4.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004304  000412                          BR      TST22           ;;
(1)  004306  005037  001124          1$:     CLR     $GDDAT          ;/EXPECT ZERO IBD WHEN
```

```
(1)  004312  042777  000020  175030          BIC     #BIT4,@IBD      ;/BIT 4 IS CLEARED.
(1)  004320  117737  175024  001126          MOVB    @IBD,$BDDAT     ;/READ IBD, IS IT CLEAR?
(3)  004326  001401                          BEQ     TST22           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004330  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;FAILED TO CLEAR IBD.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
568
(5)                                  ;;**************************************************************
(4)                                  ;*TEST 22        *TEST THAT IBD BIT 5 CAN BET SET + CLEARED
(4)                                  ;;**************************************************************
(3)  004332  000004                  TST22:  SCOPE
(1)
(1)                                                                  ;/MACRO BDT
(1)  004334  012777  000060  175004          MOV     #BIT4!BIT5,@IBS ;/SET TON AND LON.
(1)  004342  012737  000040  001124          MOV     #BIT5,$GDDAT    ;/WE'RE GONNA TEST BIT 5.
(1)  004350  013777  001124  174772          MOV     $GDDAT,@IBD     ;/SET THE BIT.
(1)
(1)  004356  117737  174766  001126          MOVB    @IBD,$BDDAT     ;/READ THE IBD.
(1)  004364  123737  001124  001126          CMPB    $GDDAT,$BDDAT   ;/DID IT GET THRU OK?
(1)  004372  001402                          BEQ     1$              ;/YES - CONTINUE.
(1)
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004374  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ERROR IN SETTING IBD BIT 5.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004376  000412                          BR      TST23           ;;
(1)  004400  005037  001124          1$:     CLR     $GDDAT          ;/EXPECT ZERO IBD WHEN
(1)  004404  042777  000040  174736          BIC     #BIT5,@IBD      ;/BIT 5 IS CLEARED.
(1)  004412  117737  174732  001126          MOVB    @IBD,$BDDAT     ;/READ IBD, IS IT CLEAR?
(3)  004420  001401                          BEQ     TST23           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004422  104004                          ERROR   4               ;/MODULE FAULT DETECTED:
(1)                                                                  ;FAILED TO CLEAR IBD.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
569
(5)                                  ;;**************************************************************
```

```
(4)                                     ;*TEST 23       *TEST THAT IBD BIT 6 CAN BET SET + CLEARED
(4)                                     ;;********************* ******************************************
(3)  004424  000004                     TST23:  SCOPE
(1)
(1)                                                                             ;/MACRO BDT
(1)  004426  012777  000060  174712             MOV     #BIT4!BIT5,@IBS        ;/SET TON AND LON.
(1)  004434  012737  000100  001124             MOV     #BIT6,$GDDAT           ;/WE'RE GONNA TEST BIT 6.
(1)  004442  013777  001124  174700             MOV     $GDDAT,@IBD            ;/SET THE BIT.
(1)
(1)  004450  117737  174674  001126             MOVB    @IBD,$BDDAT            ;/READ THE IBD.
(1)  004456  123737  001124  001126             CMPB    $GDDAT,$BDDAT          ;/DID IT GET THRU OK?
(1)  004464  001402                             BEQ     1$                     ;/YES - CONTINUE.
(1)
(2)

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004466  104004                             ERROR   4                      ;/MODULE FAULT DETECTED:
(1)                                                                             ;/ERROR IN SETTING IBD BIT 6.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004470  000412                             BR      TST24                  ;;
(1)  004472  005037  001124             1$:     CLR     $GDDAT                 ;/EXPECT ZERO IBD WHEN
(1)  004476  042777  000100  174644             BIC     #BIT6,@IBD             ;/BIT 6 IS CLEARED.
(1)  004504  117737  174640  001126             MOVB    @IBD,$BDDAT            ;/READ IBD, IS IT CLEAR?
(3)  004512  001401                             BEQ     TST24                  ;;
(2)

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004514  104004                             ERROR   4                      ;/MODULE FAULT DETECTED:
(1)                                                                             ;FAILED TO CLEAR IBD.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
570
(5)                                     ;;*****************************************************************
(4)                                     ;*TEST 24       *TEST THAT IBD BIT 7 CAN BET SET + CLEARED
(4)                                     ;;*****************************************************************
(3)  004516  000004                     TST24:  SCOPE
(1)
(1)                                                                             ;/MACRO BDT
(1)  004520  012777  000060  174620             MOV     #BIT4!BIT5,@IBS        ;/SET TON AND LON.
(1)  004526  012737  000200  001124             MOV     #BIT7,$GDDAT           ;/WE'RE GONNA TEST BIT 7.
(1)  004534  013777  001124  174606             MOV     $GDDAT,@IBD            ;/SET THE BIT.
(1)
(1)  004542  117737  174602  001126             MOVB    @IBD,$BDDAT            ;/READ THE IBD.
(1)  004550  123737  001124  001126             CMPB    $GDDAT,$BDDAT          ;/DID IT GET THRU OK?
(1)  004556  001402                             BEQ     1$                     ;/YES - CONTINUE.
(1)
(2)
```

```
                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004560  104004                     ERROR   4              ;/MODULE FAULT DETECTED:
(1)                                                             ;/ERROR IN SETTING IBD BIT 7.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  004562  000412                     BR      TST25          ;;
(1)  004564  005037  001124       1$:   CLR     $GDDAT         ;/EXPECT ZERO IBD WHEN
(1)  004570  042777  000200  174552     BIC     #BIT7,@IBD     ;/BIT 7 IS CLEARED.
(1)  004576  117737  174546  001126     MOVB    @IBD,$BDDAT    ;/READ IBD, IS IT CLEAR?
(3)  004604  001401                     BEQ     TST25          ;;
(2)

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  004606  104004                     ERROR   4              ;/MODULE FAULT DETECTED:
(1)                                                             ;FAILED TO CLEAR IBD.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
571
572                                     ;;*****************************************************************
(3)                                     ;*TEST 25       *TEST THAT NO DATA GETS XFERRED, IF NOT ENABLED
(3)                                     ;;*****************************************************************
(2)  004610  000004                     TST25:  SCOPE
573
574  004612  005077  174530                     CLR     @IBS           ;CLEAR CSR
575  004616  112777  000252  174524            MOVB    #252,@IBD      ;TRY XFERRING DATA
576  004624  005037  001124                     CLR     $GDDAT         ;NO DATA SHOULD XFERR
577  004630  117737  174514  001126           MOVB    @IBD,$BDDAT    ;READ BUFFER REG.
578  004636  001401                           BEQ     TST26          ;;
579

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  004640  104002                     ERROR   2              ;/MODULE FAULT DETECTED:
580                                                             ;DATA WAS XFERRED THROUGH IBD
581                                                             ;EVEN THOUGH TON AND LON CLEARED.
582                                                             ;SIGNAL 'ENB XFER L" PROBABLY
583                                                             ;STUCK LOW.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

585
586                                     ;;*****************************************************************
(3)                                     ;*TEST 26       *TEST IBD BITS DAC, AND DAV
(3)                                     ;;*****************************************************************
(2)  004642  000004                     TST26:  SCOPE
587
588  004644  005077  174476                     CLR     @IBS           ;CLEAR CSR.
589  004650  005077  174474                     CLR     @IBD           ;CLEAR DATA REG.
590  004654  032777  000400  174466           BIT     #BIT8,@IBD     ;IS DAC SET?
```

```
   591  004662  001002                          BNE     4$              ;YES (GOOD)
   592

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  004664  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
   593                                                                  ;DAC NOT SET.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   595  004666  000437                          BR      TST27           ;;
   596  004670                          4$:
   597  004670  052777  000260  174450          BIS     #BIT5!BIT4!BIT7,@IBS    ;SET TON AND LON
   598  004676  012777  000252  174444          MOV     #252,@IBD       ;PUT DATA IN IBD.
   599  004704  017737  174440  001126          MOV     @IBD,$BDDAT     ;READ IBD.
   600  004712  032737  001000  001126          BIT     #BIT9,$BDDAT    ;DID DAV SET?
   601  004720  001002                          BNE     1$              ;YES - CONTINUE.
   602

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  004722  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
   603                                                                  ;DAV FAILED TO SET.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   605  004724  000420                          BR      TST27           ;;
   606
   607  004726  012777  000060  174412  1$:     MOV     #BIT4!BIT5,@IBS ;CLEAR ACC.
   608  004734  105777  174410          2$:     TSTB    @IBD            ;READ LOW BYTE OF IBD.
   609  004740  032777  000400  174402          BIT     #BIT8,@IBD      ;DID DAC CLEAR?
   610  004746  001402                          BEQ     3$              ;YES - CONTINUE.
   611

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  004750  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
   612                                                                  ;DAC FAILED TO CLEAR.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   614  004752  000405                          BR      TST27           ;;
   615  004754  032777  001000  174366  3$:     BIT     #BIT9,@IBD      ;DID DAV CLEAR?
   616  004762  001401                          BEQ     TST27           ;;
   617

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  004764  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
   618                                                                  ;DAV FAILED TO CLEAR.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   661
```

```
662                                                     ;/MACRO -SIGC-
(1)
(5)                                 ;;*******************************************************************
(4)                                 ;*TEST 27        *TEST THAT REN SETS WHEN REM SETS, ALSO TEST CLEAR
(4)                                 ;;*******************************************************************
(3)  004766  000004                 TST27:  SCOPE
(1)
(1)  004770  005077  174352                 CLR     @IBS            ;/CLEAR CSR.
(1)  004774  052777  000004  174344         BIS     #BIT2,@IBS      ;/SET REM, SHOULD SET REN.
(1)  005002  032777  010000  174340         BIT     #BIT12,@IBD     ;/DID REN SET?
(1)  005010  001011                         BNE     1$              ;/YES - LETS TRY CLEARING IT.
(1)  005012  052777  000004  174326         BIS     #BIT2,@IBS      ;/SET REM, MEMORY
(1)                                                                 ;/REFRESH COULD HAVE
(1)                                                                 ;/INTERRUPTED US.
(1)  005020  032777  010000  174322         BIT     #BIT12,@IBD     ;/DID REN SET THIS TIME?
(1)  005026  001002                         BNE     1$
(2)

                                            ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005030  104002                         ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                 ;/REN FILED TO SET WHEN REM SET.

                                            ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  005032  000410                         BR      TST30           ;;
(1)  005034  042777  000004  174304  1$:    BIC     #BIT2,@IBS      ;/CLEAR REM, SHOULD CLEAR REN.
(1)  005042  032777  010000  174300         BIT     #BIT12,@IBD     ;/DID REN CLEAR?
(3)  005050  001401                         BEQ     TST30           ;;
(2)

                                            ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005052  104002                         ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                 ;/REN FAILED TO CLEAR.

                                            ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(1)
663
664                                                     ;/MACRO -SIGC-
(1)
(5)                                 ;;*******************************************************************
(4)                                 ;*TEST 30        *TEST THAT IFC SETS WHEN IBS SETS, ALSO TEST CLEAR
(4)                                 ;;*******************************************************************
(3)  005054  000004                 TST30:  SCOPE
(1)
(1)  005056  005077  174264                 CLR     @IBS            ;/CLEAR CSR.
(1)  005062  052777  000010  174256         BIS     #BIT3,@IBS      ;/SET IBS, SHOULD SET IFC.
(1)  005070  032777  020000  174252         BIT     #BIT13,@IBD     ;/DID IFC SET?
(1)  005076  001011                         BNE     1$              ;/YES - LETS TRY CLEAR'NG IT.
(1)  005100  052777  000010  174240         BIS     #BIT3,@IBS      ;/SET IBS, MEMORY
(1)                                                                 ;/REFRESH COULD HAVE
(1)                                                                 ;/INTERRUPTED US.
```

```
(1)  005106  032777  020000  174234          BIT     #BIT13,@IBD     ;/DID IFC SET THIS TIME?
(1)  005114  001002                          BNE     1$
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005116  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/IFC FILED TO SET WHEN IBS SET.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  005120  000411                          BR      TST31           ;;
(1)
(1)  005122  032777  000010  174216  1$:     BIT     #BIT3,@IBS      ;/WAIT FOR IBS TO CLEAR.
(1)  005130  001374                          BNE     1$
(1)
(1)  005132  032777  020000  174210          BIT     #BIT13,@IBD     ;/IBS CLEAR, DID IFC CLEAR?
(3)  005140  001401                          BEQ     TST31           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005142  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/IFC FAILED TO CLEAR.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
665
666                                                                  ;/MACRO -SIGC-
(1)
(5)                                          ;;*****************************************************************
(4)                                          ;*TEST 31        *TEST THAT ATN SETS WHEN TCS SETS, ALSO TEST CLEAR
(4)                                          ;;*****************************************************************
(3)  005144  000004                          TST31:  SCOPE
(1)
(1)  005146  005077  174174                          CLR     @IBS            ;/CLEAR CSR.
(1)  005152  052777  000001  174166          BIS     #BIT0,@IBS      ;/SET TCS, SHOULD SET ATN.
(1)  005160  032777  040000  174162          BIT     #BIT14,@IBD     ;/DID ATN SET?
(1)  005166  001011                          BNE     1$              ;/YES - LETS TRY CLEARING IT.
(1)  005170  052777  000001  174150          BIS     #BIT0,@IBS      ;/SET TCS, MEMORY
(1)                                                                  ;/REFRESH COULD HAVE
(1)                                                                  ;/INTERRUPTED US.
(1)  005176  032777  040000  174144          BIT     #BIT14,@IBD     ;/DID ATN SET THIS TIME?
(1)  005204  001002                          BNE     1$
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005206  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ATN FILED TO SET WHEN TCS SET.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
```

```
(3)  005210  000410                          BR      TST32           ;;
(1)  005212  042777  000001  174126  1$:     BIC     #BIT0,@IBS      ;/CLEAR TCS, SHOULD CLEAR ATN.
(1)  005220  032777  040000  174122          BIT     #BIT14,@IBD     ;/DID ATN CLEAR?
(3)  005226  001401                          BEQ     TST32           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005230  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/ATN FAILED TO CLEAR.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
667
668
(1)                                                                  ;/MACRO -SIGC-
(1)
(5)                                  ;;*****************************************************************
(4)                                  ;*TEST 32       *TEST THAT EOI SETS WHEN EOP SETS, ALSO TEST CLEAR
(4)                                  ;;*****************************************************************
(3)  005232  000004                  TST32:  SCOPE
(1)
(1)  005234  005077  174106                  CLR     @IBS            ;/CLEAR CSR.
(1)  005240  052777  000002  174100          BIS     #BIT1,@IBS      ;/SET EOP, SHOULD SET EOI.
(1)  005246  032777  100000  174074          BIT     #BIT15,@IBD     ;/DID EOI SET?
(1)  005254  001011                          BNE     1$              ;/YES - LETS TRY CLEARING IT.
(1)  005256  052777  000002  174062          BIS     #BIT1,@IBS      ;/SET EOP, MEMORY
(1)                                                                  ;/REFRESH COULD HAVE
(1)                                                                  ;/INTERRUPTED US.
(1)  005264  032777  100000  174056          BIT     #BIT15,@IBD     ;/DID EOI SET THIS TIME?
(1)  005272  001002                          BNE     1$
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005274  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/EOI FILED TO SET WHEN EOP SET.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
(3)  005276  000410                          BR      TST33           ;;
(1)  005300  042777  000002  174040  1$:     BIC     #BIT1,@IBS      ;/CLEAR EOP, SHOULD CLEAR EOI.
(1)  005306  032777  100000  174034          BIT     #BIT15,@IBD     ;/DID EOI CLEAR?
(3)  005314  001401                          BEQ     TST33           ;;
(2)

                                             ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(2)
(2)  005316  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
(1)                                                                  ;/EOI FAILED TO CLEAR.

                                             ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

(1)
```

```
669
670                                     ;;**********************************************************
(3)                                     ;*TEST 33        *TEST THAT RFD SET WHEN CSR CLEAR,CLEAR WHEN ACC SET
(3)                                     ;;**********************************************************
(2)  005320  000004                     TST33:  SCOPE
671
672  005322  005077  174020                    CLR     @IBS            ;CLEAR CSR.
673  005326  032777  002000  174014            BIT     #BIT10,@IBD     ;DID RFD SET?
674  005334  001002                            BNE     1$              ;YES CONTINUE.
675

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  005336  104002                        ERROR   2               ;/MODULE FAULT DETECTED:
676                                                                 ;RFD FAILED TO SET.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
678  005340  000410                        BR      TST34           ;;
679
680  005342  052777  000200  173776  1$:     BIS     #BIT7,@IBS      ;NOW SET ACC,RFD SHOULD CLEAR.
681  005350  032777  002000  173772          BIT     #BIT10,@IBD     ;DID IT CLEAR?
682  005356  001401                          BEQ     TST34           ;;
683

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
( )  005360  104002                        ERROR   2               ;/MODULE FAULT DETECTED:
684                                                                 ;RFD FAILED TO CLEAR.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
686
687
688                                     ;;**********************************************************
(3)                                     ;*TEST 34        *TEST THAT WE CAN GENERATE AN ER2
(3)                                     ;;**********************************************************
(2)  005362  000004                     TST34:  SCOPE
689
690  005364  005077  173756                    CLR     @IBS            ;CLEAR THE STATUS REG.
691  005370  052777  000041  173750            BIS     #BIT5.BIT0,@IBS ;SET TON; THIS SHOULD CAUSE AN
692                                                                     ;ERROR SENCE NO LISTENERS ARE ON
693  005376  105077  173746                    CLRB    @IBD            ;AND WE SENT DATA TO THE BUS.
694                                                                     ;BUS.
695  005402  032777  040000  173736            BIT     #BIT14,@IBS     ;DID ER2 SET?
696  005410  001001                            BNE     TST35           ;;
697

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  005412  104001                        ERROR   1               ;/MODULE FAULT DETECTED:
698                                                                 ;ER2 FAILED TO SET.
```

```
                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   700
   701                                  ;;*****************************************************************
   (3)                                  ;*TEST 35        *TEST THAT BUS INIT CLEARS ACC,TON,LON,REM,EIP,TCS
   (3)                                  ;;*****************************************************************
   (2)  005414  000004                  TST35:  SCOPE
   (1)  005416  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
   702
   703  005424  012777  000367  173714          MOV     #367,@IBS       ;SET ACC,TON,LON,REM,EOP, AND TCS.
   704  005432  000005                          RESET                   ;ISSUE SYS INIT.
   705  005434  105777  173706                  TSTB    @IBS            ;DID THEY ALL CLEAR?
   706  005440  001401                          BEQ     TST36           ;;
   707

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  005442  104001                          ERROR   1               ;/MODULE FAULT DETECTED:
   708                                                                  ;BUS INIT FAILED TO CLEAR CSR.
   709

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   711
   712                                  ;;*****************************************************************
   (3)                                  ;*TEST 36        *TEST IBC CLEARS ACC,TON,LON,REM AND EOP
   (3)                                  ;;*****************************************************************
   (2)  005444  000004                  TST36:  SCOPE
   (1)  005446  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
   713
   714  005454  012777  000266  173664          MOV     #266,@IBS       ;SET ACC,TONLON,REM, AND EOP.
   715  005462  052777  000010  173656          BIS     #BIT3,@IBS      ;SET IBC, THIS SHOULD CLEAR ABOVE BITS.
   716  005470  032777  000010  173650  1$:     BIT     #BIT3,@IBS      ;WAIT TILL IBS CLEARS
   717  005476  001374                          BNE     1$              ;
   718  005500  032777  000266  173640          BIT     #266,@IBS       ;DID THEY CLEAR?
   719  005506  001401                          BEQ     TST37           ;;
   720

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  005510  104001                          ERROR   1               ;/MODULE FAULT DETECTED:
   721                                                                  ;ACC,TON,LON,REM, AND/OR EOP
   722                                                                  ;FAILED TO CLEAR ON IBC

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   724
   725                                  ;;*****************************************************************
   (3)                                  ;*TEST 37        *TEST THAT BUS INIT INDIRECTLY CLEARS IBD
   (3)                                  ;;*****************************************************************
   (2)  005512  000004                  TST37:  SCOPE
   (1)  005514  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
   726
   727  005522  012777  000260  173616          MOV     #BIT7!BIT5.BIT4,@IBS ;SET ACC,TON, AND LON.
   728  005530  012777  000377  173612          MOV     #377,@IBD       ;LOAD IBD
```

```
   729  005536  000005                          RESET                   ;ISSUE SYS INIT.
   730  005540  105777  173604                  TSTB    @IBD            ;DID IT CLEAR?
   731  005544  001401                          BEQ     TST40           ;;
   732

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  005546  104002                          ERROR   2               ;/MODULE FAULT DETECTED:
   733                                                                  ;FAILED TO CLEAR LOW BYTE OF IBD ON
   734                                                                  ;SYSTEM INIT.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

   736
   737                                  .SBTTL
   738                                  .SBTTL          INTERRUPT TESTS
   739                                  .SBTTL
   740
   741                                  ;;*****************************************************************
   (3)                                  ;*TEST 40        *TEST THAT CMD CAN GENERATE AN INTERRUPT B
   (3)                                  ;;*****************************************************************
   (2)  005550  000004                  TST40:  SCOPE
   742
   743  005552  005077  173570                  CLR     @IBS            ;CLEAR THE CSR.
   744  005556  012777  000200  173622          MOV     #200,@PRC
   745  005564  012777  005622  173570          MOV     #1$,@VECTC      ;SET UP INTERRUPT VECTOR
   746  005572  052777  000101  173546          BIS     #BIT0!BIT6,@IBS ;SET TCS, SHOULD CAUSE
   747                                                                  ;/PR
   (1)  005600  012746  000000                  MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
   (1)  005604  012746  005612                  MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
   (1)  005610  000002                          RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
   (1)  005612                          64$:                            ;/IN STATUS REG.)
   748  005612  000240                          NOP                     ;CMD TO SET AND GIVE US AN
   749  005614  000240                          NOP                     ;INTERRUPT.
   750

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

   (1)
   (1)  005616  104001                          ERROR   1               ;/MODULE FAULT DETECTED:
   751                                                                  ;CMD FAILED TO GENERATE AN INTERRUPT.

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
   753  005620  000402                          BR      2$
   754  005622                          1$:
   (1)  005622  062706  000004                  ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
   755  005626  005077  173514          2$:     CLR     @IBS            ;CLEAR INTERRUPT
   756                                                                  ;/-RESV-
   (1)  005632  013777  001406  173522          MOV     PRC,@VECTC ;/RESTORE VECTOR FOR
   (1)  005640  012777  004700  173540          MOV     #4700,@PRC      ;/ILLEGAL INTRO.
   757
   758                                  ;;*****************************************************************
   (3)                                  ;*TEST 41        *TEST THAT TKR AND LNR CAN GENERATE INTERRUPTS
   (3)                                  ;;*****************************************************************
```

```
(2)  005646  000004                    TST41:  SCOPE
759  005650  012777  000200  173530            MOV     #200,@PRC
760  005656  012777  005742  173476            MOV     #1$,@VECTC      ;SET UP INTERRUPT VECTOR FOR TKR INTERRUPT
761  005664  012777  000060  173454            MOV     #BIT4!BIT5,@IBS ;SET TON AND LON
762  005672  052777  000100  173446            BIS     #BIT6,@IBS      ;ALLOW INTERRUPT
763                                                                     ;/PR
(1)  005700  012746  000000                    MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
(1)  005704  012746  005712                    MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  005710  000002                            RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  005712                            64$:                            ;/IN STATUS REG.)
764  005712  000240                            NOP
765  005714  000240                            NOP
766

                                               ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  005716  104001                            ERROR   1               ;/MODULE FAULT DETECTED:
767                                                                     ;FAILED TO GENERATE A TKR INTERRUPT.

                                               ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
769  005720  005077  173422                    CLR     @IBS            ;CLR CSR
770                                                                     ;/-RESV-
(1)  005724  013777  001406  173430            MOV     PRC,@VECTC ;/RESTORE VECTOR FOR
(1)  005732  012777  004700  173446            MOV     #4700,@PRC      ;/ILLEGAL INTRO.
771  005740  000443                            BR      TST42           ;;
772
773  005742                            1$:
(1)  005742  062706  000004                    ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
774                                                                     ;/-RESV-
(1)  005746  013777  001406  173406            MOV     PRC,@VECTC ;/RESTORE VECTOR FOR
(1)  005754  012777  004700  173424            MOV     #4700,@PRC      ;/ILLEGAL INTRO.
775  005762  012777  000200  173420            MOV     #200,@PRD
776  005770  012777  006024  173366            MOV     #2$,@VECTD      ;SET UP FOR LNR INTERRUPT.
777                                                                     ;/PR
(1)  005776  012746  000000                    MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
(1)  006002  012746  006010                    MOV     #65$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  006006  000002                            RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  006010                            65$:                            ;/IN STATUS REG.)
778  006010  105277  173334                    INCB    @IBD            ;SEND DATA - CLRS TKR SETS LNR
779                                                                     ;FOR INTERRUPT
780  006014  000240                            NOP
781  006016  000240                            NOP
782

                                               ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  006020  104001                            ERROR   1               ;/MODULE FAULT DETECTED:
783                                                                     ;FAILED TO GENERATE LNR INTERRUPT

                                               ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
785  006022  000402                            BR      3$
786
```

```
 787  006024                          2$:
 (1)  006024  062706  000004                ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
 788  006030  005077  173312          3$:   CLR     @IBS            ;CLEAR THE STATUS REG.
 789                                                                ;/-RESV-
 (1)  006034  013777  001410  173322        MOV     PRD,@VECTD ;/RESTORE VECTOR FOR
 (1)  006042  012777  004700  173340        MOV     #4700,@PRD      ;/ILLEGAL INTRO.
 790
 791                          ;;*****************************************************************
 (3)                          ;*TEST 42       *TEST THAT ER2 CAN GENERATE AN INTERRUPT
 (3)                          ;;*****************************************************************
 (2)  006050  000004          TST42:  SCOPE
 792
 793  006052  005077  173270          CLR     @IBS            ;START WITH CSR CLEAR
 794  006056  012777  000200  173316  MOV     #200,@PRA
 795  006064  012777  006142  173264  MOV     #1$,@VECTA      ;SET UP INTERRUPT VECTOR
 796                                                            ;/PR
 (1)  006072  012746  000200          MOV     #200,-(SP)      ;/SET CPU PRIORITY ON RETURN
 (1)  006076  012746  006104          MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
 (1)  006102  000002                  RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
 (1)  006104                  64$:                            ;/IN STATUS REG.)
 797  006104  052777  000140  173234  BIS     #BIT5!BIT6,@IBS ;SET TON - NO LISTNERS ON
 798  006112  105077  173232          CLRB    @IBD            ;BUS BUT DATA PUT ON
 799  006116  000240                  NOP                     ;BUS - THEREFORE AN INTERRUPT
 800  006120  000240                  NOP                     ;SHOULD BE POSTED.
 801                                                            ;/PR
 (1)  006122  012746  000000          MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
 (1)  006126  012746  006134          MOV     #65$,-(SP)      ;/SHOW RETURN ADDRESS
 (1)  006132  000002                  RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
 (1)  006134                  65$:                            ;/IN STATUS REG.)
 802  006134  000240                  NOP
 803
 804

                                      ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

 (1)
 (1)  006136  104001                  ERROR   1               ;/MODULE FAULT DETECTED:
 805                                                            ;FAILED TO INTERRUPT ON ERROR2

                                      ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 807  006140  000402                  BR      2$
 808  006142                  1$:
 (1)  006142  062706  000004          ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
 809  006146  005077  173174  2$:     CLR     @IBS            ;CLEAR CSR
 810                                                            ;/-RESV-
 (1)  006152  013777  001402  173176  MOV     PRA,@VECTA ;/RESTORE VECTOR FOR
 (1)  006160  012777  004700  173214  MOV     #4700,@PRA      ;/ILLEGAL INTRO.
 811
 812                                  .SBTTL
 813                                  .SBTTL  SECOND MODULE TESTS
 814                                  .SBTTL
 815
 816                          ;;*****************************************************************
 (3)                          ;*TEST 43       *TEST THAT MODULE PASSES 'BIAKI''
```

```
(3)                                     ;;*****************************************************************
(2)  006166  000004                     TST43:  SCOPE
817
827
828                                             ;*WARNING. THIS TEST IS DESIGNED TO BE EXERCISED WITH A
(1)                                             ;*SECOUND MODULE (IBV-11) WITH SWITCH 'ER1 INH'' SET.
(1)                                             ;*ADDRESS OF THE SECOUND MODULE IS IN LOCATION ''IBS2'' VECTOR
(1)                                             ;*ADDRESS IS IN LOCATION 'VECTA2''. THE SECOUND IBV-11 SHOULD BE ELECTRICALLY SEC
(1)                                             ;*TO INHIBIT THE USE OF TESTING WITH A SECOUND MODULE, MAKE
(1)                                             ;*LOCATION ''$CDW1'' ZERO.
(1)                                             ;*
829
830  006170  005737  001254                    TST     $CDW1           ;TESTING WITH
831  006174  001002                            BNE     3$              ;SECOUND IBV11?
832  006176  000137  007000                    JMP     EOP             ;NO-END PASS.
833  006202                          3$:
834
835  006202  005077  173140                    CLR     @IBS            ;CLEAR CSR.
836  006206  005077  173154                    CLR     @IBS2           ;CLEAR SECOUND MODULE.
837  006212  012777  000200  173176            MOV     #200,@PRC2
838  006220  012777  006256  173150            MOV     #1$,@VECTC2     ;SET UP VECTOR ADDR.
839                                                                     ;/PR
(1)  006226  012746  000000                    MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
(1)  006232  012746  006240                    MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  006236  000002                            RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  006240                          64$:                               ;/IN STATUS REG.)
840  006240  012777  000140  173120            MOV     #BIT6!BIT5,@IBS2 ;SET INTR ENABLE AND TON ON SECOUND
841  006246  000240                            NOP                     ;IBV - SHOULD CAUSE A TKR  INTERRUPT.
842  006250  000240                            NOP
843

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  006252  104001                            ERROR   1               ;/MODULE FAULT DETECTED:
844                                                                     ;ASSUMING SECOUND MODULE IS GOOD,
845                                                                     ;MODULE (IBV-11) UNDER TEST FAILED
846                                                                     ;TO PASS Q BUSS SIGNAL 'BTAKI''

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
848  006254  000402                            BR      2$
849  006256                          1$:
(1)  006256  062706  000004                    ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
850  006262  005077  173100            2$:     CLR     @IBS2           ;CLEAR SECOUND MODULE
851                                                                     ;/-RESV-
(1)  006266  013777  001416  173102            MOV     PRC2,@VECTC2 ;/RESTORE VECTOR FOR
(1)  006274  012777  004700  173114            MOV     #4700,@PRC2     ;/ILLEGAL INTRO.
852
853                                     ;;*****************************************************************
(3)                                     ;*TEST 44        *TEST THAT SRQ CAN GENERATE AN INTERRUPT
(3)                                     ;;*****************************************************************
(2)  006302  000004                     TST44:  SCOPE
854                                             ;*WARNING! THIS TEST IS DESIGNED TO BE EXERCISED WITH A
(1)                                             ;*SECOUND MODULE (IBV-11) WITH SWITCH 'ER1 INH'' SET.
```

```
(1)                                     ;*ADDRESS OF THE SECOUND MODULE IS IN LOCATION ''IBS2'' VECTOR
(1)                                     ;*ADDRESS IS IN LOCATION 'VECTA2'. THE SECOUND IBV-11 SHOULD BE ELECTRICALLY SEC
(1)                                     ;*TO INHIBIT THE USE OF TESTING WITH A SECOUND MODULE, MAKE
(1)                                     ;*LOCATION '$CDW1'' ZERO.
(1)                                     ;*
855
856  006304  005077  173036            CLR     @IBS            ;CLEAR CSRS.
857  006310  005077  173052            CLR     @IBS2
858
859  006314  012777  000200  173062    MOV     #200,@PRB       ;SET UP INTERRUPT VECTOR.
860  006322  012777  006366  173030    MOV     #1$,@VECTB
861                                             ;/PR
(1)  006330  012746  000000            MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
(1)  006334  012746  006342            MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  006340  000002                    RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  006342                        64$:                        ;/IN STATUS REG.)
862  006342  012777  000100  172776    MOV     #100,@IBS       ;ENABLE INTERRUPTS
863  006350  052777  100000  173010    BIS     #BIT15,@IBS2    ;SETTING SRQ IN THE ''CDW'' MODULE
864                                             ;WILL PUT SRQ ON THE IB BUS
865                                             ;IS ER1 INH SW IS SET.
866  006356  000240                    NOP
867  006360  000240                    NOP
868

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  006362  104001                    ERROR   1               ;/MODULE FAULT DETECTED:
869                                             ;SRQ FAILED TO GENERATE
870                                             ;AN INTERRUPT

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
872  006364  000402                    BR      2$
873
874  006366                        1$:
(1)  006366  062706  000004            ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
875
876  006372                        2$:
(1)                                             ;/-RESV-
(1)  006372  013777  001404  172760    MOV     PRB,@VECTB ;/RESTORE VECTOR FOR
(1)  006400  012777  004700  172776    MOV     #4700,@PRB      ;/ILLEGAL INTRO.
877  006406  005077  172734            CLR     @IBS            ;CLEAR CSRS
878  006412  005077  172750            CLR     @IBS2
879
880                                     ;;*********************************************************************
(3)                                     ;*TEST 45        *TEST THAT ERROR1 IS GENERATED IF ATN IS ON THE IB BUS
(3)                                     ;;*********************************************************************
(2)  006416  000004                    TST45:  SCOPE
881
882                                     ;*WARNING! THIS TEST IS DESIGNED TO BE EXERCISED WITH A
(1)                                     ;*SECOUND MODULE (IBV-11) WITH SWITCH 'ER1 INH'' SET.
(1)                                     ;*ADDRESS OF THE SECOUND MODULE IS IN LOCATION ''IBS2'' VECTOR
(1)                                     ;*ADDRESS IS IN LOCATION 'VECTA2''. THE SECO    IBV-11 SHOULD BE ELECTRICALLY SEC
(1)                                     ;*TO INHIBIT THE USE OF TESTING WITH A SECOU... MODULE, MAKE
```

```
(1)                                     ;*LOCATION '$CDW1'' ZERO.
(1)                                     ;*
883
884  006420  005077  172742            CLR     @IBS2           ;CLR CSR OF 2ND MODULE.
885  006424  005277  172736            INC     @IBS2           ;ASSERT ATN ON IB BUS
886                                                             ;ASSERTED ATN ON IBV UNDER TEST-
887                                                             ;THIS SHOULD CAUSE AN ERROR 1
888                                                             ;SENCE THE 2ND IBV HAS ATN SET.
889  006430  032777  020000  172710    BIT     #BIT13,@IBS     ;DID ERROR 1 SET?
890  006436  001001                    BNE     TST46           ;;
891

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  006440  104001                    ERROR   1               ;/MODULE FAULT DETECTED:
892                                                             ;FAILED TO GENERATE ERROR 1

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

894
895                                 ;;******************************************************************
(3)                                 ;*TEST 46        *TEST THAT ERROR 1 IS GENERATED IF IFC IS PUT ON IB BUS BY SECOUND MODUL
(3)                                 ;;******************************************************************
(2)  006442  000004                 TST46:  SCOPE
(1)  006444  012737  000005  001160        MOV     #5,$TIMES       ;;DO 5 ITERATIONS
896                                         ;*WARNING! THIS TEST IS DESIGNED TO BE EXERCISED WITH A
(1)                                         ;*SECOUND MODULE (IBV-11) WITH SWITCH ''ER1 INH'' SET.
(1)                                         ;*ADDRESS OF THE SECOUND MODULE IS IN LOCATION ''IBS2'' VECTOR
(1)                                         ;*ADDRESS IS IN LOCATION 'VECTA2''. THE SECOUND IBV-11 SHOULD BE ELECTRICALLY SEC
(1)                                         ;*TO INHIBIT THE USE OF TESTING WITH A SECOUND MODULE, MAKE
(1)                                         ;*LOCATION '$CDW1'' ZERO.
(1)                                         ;*
897  006452  005077  172670            CLR     @IBS            ;CLEAR CSR
898  006456  012777  000010  172702    MOV     #BIT3,@IBS2     ;ASSERT IFC FROM TESTOR
899  006464  032777  020000  172654    BIT     #BIT13,@IBS     ;DID ERROR 1 GET SET?
900                                                             ;IF SO - NEXT TEST
901  006472  001010                    BNE     TST47           ;;
902  006474  012777  000010  172664    MOV     #BIT3,@IBS2     ;IF NOT WE'LL TRY AGAIN SENCE MEMORY
903  006502  032777  020000  172636    BIT     #BIT13,@IBS     ;REFRESH COULD HAVE GO IN THE WAY.
904  006510  001001                    BNE     TST47           ;;
905

                                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  006512  104001                    ERROR   1               ;/MODULE FAULT DETECTED:
906                                                             ;ERROR 1 FAILED TO SET WHEN
907                                                             ;IFC WAS ON IB-BUS AND MODULE
908                                                             ;UNDER TEST DIDN'T PUT IT THERE.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

910
911                                 ;;******************************************************************
(3)                                 ;*TEST 47        *TEST THAT ERROR 1 IS GENERATED IF REN IS ON IB BUS
```

```
(3)                                 ;;*****************************************************************
(2)  006514  000004                 TST47:  SCOPE
912
913                                         ;*WARNING! THIS TEST IS DESIGNED TO BE EXERCISED WITH A
(1)                                         ;*SECOUND MODULE (IBV-11) WITH SWITCH 'ER1 INH'' SET.
(1)                                         ;*ADDRESS OF THE SECOUND MODULE IS IN LOCATION ''IBS2'' VECTOR
(1)                                         ;*ADDRESS IS IN LOCATION 'VECTA2'. THE SECOUND IBV-11 SHOULD BE ELECTRICALLY SEC
(1)                                         ;*TO INHIBIT THE USE OF TESTING WITH A SECOUND MODULE, MAKE
(1)                                         ;*LOCATION '$CDW1'' ZERO.
(1)                                         ;*
914
915  006516  005077  172624                CLR     @IBS            ;CLEAR CSRS.
916  006522  005077  172640                CLR     @IBS2
917  006526  052777  000004  172632        BIS     #BIT2,@IBS2     ;ASSERT REN ON IB BUS FROM 2ND
918                                                                 ;MODULE. 1ST IBV-11 SHOULD
919  006534  032777  020000  172604        BIT     #BIT13,@IBS     ;GENERATE AN ERROR 1;DID IT??
920  006542  001001                        BNE     TST50           ;;
921

                                    ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)  006544  104001                        ERROR   1               ;/MODULE FAULT DETECTED:
922                                                                 ;FAILED TO GENERATE AN ERROR 1.

                                    ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$

924
925                                 ;;*****************************************************************
(3)                                 ;*TEST 50        *TEST THAT AN ERROR 1 CAN GENERATE AN INTERRUPT
(3)                                 ;;*****************************************************************
(2)  006546  000004                 TST50:  SCOPE
926
927                                         ;*WARNING! THIS TEST IS DESIGNED TO BE EXERCISED WITH A
(1)                                         ;*SECOUND MODULE (IBV-11) WITH SWITCH 'ER1 INH'' SET.
(1)                                         ;*ADDRESS OF THE SECOUND MODULE IS IN LOCATION ''IBS2'' VECTOR
(1)                                         ;*ADDRESS IS IN LOCATION 'VECTA2'. THE SECOUND IBV-11 SHOULD BE ELECTRICALLY SEC
(1)                                         ;*TO INHIBIT THE USE OF TESTING WITH A SECOUND MODULE, MAKE
(1)                                         ;*LOCATION '$CDW1'' ZERO.
(1)                                         ;*
928
929  006550  005077  172612                CLR     @IBS2           ;CLEAR CSRS.
930  006554  005077  172566                CLR     @IBS
931
932  006560  012777  000200  172614        MOV     #200,@PRA
933  006566  012777  006632  172562        MOV     #1$,@VECTA      ;SET UP VECTOR ADDR.
934
935  006574  052777  000100  172544        BIS     #BIT06,@IBS     ;SET INTERRUPT ENABLE
936                                                                 ;/PR
(1)  006602  012746  000000                MOV     #0,-(SP)        ;/SET CPU PRIORITY ON RETURN
(1)  006606  012746  006614                MOV     #64$,-(SP)      ;/SHOW RETURN ADDRESS
(1)  006612  000002                        RTI                     ;/CAUSE A RETURN (PUTS NEW STATUS
(1)  006614                         64$:                           ;/IN STATUS REG.)
937  006614  052777  000004  172544        BIS     #BIT2,@IBS2     ;GENERATE AN ERROR 1 AS PER LAST TEST.
938  006622  000240                        NOP
```

```
                        NOP

                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)                     ERROR   1               ;/MODULE FAULT DETECTED:
                                                ;ERROR 1 FAILED TO GENERATE AN INTR.

                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
                        BR      2$
1$:
                        ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
2$:
                                                ;/-RESV-
                        MOV     PRA,@VECTA ;/RESTORE VECTOR FOR
                        MOV     #4700,@PRA      ;/ILLEGAL INTRO.
                        CLR     @IBS2           ;CLEAR CSRS.
                        CLR     @IBS

;;**************************************************************************
;*TEST 51        *TEST THAT DATA CAN BE XFERRED BETWEEN THE MODULE UNDER TEST AND THE KGM
                ;*      NOTE: KGM =KNOWN GOOD MODULE
                ;*IN THIS TEST WE'LL MAKE THE KGM A LISTENER
                ;* AND THE MODULE UNDER TEST A TALKER.
                ;*WE'VE ALREADY XFERRED DATA TO AND FROM THE IB-BUS
                ;*VIA THE MODULE UNDER TEST. THE ONLY UNKNOWN
                ;*IS THE CABLE CONNECTING THE KGM TO THE MODULE UNDER TEST,
                ;*AS WELL AS THE KGM.
                ;*
;;**************************************************************************
TST51:  SCOPE

1$:     CLR     @IBS            ;CLEAR CSRS.
        CLR     @IBS2
        BIS     #BIT5!BIT0,@IBS ;SET TON AND TCS.
        BIS     #BIT4,@IBS2     ;SET LON ON KGM.
        MOV     $GDDAT,@IBD     ;SEND PATTERN.
        MOVB    @IBD2,$BDDAT    ;READ ATA FROM KGM.
        CMPB    $GDDAT,$BDDAT   ;DATA SENT = DATA RECEIVED?
        BEQ     2$              ;YES, CONTINUE

                        ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

(1)
(1)                     ERROR   4               ;/MODULE FAULT DETECTED:
                                                ;ERROR - BAD DATA PASSED BETWEEN
```

```
                                                        ;MODULE UNDER TEST AND KGM.

                                        ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 979  006756  000407                    BR      TST52           ;;
 980
 981  006760  105237  001124    2$:     INCB    $GDDAT          ;CHANGE PATTERN.
 982  006764  001347                    BNE     1$              ;IF NOT DONE, CONTINUE.
 983
 984  006766  005077  172354            CLR     @IBS            ;CLEAR CSR'S
 985  006772  005077  172370            CLR     @IBS2
 986
 987                            ;;*****************************************************************
 (3)                            ;*TEST 52       *TEMP END OF TESTS
 (3)                            ;;*****************************************************************
 (2)  006776  000004            TST52:  SCOPE
 988
 989  007000                    EOP:
 990
 991                                    .SBTTL  SYSMAC ROUTINES:
 992
 993                            .SBTTL  END OF PASS ROUTINE
 (1)
 (2)                            ;;*****************************************************************
 (1)                            ;*INCREMENT THE PASS NUMBER ($PASS)
 (1)                            ;*TYPE 'END PASS #XXXXX'' (WHERE XXXXX IS A DECIMAL NUMBER)
 (1)                            ;*IF THERES A MONITOR GO TO IT
 (1)                            ;*IF THERE ISN'T JUMP TO RSTART
 (1)
 (1)  007000                    $EOP:
 (1)  007000  000004                    SCOPE
 (1)  007002  005037  001102            CLR     $TSTNM          ;;ZERO THE TEST NUMBER
 (1)  007006  005037  001160            CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
 (1)  007012  005237  001202            INC     $PASS           ;;INCREMENT THE PASS NUMBER
 (1)  007016  042737  100000  001202    BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
 (1)  007024  005327                    DEC     (PC)+           ;;LOOP?
 (1)  007026  000001            $EOPCT: .WORD   1
 (1)  007030  003022                    BGT     $DOAGN          ;;YES
 (1)  007032  012737                    MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
 (1)  007034  000001            $ENDCT: .WORD   1
 (1)  007036  007026                    $EOPCT
 (1)  007040  104401  007105            TYPE    ,$ENDMG         ;;TYPE 'END PASS #''
 (2)  007044  013746  001202            MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
 (2)  007050  104405                    TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
 (1)  007052  104401  007102            TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
 (1)  007056  013700  000042    $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
 (1)  007062  001405                    BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
 (1)  007064  000005                    RESET                   ;;CLEAR THE WORLD
 (1)  007066  004710            $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
 (1)  007070  000240                    NOP                     ;;SAVE ROOM
 (1)  007072  000240                    NOP                     ;;FOR
 (1)  007074  000240                    NOP                     ;;ACT11
 (1)  007076                    $DOAGN:
 (1)  007076  000137                    JMP     @(PC)+          ;;RETURN
 (1)  007100  002266            $RTNAD: .WORD   RSTART
```

```
(1)  007102  000377  000377  000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
(1)  007105  000015  042412  042116 $ENDMG: .ASCIZ  <15><12>/END PASS #/
(1)  007112  050040  051501  020123
(1)  007120  000043
994
(1)                                                               ;/DELMA
(1)
(1)                                                             ;/ROUTINE TO PROVIDE DELAYS IN INCREMENTS OF 25 US
(1)                                                             ./
(1)                                                             :/ CALL=        JSR     R5,DEL50
(1)                                                             :/              .WORD   X       (# OF 25 US TO DELAY)
(1)                                                             :/              ;RETURNS HERE
(1)                                                             :/
(1)
(1)  007122  012500                  DEL50:  MOV     (5)+,R0          ;/GET # OF 25 US DELAYS
(1)  007124  012701  000002          1$:     MOV     #2.,R1           ;/# FOR LOOP TO DO 50 US.
(1)  007130  005301                  2$:     DEC     R1               ;/DEC IT
(1)  007132  001376                          BNE     2$               ;/WAITED 25. TIMES?
(1)  007134  005300                          DEC     R0               ;/DONE # OF 50 US DELAY DESIRED?
(1)  007136  001372                          BNE     1$               ;/NO - NEXT ONE.
(1)  007140  000205                          RTS     R5               ;/YES - EXIT.
(1)
995                                 .SBTTL  ERROR HANDLER ROUTINE
(1)
(2)                                 ;;**********************************************************************
(1)                                 ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
(1)                                 ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
(1)                                 ;*AND GO TO $ERRTYP ON ERROR
(1)                                 ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
(1)                                 ;*SW15=1        HALT ON ERROR
(1)                                 ;*SW13=1        INHIBIT ERROR TYPEOUTS
(1)                                 ;*SW10=1        BELL ON ERROR
(1)                                 ;*SW09=1        LOOP ON ERROR
(1)                                 ;*CALL
(1)                                 ;*      ERROR   N       ;;ERROR EMT AND N=ERROR ITEM NUMBER
(1)
(1)  007142                         $ERROR:
(1)  007142  104407                          CKSWR                    ;;TEST FOR CHANGE IN SOFT-SWR
(1)  007144  105237  001103          7$:     INCB    $ERFLG           ;;SET THE ERROR FLAG
(1)  007150  001775                          BEQ     7$               ;;DON'T LET THE FLAG GO TO ZERO
(1)  007152  013777  001102  171762          MOV     $TSTNM,@DISPLAY  ;;DISPLAY TEST NUMBER AND ERROR FLAG
(1)  007160  032777  002000  171752          BIT     #BIT10,@SWR      ;;BELL ON ERROR?
(1)  007166  001402                          BEQ     1$               ;;NO - SKIP
(1)  007170  104401  001164                  TYPE    ,$BELL           ;;RING BELL
(1)  007174  005237  001112          1$:     INC     $ERTTL           ;;COUNT THE NUMBER OF ERRORS
(1)  007200  011637  001116                  MOV     (SP),$ERRPC      ;;GET ADDRESS OF ERROR INSTRUCTION
(1)  007204  162737  000002  001116          SUB     #2,$ERRPC
(1)  007212  117737  171700  001114          MOVB    @$ERRPC,$ITEMB   ;;STRIP AND SAVE THE ERROR ITEM CODE
(1)  007220  032777  020000  171712          BIT     #BIT13,@SWR      ;;SKIP TYPEOUT IF SET
(1)  007226  001004                          BNE     20$              ;;SKIP TYPEOUTS
(1)  007230  004737  007330                  JSR     PC,$ERRTYP       ;;GO TO USER ERROR ROUTINE
(1)  007234  104401  001171                  TYPE    ,$CRLF
(1)  007240                         20$:
(1)  007240  122737  000001  001214          CMPB    #APTENV,$ENV     ;;RUNNING IN APT MODE
(1)  007246  001007                          BNE     2$               ;;NO,SKIP APT ERROR REPORT
```

```
(1)  007250  113737  001114  007262          MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
(1)  007256  004737  011474                  JSR     PC,$AT 4        ;;REPORT FATAL ERROR TO APT
(1)  007262     000                  21$:    .BYTE   0
(1)  007263     000                          .BYTE   0
(1)  007264  000777                  22$:    BR      22$             ;;APT ERROR LOOP
(1)  007266  005777  171646          2$:     TST     @SWR            ;;HALT ON ERROR
(1)  007272  100002                          BPL     3$              ;;SKIP IF CONTINUE
(1)  007274  000000                          HALT                    ;;HALT ON ERROR!
(1)  007276  104407                          CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
(1)  007300  032777  001000  171632  3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
(1)  007306  001402                          BEQ     4$              ;;BR IF NO
(1)  007310  013716  001110                  MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
(1)  007314  005737  001162          4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
(1)  007320  001402                          BEQ     5$              ;;BR IF NONE
(1)  007322  013716  001162                  MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
(1)  007326                          5$:
(1)  007326  000002                          RTI                     ;;RETURN
996                                  .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE
(1)
(2)                                  ;;**************************************************************************
(1)                                  ;*THIS ROUTINE USES THE ''ITEM CONTROL BYTE'' ($ITEMB) TO DETERMINE WHICH
(1)                                  ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE 'ERROR TABLE'' ($ERRTB),
(1)                                  ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.
(1)
(1)  007330                          $ERRTYP:
(1)  007330  104401  001171                  TYPE    ,$CRLF          ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  007334  010046                          MOV     R0,-(SP)        ;;SAVE R0
(1)  007336  005000                          CLR     R0              ;;PICKUP THE ITEM INDEX
(1)  007340  153700  001114                  BISB    @#$ITEMB,R0
(1)  007344  001004                          BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
(1)                                                                  ;;TYPE THE PC OF THE ERROR
(2)  007346  013746  001116                  MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
(2)                                                                  ;;ERROR ADDRESS
(2)  007352  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  007354  000426                          BR      6$              ;;GET OUT
(1)  007356  005300                  1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
(1)  007360  006300                          ASL     R0              ;;      WORK FOR THE ERROR TABLE
(1)  007362  006300                          ASL     R0
(1)  007364  006300                          ASL     R0
(1)  007366  062700  001256                  ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
(1)  007372  012037  007402                  MOV     (R0)+,2$        ;;PICKUP ''ERROR MESSAGE'' POINTER
(1)  007376  001404                          BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
(1)  007400  104401                          TYPE                    ;;TYPE THE ''ERROR MESSAGE''
(1)  007402  000000                  2$:     .WORD   0               ;;''ERROR MESSAGE'' POINTER GOES HERE
(1)  007404  104401  001171                  TYPE    ,$CRLF          ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  007410  012037  007420          3$:     MOV     (R0)+,4$        ;;PICKUP ''DATA HEADER'' POINTER
(1)  007414  001404                          BEQ     5$              ;;SKIP TYPEOUT IF 0
(1)  007416  104401                          TYPE                    ;;TYPE THE ''DATA HEADER''
(1)  007420  000000                  4$:     .WORD   0               ;;''DATA HEADER'' POINTER GOES HERE
(1)  007422  104401  001171                  TYPE    ,$CRLF          ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  007426  011000                  5$:     MOV     (R0),R0         ;;PICKUP ''DATA TABLE'' POINTER
(1)  007430  001004                          BNE     7$              ;;GO TYPE THE DATA
(1)  007432  012600                  6$:     MOV     (SP)+,R0        ;;RESTORE R0
(1)  007434  104401  001171                  TYPE    ,$CRLF          ;;''CARRIAGE RETURN'' & 'LINE FEED''
```

```
(1)  007440  000207                          RTS     PC              ;;RETURN
(2)  007442                           7$:
(2)  007442  013046                          MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
(2)  007444  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  007446  005710                          TST     (R0)            ;;IS THERE ANOTHER NUMBER?
(1)  007450  001770                          BEQ     6$              ;;BR IF NO
(1)  007452  104401  007460                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
(1)  007456  000771                          BR      7$              ;;LOOP
(1)  007460  020040     000          8$:     .ASCIZ  /  /            ;;TWO(2) SPACES
(1)          007464                          .EVEN
997                                   .SBTTL  SCOPE HANDLER ROUTINE
(1)
(2)                                   ;;**********************************************************************
(1)                                   ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
(1)                                   ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
(1)                                   ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
(1)                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
(1)                                   ;*SW14=1        LOOP ON TEST
(1)                                   ;*SW11=1        INHIBIT ITERATIONS
(1)                                   ;*SW09=1        LOOP ON ERROR
(1)                                   ;*SW08=1        LOOP ON TEST IN SWR<7:0>
(1)                                   ;*CALL
(1)                                   ;*      SCOPE           ;;SCOPE=IOT
(1)
(1)  007464                           $SCOPE:
(1)  007464  104407                          CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
(2)  007466  104407                          CKSWR
(1)  007470  032777  040000  171442   1$:     BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
(1)  007476  001114                          BNE     $OVER           ;;YES IF SW14=1
(1)                                   ;#####START OF CODE FOR THE XOR TESTER#####
(1)  007500  000416                   $XTSTR: BR      6$              ;;IF RUNNING ON THE ''XOR'' TESTER CHANGE
(1)                                                                   ;;THIS INSTRUCTION TO A ''NOP'' (NOP=240)
(1)  007502  013746  000004                  MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
(1)  007506  012737  007526  000004          MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
(1)  007514  005737  177060                  TST     @#177060        ;;TIME OUT ON XOR?
(1)  007520  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
(1)  007524  000463                          BR      $SVLAD          ;;GO TO THE NEXT TEST
(1)  007526  022626                   5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
(1)  007530  012637  000004                  MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
(1)  007534  000423                          BR      7$              ;;LOOP ON THE PRESENT TEST
(1)  007536                           6$:;#####END OF CODE FOR THE XOR TESTER#####
(1)  007536  032777  000400  171374          BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
(1)  007544  001404                          BEQ     2$              ;;BR IF NO
(1)  007546  127737  171366  001102          CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
(1)  007554  001465                          BEQ     $OVER           ;;BR IF YES
(1)  007556  105737  001103           2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
(1)  007562  001421                          BEQ     3$              ;;BR IF NO
(1)  007564  123737  001115  001103          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
(1)  007572  101015                          BHI     3$              ;;BR IF NO
(1)  007574  032777  001000  171336          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
(1)  007602  001404                          BEQ     4$              ;;BR IF NO
(1)  007604  013737  001110  001106   7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
(1)  007612  000446                          BR      $OVER
(1)  007614  105037  001103           4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
```

```
(1)  007620  005037  001160                    CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
(1)  007624  000415                            BR      1$              ;;ESCAPE TO THE NEXT TEST
(1)  007626  032777  004000  171304  3$:      BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
(1)  007634  001011                            BNE     1$              ;;BR IF YES
(1)  007636  005737  001202                    TST     $PASS           ;;IF FIRST PASS OF PROGRAM
(1)  007642  001406                            BEQ     1$              ;;      INHIBIT ITERATIONS
(1)  007644  005237  001104                    INC     $ICNT           ;;INCREMENT ITERATION COUNT
(1)  007650  023737  001160  001104            CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
(1)  007656  002024                            BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
(1)  007660  012737  000001  001104  1$:       MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
(1)  007666  013737  007744  001160            MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
(1)  007674  105237  001102            $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
(1)  007700  113737  001102  001200            MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
(1)  007706  011637  001106                    MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
(1)  007712  011637  001110                    MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
(1)  007716  005037  001162                    CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
(1)  007722  112737  000001  001115            MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
(1)  007730  013777  001102  171204  $OVER:   MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
(1)  007736  013716  001106                    MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
(1)  007742  000002                            RTI                     ;;FIXES PS
(1)  007744  003720                    $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
 998                                           .SBTTL  TTY INPUT ROUTINE
(1)
(2)                                            ;;**************************************************************************
(1)                                            .ENABL  LSB
(1)
(2)                                            ;;**************************************************************************
(1)                                            ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
(1)                                            ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
(1)                                            ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CAL'
(1)                                            ;*WHEN OPERATING IN TTY FLAG MODE.
(1)  007746  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
(1)  007754  001074                            BNE     15$             ;;BRANCH IF NO
(1)  007756  105777  171162                    TSTB    @$TKS           ;;CHAR THERE?
(1)  007762  100071                            BPL     15$             ;;IF NO, DON'T WAIT AROUND
(1)  007764  117746  171156                    MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
(1)  007770  042716  177600                    BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
(1)  007774  022726  000007                    CMP     #7,(SP)+        ;;IS IT A CONTROL G?
(1)  010000  001062                            BNE     15$             ;;NO, RETURN TO USER
(1)  010002  123727  001134  000001            CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
(1)  010010  001456                            BEQ     15$             ;;BRANCH IF YES
(1)
(1)  010012  104401  010473                    TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
(1)  010016  104401  010500            $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
(2)  010022  013746  000176                    MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
(2)  010026  104402                            TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  010030  104401  010511                    TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
(1)  010034  005046                    19$:    CLR     -(SP)           ;;CLEAR COUNTER
(1)  010036  005046                            CLR     -(SP)           ;;THE NEW SWR
(1)  010040  105777  171100            7$:     TSTB    @$TKS           ;;CHAR THERE?
(1)  010044  100375                            BPL     7$              ;;IF NOT TRY AGAIN
(1)
(1)  010046  117746  171074                    MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
(1)  010052  042716  177600                    BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
```

```
(1)
(1)
(1)
(1)  010056  021627  000025          9$:   CMP   (SP),#25        ;;IS IT A CONTROL-U?
(1)  010062  001005                       BNE   10$              ;;BRANCH IF NOT
(1)  010064  104401  010466               TYPE  ,$CNTLU          ;;YES, ECHO CONTROL-U (^U)
(1)  010070  062706  000006         20$:  ADD   #6,SP            ;;IGNORE PREVIOUS INPUT
(1)  010074  000757                       BR    19$              ;;LET'S TRY IT AGAIN
(1)
(1)
(1)  010076  021627  000015         10$:  CMP   (SP),#15         ;;IS IT A <CR>?
(1)  010102  001022                       BNE   16$              ;;BRANCH IF NO
(1)  010104  005766  000004               TST   4(SP)            ;;YES, IS IT THE FIRST CHAR?
(1)  010110  001403                       BEQ   11$              ;;BRANCH IF YES
(1)  010112  016677  000002  171020       MOV   2(SP),@SWR       ;;SAVE NEW SWR
(1)  010120  062706  000006         11$:  ADD   #6,SP            ;;CLEAR UP STACK
(1)  010124  104401  001171         14$:  TYPE  ,$CRLF           ;;ECHO <CR> AND <LF>
(1)  010130  123727  001135  000001       CMPB  $INTAG,#1        ;;RE-ENABLE TTY KBD INTERRUPTS?
(1)  010136  001003                       BNE   15$              ;;BRANCH IF NOT
(1)  010140  012777  000100  170776       MOV   #100,@$TKS       ;;RE-ENABLE TTY KBD INTERRUPTS
(1)  010146  000002                 15$:  RTI                    ;;RETURN
(1)  010150  004737  011406         16$:  JSR   PC,$TYPEC        ;;ECHO CHAR
(1)  010154  021627  000060               CMP   (SP),#60         ;;CHAR < 0?
(1)  010160  002420                       BLT   18$              ;;BRANCH IF YES
(1)  010162  021627  000067               CMP   (SP),#67         ;;CHAR > 7?
(1)  010166  003015                       BGT   18$              ;;BRANCH IF YES
(1)  010170  042726  000060               BIC   #60,(SP)+        ;;STRIP-OFF ASCII
(1)  010174  005766  000002               TST   2(SP)            ;;IS THIS THE FIRST CHAR
(1)  010200  001403                       BEQ   17$              ;;BRANCH IF YES
(1)  010202  006316                       ASL   (SP)             ;;NO, SHIFT PRESENT
(1)  010204  006316                       ASL   (SP)             ;;    CHAR OVER TO MAKE
(1)  010206  006316                       ASL   (SP)             ;;    ROOM FOR NEW ONE.
(1)  010210  005266  000002         17$:  INC   2(SP)            ;;KEEP COUNT OF CHAR
(1)  010214  056616  177776               BIS   -2(SP),(SP)      ;;SET IN NEW CHAR
(1)  010220  000707                       BR    7$               ;;GET THE NEXT ONE
(1)  010222  104401  001170         18$:  TYPE  ,$QUES           ;;TYPE ?<CR><LF>
(1)  010226  000720                       BR    20$              ;;SIMULATE CONTROL-U
(1)                                 .DSABL  LSB
(1)
(1)
(2)                                 ;;*****************************************************************
(1)                                 ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
(1)                                 ;*CALL:
(1)                                 ;*      RDCHR                  ;;INPUT A SINGLE CHARACTER FROM THE TTY
(1)                                 ;*      RETURN HERE            ;;CHARACTER IS ON THE STACK
(1)                                 ;*                             ;;WITH PARITY BIT STRIPPED OFF
(1)                                 ;
(1)
(1)  010230  011646         $RDCHR: MOV   (SP),-(SP)       ;;PUSH DOWN THE PC
(1)  010232  016666  000004  000002       MOV   4(SP),2(SP)      ;;SAVE THE PS
(1)  010240  105777  170700         1$:   TSTB  @$TKS            ;;WAIT FOR
(1)  010244  100375                       BPL   1$               ;;A CHARACTER
(1)  010246  117766  170674  000004       MOVB  @$TKB,4(SP)      ;;READ THE TTY
(1)  010254  042766  177600  000004       BIC   #^C<177>,4(SP)   ;;GET RID OF JUNK IF ANY
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(1)  010262  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
(1)  010270  001013                          BNE     3$              ;;BRANCH IF NO
(1)  010272  105777  170646          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
(1)  010276  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
(1)  010300  117746  170642                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
(1)  010304  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
(1)  010310  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
(1)  010314  001366                          BNE     2$              ;;IF NOT DISCARD IT
(1)  010316  000750                          BR      1$              ;;YES, RESUME
(1)  010320  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
(1)  010326  002407                          BLT     4$              ;;BRANCH IF YES
(1)  010330  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
(1)  010336  003003                          BGT     4$              ;;BRANCH IF YES
(1)  010340  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
(1)  010346  000002                  4$:     RTI                     ;;GO BACK TO USER
(2)                                        ;;**************************************************************
(1)                                        ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
(1)                                        ;*CALL:
(1)                                        ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
(1)                                        ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
(1)                                        ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
(1)
(1)  010350  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
(1)  010352  012703  010456          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
(1)  010356  022703  010466          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
(1)  010362  101405                          BLOS    4$              ;;BR IF YES
(1)  010364  104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
(1)  010366  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
(1)  010370  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
(1)  010374  001003                          BNE     3$              ;;SKIP IF NOT
(1)  010376  104401  001170          4$:     TYPE    ,$QUES          ;;TYPE A '?'
(1)  010402  000763                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
(1)  010404  111337  010454          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
(1)  010410  104401  010454                  TYPE    ,9$
(1)  010414  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
(1)  010420  001356                          BNE     2$              ;;LOOP IF NOT RETURN
(1)  010422  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
(1)  010426  104401  001172                  TYPE    ,$LF            ;;TYPE A LINE FEED
(1)  010432  012603                          MOV     (SP)+,R3        ;;RESTORE R3
(1)  010434  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
(1)  010436  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
(1)  010444  012766  010456  000004          MOV     #$TTYIN,4(SP)
(1)  010452  000002                          RTI                     ;;RETURN
(1)  010454     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
(1)  010455     000                          .BYTE   0               ;;TERMINATOR
(1)  010456  000010                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
(1)  010466  052536  005015     000  $CNTLU: .ASCIZ  /^U/<15><12>    ;;CONTROL 'U'
(1)  010473     136  006507  000012  $CNTLG: .ASCIZ  /^G/<15><12>    ;;CONTROL 'G'
(1)  010500  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
(1)  010506  020075     000
(1)  010511     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
(1)  010516  036440  000040
999                                        .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
(1)
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(2)                                     ;;*****************************************************************
(1)                                     ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
(1)                                     ;*OCTAL (ASCII) NUMBER AND TYPE IT.
(1)                                     ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
(1)                                     ;*CALL:
(1)                                     ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
(1)                                     ;*      TYPOS                   ;;CALL FOR TYPEOUT
(1)                                     ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
(1)                                     ;*      .BYTE   M               ;;M=1 OR 0
(1)                                     ;*                                      ;;1-TYPE LEADING ZEROS
(1)                                     ;*                                      ;;0=SUPPRESS LEADING ZEROS
(1)                                     ;*
(1)                                     ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
(1)                                     ;*$TYPOS OR $TYPOC
(1)                                     ;*CALL:
(1)                                     ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
(1)                                     ;*      TYPON                   ;;CALL FOR TYPEOUT
(1)                                     ;*
(1)                                     ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
(1)                                     ;*CALL:
(1)                                     ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
(1)                                     ;*      TYPOC                   ;;CALL FOR TYPEOUT
(1)
(1)  010522  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
(1)  010526  116637  000001  010745          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
(1)  010534  112637  010747                   MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
(1)  010540  062716  000002                   ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
(1)  010544  000406                           BR      $TYPON
(1)  010546  112737  000001  010745  $TYPOC:  MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
(1)  010554  112737  000006  010747          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
(1)  010562  112737  000005  010744  $TYPON:  MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
(1)  010570  010346                           MOV     R3,-(SP)        ;;SAVE R3
(1)  010572  010446                           MOV     R4,-(SP)        ;;SAVE R4
(1)  010574  010546                           MOV     R5,-(SP)        ;;SAVE R5
(1)  010576  113704  010747                   MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
(1)  010602  005404                           NEG     R4
(1)  010604  062704  000006                   ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
(1)  010610  110437  010746                   MOVB    R4,$OMODE       ;;SAVE IT FOR USE
(1)  010614  113704  010745                   MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
(1)  010620  016605  000012                   MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
(1)  010624  005003                           CLR     R3              ;;CLEAR THE OUTPUT WORD
(1)  010626  006105                   1$:     ROL     R5              ;;ROTATE MSB INTO "C"
(1)  010630  000404                           BR      3$              ;;GO DO MSB
(1)  010632  006105                   2$:     ROL     R5              ;;FORM THIS DIGIT
(1)  010634  006105                           ROL     R5
(1)  010636  006105                           ROL     R5
(1)  010640  010503                           MOV     R5,R3
(1)  010642  006103                   3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
(1)  010644  105337  010746                   DECB    $OMODE          ;;TYPE THIS DIGIT?
(1)  010650  100016                           BPL     7$              ;;BR IF NO
(1)  010652  042703  177770                   BIC     #177770,R3      ;;GET RID OF JUNK
(1)  010656  001002                           BNE     4$              ;;TEST FOR 0
(1)  010660  005704                           TST     R4              ;;SUPPRESS THIS 0?
(1)  010662  001403                           BEQ     5$              ;;BR IF YES
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(1)  010664  005204                    4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
(1)  010666  052703  000060                    BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
(1)  010672  052703  000040            5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
(1)  010676  110337  010742                    MOVB    R3,8$           ;;SAVE FOR TYPING
(1)  010702  104401  010742                    TYPE    ,8$             ;;GO TYPE THIS DIGIT
(1)  010706  105337  010744            7$:     DECB    $OCNT           ;;COUNT BY 1
(1)  010712  003347                            BGT     2$              ;;BR IF MORE TO DO
(1)  010714  002402                            BLT     6$              ;;BR IF DONE
(1)  010716  005204                            INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
(1)  010720  000744                            BR      2$              ;;GO DO THE LAST DIGIT
(1)  010722  012605                    6$:     MOV     (SP)+,R5        ;;RESTORE R5
(1)  010724  012604                            MOV     (SP)+,R4        ;;RESTORE R4
(1)  010726  012603                            MOV     (SP)+,R3        ;;RESTORE R3
(1)  010730  016666  000002  000004            MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
(1)  010736  012616                            MOV     (SP)+,(SP)
(1)  010740  000002                            RTI                     ;;RETURN
(1)  010742     000            8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
(1)  010743     000                    .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
(1)  010744     000            $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
(1)  010745     000            $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
(1)  010746  000000            $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
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 1001                                   .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
  (1)                                   ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
  (1)                                   ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
  (1)                                   ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
  (1)                                   ;*REPLACED WITH SPACES.
  (1)                                   ;*CALL:
  (1)                                   ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
  (1)                                   ;*      TYPDS                   ;;GO TO THE ROUTINE
  (1)
  (2)  010750                           $TYPDS:
  (3)  010750  010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (3)  010752  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
  (3)  010754  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
  (3)  010756  010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
  (3)  010760  010546                           MOV     R5,-(SP)        ;;PUSH R5 ON STACK
  (1)  010762  012746  020200                   MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
  (1)  010766  016605  000020                   MOV     20(SP),R5       ;;GET THE INPUT NUMBER
  (1)  010772  100004                           BPL     1$              ;;BR IF INPUT IS POS.
  (1)  010774  005405                           NEG     R5              ;;MAKE THE BINARY NUMBER POS.
  (1)  010776  112766  000055  000001           MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
  (1)  011004  005000                   1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
  (1)  011006  012703  01116+                   MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
  (1)  011012  112723  00004+                   MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
  (1)  011016  005002                   2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
  (1)  011020  016001  011154                   MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
  (1)  011024  160105                   3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
  (1)  011026  002402                           BLT     4$              ;;BR IF DONE
  (1)  011030  005202                           INC     R2              ;;INCREASE THE BCD DIGIT BY 1
  (1)  011032  000774                           BR      3$
  (1)  011034  060105                   4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
  (1)  011036  005702                           TST     R2              ;;CHECK IF BCD DIGIT=0
  (1)  011040  001002                           BNE     5$              ;;FALL THROUGH IF 0
  (1)  011042  105716                           TSTB    (SP)            ;;STILL DOING LEADING 0'S?
  (1)  011044  100407                           BMI     7$              ;;BR IF YES
  (1)  011046  106316                   5$:     ASLB    (SP)            ;;MSD?
  (1)  011050  103003                           BCC     6$              ;;BR IF NO
  (1)  011052  116663  000001  177777           MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
  (1)  011060  052702  000060           6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
  (1)  011064  052702  000040           7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
  (1)  011070  110223                           MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
  (1)  011072  005720                           TST     (R0)+           ;;JUST INCREMENTING
  (1)  011074  020027  000010                   CMP     R0,#10          ;;CHECK THE TABLE INDEX
  (1)  011100  002746                           BLT     2$              ;;GO DO THE NEXT DIGIT
  (1)  011102  003002                           BGT     8$              ;;GO TO EXIT
  (1)  011104  010502                           MOV     R5,R2           ;;GET THE LSD
  (1)  011106  000764                           BR      6$              ;;GO CHANGE TO ASCII
  (1)  011110  105726                   8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
  (1)  011112  100003                           BPL     9$              ;;BR IF NO
  (1)  011114  116663  177777  177776           MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
  (1)  011122  105013                   9$:     CLRB    (R3)            ;;SET THE TERMINATOR
  (3)  011124  012605                           MOV     (SP)+,R5        ;;POP STACK INTO R5
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   (3)  011126  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
   (3)  011130  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
   (3)  011132  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
   (3)  011134  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
   (1)  011136  104401  011164                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
   (1)  011142  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
   (1)  011150  012616                          MOV     (SP)+,(SP)
   (1)  011152  000002                          RTI                     ;;RETURN TO USER
   (1)  011154  023420                $DTBL:    10000.
   (1)  011156  001750                          1000.
   (1)  011160  000144                          100.
   (1)  011162  000012                          10.
   (1)  011164  000004                $DBLK:    .BLKW   4
  1002                                .SBTTL  TYPE ROUTINE
   (1)
   (2)                                ;;**********************************************************************
   (1)                                ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
   (1)                                ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
   (1)                                ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
   (1)                                ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
   (1)                                ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
   (1)                                ;*
   (1)                                ;*CALL:
   (1)                                ;*1) USING A TRAP INSTRUCTION
   (1)                                ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
   (1)                                ;*OR
   (1)                                ;*      TYPE
   (1)                                ;*      MESADR
   (1)                                ;*
   (1)
   (1)  011174  105737  001157        $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
   (1)  011200  100002                        BPL     1$              ;;BR IF YES
   (1)  011202  000000                        HALT                    ;;HALT HERE IF NO TERMINAL
   (1)  011204  000430                        BR      3$              ;;LEAVE
   (1)  011206  010046                1$:     MOV     R0,-(SP)        ;;SAVE R0
   (1)  011210  017600  000002                MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
   (1)  011214  122737  000001  001214        CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
   (1)  011222  001011                        BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
   (1)  011224  132737  000100  001215        BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
   (1)  011232  001405                        BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
   (1)  011234  010037  011244                MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
   (1)  011240  004737  011464                JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
   (1)  011244  000000                61$:    .WORD   0               ;;MESSAGE ADDRESS
   (1)  011246  132737  000040  001215  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
   (1)  011254  001003                        BNE     60$             ;;YES,SKIP TYPE OUT
   (1)  011256  112046                2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
   (1)  011260  001005                        BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
   (1)  011262  005726                        TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
   (1)  011264  012600                60$:    MOV     (SP)+,R0        ;;RESTORE R0
   (1)  011266  062716  000002        3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
   (1)  011272  000002                        RTI                     ;;RETURN
   (1)  011274  122716  000011        4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
   (1)  011300  001430                        BEQ     8$
   (1)  011302  122716  000200                CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
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(1)  011306  001006                          BNE     5$
(1)  011310  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
(1)  011312  104401                          TYPE                    ;;TYPE A CR AND LF
(1)  011314  001171                          $CRLF
(1)  011316  105037  011452                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
(1)  011322  000755                          BR      2$              ;;GET NEXT CHARACTER
(1)  011324  004737  011406          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
(1)  011330  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
(1)  011334  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
(1)  011336  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
(1)                                                                  ;;AND THE NULL CHAR.
(1)  011342  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
(1)  011346  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
(1)  011350  004737  011406                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
(1)  011354  105337  011452                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
(1)  011360  000770                          BR      7$              ;;LOOP
(1)
(1)                                  ;HORIZONTAL TAB PROCESSOR
(1)
(1)  011362  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
(1)  011366  004737  011406          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
(1)  011372  132737  000007  011452          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
(1)  011400  001372                          BNE     9$              ;;TAB STOP
(1)  011402  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
(1)  011404  000724                          BR      2$              ;;GET NEXT CHARACTER
(1)  011406  105777  167536          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
(1)  011412  100375                          BPL     $TYPEC
(1)  011414  116677  000002  167530          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
(1)  011422  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
(1)  011430  001003                          BNE     1$              ;;BRANCH IF NO
(1)  011432  105037  011452                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
(1)  011436  000406                          BR      $TYPEX          ;;EXIT
(1)  011440  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
(1)  011446  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
(1)  011450  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
(1)  011452  000000          $CHARCNT:.WORD  0                       ;;CHARACTER COUNT STORAGE
(1)  011454  000207          $TYPEX: RTS     PC
(1)
1003                                 .SBTTL  APT COMMUNICATIONS ROUTINE
 (1)
 (2)                                 ;;**************************************************************************
(1)  011456  112737  000001  011722  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
(1)  011464  112737  000001  011720  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
(1)  011472  000403                          BR      $ATYC
(1)  011474  112737  000001  011722  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
(2)  011502                          $ATYC:
(3)  011502  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
(3)  011504  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
(1)  011506  105737  011720                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
(1)  011512  001450                          BEQ     5$              ;;IF NOT:  BR
(1)  011514  122737  000001  001214          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
(1)  011522  001031                          BNE     3$              ;;IF NOT:  BR
(1)  011524  132737  000100  001215          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
(1)  011532  001425                          BEQ     3$              ;;IF NOT:  BR
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(1)  011534  017600  000004          MOV   @4(SP),R0        ;;GET MESSAGE ADDR.
(1)  011540  062766  000002  000004  ADD   #2,4(SP)              ;;BUMP RETURN ADDR.
(1)  011546  005737  001174    1$:   TST   $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
(1)  011552  001375                  BNE   1$              ;;IF NOT:  WAIT
(1)  011554  010037  001210          MOV   R0,$MSGAD       ;;PUT ADDR IN MAILBOX
(1)  011560  105720            2$:   TSTB  (R0)+           ;;FIND END OF MESSAGE
(1)  011562  001376                  BNE   2$
(1)  011564  163700  001210          SUB   $MSGAD,R0       ;;SUB START OF MESSAGE
(1)  011570  006200                  ASR   R0              ;;GET MESSAGE LNGTH IN WORDS
(1)  011572  010037  001212          MOV   R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
(1)  011576  012737  000004  001174  MOV   #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
(1)  011604  000413                  BR    5$
(1)  011606  017637  000004  011632  3$:   MOV   @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
(1)  011614  062766  000002  000004  ADD   #2,4(SP)              ;;BUMP RETURN ADDRESS
(3)  011622  013746  177776          MOV   177776,-(SP)    ;;PUSH 177776 ON STACK
(1)  011626  004737  011174          JSR   PC,$TYPE        ;;CALL TYPE MACRO
(1)  011632  000000            4$:   .WORD 0
(1)  011634                    5$:
(1)  011634  105737  011722    10$:  TSTB  $FFLG           ;;SHOULD REPORT FATAL ERROR?
(1)  011640  001416                  BEQ   12$             ;;IF NOT:  BR
(1)  011642  005737  001214          TST   $ENV            ;;RUNNING UNDER APT?
(1)  011646  001413                  BEQ   12$             ;;IF NOT:  BR
(1)  011650  005737  001174    11$:  TST   $MSGTYPE        ;;FINISHED LAST MESSAGE?
(1)  011654  001375                  BNE   11$             ;;IF NOT:  WAIT
(1)  011656  017637  000004  001176  MOV   @4(SP),$FATAL   ;;GET ERROR #
(1)  011664  062766  000002  000004  ADD   #2,4(SP)              ;;BUMP RETURN ADDR.
(1)  011672  005237  001174          INC   $MSGTYPE        ;;TELL APT TO TAKE ERROR
(1)  011676  105037  011722    12$:  CLRB  $FFLG           ;;CLEAR FATAL FLAG
(1)  011702  105037  011721          CLRB  $LFLG           ;;CLEAR LOG FLAG
(1)  011706  105037  011720          CLRB  $MFLG           ;;CLEAR MESSAGE FLAG
(3)  011712  012601                  MOV   (SP)+,R1        ;;POP STACK INTO R1
(3)  011714  012600                  MOV   (SP)+,R0        ;;POP STACK INTO R0
(1)  011716  000207                  RTS   PC              ;;RETURN
(1)  011720     000  $MFLG:  .BYTE  0                      ;;MESSG. FLAG
(1)  011721     000  $LFLG:  .BYTE  0                      ;;LOG FLAG
(1)  011722     000  $FFLG:  .BYTE  0                      ;;FATAL FLAG
(1)          011724          .EVEN
(1)          000200  APTSIZE=200
(1)          000001  APTENV=001
(1)          000100  APTSPOOL=100
(1)          000040  APTCSUP=040
1004                 .SBTTL  POWER DOWN AND UP ROUTINES
(1)
(2)                  ;;******************************************************************
(1)                  ;POWER DOWN ROUTINE
(1)  011724  012737  012064  000024  $PWRDN: MOV   #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
(1)  011732  012737  000340  000026          MOV   #340,@#PWRVEC+2 ;;PRIO:7
(3)  011740  010046                  MOV   R0,-(SP)        ;;PUSH R0 ON STACK
(3)  011742  010146                  MOV   R1,-(SP)        ;;PUSH R1 ON STACK
(3)  011744  010246                  MOV   R2,-(SP)        ;;PUSH R2 ON STACK
(3)  011746  010346                  MOV   R3,-(SP)        ;;PUSH R3 ON STACK
(3)  011750  010446                  MOV   R4,-(SP)        ;;PUSH R4 ON STACK
(3)  011752  010546                  MOV   R5,-(SP)        ;;PUSH R5 ON STACK
(3)  011754  017746  167160          MOV   @SWR,-(SP)      ;;PUSH @SWR ON STACK
```

```
   (1)  011760  010637  012070                    MOV     SP,$SAVR6       ;;SAVE SP
   (1)  011764  012737  011776  000024            MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
   (1)  011772  000000                            HALT
   (1)  011774  000776                            BR      .-2             ;;HANG UP
   (1)
   (2)                                  ;;*****************************************************************
   (1)                                  ;POWER UP ROUTINE
   (1)  011776  012737  012064  000024  $PWRUP:  MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
   (1)  012004  013706  012070                    MOV     $SAVR6,SP       ;;GET SP
   (1)  012010  005037  012070                    CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
   (1)  012014  005237  012070            1$:     INC     $SAVR6          ;;WAIT FOR THE INC
   (1)  012020  001375                            BNE     1$              ;;OF  WORD
   (3)  012022  012677  167112                    MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
   (3)  012026  012605                            MOV     (SP)+,R5        ;;POP STACK INTO R5
   (3)  012030  012604                            MOV     (SP)+,R4        ;;POP STACK INTO R4
   (3)  012032  012603                            MOV     (SP)+,R3        ;;POP STACK INTO R3
   (3)  012034  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
   (3)  012036  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
   (3)  012040  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
   (1)  012042  012737  011724  000024            MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
   (1)  012050  012737  000340  000026            MOV     #340,@#PWRVEC+2 ;;PRIO:7
   (1)  012056  104401                            TYPE                    ;REPORT THE POWER FAILURE
   (1)  012060  012072                    $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
   (1)  012062  000002                            RTI
   (1)  012064  000000                    $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
   (1)  012066  000776                            BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
   (1)  012070  000000                    $SAVR6: 0                       ;;PUT THE SP HERE
   (1)  012072  005015  047520  042527    $POWER: .ASCIZ  <15><12>'POWER'
   (1)  012100  000122
   (1)                                            .EVEN
  1005
  1006                                            ;*
  1007                                            ;*THIS ROUTINE WILL PROTECT THE PROGRAM
  1008                                            ;*FROM INTERRUPTS.
  1009                                            ;*
  1010                                            ;*THE TRAP CATCHER IS SET UP FOR
  1011                                            ;*      .WORD   .+2
  1012                                            ;*      .WORD   JSR     PC,R0
  1013                                            ;*
  1014                                            ;*ILLEGAL INTERRUPTS OR INTERRUPTS TO THE WRONG VECTOR
  1015                                            ;*GOTO THE VECTOR AND PICK UP THE ".+2" AS AN ADDRESS
  1016                                            ;*AND "4700" AS NEW STATUS.
  1017                                            ;*THE .+2 AS A PC WILL CAUSE EXECUTION OF THE "JSR PC,R0" (AN ILLEGAL INSTR).
  1018                                            ;*AND TRAP TO LOCATION "4". IN LOCATION 10 WE HAVE A
  1019                                            ;*POINTER HERE. IF THIS CONDITION CAUSES A TRAP TO LOC. 4
  1020                                            ;*WE WILL REPORT IT IN THE SAME MANNER THAT WE WOULD
  1021                                            ;*REPORT ANY OTHER ERROR.
  1022
  1023                                            ;*IF A BUSS ERROR TRAP DID OCCUR AND CAUSE A TRAP TO 4,
  1024                                            ;*WE WILL HALT.
  1025
  1026  012102  011637  012146            IOTRD: MOV     (6),TRTO         ;GET WHERE WE CAME TO.
  1027  012106  162737  000004  012146            SUB     #4,TRTO         ;FORM REAL ADDR.
  1028
```

```
 1029  012114  023727  012146  001000          CMP     TRTO,#1000      ;DID TRAP COME FROM LESS THAN ADDR. 1000?
 1030  012122  003402                          BLE     2$
 1031
 1032  012124  000000                  1$:     HALT                    ;NO!   MUST BE A BUSS ILLEGAL ADDR. TIME OUT.
 1033                                                                  ; ADDRESS CONTAINED IN TRTO.
 1034
 1035  012126  000776                          BR      1$              ;DON'T ALLOW A CONTINUE.
 1036  012130                          2$:
 1037
 1038  012130  016637  000004  012150          MOV     4(6),TRFRO      ;GET TRAPPED FROM ADDR.
 1039
 1040  012136  062706  000004                  ADD     #4,SP           ;/ADD #4 TO STACK POINTER.
 1041
 1042

                                                ;;$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$

  (1)
  (1)  012142  104007                          ERROR   7               ;/MODULE FAULT DETECTED:
 1043                                                                  ;ERROR! ILLEGAL INTERRUPT
 1044                                                                  ;OR INTERRUPT TO WRONG
 1045                                                                  ;VECTOR - IF TEST NUMBER
 1046                                                                  ;IS LESS THAN 10, ITS LIKELY
 1047                                                                  ;(BUT NOT EXCLUSIVELY) TO BE A
 1048                                                                  ;DEVICE OTHER THAN THE IBV-11
 1049                                                                  ;TO BLAME.
 1050                                                                  ;IF THE INTERRUPT OCCURRED
 1051                                                                  ;DURING AN INTERRUPT TEST, I'D
 1052                                                                  ;SUSPECT A PROBLEM WITH THE
 1053                                                                  ;IBV-11.
 1054                                                                  ;IF THE ADDRESS THE INTERRUPT
 1055                                                                  ;VECTOR TO IS WITHIN THE RANGE
 1056                                                                  ;OF VECTORS ASSIGNED TO THE IBV-11,
 1057                                                                  ;THEN I'D SUSPECT THE IBV-11
 1058                                                                  ;INTERRUPTED ILLEGALLY.
 1059                                                                  ;IF THE ADDRESS THE INTERRUPT
 1060                                                                  ;VECTORED TO IS OUTSIDE OF THE
 1061                                                                  ;RANGE ASSIGNED TO THE IBV-11,
 1062                                                                  ;I'D SUSPECT THAT THE
 1063                                                                  ;IBV-11 PUT THE WRONG VECTOR ON
 1064                                                                  ;THE BUSS DURING THE INTERRUPT
 1065                                                                  ;PROCESS.
 1066                                                                  ;FOR THIS ERROR - DON'T
 1067                                                                  ;USE 'LOOP ON ERROR' OPTION.
 1068                                                                  ;ALSO EXPECT THE INTERRUPT TEST TO
 1069                                                                  ;REPORT THAT THE IBV-11 DIDN'T
 1070                                                                  ;INTERRUPT.
 1071                                                                  ;FOLLOW RECOMMENDED PROCEDURE
 1072                                                                  ;IN THE DOCUMENT (ON THIS DIAGNOSTIC)
 1073                                                                  ;FOR LOOPING ON ERROR

                                                ;;$$$$$$$$$$^^^ ERROR ^^^$$$$$$$$$$
 1075  012144  000002                          RTI
 1076
```

```
                                        .SBTTL  TRAP DECODER

                                        ;;**********************************************************************
                                        ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                        ;*AND USE IT TO INDEX THRCUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                        ;*OF THE DESIRED ROUTINE. THEN US'NG THE ADDRESS OBTAINED IT WILL
                                        ;*GO TO THAT ROUTINE.

012152  010046                $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
012154  016600  000002                MOV     2(SP),R0        ;;GET TRAP ADDRESS
012160  005740                        TST     -(R0)           ;;BACKUP BY 2
012162  111000                        MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
012164  006300                        ASL     R0              ;;POSITION FOR INDEXING
012166  016000  012206                MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
012172  000200                        RTS     R0              ;;GO TO ROUTINE


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

012174  011646                $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
012176  016666  000004  000002        MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
012204  000002                        RTI                     ;;RESTORE THE PSW

                                        .SBTTL  TRAP TABLE

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

                                        ;       ROUTINE
                                        ;       -------
012206  012174                $TRPAD: .WORD   $TRAP2
012210  011174                        $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
012212  010546                        $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
012214  010522                        $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
012216  010562                        $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
012220  010750                        $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

012222  010016                        $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

012224  007746                        $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
012226  010230                        $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
012230  010350                        $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE

                                        .SBTTL MESSAGES AND TABLES

012232  005007  044405  051502  EM1:    .ASCIZ<7><12><15>#IBS FUNCTION ERROR#
012240  043040  047125  052103
012246  047511  020116  051105
012254  047522  000122

012260  005007  044415  042102  EM2:    .ASCIZ<7><12><15>#IBD FUNCTION ERROR#
```

```
                012266  043040  047125  052103
                012274  047511  020116  051105
                012302  047522  000122
 1087
 1088   012306  005007  044415  051502  EM3:    .ASCIZ<7><12><15>#IBS DATA ERROR#
                012314  042040  052101  020101
                012322  051105  047522  000122
 1089
 1090   012330  005007  044415  042102  EM4:    .ASCIZ<7><12><15>#IBD DATA ERROR#
                012336  042040  052101  020101
                012344  051105  047522  000122
 1091
 1092   012352  100007  041111  027523  EM5:    .ASCIZ<7><200>#IBS/IBD ADDRESS ERROR#
                012360  041111  020104  042101
                012366  051104  051505  020123
                012374  051105  047522  000122
 1093   012402  100007  041111  041527  EM6:    .ASCIZ  <7><200>#IBWC/IBCA DATA ERROR#
                012410  044457  041502  020101
                012416  040504  040524  042440
                012424  051122  051117     000
 1094
 1095   012431     007  044600  052116  EM7:    .ASCIZ  <7><200>#INTERRUPT ERROR#
                012436  051105  052522  052120
                012444  042440  051122  051117
                012452     000
 1096
 1097   012453     200  042524  052123  DH1:    .ASCIZ<CRLF>#TEST    ERRPC    IB ADR    IBS      IBD#
                012460  020040  020040  051105
                012466  050122  020103  020040
                012474  041111  040440  051104
                012502  020040  044440  051502
                012510  020040  020040  044440
                012516  042102     000
 1098
 1099   012521     200  042524  052123  DH3:    .ASCIZ<CRLF>#TEST    ERRPC    GOOD     BAD#
                012526  020040  020040  051105
                012534  050122  020103  020040
                012542  047507  042117  020040
                012550  020040  040502  000104
 1100
 1101   012556  052200  051505  020124  DH5:    .ASCIZ  <CRLF>#TEST    ERRPC    IB ADDR#
                012564  020040  042440  051122
                012572  041520  020040  044440
                012600  020102  042101  051104
                012606     000
 1102
 1103   012607     200  042524  052123  DH7:    .ASCIZ  <CRLF>#TEST    ERRPC    TO       FROM ADDR.#
                012614  020040  020040  051105
                012622  050122  020103  020040
                012630  047524  020040  020040
                012636  020040  051106  046517
                012644  040440  042104  027122
                012652     000
 1104
```

```
1105            012654                                  .EVEN
1106
1107    012654  001200  001116  001346  DT1:    .WORD   $TESTN,$ERRPC,IBS
1108
1109    012662  000000                  IBSA:   .WORD   0
1110
1111    012664  000000  000000          IBDA:   .WORD   0,0
1112
1113    012670  001200  001116  001124  DT3:    .WORD   $TESTN,$ERRPC,$GDDAT,$BDDAT,0
        012676  001126  000000
1114
1115    012702  001200  001116  001346  DT5:    .WORD   $TESTN,$ERRPC,IBS,0
        012710  000000
1116
1117    012712  001200  001116  012146  DT7:    .WORD   $TESTN,$ERRPC,TRTO,TRFRO,0
        012720  012150  000000
1118
1119    012724  000000  000000          DF0:    .WORD   0,0
1120
1121            000001                          .END
```

```
ABASE = 171420           46#     57     179     180     181     182     187     188
ACDW1 = 000000           57
ACDW2 = 000000           57
ACPUOP= 000000           57
ADDW0 = 000000           57
ADDW1 = 000000           57
ADDW10= 000000           57
ADDW11= 000000           57
ADDW12= 000000           57
ADDW13= 000000           57
ADDW14= 000000           57
ADDW15= 000000           57
ADDW2 = 000000           57
ADDW3 = 000000           57
ADDW4 = 000000           57
ADDW5 = 000000           57
ADDW6 = 000000           57
ADDW7 = 000000           57
ADDW8 = 000000           57
ADDW9 = 000000           57
ADEVCT= 000000           57
ADEVM = 000000           57
AENV  = 000000           57
AENVM = 000000           57
AFATAL= 000000           57
AMADR1= 000000           57
AMADR2= 000000           57
AMADR3= 000000           57
AMADR4= 000000           57
AMAMS1= 000000           57
AMAMS2= 000000           57
AMAMS3= 000000           57
AMAMS4= 000000           57
AMSGAD= 000000           57
AMSGLG= 000000           57
AMSGTY= 000000           57
AMTYP1= 000000           57
AMTYP2= 000000           57
AMTYP3= 000000           57
AMTYP4= 000000           57
APASS = 000000           57
APRIOR= 000200           48#     57
APTCSU= 000040         1002    1003#
APTENV= 000001          995    1002    1003#
APTSIZ= 000200          211    1003#
APTSPO= 000100         1002    1003#
ASWREG= 000000           57
ATESTN= 000000           57
AUNIT = 000000           57
AUSWR = 000000           57
AVECT1= 000420           47#     57     183     184     185     186     196     197     198     199     201     202     203
                       204
AVECT2= 000000           57
BIT0  = 000001           44#    382     383     392     462     563     666     691     746     969
```

```
BIT00 = 000001              44#
BIT01 = 000002              44#
BIT02 = 000004              44#     424     425     434
BIT03 = 000010              44#     445     446     450
BIT04 = 000020              44#
BIT05 = 000040              44#
BIT06 = 000100              44#     935
BIT07 = 000200              44#
BIT08 = 000400              44#     997
BIT09 = 001000              44#     995     997
BIT1  = 000002              44#     403     404     413     564     668
BIT10 = 002000              44#     383     462     673     681     995
BIT11 = 004000              44#     997
BIT12 = 010000              44#     662
BIT13 = 020000              44#     664     889     899     903     919     995
BIT14 = 040000              44#     666     695     997
BIT15 = 100000              44#     668     863
BIT2  = 000004              44#     565     662     917     937
BIT3  = 000010              44#     566     664     715     716     898     902
BIT4  = 000020              44#     563     564     565     566     567     568     569     570     597     607     727     761
                            970
BIT5  = 000040              44#     472     473     483     563     564     565     566     567     568     569     570     597
                            607     691     727     761     797     840     969
BIT6  = 000100              44#     497     498     508     569     746     762     797     840
BIT7  = 000200              44#     518     519     528     570     597     680     727
BIT8  = 000400              44#     590     609
BIT9  = 001000              44#     473     600     615
BPTVEC= 000014              44#
CKSWR = 104407              995     997     1080#
CR    = 000015              44#     1002
CRLF  = 000200              44#     262     1002    1097    1099    1101    1103
DDISP = 177570              44#      57     211
DEL50   007122              459     994#
DF0     012724               68      75      82      89      96     103     109     1119#
DH1     012453               66      73     1097#
DH3     012521               80      87     101     1099#
DH5     012556               94     1101#
DH7     012607              107     1103#
DISPLA  001142               57#     211*    995*    997*
DISPRE  000174               36#     211
DSWR  = 177570              44#      57     211
DT1     012654               67      74     1107#
DT3     012670               81      88     102     1113#
DT5     012702               95     1115#
DT7     012712              108     1117#
EMTVEC= 000030              44#     211*
EM1     012232               65     1084#
EM2     012260               72     1086#
EM3     012306               79     1088#
EM4     012330               86     1090#
EM5     012352               93     1092#
EM6     012402              100     1093#
EM7     012431              106     1095#
EOP     007000              832      989#
```

```
ERRVEC= 000004          44#  211*  212*  213*  271   272*  278*  292*  305   306*  312*  330*  997*
GNS   = ****** U       262  1080
GTSWR = 104406         262  1080#
HT    = 000011          44#  1002
IBCA    001354        182#  220*  221*  314   372
IBD     001350        180#  216*  217*  218   225   280   348   563*  564*  565*  566*  567*  568*
                      569*  570*  575*  577   589*  590   598*  599   608   609   615   662   664
                      666   668   673   681   693*  728*  730   778*  798*  971*
IBDA    012664        225*  1111#
IBD2    001370        188#  226*  227*  972
IBS     001346        179#  215*  216   224   276   337   381*  382*  384   392*  394   402*  403*
                      405   413*  415   423*  424*  426   434*  436   444*  445*  447   450*  451
                      463   471*  472*  474   483*  485   495*  497*  499   508*  509   517*  518*
                      520   528*  530   563*  564*  565*  566*  567*  568*  569*  570*  574*  588*
                      597*  607*  662*  664*  666*  668*  672*  680*  690*  691*  695   703*  705
                      714*  715*  716   718   727*  743*  746*  755*  761*  762*  769*  788*  793*
                      797*  809*  835*  856*  862*  877*  889   897*  899   903   915*  919   930*
                      935*  948*  967*  969*  984*  1107  1115
IBSA    012662        224*  1109#
IBS2    001366        187#  226   836*  840*  850*  857*  863*  878*  884*  885*  898*  902*  916*
                      917*  929*  937*  947*  968*  970*  985*
IBWC    001352        181#  218*  219*  220   309   364
IOTRD   012102         34   212   1026#
IOTVEC= 000020          44#  211*
LF    = 000012          44#  1002
PC    =%000007          44#  993*  995*  996*  998*  1002*  1003*
PIRQ  = 177772          44#
PIRQVE= 000240          44#
PRA     001402        196#  241*  242*  243   258*  794*  810*  932*  946*
PRA2    001412        201#  249*  250*  251
PRB     001404        197#  243*  244*  245   259*  859*  876*
PRB2    001414        202#  251*  252*  253
PRC     001406        198#  245*  246*  247   260*  744*  756*  759*  770*  774*
PRC2    001416        203#  253*  254*  255   837*  851*
PRD     001410        199#  247*  248*  261*  775*  789*
PRD2    001420        204#  255*  256*
PR0   = 000000          44#
PR1   = 000040          44#
PR2   = 000100          44#
PR3   = 000140          44#
PR4   = 000200          44#
PR5   = 000240          44#
PR6   = 000300          44#
PR7   = 000340          44#
PS    = 177776          44#
PSW   = 177776          44#
PWRVEC= 000024          44#  211*  1004*
RDCHR = 104410         998   1080#
RDLIN = 104411        1080#
RESVEC= 000010          44#
RSTART  002266        257#  993
R0    =%000000          44#  993*  994*  996*  1001*  1002*  1003*  1004*  1080*
R1    =%000001          44#  994*  1001*  1003*  1004*
R2    =%000002          44#  1001*  1004*
```

```
R3      =%000003              44#     998*    999*    1001*   1004*
R4      =%000004              44#     999*    1004*
R5      =%000005              44#     459*    994*    999*    1001*   1004*
R6      =%000006              44#     211*
R7      =%000007              44#
SP      =%000006              44#     211*    271*    283*    288*    292     293*    305*    317*    324*    330     493*    747*
                             754*    763*    773*    777*    787*    796*    801*    808*    839*    849*    861*    874*    936*
                             945*    993*    995*    996*    997*    998*    999*    1001*   1002*   1003*   1004*   1040*   1080*
STACK = 001100               44#     211
START   001422               42      211#
STKLMT= 177774               44#
SWR     001140               57#     211*    262     995     997     998*    1004*
SWREG   000176               37#     211     262     998
SW0   = 000001               44#
SW00  = 000001               44#
SW01  = 000002               44#
SW02  = 000004               44#
SW03  = 000010               44#
SW04  = 000020               44#
SW05  = 000040               44#
SW06  = 000100               44#
SW07  = 000200               44#
SW08  = 000400               44#
SW09  = 001000               44#
SW1   = 000002               44#
SW10  = 002000               44#
SW11  = 004000               44#
SW12  = 010000               44#
SW13  = 020000               44#
SW14  = 040000               44#
SW15  = 100000               44#
SW2   = 000004               44#
SW3   = 000010               44#
SW4   = 000020               44#
SW5   = 000040               44#
SW6   = 000100               44#
SW7   = 000200               44#
SW8   = 000400               44#
SW9   = 001000               44#
TBITVE= 000014               44#
TKVEC = 000060               44#
TPVEC = 000064               44#
TRAPVE= 000034               44#     211*
TRFRO   012150              1038*   1078#   1117
TRTO    012146              1026*   1027*   1029    1077#   1117
TRTVEC= 000014               44#
TST1    002460               265#
TST10   003172               411     416     421#
TST11   003262               432     437     442#
TST12   003406               457     465     469#
TST13   003476               481     486     491#
TST14   003600               505     510     515#
TST15   003670               526     531     563#
TST16   003762               563     564#
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TST17   004054          564     565#
TST2    002604          303#
TST20   004146          565     566#
TST21   004240          566     567#
TST22   004332          567     568#
TST23   004424          568     569#
TST24   004516          569     570#
TST25   004610          570     572#
TST26   004642          578     586#
TST27   004766          595     605     614     616     662#
TST3    002670          332#
TST30   005054          662     664#
TST31   005144          664     666#
TST32   005232          666     668#
TST33   005320          668     670#
TST34   005362          678     682     688#
TST35   005414          696     701#
TST36   005444          706     712#
TST37   005512          719     725#
TST4    002720          338     343#
TST40   005550          731     741#
TST41   005646          758#
TST42   006050          771     791#
TST43   006166          816#
TST44   006302          853#
TST45   006416          880#
TST46   006442          890     895#
TST47   006514          901     904     911#
TST5    002750          349     361#
TST50   006546          920     925#
TST51   006662          961#
TST52   006776          979     987#
TST6    003012          370     373     379#
TST7    003102          390     395     400#
TYPDS = 104405          993     1080#
TYPE  = 104401          262     993     995     996     998     999     1001    1002    1004    1080#
TYPOC = 104402          996     998     1080#
TYPON = 104404          1080#
TYPOS = 104403          1080#
VECTA   001356          183#    222*    223*    228     241     258*    795*    810*    933*    946*
VECTA2  001372          189#    234     249
VECTB   001360          184#    228*    229*    230     259*    860*    876*
VECTB2  001374          190#    234*    235*    236
VECTC   001362          185#    230*    231*    232     260*    745*    756*    760*    770*    774*
VECTC2  001376          191#    236*    237*    238     838*    851*
VECTD   001364          186#    232*    233*    261*    776*    789*
VECTD2  001400          192#    238*    239*
$APTHD  001000           55#
$ASTAT= ****** U        1003
$ATYC   011502          1003#
$ATY1   011456          1003#
$ATY3   011464          1002    1003#
$ATY4   011474           995    1003#
$AUTOB  001134            57#    262*    998
```

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$BASE   001250              57#    215
$BDADR  001122              57#
$BDDAT  001126              57#    337*   348*   364*   372*   384*   385    394*   405*   406    415*   426*   427
                           436*    447*   448    451*   452    463*   464    474*   475    485*   499*   500    509*
                           520*    521    530*   563*   564*   565*   566*   567*   568*   569*   570*   577*   599*
                           600     965*   972*   973    1113
$BELL   001164              57#    995
$CDW1   001254              57#    830
$CHARC  011452             1002#*
$CKSWR  007746              998#   1080
$CMTAG  001100              57#    211
$CM3  = 000000              57#
$CNTLG  010473              998#
$CNTLU  010466              998#
$CPUOP  001222              57#
$CRLF   001171              57#    995    996    998    1002
$DBLK   011164             1001#
$DEVCT  001204              57#
$DEVM   001252              57#
$DOAGN  007076              993#
$DTBL   011154             1001#
$ENDAD  007066              51     993#
$ENDCT  007034              993#
$ENDMG  007105              993#
$ENULL  007102              993#
$ENV    001214              57#    262    995    1002   1003
$ENVM   001215              57#    211    1002   1003
$EOP    007000              993#
$EOPCT  007026              993#
$ERFLG  001103              57#    995*   997*
$ERMAX  001115              57#    211*   997*
$ERROR  007142              211    995#
$ERRPC  001116              57#    995*   996    1107   1113   1115   1117
$ERRTB  001256              57#    996
$ERRTY  007330              995    996#
$ERTTL  001112              57#    995*
$ESCAP  001162              57#    211*   995    997*
$ETABL  001214              57#
$ETEND  001256              55     57#
$FATAL  001176              57#    1003*
$FFLG   011722             1003#*
$FILLC  001156              57#    1002
$FILLS  001155              57#    1002
$GDADR  001120              57#
$GDDAT  001124              57#    336*   347*   363*   383*   385    393*   404*   406    414*   425*   427    435*
                           446*    448    452    462*   464    473*   475    484*   498*   500    507*   519*   521
                           529*    563*   564*   565*   566*   567*   568*   569*   570*   576*   964*   971    973
                           981*    1113
$GET42  007056              993#
$GTSWR  010016              998#   1080
$HD   = 000001              12
$HIBTS  001000              55#
$ICNT   001104              57#    997*
$ILLUP  012064             1004#
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$INTAG  001135            57#     998
$ITEMB  001114            57#     995*    996
$LF     001172            57#     995     998     1002
$LFLG   011721          1003#*
$LPADR  001106            57#     211*    265*    997*
$LPERR  001110            57#     211*    269*    963*    995     997*
$MADR1  001226            57#
$MADR2  001232            57#
$MADR3  001236            57#
$MADR4  001242            57#
$MAIL   001174            55      57#     211     262     995     997     1002
$MAMS1  001224            57#
$MAMS2  001230            57#
$MAMS3  001234            57#
$MAMS4  001240            57#
$MBADR  001002            55#
$MFLG   011720          1003#*
$MNEW   010511           998#
$MSGAD  001210            57#     1003*
$MSGLG  001212            57#     1003*
$MSGTY  001174            57#     1003*
$MSWR   010500           998#
$MTYP1  001225            57#
$MTYP2  001231            57#
$MTYP3  001235            57#
$MTYP4  001241            57#
$MXCNT  007744           997#
$NULL   001154            57#     1002
$NWTST= 000001            265#    303#    332#    343#    361#    379#    400#    421#    442#    469#    491#    515#    563#
                          564#    565#    566#    567#    568#    569#    570#    572#    586#    662#    664#    666#    668#
                          670#    688#    701#    712#    725#    741#    758#    791#    816#    853#    880#    895#    911#
                          925#    961#    987#
$OCNT   010744           999#*
$OMODE  010746           999#*
$OVER   007730           997#
$PASS   001202            57#     211*    993*    997
$PASTM  001006            55#
$POWER  012072          1004#
$PWRDN  011724            211     1004#
$PWRMG  012060          1004#
$PWRUP  011776          1004#
$QUES   001170            57#     995     998     1002
$RDCHR  010230           998#     1080
$RDDEC= ****** U        1080
$RDLIN  010350           998#     1080
$RDOCT= ****** U        1080
$RDSZ = 000010           998#
$RTNAD  007100           993#
$R2A  = ****** U        1080
$SAVRE= ****** U        1080
$SAVR6  012070          1004#*
$SCOPE  007464            211     997#
$SETUP= 000117            209#    211     262     993     995     997     998
$STUP = 177777            209#
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$SVLAD  007674          997#
$SVPC = 000204           51#
$SWR  = 167400           10#    12    14    57   211   265   303   332   343   361   379   400   421
                        442   469   491   515   563   564   565   566   567   568   569   570   572
                        586   662   664   666   668   670   688   701   712   725   741   758   791
                        816   853   880   895   911   925   961   987   993   995   997  1004
$SWREG  001216           57#   211
$SWRMK= 000000           14    997
$TESTN  001200           57#   268*  997*  1107  1113  1115  1117
$TIMES  001160           57#   211*  265*  303*  332*  343*  361*  701*  712*  725*  895*  993*  997*
$TKB    001146           57#   998
$TKS    001144           57#   998*
$TN   = 000053           12#    49#  265#  303#  332#  338   343#  349   361#  370   373   379#  390
                        395   400#  411   416   421#  432   437   442#  457   465   469#  481   486
                        491#  505   510   515#  526   531   563#  564#  565#  566#  567#  568#  569#
                        570#  572#  578   586#  595   605   614   616   662#  664#  666#  668#  670#
                        678   682   688#  696   701#  706   712#  719   725#  731   741#  758#  771
                        791#  816#  853#  880#  890   895#  901   904   911#  920   925#  961#  979
                        987#
$TPB    001152           57#  1002*
$TPFLG  001157           57#  1002
$TPS    001150           57#  1002
$TRAP   012152          211   1080#
$TRAP2  012174         1080#
$TRP  = 000012         1080#
$TRPAD  012206         1080#
$TSTM   001004           55#
$TSTNM  001102           57#   267*  993*  995   997*
$TTYIN  010456          998#
$TYPBN= ****** U        1080
$TYPDS  010750         1001#  1080
$TYPE   011174         1002#  1003  1080
$TYPEC  011406          998   1002#
$TYPEX  011454         1002#
$TYPOC  010546          999#  1080
$TYPON  010562          999#  1080
$TYPOS  010522          999#  1080
$UNIT   001206           57#
$UNITM  001010           55#
$USWR   001220           57#
$VECT1  001244           57#   222
$VECT2  001246           57#
$XTSTR  007500          997#
$$GET4= 000000          993#
$OFILL  010745          999#*
$40CAT= ****** U        995   997
.     = 012730           18#    29    30#   33#   35#   38#   41#   51#   53#   55#   57#   211   262#
                        993   995   996#  997   998#  1001#  1002  1003#  1004  1105#
.$ASTA= ****** U        1003
.$X   - 001000           55#
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BDT      536#  563  564  565  566  567  568  569  570
COMMEN    44#
DELMA    155#  994
DFC       59#   68   75   82   89   96  103  109
ECB      126#  287  291  321  328  341  352  369  377  389  398  410  419  431  440
         456   468  480  489  504  513  525  534  563  564  565  566  567  568  569
         570   584  594  604  613  619  662  664  666  668  677  695  699  710  723
         735   752  768  784  806  847  871  893  909  923  942  978 1074
ENDCOM    44#
ERC      111#  284  289  318  325  339  350  366  374  387  396  408  417  429  438
         454   466  478  487  502  511  523  532  563  564  565  566  567  568  569
         570   579  592  602  611  617  662  664  666  668  675  683  697  707  720
         732   750  766  782  804  843  868  891  905  921  940  975 1042
ERROR     44#  284  289  318  325  339  350  366  374  387  396  408  417  429  438
         454   466  478  487  502  511  523  532  563  564  565  566  567  568  569
         570   579  592  602  611  617  662  664  666  668  675  683  697  707  720
         732   750  766  782  804  843  868  891  905  921  940  975 1042
ESCAPE    44#
GETPRI    44#
GETSWR    44#  262#
MULT      44#
NEWTST    44#  265  303  332  343  361  379  400  421  442  469  491  515  563  564
         565   566  567  568  569  570  572  586  662  664  666  668  670  688  701
         712   725  741  758  791  816  853  880  895  911  925  961  987
POP       44# 1001 1003 1004
POPSP2   137#  283  288  317  324  754  773  787  808  849  874  945 1040
PR       141#  293  493  747  763  777  796  801  839  861  936
PUSH      44# 1001 1003 1004
REPORT    44#
RESV     149#  258  259  260  261  756  770  774  789  810  851  876  946
SCOPE     44#  303  332  343  361  379  400  421  442  469  491  515  563  564  565
         566   567  568  569  570  572  586  662  664  666  668  670  688  701  712
         725   741  758  791  816  853  880  895  911  925  961  987  993
SETPRI    44#
SETTRA  1080#
SETUP     44#  211
SIGC     620#  662  664  666  668
SKIP      44#  338  349  370  373  390  395  411  416  432  437  457  465  481  486
         505   510  526  531  563  564  565  566  567  568  569  570  578  595  605
         614   616  662  664  666  668  678  682  696  706  719  731  771  890  901
         904   920  979
SLASH     44#
SPACE     44#
STARS     44#   51   55   57  265  303  332  343  361  379  400  421  442  469  491
         515   563  564  565  566  567  568  569  570  572  586  662  664  666  668
         670   688  701  712  725  741  758  791  816  853  880  895  911  925  961
         987   993  995  996  997  998  999 1001 1002 1003 1004 1080
SWRSU     44#  211#
TRMTRP  1080#
TYPBIN    44#
TYPDEC    44#  993
TYPNAM    44#  262
TYPNUM    44#
TYPOCS     6#   44#
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TYPOCT      44#     996     998
TYPTXT      44#
WARN       818#     828     854     882     896     913     927
ZZ1        295#     303     354#    361     950#    961
$$CMRE      57#
$$CMTM      57#
$$ESCA      44#
$$NEWT      44#     265     303     332     343     361     379     400     421     442     469     491     515     563     564
            565     566     567     568     569     570     572     586     662     664     666     668     670     688     701
            712     725     741     758     791     816     853     880     895     911     925     961     987
$$SET      1080#
$$SETM      211#
$$SKIP      44#     338     340     370     373     390     395     411     416     432     437     457     465     481     486
            505     510     526     531     563     564     565     566     567     568     569     570     578     595     605
            614     616     662     664     666     668     678     682     696     706     719     731     771     890     901
            904     920     979
.EQUAT       6#      44
.HEADE       5#      12
.SETTR       5#
.SETUP       5#     209
.SWRHI       7#      14
.SWRLO      14#
.TRMTR       5#
.$ACT1       9#      51
.$APTB      57#
.$APTH       9#      55
.$APTY       9#    1003
.$CATC       6#
.$CMTA       7#      57
.$EOP        7#     993
.$ERRO       7#     995
.$ERRT       7#     996
.$POWE       6#    1004
.$RDOC       5#
.$READ       8#     998
.$SCOP       8#     997
.$TRAP       5#    1080
.$TYPB       6#
.$TYPD       8#    1001
.$TYPE       8#    1002
.$TYPO       6#     999
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```
                451   462   463   473   474   485   493   498   499   509   519   520   530   563   564
                565   566   567   568   569   570   598   599   607   701   703   712   714   725   727
                728   744   745   747   756   759   760   761   763   770   774   775   776   777   789
                794   795   796   801   810   837   838   839   840   851   859   860   861   862   876
                895   898   902   932   933   936   946   963   964   971   993   994   995   996   997
                998   999  1001  1002  1003  1004  1026  1038  1080
MOVB            211   262   348   563   564   565   566   567   568   569   570   575   577   972   995
                997   998   999  1001  1002  1003  1080
NEG             999  1001
NOP             265   748   749   764   765   780   781   799   800   802   841   842   866   867   938
                939   993
RESET           263   334   345   704   729   993
ROL             999
RTI             211   293   493   747   763   777   796   801   839   861   936   995   997   998   999
               1001  1002  1004  1075  1080
RTS             994   996  1002  1003  1080
SUB             995  1001  1003  1027
TRAP           1080
TST             262   276   280   309   314   830   995   996   997   998   999  1001  1002  1003  1080
TSTB            608   705   730   997   998  1001  1002  1003
.ASCII           57
.ASCIZ           57   262   993   996   998  1004  1084  1086  1088  1090  1092  1093  1095  1097  1099
               1101  1103
.BLKB           998
.BLKW          1001
.BYTE            57   993   995   998   999  1003
.DSABL          998
.ENABL            3     4   998
.END           1121
.ENDC            12    14    44    51    55    57   209   211   262   265   303   332   338   343   349
                361   370   373   379   390   395   400   411   416   421   432   437   442   457   465
                469   481   486   491   505   510   515   526   531   563   564   565   566   567   568
                569   570   572   578   586   595   605   614   616   662   664   666   668   670   678
                682   688   696   701   706   712   719   725   731   741   758   771   791   816   853
                880   890   895   901   904   911   920   925   961   979   987   993   995   996   997
                998   999  1001  1002  1003  1004  1080
.EQUIV           44
.EVEN            57   262   996  1003  1004  1105
.IF              12    14    44    51    55    57   209   211   262   265   303   332   338   343   349
                361   370   373   379   390   395   400   411   416   421   432   437   442   457   465
                469   481   486   491   505   510   515   526   531   563   564   565   566   567   568
                569   570   572   578   586   595   605   614   616   662   664   666   668   670   678
                682   688   696   701   706   712   719   725   731   741   758   771   791   816   853
                880   890   895   901   904   911   920   925   961   979   987   993   995   996   997
                998   999  1001  1002  1003  1004  1080
.IFF             14    44    51    55    57   211   262   265   303   332   338   343   349   361   370
                373   379   390   395   400   411   416   421   432   437   442   457   465   469   481
                486   491   505   510   515   526   531   563   564   565   566   567   568   569   570
                572   578   586   595   605   614   616   662   664   666   668   670   678   682   688
                696   701   706   712   719   725   731   741   758   771   791   816   853   880   890
                895   901   904   911   920   925   961   979   987   993   995   996   997   998   999
               1001  1002  1003  1004  1080
.IFT            262   995   997   998
.IFTF           262   995   997   998
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.IIF      12   14   57  211  262  993  995  996  997  998 1002 1080
.IRP     209  265  303  332  343  361  379  400  421  442  469  491  515  563  564
         565  566  567  568  569  570  572  586  662  664  666  668  670  688  701
         712  725  741  758  791  816  853  880  895  911  925  961  987  997 1001
        1003 1004
.LIST      2   14   32   44   57  209  211  262  265  284  287  289  291  303  318
         321  325  328  332  339  341  343  350  352  361  366  369  374  377  379
         387  389  396  398  400  408  410  417  419  421  429  431  438  440  442
         454  456  466  468  469  478  480  487  489  491  502  504  511  513  515
         523  525  532  534  563  564  565  566  567  568  569  570  572  579  584
         586  592  594  602  604  611  613  617  619  662  664  666  668  670  675
         677  683  685  688  697  699  701  707  710  712  720  723  725  732  735
         741  750  752  758  766  768  782  784  791  804  806  816  843  847  853
         868  871  880  891  893  895  905  909  911  921  923  925  940  942  961
         975  978  987  993  995  997  998 1042 1074 1080
.MACRO    14   57   59  111  126  137  141  149  155  211  295  354  536  620  818
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.REPT     26
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         204  460  993  996  999 1002 1003 1004 1077 1078 1080 1107 1109 1111 1113
        1115 1117 1119
```

ERRORS DETECTED: 0

```
 *CVIBBA,CVIBBA/CRF-CVIBBA
RUN-TIME: 30 13 2 SECONDS
CORE USED:  25K
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