

RM02/03/05

RM05/3/2 DU POR TST 2
CZRMSBO

AH-F940B-MC
FICHE 1 OF 1

AUG 1981
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IDENTIFICATION

PRODUCT CODE: AC-F939B-MC
PRODUCT NAME: CZRMSB0 RM05/3/2 DUAL PORT TEST, PT 2
PRODUCT DATE: APRIL 1981
MAINTAINER: CX DIAGNOSTIC GROUP
AUTHOR: MIKE LEAVITT

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1. ABSTRACT

THE RM05/3/2 DUAL PORT LOGIC TEST PERFORMS A SERIES OF TESTS WHICH VERIFY THAT THE RM05/3/2 DUAL PORT LOGIC IS FUNCTIONING PROPERLY. ONLY THE CONTROL LOGIC IS TESTED BY THIS PROGRAM; DATA HANDLING IN THE DUAL PORT MODE IS NOT TESTED BY THIS PROGRAM.

BOTH PORTS OF THE DRIVE ARE CABLED TO THE SAME MASSBUS BY A SPECIAL ADAPTER CABLE. THIS ARRANGEMENT ALLOWS THE DUAL PORT LOGIC TO BE TESTED FROM ONE PDP-11, RH11 OR RH70.

THIS PROGRAM IS THE SECOND PART OF THE RM05/3/2 DUAL PORT OPTION LOGIC TEST, AND IS USED TO TEST THE 'PORT SELECT' SWITCH.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 PROCESSOR
8K MEMORY
KW11-L OR KW11-P CLOCK
TERMINAL
RH11 OR RH70
1 - DISK DRIVE (RM05, RM03 OR RM02)
RM DUAL PORT TEST CABLE (P/N: 7010507-02)

2.2 PREREQUISITE PROGRAMS

- A. RM05/3/2 DISKLESS TEST, PART 1 & 2
- B. RM05/3/2 FUNCTIONAL TEST, PART 1, 2 & 3

THE PRELIMINARY PROGRAMS MUST BE RUN TWICE: ONCE FROM EACH PORT (A & B).

- C. RM05/3/2 DUAL PORT LOGIC TEST, PART 1

2.3 OTHER PROGRAMS

DYNAMIC OPERATION OF THE DUAL PORT OPTION IS TESTED BY THE RM05/3/2 PERFORMANCE EXERCISER PROGRAM.

3. LOADING PROCEDURES

THE PROGRAM MAY BE LOADED BY THE ABSOLUTE PAPER TAPE LOADER OR IT MAY BE LOADED FROM THE APPROPRIATE MEDIA USING THE ASSOCIATED 'XXDP' LOADER. THE PROGRAM MAY NOT

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BE INCLUDED IN AN 'XXDP' CHAIN.

4. STARTING PROCEDURES

4.1 STARTING ADDRESSES

- A. THE NORMAL STARTING ADDRESS OF THE PROGRAM IS LOCATION 200(8). STARTING AT THIS ADDRESS ALLOWS THE OPERATOR TO SELECT (OR RESELECT) THE ADDRESS OF THE DRIVE TO BE TESTED.
- B. THE RESTART ADDRESS IS LOCATION 204(8). THE PROGRAM WILL USE THE CURRENT DRIVE ADDRESS.
- C. THE PROGRAM CAN BE STARTED AT LOCATION 210(8) TO ALLOW THE RH11 OR RH70 ADDRESS TO BE CHANGED.

4.2 OPERATOR ACTION

- A. CONNECT THE DUAL PORT TEST CABLE BETWEEN BUS A & BUS B ON THE DRIVE BEING TESTED. (SEE SECTION 5.4)
- B. LOAD THE PROGRAM INTO MEMORY IN THE PROCESSOR CONTROLLING THE MASSBUS USED FOR TESTING.
- C. SWITCH THE 'PORT SELECT' SWITCH ON THE DRIVE TO BE TESTED TO THE 'A/B' POSITION. CYCLE THE DRIVE UP.
- D. LOAD THE APPROPRIATE STARTING ADDRESS (200(8) OR 210(8)) INTO THE SWITCH REGISTER (OR THE 'SOFTWARE' SWITCH REGISTER, SEE SECTION 5.2.)
- E. PRESS START.
- F. ENTER THE DRIVE NUMBER.
- G. ENTER THE NUMBER OF THE TEST TO BE RUN. ('CARRIAGE RETURN' OR '0' WILL RUN ALL TESTS.)
- H. THE PROGRAM MAY BE STOPPED AT ANY TIME AND RESTARTED FROM LOCATION 204.

5. OPERATING PROCEDURES

5.1 'SOFTWARE' SWITCH REGISTER

IF THE PROGRAM IS BEING RUN ON A SWITCHLESS PROCESSOR THE PROGRAM WILL DETERMINE THAT THE HARDWARE SWITCH REGISTER IS NOT PRESENT AND WILL USE A 'SOFTWARE' SWITCH REGISTER. THE 'SOFTWARE' SWITCH REGISTER IS LOCATED AT LOCATION 176 (8). THE SETTINGS OF THE 'SOFTWARE' SWITCHES ARE CONTROLLED THROUGH A KEYBOARD ROUTINE WHICH IS CALLED BY TYPING A 'CONTROL G'. THE PROGRAM WILL RECOGNIZE THE 'CONTROL G' AT ANY TIME EXCEPT WHEN THE PROGRAM IS AT A HIGHER PRIORITY PROCESSING AN RM80 INTERRUPT. THE 'SOFTWARE' SWITCH VALUES ARE ENTERED AS AN OCTAL NUMBER IN RESPONSE TO THE PROMPT FROM THE SWITCH ENTRY ROUTINE:

'SWR = NNNNNN NEW ='

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EACH TIME SWITCH SETTING ARE ENTERED, THE ENTIRE SWITCH REGISTER IMAGE MUST BE ENTERED. LEADING ZEROS ARE NOT REQUIRED., 'RUBOUT' AND 'CONTROL U' FUNCTIONS MAY BE USED TO CORRECT TYPING ERRORS DURING SWITCH ENTRY.

ON PROCESSORS WITH HARDWARE SWITCH REGISTERS, THE 'SOFTWARE' SWITCH REGISTER MAY BE USED, IF THE PROGRAM FINDS ALL 1'S IN THE SWITCHES. ALL SWITCH REGISTER REFERENCES WILL BE TO THE 'SOFTWARE' REGISTER AND THE PROCEDURES DESCRIBED ABOVE MUST BE FOLLOWED.

5.2 OPERATIONAL SWITCH SETTINGS

WITH ALL SWITCHES SET TO ZERO, THE PROGRAM WILL TYPE ALL ERRORS AND CONTINUE TESTING.

THE SWITCH SETTINGS ARE:

SW<15>=1	HALT ON ERROR
SW<14>=1	LOOP ON TEST
SW<13>=1	INHIBIT ERROR TYPEOUTS
SW<11>=1	INHIBIT TEST ITERATIONS
SW<10>=1	RING TTY BELL ON ERROR
SW<09>=1	LOOP ON ERROR

5.3 TEST SELECTION

INDIVIDUAL TESTS ARE SELECTED IN RESPONSE TO THE 'ENTER TEST NUMBER:' MESSAGE. ANY VALID TEST NUMBER CAN BE ENTERED. EACH ENTRY MUST BE TERMINATED BY A CARRIAGE RETURN (CR). THE LOOP ON TEST SWITCH, SW<14>, MUST BE SET TO ALL CONTINUOUS EXECUTION OF THE SELECTED TEST.

TO RUN ALL TESTS IN SEQUENCE, ENTER EITHER A '0' FOLLOWED BY A CARRIAGE RETURN OR A CARRIAGE RETURN BY ITSELF. THE PROGRAM WILL THEN EXECUTE ALL TESTS IN SEQUENCE.

THE 'RUBOUT KEY' (RO) CAN BE USED TO DELETE THE LAST CHARACTER ENTERED. SUCCESSIVELY STRIKING THE RO KEY WILL DELETE CHARACTERS UNTIL THE PREVIOUS CHARACTERS HAVE BEEN DELETED. CHARACTERS DELETED BY THE RO KEY WILL BE TYPED AND WILL BE SEPARATED BY '\ ' FROM THE CHARACTERS ENTERED BY THE OPERATOR.

THE OPERATOR CAN DELETE AN ENTIRE ENTRY BY TYPING A 'CONTROL U' .

5.4 TEST CABLE CONNECTION

TO TEST THE RM05/3/2 DUAL PORT OPTION WITH THIS PROGRAM, A SPECIAL TEST CABLE MUST BE USED. (THE TEST CABLE IS P/N: 7010507-02). THE TEST CABLE CONNECTS MASSBUS A & MASSBUS B TOGETHER AT THE DRIVE BEING TESTED AND IS CONSTRUCTED SO THAT BIT 0 OF THE MASSBUS UNIT SELECT LINES IS COMPLEMENTED.

WITH THE TEST CABLE CONNECTED TO THE DRIVE UNDER TEST, THE DRIVE APPEARS AS TWO UNITS ON THE MASSBUS: EACH PORT

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OF THE RM05/3/2 WILL RESPOND TO A DIFFERENT MASSBUS ADDRESS.

THE ADDRESS OF EACH PORT WILL DEPEND UPON THE DRIVE'S ADDRESS PLUG.

THE PROGRAM WILL TYPEOUT THE APPARENT ADDRESSES OF BOTH PORTS. (ONE PORT WILL HAVE THE ADDRESS OF THE DRIVE; THE OTHER PORT WILL HAVE THE ADDRESS DEVELOPED BY THE CABLE).

* ANY OTHER DRIVE ON THE MASSBUS WHICH HAS AN ADDRESS IN *
* CONFLICT WITH EITHER OF THE TEST ADDRESSES MUST BE *
* POWERED DOWN. *

THE TEST CABLE CONNECTION TO THE DRIVE UNDER TEST WILL DEPEND ON WHICH PROCESSOR, RH11/RH70 IS TO TEST THE DRIVE. IF THE DRIVE IS TO BE TESTED BY THE PROCESSOR ON PORT A, CONNECT THE MASSBUS CABLE FROM THE RH11/RH70 TO J3 OF THE RM05/3/2 BACK PANEL, THEN CONNECT THE TEST CABLE (P/N: 7010507-02) FROM J2 TO J7 OF THE BACK PANEL AND TERMINATE THE PORT B AT J6.

WHEN THE DUAL PORT TEST CABLE IS CONNECTED, THE ATTENTION BITS FOR PORTS A & B ARE ASSERTED IN THE SAME BIT POSITION WHEN 'RMAS' (ATTENTION SUMMARY REGISTER) IS READ. THE ATTENTION BIT POSITION IS DETERMINED BY THE ADDRESS OF THE DRIVE. THE ATTENTION BIT THAT APPEARS FOR THE DRIVE IS THE INCLUSIVE 'OR' OF THE PORT A & PORT B ATTENTION BITS. BECAUSE OF THIS, THE PROGRAM LOOKS AT ONLY THE ATTENTION BIT IN 'RMDS' (DRIVE STATUS REGISTER) TO DETERMINE THE STATE OF THE SELECTED PORT'S ATTENTION BIT.

6. ERRORS

WHEN THE PROGRAM ENCOUNTERS AN ERROR, THE ERROR ROUTINE IS CALLED AND IF SW<13> IS NOT SET, THE ERROR MESSAGE PERTAINING TO THE ERROR WILL BE TYPED. EACH ERROR TYPEOUT WILL CONTAIN THE FOLLOWING:

- A. AN ERROR MESSAGE
- B. A DATA HEADER LINE
- C. A DATA LINE CONTAINING:
 - 1. THE TEST NUMBER
 - 2. THE PC (PROGRAM COUNTER VALUE) WHERE THE ERROR CALL WAS MADE
 - 3. CONTENTS OF THE APPROPRIATE REGISTERS

7. MISCELLANEOUS

7.1 RESTRICTIONS

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TO RUN THIS PROGRAM, THE SYSTEM MUST HAVE EITHER A KW11-P OR A KW11-L CLOCK. ADDITIONALLY, THE RM05/3/2 UNDER TEST MUST HAVE THE DUAL PORT TEST CABLE CONNECTED.

7.2 LIMITATIONS

THIS PROGRAM DOES NOT TEST DATA TRANSFERS THROUGH EITHER PORT AND DOES NOT TEST THE DYNAMIC OPERATION OF THE DUAL PORT OPTION.

7.3 EXECUTION TIME

THE PROGRAM TAKES ABOUT 4 MINUTES PER PASS (DEPENDING ON OPERATOR INTERVENTION EFFICIENCY).

7.4 REQUIRED TESTS

IF THE PROGRAM IS BEING EXECUTED IN SINGLE TEST MODE, THE OPERATOR MUST CALL AND RUN THE FOLLOWING TESTS BEFORE OTHER TESTS ARE RUN:

- A. TEST 2 AND TEST 3. THESE TESTS SET 'VV-A' AND 'VV-B' RESPECTIVELY. THESE TESTS MUST BE PERFORMED AT LEAST ONCE BEFORE TESTS 4 - 10 ARE RUN.
- B. TEST 4 AND TEST 5. THESE TESTS DETERMINE AND STORE FOR LATER USE THE TIMEOUT ONE-SHOT VALUE MEASURED THROUGH EACH PORT. THESE TESTS MUST BE PERFORMED AT LEAST ONCE BEFORE TESTS 6 - 10 ARE RUN.

7.5 DISK SURFACE USAGE

THE DIAGNOSTIC DOES NOT USE THE DISK SURFACE. HOWEVER, THE DRIVE MUST BE CYCLED UP AND ON LINE FOR THE DIAGNOSTIC TO BE RUN.

7.8 LOOP ON ERROR OPTION

IF SW<09> IS SET, THE PROGRAM WILL LOOP ON A FAILING TEST UNTIL EITHER THE SWITCH IS RESET OR THE ERROR STOPS OCCURING. BECAUSE THE PROGRAM MUST RESET THE RM05/3/2 TO A KNOWN STATE BEFORE LOOPING ON THE ERROR, THE TEST FOR SW<09> IS PERFORMED AT THE END OF THE TEST - NOT AT THE POINT WHERE THE ERROR WAS DETECTED.

8. TEST DESCRIPTIONS

8.1 METHOD USED TO VERIFY THAT DRIVE IS IN NEUTRAL

THE PROGRAM DETERMINES THE THE DRIVE IS IN NEUTRAL BY CHECKING THE CONTENTS OF THE DRIVE STATUS REGISTER (RMDS) THROUGH BOTH PORTS. THE PROGRAM MASKS OUT THE PORT DEPENDENT BITS

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('ATA' & 'VV') AND VERIFIES THAT CORRECT STATUS IS READ THROUGH BOTH PORTS. (THE CORRECT STATUS IS 'MOL', 'PGM', 'DPR', & 'DRY'.) IF NEITHER PORT SEES ALL ZEROS FROM RMDS, THE PROGRAM CONCLUDES THAT THE DRIVE IS IN NEUTRAL AND THAT ANY BIT DISCREPANCY BETWEEN PORTS INDICATES A FAILURE IN THE PATH FOR THAT BIT.

8.2 METHOD USED TO VERIFY THAT THE DRIVE HAS BEEN SEIZED

THE PROGRAM VERIFIES THAT THE DRIVE HAS BEEN SEIZED BY CHECKING THE DRIVE STATUS REGISTER (RMDS) THROUGH THE SEIZING PORT AND VERIFYING THAT CORRECT STATUS IS SEEN. WHEN RMDS IS READ THROUGH THE OPPOSITE PORT, ZEROS SHOULD BE SEEN. IF BOTH CONDITIONS EXIST, (I.E., THE OPPOSITE PORT), THE PROGRAM CONCLUDES THAT THE DRIVE HAS BEEN SEIZED BY THE SPECIFIED PORT.

TEST 1 DRIVE ACCESS TEST

VERIFY THAT THE DRIVE CAN BE ACCESSED THROUGH BOTH PORTS

- A. SELECT DRIVE, VERIFY THAT THE DRIVE IS PRESENT, THAT THE DRIVE IS A DUAL PORT RM05/3/2, THAT THE DRIVE IS ONLINE (RMDS HAS 'MOL', 'PGM', 'DPR', & 'DRY' BITS SET), AND THE THE DRIVE SERIAL NUMBER READ THROUGH BOTH PORTS IS THE SAME.
- B. THE TEST IS REPEATED THROUGH BOTH PORTS.

TEST 2 SET 'VV' FOR PORT A

SET VOLUME VALID

- A. ISSUE A DRIVE CLEAR COMMAND THROUGH PORT A.
- B. ISSUE A READIN PRESET COMMAND THROUGH PORT A. VERIFY THAT THE 'VV' BIT IS SET FOR PORT A.
- C. ISSUE A RELEASE COMMAND THROUGH PORT A. VERIFY THAT THE DRIVE RETURNED TO NEUTRAL AND THAT NEITHER ATTENTION BIT IS SET.

TEST 3 SET 'VV' FOR PORT B

SET VOLUME VALID

- A. ISSUE A DRIVE CLEAR COMMAND THROUGH PORT B.
- B. ISSUE A READIN PRESET COMMAND THROUGH PORT B. VERIFY THAT THE 'VV' BIT IS SET FOR PORT B.
- C. ISSUE A RELEASE COMMAND THROUGH PORT B. VERIFY THAT THE DRIVE RETURNED TO NEUTRAL AND THAT NEITHER ATTENTION BIT IS SET.

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TEST 4 MEASURE THE TIMEOUT ONE-SHOT THROUGH PORT A

MEASURE THE TIMEOUT ONE-SHOT VALUE THROUGH PORT A

- A. WRITE 0'S INTO RMDS THROUGH PORT A AND VERIFY THAT THE DRIVE HAS BEEN SEIZED.
- B. WAIT FOR TIMEOUT TO OCCUR. MEASURE THE DURATION OF THE TIMEOUT ONE-SHOT AND SAVE THE VALUE FOR LATER USE.
- C. VERIFY THAT THE TIMEOUT OCCURRED AND THAT THE DRIVE RETURNS TO NEUTRAL

TEST 5 MEASURE THE TIMEOUT ONE-SHOT THROUGH PORT B

MEASURE THE TIMEOUT ONE-SHOT VALUE THROUGH PORT B

- A. WRITE 0'S INTO RMDS THROUGH PORT B AND VERIFY THAT THE DRIVE HAS BEEN SEIZED.
- B. WAIT FOR TIMEOUT TO OCCUR. MEASURE THE DURATION OF THE TIMEOUT ONE-SHOT AND SAVE THE VALUE FOR LATER USE.
- C. VERIFY THAT THE TIMEOUT OCCURRED AND THAT THE DRIVE RETURNS TO NEUTRAL

TEST 6 TEST 'PORT SELECT' SWITCH, DRIVE CYCLED UP

TEST THE OPERATION OF THE 'PORT SELECT' SWITCH (DRIVE CYCLED UP).

- A. SWITCH TO PORT 'A' POSITION. VERIFY THAT THE DRIVE IS IN NEUTRAL AND THAT THE STATUS BITS IN RMDS, AS READ THROUGH BOTH PORTS, ARE CORRECT.
- B. SWITCH TO PORT 'B' POSITION. VERIFY THAT THE DRIVE IS IN NEUTRAL AND THAT THE STATUS BITS IN RMDS, AS READ THROUGH BOTH PORTS, ARE CORRECT.
- C. RETURN THE 'PORT SELECT' SWITCH TO THE 'A/B' POSITION. VERIFY THE DRIVE STATE.

TEST 7 TEST 'PORT SELECT' SWITCH LOCKED ON PORT A

TEST THE OPERATION OF THE 'PORT SELECT' SWITCH (DRIVE CYCLED DOWN).

- A. CYCLE THE DRIVE DOWN.
- B. SWITCH TO PORT 'A' POSITION. VERIFY THAT THE DRIVE IS IN NEUTRAL AND THAT THE STATUS BITS IN RMDS, AS READ THROUGH BOTH PORTS, ARE CORRECT.
- C. SWITCH THE 'PORT SELECT' SWITCH TO A; CYCLE THE DRIVE UP.

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- D. WHEN THE DRIVE CYCLES UP, VERIFY THAT 'VV-A IS RESET, AND THAT 'ATA-A IS SET.
- E. ISSUE A DRIVE CLEAR COMMAND AND A READIN PRESET COMMAND THROUGH PORT A.
- F. VERIFY THAT THE DRIVE CANNOT BE ACCESSED THROUGH PORT B AND 'NED' SETS WHEN ATEMPTING TO ACCESS THE DRIVE THROUGH PORT B. ATTEMPT TO SET PORT REQUEST BY WRITING 0'S INTO RMDS THROUGH PORT B.
- G. ISSUE A RELEASE COMMAND THROUGH PORT A. VERIFY THAT THE DRIVE REMAINS LOCKED ON PORT A.

TEST 10 TEST 'PORT SELECT' SWITCH LOCKED ON PORT B

TEST THE OPERATION OF THE 'PORT SELECT' SWITCH (DRIVE CYCLED DOWN).

- A. CYCLE THE DRIVE DOWN.
- B. SWITCH TO PORT 'B' POSITION. VERIFY THAT THE DRIVE IS IN NEUTRAL AND THAT THE STATUS BITS IN RMDS, AS READ THROUGH BOTH PORTS, ARE CORRECT.
- C. SWITCH THE 'PORT SELECT' SWITCH TO B; CYCLE THE DRIVE UP.
- D. WHEN THE DRIVE CYCLES UP, VERIFY THAT 'VV-B IS RESET, AND THAT 'ATA-B IS SET.
- E. ISSUE A DRIVE CLEAR COMMAND AND A READIN PRESET COMMAND THROUGH PORT B.
- F. VERIFY THAT THE DRIVE CANNOT BE ACCESSED THROUGH PORT A AND 'NED' SETS WHEN ATEMPTING TO ACCESS THE DRIVE THROUGH PORT A. ATTEMPT TO SET PORT REQUEST BY WRITING 0'S INTO RMDS THROUGH PORT A.
- G. ISSUE A RELEASE COMMAND THROUGH PORT B. VERIFY THAT THE DRIVE REMAINS LOCKED ON PORT B.
- H. CYCLE THE DRIVE DOWN. CHANGE THE 'PORT SELECT' SWITCH TO A/B; CYCLE THE DRIVE UP.
- I. VERIFY THAT BOTH PORTS CAN ACCESS THE DRIVE, THAT BOTH ATTENTION BITS ARE SET, AND THAT BOTH 'VV' BITS ARE RESET.

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;*COLORADO SPGS., CO. 80919
;*
;*PROGRAM BY MIKE LEAVITT
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-C5), 18-MAR-81

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.SBTTL OPERATIONAL SWITCH SETTINGS
;*
;* SWITCH USE
;* -----
;* 15 HALT ON ERROR
;* 14 LOOP ON TEST
;* 13 INHIBIT ERROR TYPEOUTS
;* 11 INHIBIT ITERATIONS
;* 10 BELL ON ERROR
;* 9 LOOP ON ERROR

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.SBTTL BASIC DEFINITIONS

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001100      ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
104000      STACK = 1100
000004      ERROR = EMT          ;;BASIC DEFINITION OF ERROR CALL
           SCOPE = IOT          ;;BASIC DEFINITION OF SCOPE CALL

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000011      ;*MISCELLANEOUS DEFINITIONS
000012      HT = 11             ;;CODE FOR HORIZONTAL TAB
000015      LF = 12             ;;CODE FOR LINE FEED
000200      CR = 15             ;;CODE FOR CARRIAGE RETURN
177776      CRLF = 200          ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776      PS = 177776        ;;PROCESSOR STATUS WORD
177774      PSW=PS
177774      STKLMT = 177774     ;;STACK LIMIT REGISTER
177772      PIRQ = 177772      ;;PROGRAM INTERRUPT REQUEST REGISTER
177570      DSWR = 177570      ;;HARDWARE SWITCH REGISTER
177570      DDISP = 177570     ;;HARDWARE DISPLAY REGISTER

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000000      ;*GENERAL PURPOSE REGISTER DEFINITIONS
000001      R0 = %0             ;;GENERAL REGISTER
000002      R1 = %1             ;;GENERAL REGISTER
000003      R2 = %2             ;;GENERAL REGISTER
000004      R3 = %3             ;;GENERAL REGISTER
000005      R4 = %4             ;;GENERAL REGISTER
000006      R5 = %5             ;;GENERAL REGISTER
000007      R6 = %6             ;;GENERAL REGISTER
000006      R7 = %7             ;;GENERAL REGISTER
000006      SP = %6             ;;STACK POINTER
000007      PC = %7             ;;PROGRAM COUNTER

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000000      ;*PRIORITY LEVEL DEFINITIONS
000040      PRO = 0             ;;PRIORITY LEVEL 0
           PR1 = 40            ;;PRIORITY LEVEL 1

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000100	PR2	= 100	::PRIORITY LEVEL 2
000140	PR3	= 140	::PRIORITY LEVEL 3
000200	PR4	= 200	::PRIORITY LEVEL 4
000240	PR5	= 240	::PRIORITY LEVEL 5
000300	PR6	= 300	::PRIORITY LEVEL 6
000340	PR7	= 340	::PRIORITY LEVEL 7

;'SWITCH REGISTER' SWITCH DEFINITIONS

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

;'DATA BIT DEFINITIONS (BIT00 TO BIT15)

100000	BIT15	= 100000
040000	BIT14	= 40000
020000	BIT13	= 20000
010000	BIT12	= 10000
004000	BIT11	= 4000
002000	BIT10	= 2000
001000	BIT09	= 1000
000400	BIT08	= 400
000200	BIT07	= 200
000100	BIT06	= 100
000040	BIT05	= 40
000020	BIT04	= 20
000010	BIT03	= 10
000004	BIT02	= 4
000002	BIT01	= 2
000001	BIT00	= 1
001000	BIT9=BIT09	
000400	BIT8=BIT08	
000200	BIT7=BIT07	
000100	BIT6=BIT06	
000040	BIT5=BIT05	

000020
 000010
 000004
 000002
 000001

BIT4=BIT04
 BIT3=BIT03
 BIT2=BIT02
 BIT1=BIT01
 BIT0=BIT00

```

;*BASIC "CPU" TRAP VECTOR ADDRESSES
ERRVEC = 4           ;; TIME OUT AND OTHER ERRORS
RESVEC = 10          ;; RESERVED AND ILLEGAL INSTRUCTIONS
TBITVEC = 14         ;; 'T' BIT
TRTVEC = 14         ;; TRACE TRAP
BPTVEC = 14         ;; BREAKPOINT TRAP (BPT)
IOTVEC = 20          ;; INPUT/OUTPUT TRAP (IOT) **SCOPE**
PWRVEC = 24          ;; POWER FAIL
EMTVEC = 30          ;; EMULATOR TRAP (EMT) **ERROR**
TRAPVEC = 34         ;; 'TRAP' TRAP
TKVEC = 60           ;; TTY KEYBOARD VECTOR
TPVEC = 64           ;; TTY PRINTER VECTOR
PIRQVEC = 240        ;; PROGRAM INTERRUPT REQUEST VECTOR
    
```

000004
 000010
 000014
 000014
 000014
 000020
 000024
 000030
 000034
 000060
 000064
 000240

.SBTTL RH/RM REGISTERS

;CONTROL AND STATUS REGISTER 1 (RMCS1)

000100
 000200
 000400
 001000
 002000
 020000
 040000
 100000

```

IE = 100           ;INTERRUPT ENABLE (BIT #6)
RDY = 200          ;READY (BIT #7)
A16 = 400          ;HIGH ORDER BUS ADDRESS BIT (BIT #8)
A17 = 1000         ;HIGH ORDER BUS ADDRESS BIT (BIT #9)
PSEL = 2000        ;PORT SELECT (BIT #10)
MCPE = 20000       ;MASSBUS PARITY ERROR (BIT #13)
TRE = 40000        ;TRANSFER ERROR (BIT #14)
SC = 100000        ;SPECIAL CONDITION (BIT #15)
    
```

;WORD COUNT REGISTER (RMWC)
 ;(EACH BIT IS CALLED BY BIT NUMBER)

;BUS ADDRESS REGISTER (RMBA)
 ;(EACH BIT IS CALLED BY BIT NUMBER)

;CONTROL AND STATUS REGISTER 2 (RMCS2)

000001
 000002
 000004
 000010
 000020
 000040
 000100
 000200
 000400
 001000
 002000
 004000
 010000
 020000
 040000
 100000

```

U0 = 1             ;UNIT SELECT (BIT #0)
U1 = 2             ;UNIT SELECT (BIT #1)
U3 = 4             ;UNIT SELECT (BIT #2)
BAI = 10           ;BUS ADDRESS INCREMENT INHIBIT (BIT #3)
PAT = 20           ;MASSBUS PARITY TEST (BIT #4)
CLR = 40           ;CLEAR (BIT #5)
IR = 100           ;INPUT READY (BIT #6)
OR = 200           ;OUTPUT READY (BIT #7)
MDPE = 400         ;MASS BUS PARITY ERROR (BIT #8)
MXF = 1000         ;MISSED TRANSFER ERROR (BIT #9)
PGE = 2000         ;PROGRAM ERROR (BIT #10)
NEM = 4000         ;NON EXISTENT MEMORY (BIT #11)
NED = 10000        ;NON EXISTENT DRIVE (BIT #12)
UPE = 20000        ;UNIBUS PARITY ERROR (BIT #13)
WCE = 40000        ;WRITE CHECK ERROR (BIT #14)
DLT = 100000       ;DATA LATE (BIT #15)
    
```

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```

558
559 ;DATA BUFFER REGISTER (RMDB)
560 ;(EACH BIT IS CALLED BY BIT NUMBER)
561
562 .SBTTL RM REGISTERS
563
564 ;CONTROL AND STATUS 1 REGISTER. (#00)
565
566 000001 GO = 1 ;GO BIT (BIT #0)
567 000002 F0 = 2 ;FUNCTION CODE BIT #1
568 000004 F1 = 4 ;FUNCTION CODE BIT #2
569 000010 F2 = 10 ;FUNCTION CODE BIT #3
570 000020 F3 = 20 ;FUNCTION CODE BIT #4
571 000040 F4 = 40 ;FUNCTION CODE BIT #5
572 004000 DVA = 4000 ;DEVICE AVAILABLE (BIT #11)
573
574 ;DRIVE STATUS REGISTER (RMDS) (#01)
575
576 ;DF5 = 1 DRIVE FORWARD 5'/SEC. (BIT #0)
577 000002 DFF20 = 2 ;DRIVE FORWARD 20'/SEC. (BIT #1)
578 000004 DIGB = 4 ;DRIVE TO INNER GUARD BAND (BIT #2)
579 000010 GRV = 10 ;GO REVERSE (BIT #3)
580 000020 DL64 = 20 ;DIFFERENCE LESS THAN 64 (BIT #4)
581 000040 DE1 = 40 ;DIFFERENCE EQUALS 1 (BIT #5)
582 000100 VV = 100 ;VOLUME VALID (BIT #6)
583 000200 DRY = 200 ;DRIVE READY (BIT #7)
584 000400 DPR = 400 ;DRIVE PRESENT (BIT #8)
585 001000 PGM = 1000 ;PROGRAMABLE (BIT #9)
586 002000 LBT = 2000 ;LAST SECTOR TRANSFERRED (BIT #10)
587 004000 WRL = 4000 ;WRITE LOCK (BIT #11)
588 010000 MOL = 10000 ;MEDIUM ON-LINE (BIT #12)
589 020000 PIP = 20000 ;POSITIONING OPERATION IN PROGRESS (BIT #13)
590 040000 ERR = 40000 ;COMPOSITE ERROR (BIT #14)
591 100000 ATA = 100000 ;ATTENTION ACTIVE (BIT #15)
592
593 ;ERROR REGISTER #01 (RMER1) (#02)
594
595 000001 ILF = 1 ;ILLEGAL FUNCTION (BIT #0)
596 000002 ILR = 2 ;ILLEGAL REGISTER (BIT #1)
597 000004 RMR = 4 ;REGISTER MODIFICATION REFUSED (BIT #2)
598 000010 PAR = 10 ;PARITY ERROR (BIT #3)
599 000020 FER = 20 ;FORMAT ERROR (BIT #4)
600 000040 WCF = 40 ;WRITE CLOCK FAIL (BIT #5)
601 000100 ECH = 100 ;ECC HARD ERROR (BIT #6)
602 000200 HCE = 200 ;HEADER COMPARE ERROR (BIT #7)
603 000400 HCRC = 400 ;HEADER CRC ERROR (BIT #8)
604 001000 AOE = 1000 ;ADDRESS OVERFLOW ERROR (BIT #9)
605 002000 IAE = 2000 ;INVALID ADDRESS ERROR (BIT #10)
606 004000 WLE = 4000 ;WRITE LOCK ERROR (BIT #11)
607 010000 DTE = 10000 ;DRIVE TIMING ERROR (BIT #12)
608 020000 OPI = 20000 ;OPERATION INCOMPLETE (BIT #13)
609 040000 UNS = 40000 ;DRIVE UNSAFE (BIT #14)
610 100000 DCK = 100000 ;DATA CHECK ERROR (BIT 15)
611
612 ;MAINTAINABILITY REGISTER (RMMR1) (#03)
613
614 000001 DMD = 1 ;DIAGINOSTIC MODE (BIT #0)
  
```

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615
616
617
618      000001
619      000002
620      000004
621      000010
622      000020
623      000040
624      000100
625      000200
626
627
628
629
630
631
632      000001
633      000002
634      000004
635      000010
636      000020
637      000040
638      000100
639      000200
640      000400
641      000800
642      002000
643      004000
644      010000
645
646
647
648      000100
649      000200
650      000400
651      001000
652      002000
653
654
655
656      000010
657      000200
658      002000
659      004000
660      010000
661      020000
662      100000
663
664
665
666      000200
667      002000
668      004000
669      010000
670
671

```

```

;ATTENTION SUMMARY PSEUDO-REGISTER (RMAS) (#04)
AT0      = 1      ;DEVICE 0 (BIT #0)
AT1      = 2      ;DEVICE 1 (BIT #1)
AT2      = 4      ;DEVICE 2 (BIT #2)
AT3      = 10     ;DEVICE 3 (BIT #3)
AT4      = 20     ;DEVICE 4 (BIT #4)
AT5      = 40     ;DEVICE 5 (BIT #5)
AT6      = 100    ;DEVICE 6 (BIT #6)
AT7      = 200    ;DEVICE 7 (BIT #7)

;DESIRED SECTOR/TRACK ADDRESS REGISTER (RMDA) (#05)
;(EACH BIT IS CALLED BY BIT NUMBER)

;DRIVE TYPE REGISTER (RMDT) (#06)
DT00     = 1      ;DRIVE TYPE NUMBER BIT 1
DT01     = 2      ;DRIVE TYPE NUMBER BIT 2
DT02     = 4      ;DRIVE TYPE NUMBER BIT 3
DT03     = 10     ;DRIVE TYPE NUMBER BIT 4
DT04     = 20     ;DRIVE TYPE NUMBER BIT 5
DT05     = 40     ;DRIVE TYPE NUMBER BIT 6
DT06     = 100    ;DRIVE TYPE NUMBER BIT 7
DT07     = 200    ;DRIVE TYPE NUMBER BIT 8
DT08     = 400    ;DRIVE TYPE NUMBER BIT 9
DRQ      = 4000   ;DRIVE REQUEST REQUIRED (BIT #11)
MOH      = 20000  ;MOVING HEAD (BIT #13)
TAP      = 40000  ;TAPE DRIVE (BIT #14)
NBA      = 100000 ;NOT BLOCK ADDRESSED (BIT #15)

;LOOK-AHEAD REGISTER (RMLA) (#07)
SC0      = 100    ;SECTOR COUNT FIELD 0 (BIT #6)
SC1      = 200    ;SECTOR COUNT FIELD 1 (BIT #7)
SC2      = 400    ;SECTOR COUNT FIELD 2 (BIT #8)
SC3      = 1000   ;SECTOR COUNT FIELD 3 (BIT #9)
SC4      = 2000   ;SECTOR COUNT FIELD 4 (BIT #10)

;RM ERROR REGISTER #2 (RMER2) (#10)
DPE      = 10     ;DATA PARITY ERROR (BIT #3)
DVC      = 200    ;DEVICE CHECK (BIT #7)
LBC      = 2000   ;LOSS OF BIT CLOCK (BIT #10)
LSC      = 4000   ;LOSS OF SYSTEM CLOCK (BIT #11)
IVC      = 10000  ;INVALID COMMAND (BIT #12)
OPE      = 20000  ;OPERATOR ERROR (BIT #13)
SKI      = 100000 ;SEEK INCOMPLETE (BIT #14)

;OFFSET REGISTER (RMOF) (#11)
OFD      = 200    ;OFFSET FORWARD (BIT #5)
HCI      = 2000   ;HEADER COMPARE INHIBIT (BIT #10)
ECI      = 4000   ;ERROR CORRECTION CODE INHIBIT (BIT #11)
FMT16    = 10000  ;FORMAT BIT (BIT #12)

;DESIRED CYLINDER ADDRESS (RMDC) (#12)

```


672 ;(EACH BIT IS CALLED BY BIT NUMBER)
 673
 674 ;SERIAL NUMBER REGISTER (RMSN) (#14)
 675 ;(EACH IS CALLED BY BIT NUMBER)
 676
 677 ;ECC POSITION REGISTER (RMEC1) (#16)
 678 ;(EACH BIT IS CALLED BY BIT NUMBER)
 679
 680 ;ECC PATTERN REGISTER (RMEC2) (#17)
 681 ;(EACH BIT IS CALLED BY BIT NUMBER)
 682

.SBTTL DEFINITIONS OF THE RH/RM ADDRESS INDEXES

685	000000	RMCS1 = 0	;	CONTROL AND STATUS REGISTER #1 (DRIVE REG. 00)
686	000002	RMWC = 2	;	WORD COUNT REGISTER (NOT A DRIVE REG)
687	000004	RMBA = 4	;	UNIBUS ADDRESS REGISTER (NOT A DRIVE REG)
688	000006	RMDA = 6	;	DESIRED SECTOR/TRACK ADDRESS REGISTER (DRIVE REG. 05)
689	000010	RMCS2 = 10	;	CONTROL AND STATUS REGISTER #2 (NOT A DRIVE REG)
690	000012	RMD5 = 12	;	DRIVE STATUS REGISTER (DRIVE REG 01)
691	000014	RMER1 = 14	;	ERROR REGISTER #1 (DRIVE REG. 02)
692	000016	RMA5 = 16	;	ATTENTION SUMMARY PSEUDO REGISTER (DRIVE REG. 04)
693	000020	RMLA = 20	;	LOOK AHEAD REGISTER (DRIVE REG. 07)
694	000022	RMDB = 22	;	DATA BUFFER REGISTER (NOT A DRIVE REG.)
695	000024	RMMR1 = 24	;	MAINTAINABILITY REGISTER (DRIVE REG. 03)
696	000026	RMDT = 26	;	DRIVE TYPE REGISTER (DRIVE REG. 06)
697	000030	RMSN = 30	;	SERIAL NUMBER REGISTER (DRIVE REG. 10)
698	000032	RMOF = 32	;	OFFSET REGISTER (DRIVE REG. 11)
699	000034	RMDC = 34	;	DESIRED CYLINDER ADDRESS REGISTER (DRIVE REG. 12)
700	000040	RMMR2 = 40	;	MAINTENANCE REGISTER #2 (DRIVE REG. 14)
701	000042	RMER2 = 42	;	ERROR REGISTER #2 (DRIVE REG. 15)
702	000044	RMEC1 = 44	;	ECC POSITION REGISTER (DRIVE REG. 16)
703	000046	RMEC2 = 46	;	ECC PATTERN REGISTER (DRIVE REG. 17)
704				

```
1          .SBTTL TRAP CATCHER
          000000          .=0
          ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
          ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
          ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
          000174          000174          .=174
000174      000000      DISPREG: .WORD 0          ;;SOFTWARE DISPLAY REGISTER
000176      000000      SWREG:   .WORD 0          ;;SOFTWARE SWITCH REGISTER

          .SBTTL STARTING ADDRESS(ES)
2          000200      000137      001766          JMP      @#START          ;;JUMP TO STARTING ADDRESS OF PROGRAM
3          000204      000137      001774          JMP      @#START1         ;START AND CHANGE THE RH/RM ADDRESS
4
5          .SBTTL ACT11 HOOKS
          ;*****
          ;HOOKS REQUIRED BY ACT11
          000210          $SVPC=.          ;SAVE PC
          000046          .=46
000046      013366      $ENDAD          ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
          000052          .=52
000052      020000      .WORD 20000      ;;2)SET LOC.52 TO 20000
          000210          .= $SVPC          ;; RESTORE PC
6
```


0

.SBTTL COMMON TAGS

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

Address	Value	Label	Type	Value	Description
001100	001100	\$CMTAG:		.=1100	:: START OF COMMON TAGS
001100	000000	\$PASS:	.WORD	0	:: CONTAINS PASS COUNT
001102	000	\$TSTNM:	.BYTE	0	:: CONTAINS THE TEST NUMBER
001103	000	\$ERFLG:	.BYTE	0	:: CONTAINS ERROR FLAG
001104	000000	\$ICNT:	.WORD	0	:: CONTAINS SUBTEST ITERATION COUNT
001106	000000	\$LPADR:	.WORD	0	:: CONTAINS SCOPE LOOP ADDRESS
001110	000000	\$LPERR:	.WORD	0	:: CONTAINS SCOPE RETURN FOR ERRORS
001112	000000	\$ERTTL:	.WORD	0	:: CONTAINS TOTAL ERRORS DETECTED
001114	000	\$ITEMB:	.BYTE	0	:: CONTAINS ITEM CONTROL BYTE
001115	001	\$ERMAX:	.BYTE	1	:: CONTAINS MAX. ERRORS PER TEST
001116	000000	\$ERRPC:	.WORD	0	:: CONTAINS PC OF LAST ERROR INSTRUCTION
001120	000000	\$GDADR:	.WORD	0	:: CONTAINS ADDRESS OF 'GOOD' DATA
001122	000000	\$BDADR:	.WORD	0	:: CONTAINS ADDRESS OF 'BAD' DATA
001124	000000	\$GDDAT:	.WORD	0	:: CONTAINS 'GOOD' DATA
001126	000000	\$BDDAT:	.WORD	0	:: CONTAINS 'BAD' DATA
001130	000000		.WORD	0	:: RESERVED--NOT TO BE USED
001132	000000		.WORD	0	
001134	000	\$AUTOB:	.BYTE	0	:: AUTOMATIC MODE INDICATOR
001135	000	\$INTAG:	.BYTE	0	:: INTERRUPT MODE INDICATOR
001136	000000		.WORD	0	
001140	177570	SWR:	.WORD	DSWR	:: ADDRESS OF SWITCH REGISTER
001142	177570	DISPLAY:	.WORD	DDISP	:: ADDRESS OF DISPLAY REGISTER
001144	177560	\$TKS:		177560	:: TTY KBD STATUS
001146	177562	\$TKB:		177562	:: TTY KBD BUFFER
001150	177564	\$TPS:		177564	:: TTY PRINTER STATUS REG. ADDRESS
001152	177566	\$TPB:		177566	:: TTY PRINTER BUFFER REG. ADDRESS
001154	000	\$NULL:	.BYTE	0	:: CONTAINS NULL CHARACTER FOR FILLS
001155	002	\$FILLS:	.BYTE	2	:: CONTAINS # OF FILLER CHARACTERS REQUIRED
001156	012	\$FILLC:	.BYTE	12	:: INSERT FILL CHARS. AFTER A 'LINE FEED'
001157	000	\$TPFLG:	.BYTE	0	:: 'TERMINAL AVAILABLE' FLAG (BIT<07>=0=YES)
001160	000000	\$REGAD:	.WORD	0	:: CONTAINS THE ADDRESS FROM WHICH (\$REGO) WAS OBTAINED
001162	000000	\$REGO:	.WORD	0	:: CONTAINS ((\$REGAD)+0)
001164	000000	\$TMP0:	.WORD	0	:: USER DEFINED
001166	000000	\$TMP1:	.WORD	0	:: USER DEFINED
001170	000000	\$TMP2:	.WORD	0	:: USER DEFINED
001172	000000	\$TMP3:	.WORD	0	:: USER DEFINED
001174	000000	\$TMP4:	.WORD	0	:: USER DEFINED
001176	000000	\$TIMES:		0	:: MAX. NUMBER OF ITERATIONS
001200	000000	\$ESCAPE:		0	:: ESCAPE ON ERROR ADDRESS
001202	207	\$BELL:	.ASCIZ	<207><377><377>	:: CODE FOR BELL
001206	077	\$QUES:	.ASCII	/?/	:: QUESTION MARK
001207	015	\$CRLF:	.ASCII	<15>	:: CARRIAGE RETURN
001210	012	\$LF:	.ASCIZ	<12>	:: LINE FEED

.SBTTL USER DEFINED TAGS

001212	172540	\$LKCSR: .WORD	172540	:ADDR OF KW11-P STATUS REGISTER
001214	172542	\$LKCSB: .WORD	172542	:ADDR OF KW11-P COUNTER BUFFER
001216	000104	\$LPVEC: .WORD	104	:ADDR OF KW11-P VECTOR
001220	177546	\$LKS: .WORD	177546	:ADDR OF KW11-L STATUS REGISTER
001222	000100	\$LLVEC: .WORD	100	:ADDR OF KW11-L VECTOR
001224	000000	PORTA: .WORD	0	:ADDRESS OF PORT A
001226	000000	PORTB: .WORD	0	:ADDRESS OF PORT B
001230	000000	PORTC: .WORD	0	:ADDRESS OF DIFFERENT DRIVE
001232	000000	ASR1: .WORD	0	:ATA-A OR ATA-B = 1
001234	000000	PTNBR: .WORD	0	:CONTAINS THE PORT ADDRESS FOR ERROR TYPEOUTS
001236	000000	SEIZPT: .WORD	0	:CONTAINS THE ADDRESS OF THE SEIZING PORT
001240	000000	OPPRT: .WORD	0	:CONTAINS THE ADDRESS OF THE 'OPPOSITE' PORT
001242	000000	TSTNUM: .WORD	0	:NUMBER OF THE CURRENT TEST
001244	000000	CKERR: .WORD	0	:IF -1, A REGISTER MISCOMPARISON OCCURRED
001246	000000	NOSEIZ: .WORD	0	:IF -1, THE PORT IN 'SEIZPT' DID NOT SEIZE THE DRIVE
001250	000000	RELERR: .WORD	0	:IF -1, THE PORT IN 'SEIZPT' DID NOT RELEASE THE DRIVE
001252	000000	TIME: .WORD	0	:ELAPSED TIME COUNTER
001254	000000	WATCH: .WORD	0	:WATCH DOG TIMER LOCATION
001256	000000	TIMEA: .WORD	0	:THE TIMEOUT ONE-SHOT VALUE MEASURED THROUGH PORT A
001260	000000	TIMEAP: .WORD	0	:PORT A TIMEOUT VALUE + 25%
001262	000000	TIMEB: .WORD	0	:THE TIMEOUT ONE-SHOT VALUE MEASURED THROUGH PORT B
001264	000000	TIMEBP: .WORD	0	:PORT B TIMEOUT VALUE + 25%
001266	000000	KYBCTL: .WORD	0	:SINGLE TEST INDICATOR
001270	000000	CHGADR: .WORD	0	:CHANGE THE RH/RM ADDRESS INDICATOR

.SBTTL RH/RM UNIBUS AND VECTOR ADDRESSES

001272	176700	\$RMADR: .WORD	176700	:RH/RM UNIBUS ADDRESS
001274	000254	\$RMVEC: .WORD	254	:INTERRUPT VECTOR ADDRESS

.SBTTL ERROR POINTER TABLE

;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
 ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
 ;*LOCATION \$ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
 ;*NOTE1: IF \$ITEMB IS 0 THE ONLY PERTINENT DATA IS (\$ERRPC).
 ;*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:

;* EM ;:POINTS TO THE ERROR MESSAGE
 ;* DH ;:POINTS TO THE DATA HEADER
 ;* DT ;:POINTS TO THE DATA
 ;* DF ;:POINTS TO THE DATA FORMAT

1	001276		\$ERRTB:	
2			;ERROR 1	
3				
4	001276	020501	EM1	;DRIVE IS NON-EXISTENT ('NED' BIT SET)
5	001300	023244	DH1	
6	001302	024614	DT1	
7	001304	025034	DF1	
8				
9			;ERROR 2	
10				
11	001306	020547	EM2	;WRONG DRIVE TYPE
12	001310	023315	DH2	
13	001312	024630	DT2	
14	001314	025041	DF2	
15				
16			;ERROR 3	
17				
18	001316	020570	EM3	;PORT SELECT SWITCH ON DRIVE NOT IN 'A/B'
19	001320	023244	DH1	
20	001322	024614	DT1	
21	001324	025034	DF1	
22				
23			;ERROR 4	
24				
25	001326	020642	EM4	;DRIVE NOT ON LINE
26	001330	023315	DH2	
27	001332	024630	DT2	
28	001334	025041	DF2	
29				
30			;ERROR 5	
31				
32	001336	020664	EM5	;SERIAL NUMBER READ THROUGH EACH PORT NOT THE SAME
33	001340	023371	DH5	
34	001342	024646	DT5	
35	001344	025047	DF5	
36				
37			;ERROR 6	
38				
39	001346	020746	EM6	;TIMEOUT HAS NOT OCCURRED WITHIN 2 SECONDS
40	001350	023440	DH6	
41	001352	024662	DT6	
42	001354	025054	DF6	

43				
44			:ERROR 7	
45				
46	001356	021020	EM7	:TIMEOUT ONE-SHOT IS LESS THAN 500 MS
47	001360	023467	DH7	
48	001362	024672	DT7	
49	001364	025057	DF7	
50				
51			:ERROR 10	
52				
53	001366	021065	EM10	:READIN PRESET DOES NOT SET VOLUME VALID FOR THE PORT
54	001370	023244	DH1	
55	001372	024614	DT1	
56	001374	025034	DF1	
57				
58			:ERROR 11	
59				
60	001376	021153	EM11	: 'GO' BIT RESET DURING UNLOAD COMMAND
61	001400	023244	DH1	
62	001402	024614	DT1	
63	001404	025034	DF1	
64				
65			:ERROR 12	
66				
67	001406	021220	EM12	:INCORRECT STATUS DURING UNLOAD COMMAND
68	001410	023244	DH1	
69	001412	024614	DT1	
70	001414	025034	DF1	
71				
72			:ERROR 13	
73				
74	001416	021267	EM13	:DRIVE DID NOT RETURN TO NEUTRAL AFTER UNLOAD COMMAND
75	001420	023534	DH13	
76	001422	024704	DT13	
77	001424	025054	DF6	
78				
79			:ERROR 14	
80				
81	001426	021354	EM14	:ATTENTION BIT SET ON 'OPPOSITE PORT' AFTER UNLOAD
82	001430	023611	DH14	
83	001432	024714	DT14	
84	001434	025063	DF14	
85				
86			:ERROR 15	
87				
88	001436	021436	EM15	:ATTENTION BIT NOT SET ON PORT WHICH ISSUED 'UNLOAD'
89	001440	023244	DH1	
90	001442	024614	DT1	
91	001444	025034	DF1	
92				
93			:ERROR 16	
94				
95	001446	021522	EM16	:DRIVE NOT IN NEUTRAL AFTER UNLOAD WITH 'PORT :SELECT' SWITCH MOVED FROM 'A/B'
96				
97	001450	023534	DH13	
98	001452	024704	DT13	
99	001454	025054	DF6	

100				
101			;ERROR 17	
102				
103	001456	021641	EM17	;DRIVE LOCKED ON PORT 'A' BY SWITCH WHILE CYCLED UP
104	001460	023730	DH17	
105	001462	024732	DT17	
106	001464	025071	DF17	
107				
108			;ERROR 20	
109				
110	001466	021724	EM20	;DRIVE LOCKED ON PORT 'B' BY SWITCH WHILE CYCLED UP
111	001470	023730	DH17	
112	001472	024732	DT17	
113	001474	025071	DF17	
114				
115			;ERROR 21	
116				
117	001476	022007	EM21	;STATUS INCORRECT FOR PORT AFTER CYCLE UP
118	001500	023244	DH1	
119	001502	024614	DT1	
120	001504	025034	DF1	
121				
122			;ERROR 22	
123				
124	001506	022060	EM22	;REGISTER CONTENTS SEEN WHEN DRIVE SWITCHED ON 'OPPOSITE' PORT
125	001510	023244	DH1	
126	001512	024614	DT1	
127	001514	025034	DF1	
128				
129			;ERROR 23	
130				
131	001516	022156	EM23	; 'NED' SET WHEN RMD5 ACCESSED THROUGH PORT NOT SWITCHED
132	001520	023244	DH1	
133	001522	024614	DT1	
134	001524	025034	DF1	
135				
136			;ERROR 24	
137				
138	001526	022251	EM24	;DRIVE SWITCHED TO LOCKED OUT PORT WHEN RELEASED/
139	001530	023747	DH24	
140	001532	024740	DT24	
141	001534	025057	DF7	
142				
143			;ERROR 25	
144				
145	001536	022331	EM25	;RH/RM DIDN'T RESPOND TO ADDRESSING
146	001540	024052	DH25	
147	001542	024752	DT25	
148	001544	025073	DF25	
149				
158			;ERROR 26	
	001546	000000	0	;UNUSED ERROR MESSAGES
	001550	000000	0	
	001552	000000	0	
	001554	000000	0	

```

;ERROR 27
001556 000000 0 ;UNUSED ERROR MESSAGES
001560 000000 0
001562 000000 0
001564 000000 0

159 ;ERROR 30
160
161 001566 022374 EM30 ;DRIVE NOT SEIZED BY PORT 'N'
162 001570 024061 DH30
163 001572 024756 DT30
164 001574 025074 DF30
165
166 ;ERROR 31
167
168 001576 022425 EM31 ;WRONG STATUS SEEN BY THE SEIZING PORT
169 001600 023315 DH2
170 001602 024630 DT2
171 001604 025041 DF2
172
173 ;ERROR 32
174
175 001606 022473 EM32 ;REGISTER CONTENTS INCORRECT
176 001610 023315 DH2
177 001612 024630 DT2
178 001614 025041 DF2
179
180 ;ERROR 33
181
182 001616 022523 EM33 ;CONTROL BUS PARITY ERROR WHILE READING REGISTER
183 001620 023244 DH1
184 001622 024614 DT1
185 001624 025034 DF1
186
187 ;ERROR 34
188
189 001626 022607 EM34 ;CAN'T ACCESS DRIVE THROUGH EITHER PORT
190 001630 024203 DH34
191 001632 024776 DT34
192 001634 025103 DF34
193
194 ;ERROR 35
195
196 001636 022656 EM35 ;DRIVE NOT IN NEUTRAL AFTER RELEASE, REQUEST NOT SET
197 001640 024277 DH35
198 001642 025010 DT35
199 001644 025057 DF7
200
201 ;ERROR 36
202
203 001646 022743 EM36 ;DRIVE NOT IN NEUTRAL AFTER TIMEOUT, REQUEST NOT SET
204 001650 024277 DH35
205 001652 025010 DT35
206 001654 025057 DF7
207
208 ;ERROR 37
    
```


209				
210	001656	023030	EM37	;REGISTER CONTENTS INCORRECT AFTER RELEASE/TIMEOUT
211	001660	024374	DH37	
212	001662	024756	DT30	
213	001664	025074	DF30	
214				
215				;ERROR 40
216				
217	001666	023111	EM40	;DRIVE NOT SEIZED BY PORT AFTER RELEASE WITH REQUEST SET
218	001670	024516	DH40	
219	001672	025022	DT40	
220	001674	025057	DF7	
221				
222				;ERROR 41
223				
224	001676	023166	EM41	;REGISTER WRONG AFTER RELEASE WITH REQUEST SET
225	001700	024061	DH30	
226	001702	024756	DT30	
227	001704	025074	DF30	
228				

```

1      ;THIS ROUTINE HANDLES UNEXPECTED TIMEOUTS
2
3 001706 011600 BADTMO: MOV (SP),R0 ;SAVE PC WHERE THE TIME OUT OCCURED
4 001710 005740 TST -(R0) ;ADJUST PC -2
5 001712 022626 CMP (SP)+,(SP)+ ;RESTORE STACK POINTER
6 001714 104401 001722 TYPE 65$ ;TYPE ASCIZ STRING
   001720 000417 BR 64$ ;GET OVER THE ASCIZ
   ;:65$: .ASCIZ <CRLF>/UNEXPECTED BUS TIMEOUT, PC=/
   64$:
7 001760 010046 MOV R0,-(SP) ;SETUP FOR TYPING OUT PC
8 001762 104402 TYPOC
9 001764 000240 NOP ;PUT 'HALT(0)' INSTRUCTION HERE IF YOU WISH
   ;TO STOP ON UNEXPECTED TIMEOUT.
10
11
12 .SBTTL START OF PROGRAM
13
14 001766 005037 001270 START: CLR CHGADR ;CLEAR THE 'CHANGE RH/RM ADDRESS' INDICATOR
15 001772 000403 BR START2 ;GO TO THE START
16
17 001774 012737 177777 001270 START1: MOV #-1,CHGADR ;SET THE 'CHANGE RH/RM ADDRESS' INDICATOR
18
19 002002 000240 START2: NOP
20 002004 005227 000000 INC #0 ;TTY LOOP, WAIT FOR INCREMENT
21 002010 001375 BNE -4 ;OF WORD
22 002012 000005 RESET ;CLEAR THE WORLD
23
24 .SBTTL INITIALIZE THE COMMON TAGS
   ;:CLEAR THE COMMON TAGS ($CMTAG) AREA
   MOV #CMTAG,R6 ;:FIRST LOCATION TO BE CLEARED
   CLR (R6)+ ;:CLEAR MEMORY LOCATION
   CMP #SWR,R6 ;:DONE?
   BNE -6 ;:LOOP BACK IF NO
   MOV #STACK,SP ;:SETUP THE STACK POINTER
   ;:INITIALIZE A FEW VECTORS
   MOV #SCOPE,@IOTVEC ;:IOT VECTOR FOR SCOPE ROUTINE
   MOV #340,@IOTVEC+2 ;:LEVEL 7
   MOV #ERROR,@EMTVEC ;:EMT VECTOR FOR ERROR ROUTINE
   MOV #340,@EMTVEC+2 ;:LEVEL 7
   MOV #STRAP,@TRAPVEC ;:TRAP VECTOR FOR TRAP CALLS
   MOV #340,@TRAPVEC+2 ;:LEVEL 7
   MOV $ENDCT,$EOPCT ;:SETUP END-OF-PROGRAM COUNTER
   CLR $TIMES ;:INITIALIZE NUMBER OF ITERATIONS
   CLR $ESCAPE ;:CLEAR THE ESCAPE ON ERROR ADDRESS
   MOVB #1,$ERMAX ;:ALLOW ONE ERROR PER TEST
   MOV #,$SLPADR ;:INITIALIZE THE LOOP ADDRESS FOR SCOPE
   MOV #,$SLPERR ;:SETUP THE ERROR LOOP ADDRESS
   ;:SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
   ;:EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
   MOV @ERRVEC,-(SP) ;:SAVE ERROR VECTOR
   MOV #64$,@ERRVEC ;:SET UP ERROR VECTOR
   MOV #DSWR,SWR ;:SETUP FOR A HARDWARE SWICH REGISTER
   MOV #DDISP,DISPLAY ;:AND A HARDWARE DISPLAY REGISTER
   CMP #-1,@SWR ;:TRY TO REFERENCE HARDWARE SWR
   BNE 66$ ;:BRANCH IF NO TIMEOUT TRAP OCCURRED
   ;:AND THE HARDWARE SWR IS NOT = -1
   BR 65$ ;:BRANCH IF NO TIMEOUT
   64$: MOV #65$, (SP) ;:SET UP FOR TRAP RETURN
    
```



```

002204 000002          RTI
002206 012737 000176 001140 65$: MOV #SWREG,SWR      ;;POINT TO SOFTWARE SWR
002214 012737 000174 001142      MOV #DISPREG,DISPLAY
002222 012637 000004      MOV (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR

25      ;SETUP "TIMEOUT" TRAP VECTOR FOR UNEXPECTED BUS TIMEOUTS
26 002226 012737 001706 000004      MOV #BADTMO,ERRVEC  ;;SETUP FOR UNEXPECTED TIMEOUT
27 002234 012737 000300 000006      MOV #PR6,ERRVEC+2  ;;LEVEL 6
28
29      .SBTTL TYPE PROGRAM NAME
      ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
002242 005227 177777      INC #-1          ;;FIRST TIME?
002246 001037          BNE 67$          ;;BRANCH IF NO
002250 022737 013366 000042      CMP #SENDAD,@#42  ;;ACT-11?
002256 001433          BEQ 67$          ;;BRANCH IF YES
002260 104401 002266      TYPE ,68$       ;;TYPE ASCIZ STRING
002264 000430          BR 67$          ;;GET OVER THE ASCIZ
      ;;68$: .ASCIZ <CRLF>@CZRMSBO - RM05/3/2 DUAL PORT LOGIC TEST, PT 2@<CRLF>
      67$:
      .SBTTL GET VALUE FOR SOFTWARE SWITCH REGISTER
002346 005737 000042      TST @#42          ;;ARE WE RUNNING UNDER XXDP/ACT?
002352 001006          BNE 69$          ;;BRANCH IF YES
002354 023727 001140 000176      CMP SWR,#SWREG    ;;SOFTWARE SWITCH REG SELECTED?
002362 001005          BNE 70$          ;;BRANCH IF NO
002364 104406          GTSWR          ;;GET SOFT-SWR SETTINGS
002366 000403          BR 70$
002370 112737 000001 001134 69$: MOVB #1,$AUTOB    ;;SET AUTO-MODE INDICATOR
002376 70$:

30
31 002376 004737 016044      1$: JSR PC,$TKINT     ;;SETUP THE TTY KEYBOARD
32 002402 004737 002774      JSR PC,CHANGE    ;;CHECK/CHANGE THE RH/RM ADDRESS
33 002406 104401 017626      TYPE ,ENTERA    ;;ENTER DRIVE ADDRESS
34 002412 104412          RDOCT          ;;GET THE ADDRESS
35 002414 012637 001224      MOV (SP)+,PORTA  ;;STORE THE ADDRESS
36 002420 023727 001224 000007      CMP PORTA,#7    ;;SEE IF ADDRESS TOO LARGE
37 002426 101403          BLOS 2$          ;;BR IF NOT
38 002430 104401 017655      TYPE ,ADRERR    ;;TYPE ADDRESS ERROR MESSAGE
39 002434 000760          BR 1$          ;;TRY AGAIN
40 002436 013737 001224 001226 2$: MOV PORTA,PORTB   ;;GENERATE THE PORT B ADDRESS
41 002444 005237 001226      INC PORTB        ;;INCREMENT THE ADDRESS
42 002450 042737 000016 001226      BIC #16,PORTB   ;;LEAVE BIT 0
43 002456 013746 001224      MOV PORTA,-(SP)  ;;PUT PORT A ADDRESS ON THE STACK
44 002462 042716 177771      BIC #^C6,(SP)   ;;SAVE BITS 1 & 2
45 002466 052637 001226      BIS (SP)+,PORTB ;;SET BITS 1 & 2 IN PORT B ADDRESS
46 002472 104401 017700      TYPE ,PORTAIS  ;;'PORT A ADDRESS IS '
47 002476 013746 001224      MOV PORTA,-(SP) ;;SAVE PORTA FOR TYPEOUT
      ;;TYPE PORT A ADDRESS
      ;;GO TYPE--OCTAL ASCII
002502 104403          TYPOS          ;;TYPE 1 DIGIT(S)
002504 001          .BYTE 1          ;;SUPPRESS LEADING ZEROS
002505 000          .BYTE 0
48 002506 104401 017727      TYPE ,PORTBIS  ;;'PORT B ADDRESS IS '
49 002512 013746 001226      MOV PORTB,-(SP) ;;SAVE PORTB FOR TYPEOUT
      ;;TYPE PORT B ADDRESS
      ;;GO TYPE--OCTAL ASCII
002516 104403          TYPOS          ;;TYPE 1 DIGIT(S)
002520 001          .BYTE 1          ;;SUPPRESS LEADING ZEROS
002521 000          .BYTE 0
50 002522 104401 001207      TYPE ,CRLF     ;;ANOTHER CR-LF
    
```

```

51 002526 013737 001224 001230      MOV     PORTA,PORTC      ;GENERATE ADDRESS OF DRIVE NOT TESTED
52 002534 062737 000006 001230      ADD     #6,PORTC        ;COMPLEMENT SOME BITS
53 002542 042737 177770 001230      BIC     #^C7,PORTC      ;SAVE ONLY LOWER BITS
54 002550 013701 001224                MOV     PORTA,R1        ;USE PORT A ADDRESS AS INDEX
55 002554 116137 025130 001232      MOVVB  ATABIT(R1),ASR1   ;GET ATTENTION BIT FOR DRIVE
58 002562 005037 001256                CLR     TIMEA           ;CLEAR TIMEOUT ONE-SHOT VALUE LOCATION
    002566 005037 001260                CLR     TIMEAP          ;CLEAR TIMEOUT ONE-SHOT VALUE LOCATION
    002572 005037 001262                CLR     TIMEB           ;CLEAR TIMEOUT ONE-SHOT VALUE LOCATION
    002576 005037 001264                CLR     TIMEBP          ;CLEAR TIMEOUT ONE-SHOT VALUE LOCATION
59 002602 004737 C13406                JSR     PC,CKCLK        ;SETUP CLOCK
60 002606 000137 002622                JMP     EXEC            ;CLOCK HAS BEEN STARTED
61 002612 104401 017756                TYPE   ,NOCLOCK        ;NO CLOCK ON SYSTEM
62 002616 000000                3$:    HALT             ;FATAL ERROR
63 002620 000776                BR     3$              ;INTERLOCK THE HALT
64
65                                     ;ROUTINE TO GET THE TEST NUMBER FROM THE OPERATOR
66
67 002622 000005                EXEC:  RESET            ;CLEAR EVERYTHING
68 002624 005037 177776                CLR     PS              ;CLEAR THE PROCESSOR STATUS WORD
69 002630 104401 001207                TYPE   ,SCLF           ;CR-LF
70 002634 013700 001272                MOV     $RMADR,R0      ;RH/RM ADDRESS FOR INDEXING
71 002640 012706 001100                MOV     #STACK,SP      ;LOAD STACK POINTER
72 002644 004737 013406                JSR     PC,CKCLK        ;START THE CLOCK
73 002650 000240                NOP                    ;RETURN IF NO CLOCK
74 002652 004737 016044                JSR     PC,$TKINT      ;INITIALIZE THE KEYBOARD
75 002656 005037 001266                CLR     KYBCTL         ;CLEAR SINGLE TEST INDICATOR
76 002662 005037 001100                CLR     $PASS          ;CLEAR THE PASS COUNT
77 002666 112737 000001 001115      MOVVB  #1,$ERMAX       ;SET ERROR MAX TO 1
78 002674 012737 002674 001106      MOV     #,$SLPADR      ;INITIAL SETTING FOR LOOP ADDRESS
79 002702 012737 002702 001110      MOV     #,$SLPERR      ;INITIAL SETTING FOR LOOP ON ERROR ADDRESS
80 002710 104401 020023                1$:    TYPE   ,TESTNO   ;ASK FOR TEST NUMBER
81 002714 104412                RDOCT                    ;GET THE NUMBER
82 002716 012601                MOV     (SP)+,R1       ;PUT ENTRY INTO R1
83 002720 001002                BNE    2$              ;BR IF NOT ZERO
84 002722 000137 003122                JMP     TST1           ;ENTER ZERO - PERFORM ALL TESTS
85 002726 020137 025140                2$:    CMP     R1,MAXTN  ;SEE IF NUMBER GREATER THAN MAXIMUM
86 002732 003403                BLE    3$              ;BR IF LESS OR EQUAL
87 002734 104401 020043                TYPE   ,BADNO         ;BAD ENTRY
88 002740 000763                BR     1$              ;TRY AGAIN
89 002742 005301                3$:    DEC     R1        ;DECREMENT ENTRY
90 002744 006301                ASL    R1              ;SHIFT IT LEFT
91 002746 016137 025110 002772      MOV     TSTADR(R1),4$  ;GET THE TEST ADDRESS
92 002754 005237 001266                INC     KYBCTL         ;SET SINGLE TEST INDICATOR
93 002760 012737 000001 001104      MOV     #1,$ICNT      ;PRESET ITERATION COUNT
94 002766 000177 000000                JMP     @4$            ;GO TO THE SELECTED TEST
95 002772 000000                4$:    .WORD   0        ;TEST ADDRESS GOES HERE
96
97                                     ;CHANGE THE RH/RM UNIBUS ADDRESS USED BY THE PROGRAM
98
99 002774 005737 001270                CHANGE: TST   CHGADR    ;CHANGE THE ADDRESS ?
100 003000 001421                BEQ    3$              ;BR IF NOT
101 003002 005037 001270                CLR    CHGADR         ;CLEAR THE INDICATOR
102 003006 104401 020072                1$:    TYPE   ,ADDRIS  ;TYPE OUT WHAT THE PRESENT ADDRESS IS
103 003012 013746 001272                MOV    $RMADR,-(SP)   ;PUT THE ADDRESS ON THE STACK
104 003016 104402                TYPOC                    ;TYPE THE ACTUAL ADDRESS
105 003020 104401 001207                TYPE   ,SCLF          ;CR-LF
106 003024 104401 020127                TYPE   ,NTRH         ;ASK FOR NEW ADDRESS
    
```


107	003030	104412			RDOCT		
108	003032	005716			TST	(SP)	:0 OR 'CR' ENTERED ?
109	003034	001402			BEQ	2\$:BR IF EITHER ENTERED (NO ADDRESS CHANGE)
110	003036	011637	001272		MOV	(SP), \$RMADR	:NEW RH/RM ADDRESS
111	003042	005726		2\$:	TST	(SP)+	:CORRECT THE STACK POINTER
112	003044	012737	003064	000004	MOV	#4\$, @#4	:LOAD TRAP ADDRESS
113	003052	013700	001272		MOV	\$RMADR, R0	:GET RH/RM ADDRESS
114	003056	005760	000002		TST	RMWC(R0)	:RESPONDS AT THAT ADDRESS ?
115	003062	000704			BR	5\$:BR IF YES
116	003064			4\$:			
117	003066	104025			EMT	25	
118	003072	062706	000004		ADD	#4, SP	:RESET THE STACK POINTER
119	003074	000745			BR	1\$:GET ADDRESS AGAIN
119	003074	012737	000006	000004	MOV	#6, @#4	:RESTORE THE VECTOR
120	003102	000207			RTS	PC	:RETURN

TESTS

1
2
16
17
18
19
20

.SBTTL TESTS

```
TST1AA: MOV $RMADR,R0      ;;RESTORE R0 AFTER END OF PASS
          MOV #PR5,-(SP)    ;;PUT NEW PS ON STACK
          MOV #64$,-(SP)   ;;PUT NEW PC ON STACK
          RTI               ;;POP NEW PC AND PS
```

64\$:

```
*****
*TEST 1      DRIVE ACCESS TEST
*
*VERIFY THAT THE DRIVE CAN BE ACCESSED THROUGH BOTH PORTS
*
* A.  SELECT DRIVE, VERIFY THAT THE DRIVE IS PRESENT, THAT THE
*      DRIVE IS A DUAL PORT RM05, RM03 OR RM02 AND THAT THE DRIVE
*      IS ONLINE (RMDS HAS 'MOL', 'PGM', 'DPR', & 'DRY' BITS SET),
*      AND THE THE DRIVE SERIAL NUMBER READ THROUGH BOTH PORTS IS
*      THE SAME.
*
* B.  THE TEST IS REPEATED THROUGH BOTH PORTS.
```

```
TST1:
      TST   KYBCTL      ;PERFORMING ONLY SINGLE TESTS ?
      BEQ   2$          ;BR IF NOT
      BPL   1$          ;BR IF JUST ENTERED TEST
      JMP   EXEC        ;RETURN & GET NEXT TEST NUMBER
1$:   MOV   #-1,KYBCTL  ;SET SINGLE TEST INDICATOR
2$:   MOV   #TEST1,$LPADR ;SETUP SCOPE LOOP ADDRESS
      MOV   #TEST1,$LPERR ;SETUP ERROR LOOP ADDRESS

TEST1:
      MOVB  #1,$TSTNM   ;MOVE #1 TEST NUMBER
      MOV   #STACK,SP   ;SETUP THE STACK POINTER
      MOV   #1,$TIMES   ;;DO 1 ITERATION

      MOV   #CLR,RMCS2(R0) ;CLEAR MASSBUS
```

;VERIFY THAT DRIVE IS PRESENT THROUGH PORTS A & B

21
22
23
24
25
33

```
003122 005737 001266
003122 001406
003126 100002
003130 000137 002622
003132 012737 177777 001266 1$:
003136 012737 003160 001106 2$:
003144 012737 003160 001110
003152 012737 003160 001110
003160
003160 112737 000001 001102
003166 012706 001100
003172 012737 000001 001176

003200 012760 000040 000010

      MOVB  PORTA,RMCS2(R0) ;SELECT PORT A
      MOV   PORTA,PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
      TST   RMDS(R0)    ;SEE IF DRIVE (PORT A) PRESENT
      CLR   CKERR       ;CLEAR THE 'CHECK ERROR' INDICATOR
      MOV   RMCS2(R0),$BDDAT ;GET CONTENTS OF RMCS2
      MOV   #RMCS2,$BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
      ADD   R0,$BDADR   ;ADD RH/RM BASE ADDRESS
      CLR   $GDDAT      ;WHAT REGISTER SHOULD BE
      MOV   $BDDAT,$TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
      BIC   #^CNED,$TMP0 ;SAVE SPECIFIED BITS
      CMP   $GDDAT,$TMP0 ;COMPARE THE BITS
      BEQ   64$         ;BR IF OK
      MOV   $BDDAT,$TMP4 ;COPY 'BAD DATA'
      BIC   #NED,$TMP4  ;CLEAR THE MASKED BITS
      BIS   $TMP4,$GDDAT ;'OR' WITH GOOD DATA FOR TYPEOUT
      EMT   1
      COM   CKERR       ;SET THE REGISTER COMPARE ERROR INDICATOR
```



```

003332 000240          64$:  NOP
003334 005737 001244    TST      CKERR          ;WAS 'NED' SET ?
003340 001403          BEQ      .+10          ;BR IF NOT
003342 012760 000040 000010  MOV     #CLR, RMCS2(R0) ;ISSUE MASSBUS INIT TO CLEAR 'NED'
003350 113760 001226 000010  MOV     PORTB, RMCS2(R0) ;SELECT PORT B
003356 013737 001226 001234  MOV     PORTB, PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
003364 005760 000012          TST     RMD5(R0)      ;SEE IF DRIVE (PORT B) PRESENT
003370 005037 001244          CLR     CKERR         ;CLEAR THE 'CHECK ERROR' INDICATOR
003374 016037 000010 001126  MOV     RMCS2(R0), $BDDAT ;GET CONTENTS OF RMCS2
003402 012737 000010 001122  MOV     #RMCS2, $BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
003410 060037 001122          ADD     R0, $BDADR     ;ADD RH/RM BASE ADDRESS
003414 005037 001124          CLR     $GDDAT        ;WHAT REGISTER SHOULD BE
003420 013737 001126 001164  MOV     $BDDAT, $TMP0   ;MOVE REGISTER CONTENTS TO '$TMP0'
003426 042737 167777 001164  BIC     #^CNED, $TMP0   ;SAVE SPECIFIED BITS
003434 023737 001124 001164  CMP     $GDDAT, $TMP0   ;COMPARE THE BITS
003442 001414          BEQ     66$           ;BR IF OK
003444 013737 001126 001174  MOV     $BDDAT, $TMP4   ;COPY 'BAD DATA'
003452 042737 010000 001174  BIC     #NED, $TMP4     ;CLEAR THE MASKED BITS
003460 053737 001174 001124  BIS     $TMP4, $GDDAT   ;'OR' WITH GOOD DATA FOR TYPEOUT
003466 104001          EMT     1
003470 005137 001244          COM     CKERR         ;SET THE REGISTER COMPARE ERROR INDICATOR
003474 000240          66$:  NOP
003476 005737 001244    TST     CKERR         ;WAS 'NED' SET ?
003502 001403          BEQ     .+10          ;BR IF NOT
003504 012760 000040 000010  MOV     #CLR, RMCS2(R0) ;ISSUE MASSBUS INIT TO CLEAR 'NED'

;CONFIRM THAT DRIVE IS AN RM05, RM03 OR RM02 AND IS DUAL PORTED
34
35
36
40 003512 113760 001224 000010  MOV     PORTA, RMCS2(R0) ;SELECT PORT A
003520 013737 001224 001234  MOV     PORTA, PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
003526 005037 001244          CLR     CKERR         ;CLEAR THE 'CHECK ERROR' INDICATOR
003532 016037 000026 001126  MOV     RMDT(R0), $BDDAT ;GET CONTENTS OF RMDT
003540 012737 000026 001122  MOV     #RMDT, $BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
003546 060037 001122          ADD     R0, $BDADR     ;ADD RH/RM BASE ADDRESS
003552 012737 024027 001124  MOV     #024027, $GDDAT ;WHAT REGISTER SHOULD BE
003560 022737 024024 001126  CMP     #024024, $BDDAT ;DUAL PORT RM03 ?
003566 001413          BEQ     68$           ;YES !!
003570 022737 024025 001126  CMP     #024025, $BDDAT ;DUAL PORT RM02 ?
003576 001407          BEQ     68$           ;YES !!
003600 023737 001124 001126  CMP     $GDDAT, $BDDAT ;IS THE REGISTER OK ?
003606 001403          BEQ     68$           ;BR IF OK
003610 104002          EMT     2
003612 005137 001244          COM     CKERR         ;SET THE REGISTER COMPARE ERROR INDICATOR
003616 000240          68$:  NOP
003620 113760 001226 000010  MOV     PORTB, RMCS2(R0) ;SELECT PORT B
003626 013737 001226 001234  MOV     PORTB, PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
003634 005037 001244          CLR     CKERR         ;CLEAR THE 'CHECK ERROR' INDICATOR
003640 016037 000026 001126  MOV     RMDT(R0), $BDDAT ;GET CONTENTS OF RMDT
003646 012737 000026 001122  MOV     #RMDT, $BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
003654 060037 001122          ADD     R0, $BDADR     ;ADD RH/RM BASE ADDRESS
003660 012737 024027 001124  MOV     #024027, $GDDAT ;WHAT REGISTER SHOULD BE
003666 022737 024024 001126  CMP     #024024, $BDDAT ;DUAL PORT RM03 ?
003674 001413          BEQ     70$           ;YES !!
003676 022737 024025 001126  CMP     #024025, $BDDAT ;DUAL PORT RM02 ?
003704 001407          BEQ     70$           ;YES !!
003706 023737 001124 001126  CMP     $GDDAT, $BDDAT ;IS THE REGISTER OK ?
003714 001403          BEQ     70$           ;BR IF OK

```

```

003716 104002          EMT      2
003720 005137 001244 70$:   COM      CKERR          ;SET THE REGISTER COMPARE ERROR INDICATOR
003724 000240          NOP
41
42
43
48 003726 113760 001224 000010  MOVB   PORTA, RMCS2(R0) ;SELECT PORT A
003734 013737 001224 001234  MOV    PORTA, PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
003742 005037 001244          CLR    CKERR          ;CLEAR THE 'CHECK ERROR' INDICATOR
003746 016037 000012 001126  MOV    RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
003754 012737 000012 001122  MOV    #RMDS, $BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
003762 060037 001122          ADD    R0, $BDADR ;ADD RH/RM BASE ADDRESS
003766 012737 001000 001124  MOV    #PGM, $GDDAT ;WHAT REGISTER SHOULD BE
003774 013737 001126 001164  MOV    $BDDAT, $TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
004002 042737 176777 001164  BIC   #^CPGM, $TMP0 ;SAVE SPECIFIED BITS
004010 023737 001124 001164  CMP   $GDDAT, $TMP0 ;COMPARE THE BITS
004016 001414          BEQ   72$ ;BR IF OK
004020 013737 001126 001174  MOV   $BDDAT, $TMP4 ;COPY 'BAD DATA'
004026 042737 001000 001174  BIC   #PGM, $TMP4 ;CLEAR THE MASKED BITS
004034 053737 001174 001124  BIS   $TMP4, $GDDAT ;'OR' WITH GOOD DATA FOR TYPEOUT
004042 104003          EMT      3
004044 005137 001244          COM      CKERR          ;SET THE REGISTER COMPARE ERROR INDICATOR
004050 000240          NOP
004052 005037 001244 72$:   CLR    CKERR          ;CLEAR THE 'CHECK ERROR' INDICATOR
004056 016037 000012 001126  MOV    RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
004064 012737 000012 001122  MOV    #RMDS, $BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
004072 060037 001122          ADD    R0, $BDADR ;ADD RH/RM BASE ADDRESS
004076 012737 010600 001124  MOV    #MOL!DPR!DRY, $GDDAT ;WHAT REGISTER SHOULD BE
004104 013737 001126 001164  MOV    $BDDAT, $TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
004112 042737 167177 001164  BIC   #^C10600, $TMP0 ;SAVE SPECIFIED BITS
004120 023737 001124 001164  CMP   $GDDAT, $TMP0 ;COMPARE THE BITS
004126 001414          BEQ   74$ ;BR IF OK
004130 013737 001126 001174  MOV   $BDDAT, $TMP4 ;COPY 'BAD DATA'
004136 042737 010600 001174  BIC   #10600, $TMP4 ;CLEAR THE MASKED BITS
004144 053737 001174 001124  BIS   $TMP4, $GDDAT ;'OR' WITH GOOD DATA FOR TYPEOUT
004152 104004          EMT      4
004154 005137 001244          COM      CKERR          ;SET THE REGISTER COMPARE ERROR INDICATOR
004160 000240          NOP
004162 113760 001226 000010 74$:  MOVB   PORTB, RMCS2(R0) ;SELECT PORT B
004170 013737 001226 001234  MOV    PORTB, PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
004176 005037 001244          CLR    CKERR          ;CLEAR THE 'CHECK ERROR' INDICATOR
004202 016037 000012 001126  MOV    RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
004210 012737 000012 001122  MOV    #RMDS, $BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
004216 060037 001122          ADD    R0, $BDADR ;ADD RH/RM BASE ADDRESS
004222 012737 001000 001124  MOV    #PGM, $GDDAT ;WHAT REGISTER SHOULD BE
004230 013737 001126 001164  MOV    $BDDAT, $TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
004236 042737 176777 001164  BIC   #^CPGM, $TMP0 ;SAVE SPECIFIED BITS
004244 023737 001124 001164  CMP   $GDDAT, $TMP0 ;COMPARE THE BITS
004252 001414          BEQ   76$ ;BR IF OK
004254 013737 001126 001174  MOV   $BDDAT, $TMP4 ;COPY 'BAD DATA'
004262 042737 001000 001174  BIC   #PGM, $TMP4 ;CLEAR THE MASKED BITS
004270 053737 001174 001124  BIS   $TMP4, $GDDAT ;'OR' WITH GOOD DATA FOR TYPEOUT
004276 104003          EMT      3
004300 005137 001244          COM      CKERR          ;SET THE REGISTER COMPARE ERROR INDICATOR
004304 000240          NOP
004306 005037 001244 76$:   CLR    CKERR          ;CLEAR THE 'CHECK ERROR' INDICATOR
004312 016037 000012 001126  MOV    RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
  
```



```

004320 012737 000012 001122      MOV    #RMDS,$BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
004326 060037 001122                ADD    RO,$BDADR   ;ADD RH/RM BASE ADDRESS
004332 012737 010600 001124      MOV    #MOL!DPR!DRY,$GDDAT ;WHAT REGISTER SHOULD BE
004340 013737 001126 001164      MOV    $BDDAT,$TMP0   ;MOVE REGISTER CONTENTS TO '$TMP0'
004346 042737 167177 001164      BIC    #^C10600,$TMP0 ;SAVE SPECIFIED BITS
004354 023737 001124 001164      CMP    $GDDAT,$TMP0   ;COMPARE THE BITS
004362 001414                BEQ    78$           ;BR IF OK
004364 013737 001126 001174      MOV    $BDDAT,$TMP4   ;COPY 'BAD DATA'
004372 042737 010600 001174      BIC    #10600,$TMP4   ;CLEAR THE MASKED BITS
004400 053737 001174 001124      BIS    $TMP4,$GDDAT   ;'OR' WITH GOOD DATA FOR TYPEOUT
004406 104004                EMT    4
004410 005137 001244                COM    CKERR         ;SET THE REGISTER COMPARE ERROR INDICATOR
004414 000240                NOP

49
50
51                                ;VERIFY THAT DRIVE SERIAL NUMBER SEEN THROUGH BOTH PORTS IS THE SAME
52 004416 113760 001224 000010      MOVVB  PORTA,RMCS2(RO) ;SELECT PORT A
53 004424 016037 000030 001124      MOV    RMSN(RO),$GDDAT ;STORE THE PORT A SERIAL NUMBER
54 004432 113760 001226 000010      MOVVB  PORTB,RMCS2(RO) ;SELECT PORT B
55 004440 016037 000030 001126      MOV    RMSN(RO),$BDDAT ;STORE THE PORT B SERIAL NUMBER
56 004446 023737 001124 001126      CMP    $GDDAT,$BDDAT  ;ARE THEY THE SAME ?
57 004454 001406                BEQ    1$           ;BR IF THEY ARE
58 004456 104005                EMT    5
59 004460 032777 100000 174452      BIT    #SW15,@SWR     ;HALT ON ERROR ?
60 004466 001001                BNE    1$           ;BR IF SET - PROGRAM HAS ALREADY HALTED
61 004470 000000                HALT
62 004472 000004                1$:    SCOPE        ;HALT, POSSIBLE CABLE CONNECTION PROBLEM
63
64                                ;LOOP ?
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```

```

:*****
:*TEST 2      SET 'VV' FOR PORT A
:*
:*SET VOLUME VALID
:*
:*  A.  ISSUE A DRIVE CLEAR COMMAND THROUGH PORT A.
:*
:*  B.  ISSUE A READIN PRESET COMMAND THROUGH PORT A.  VERIFY
:*        THAT THE 'VV' BIT IS SET FOR PORT A.
:*
:*  C.  ISSUE A RELEASE COMMAND THROUGH PORT A.  VERIFY THAT
:*        THE DRIVE RETURNED TO NEUTRAL AND THAT NEITHER ATTENTION
:*        BIT IS SET.
:*
:*****
  
```

```

004474
004474 005737 001266                TST    KYBCTL         ;PERFORMING ONLY SINGLE TESTS ?
004500 001406                BEQ    2$           ;BR IF NOT
004502 100002                BPL    1$           ;BR IF JUST ENTERED TEST
004504 000137 002622                JMP    EXEC          ;RETURN & GET NEXT TEST NUMBER
004510 012737 177777 001266 1$:    MOV    #-1,KYBCTL    ;SET SINGLE TEST INDICATOR
004516 012737 004532 001106 2$:    MOV    #TEST2,$LPADR ;SETUP SCOPE LOOP ADDRESS
004524 012737 004532 001110                MOV    #TEST2,$LPERR ;SETUP ERROR LOOP ADDRESS
004532
004532 112737 000002 001102      TEST2: MOVVB  #2,$STSTM    ;MOVE #2 TEST NUMBER
004540 012706 001100                MOV    #STACK,SP    ;SETUP THE STACK POINTER
004544 012737 000001 001176                MOV    #1,$TIMES    ;DO 1 ITERATION
  
```

```
004552 113760 001224 000010      MOVB   PORTA, RMCS2(R0)  ;SELECT PORT A
004560 013737 001224 001234      MOV    PORTA, PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
```

;SET VOLUME VALUE FOR PORT

```
004566 012760 000011 000000      MOV    #11, RMCS1(R0)  ;ISSUE A DRIVE CLEAR
004574 012760 000021 000000      MOV    #21, RMCS1(R0)  ;ISSUE A READIN PRESET
004602 012760 010000 000032      MOV    #FMT16, RMOF(R0) ;SET FMT16
```

;VERIFY THAT THE DRIVE STATUS IS CORRECT

```
004610 005037 001244      CLR    CKERR           ;CLEAR THE 'CHECK ERROR' INDICATOR
004614 016037 000012 001126      MOV    RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
004622 012737 000012 001122      MOV    #RMDS, $BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
004630 060037 001122      ADD    R0, $BDADR     ;ADD RH/RM BASE ADDRESS
004634 012737 011700 001124      MOV    #MOL!PGM!DPR!DRY!VV, $GDDAT ;WHAT REGISTER SHOULD BE
004642 013737 001126 001164      MOV    $BDDAT, $TMP0   ;MOVE REGISTER CONTENTS TO '$TMP0'
004650 042737 106077 001164      BIC   #^C71700, $TMP0 ;SAVE SPECIFIED BITS
004656 023737 001124 001164      CMP    $GDDAT, $TMP0   ;COMPARE THE BITS
004664 001414      BEQ   64$            ;BR IF OK
004666 013737 001126 001174      MOV    $BDDAT, $TMP4   ;COPY 'BAD DATA'
004674 042737 071700 001174      BIC   #71700, $TMP4   ;CLEAR THE MASKED BITS
004702 053737 001174 001124      BIS   $TMP4, $GDDAT   ;'OR' WITH GOOD DATA FOR TYPEOUT
004710 104010      EMT   10
004712 005137 001244      COM   CKERR           ;SET THE REGISTER COMPARE ERROR INDICATOR
004716 000240      NOP
```

;RELEASE THE DRIVE FROM PORT A

```
004720 113760 001224 000010      MOVB   PORTA, RMCS2(R0) ;SELECT PORT A
004726 013737 001224 001234      MOV    PORTA, PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
004734 012760 000013 000000      MOV    #13, RMCS1(R0)  ;ISSUE RELEASE THROUGH PORT A
```

;VERIFY THAT THE DRIVE IS IN NEUTRAL

```
004742 005037 001250      CLR    RELERR         ;CLEAR THE 'RELEASE ERROR' INDICATOR
004746 012737 000012 001122      MOV    #RMDS, $BDADR   ;FORM THE ADDRESS OF RMDS FOR TYPEOUT
004754 060037 001122      ADD    R0, $BDADR     ;ADD THE I/O BASE ADDRESS
004760 012737 011600 001124      MOV    #MOL!PGM!DPR!DRY, $GDDAT ;COMPARISON CONSTANT
004766 113760 001224 000010      MOVB   PORTA, RMCS2(R0) ;SELECT PORT A.
004774 016037 000012 001170      MOV    RMDS(R0), $TMP2 ;GET THE DRIVE STATUS REGISTER FROM PORT A.
005002 013737 001170 001164      MOV    $TMP2, $TMP0   ;COPY IT INTO '$TMP0'
005010 042737 100100 001164      BIC   #ATA!VV, $TMP0  ;CLEAR PORT DEPENDENT BITS FROM THE COPY
005016 113760 001226 000010      MOVB   PORTB, RMCS2(R0) ;SELECT PORT B.
005024 016037 000012 001172      MOV    RMDS(R0), $TMP3 ;GET THE DRIVE STATUS REGISTER FROM PORT B.
005032 013737 001172 001166      MOV    $TMP3, $TMP1   ;COPY IT INTO '$TMP1'
005040 042737 100100 001166      BIC   #ATA!VV, $TMP1  ;CLEAR PORT DEPENDENT BITS FROM THE COPY
005046 023737 001164 001166      CMP    $TMP0, $TMP1   ;IS THE STATUS REGISTER THE SAME FROM BOTH PORTS ?
005054 001006      BNE   66$            ;BR IF NOT
005056 005737 001164      TST   $TMP0           ;REGISTERS ARE THE SAME: ARE THEY ZERO ?
005062 001037      BNE   68$            ;BR IF NOT
005064 104034      EMT   34
005066 000137 005252      JMP   70$            ;BYPASS THE REST OF THE CHECKS
005072 013737 001170 001126      MOV    $TMP2, $BDDAT   ;SET UP POSSIBLE BAD DATA FOR ERROR MESSAGE
005100 013737 001226 001234      MOV    PORTB, PTNBR    ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
005106 113760 001226 000010      MOVB   PORTB, RMCS2(R0) ;SELECT PORT B.
```



```

005114 005737 001164      TST      $TMP0      ;SEE IF STATUS EQ 0 FROM PORT A.
005120 001414              BEQ      67$        ;BR IF ZERO
005122 013737 001224 001234  MOV      PORTA,PTNBR ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
005130 013737 001172 001126  MOV      $TMP3,$BDDAT ;'BAD DATA' FOR ERROR TYPE OUT
005136 113760 001224 000010  MOVVB   PORTA,RMCS2(R0) ;SELECT PORT A.
005144 005737 001166      TST      $TMP1      ;SEE IF STATUS EQ ZERO FROM PORT B.
005150 001004              BNE      68$        ;BR IF NOT
005152 012737 177777 001250 67$:    MOV      #-1,RELERR ;SET 'RELEASE ERROR' INDICATOR
005160 104036              EMT      36
005162 013737 001170 001126 68$:    MOV      $TMP2,$BDDAT ;LOOK FOR BIT FAILURES WHEN RMDs READ
005170 013737 001224 001234  MOV      PORTA,PTNBR ;CHANGE PORT NUMBER
005176 042737 100100 001170  BIC      #ATA!VV,$TMP2 ;DON'T CHECK ATTN BIT OR VV BIT
005204 023737 001124 001170  CMP      $GDDAT,$TMP2 ;ALL BITS OK ?
005212 001401              BEQ      69$        ;BR IF OK FROM PORT A.
005214 104037              EMT      37
005216 013737 001172 001126 69$:    MOV      $TMP3,$BDDAT ;CHECK RMDs FOR BIT FAILURES - FROM PORT B.
005224 013737 001226 001234  MOV      PORTB,PTNBR ;CHANGE PORT NUMBER
005232 042737 100100 001172  BIC      #ATA!VV,$TMP3 ;DON'T CHECK ATTN BIT OR VV BIT
005240 023737 001124 001172  CMP      $GDDAT,$TMP3 ;SEE IF READ OK FROM PORT B.
005246 001401              BEQ      70$        ;BR IF OK
005250 104037              EMT      37
005252 000240              NOP
005254 000004              SCOPE          ;LOOP ?

```

99

```

:*****
:*TEST 3      SET 'VV' FOR PORT B
:*
:*SET VOLUME VALID
:*
:* A.  ISSUE A DRIVE CLEAR COMMAND THROUGH PORT B.
:*
:* B.  ISSUE A READIN PRESET COMMAND THROUGH PORT B.  VERIFY
:*      THAT THE 'VV' BIT IS SET FOR PORT B.
:*
:* C.  ISSUE A RELEASE COMMAND THROUGH PORT B.  VERIFY THAT
:*      THE DRIVE RETURNED TO NEUTRAL AND THAT NEITHER ATTENTION
:*      BIT IS SET.
:*
:*****

```

```

005256 005737 001266      TST3:    TST      KYBCTL      ;PERFORMING ONLY SINGLE TESTS ?
005256 001406              BEQ      2$          ;BR IF NOT
005264 100002              BPL      1$          ;BR IF JUST ENTERED TEST
005266 000137 002622      JMP      EXEC        ;RETURN & GET NEXT TEST NUMBER
005272 012737 177777 001266 1$:    MOV      #-1,KYBCTL ;SET SINGLE TEST INDICATOR
005300 012737 005314 001106 2$:    MOV      'TEST3,$LPADR ;SETUP SCOPE LOOP ADDRESS
005306 012737 005314 001110  MCV      #TEST3,$LPERR ;SETUP ERROR LOOP ADDRESS
005314              TEST3:
005314 112737 000003 001102  MOVVB   #3,$STSTNM ;MOVE #3 TEST NUMBER
005322 012706 001100      MOV      #STACK,SP ;SETUP THE STACK POINTER
005326 012737 000001 001176  MCV      #1,$TIMES ;DO 1 ITERATION

005334 113760 001226 000010  MOVVB   PORTB,RMCS2(R0) ;SELECT PORT B
005342 013737 001226 001234  MOV      PORTB,PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT

```

;SET VOLUME VALUE FOR PORT

```

005350 012760 000011 000000      MOV    #11,RMCS1(R0)  ;ISSUE A DRIVE CLEAR
005356 012760 000021 000000      MOV    #21,RMCS1(R0)  ;ISSUE A READIN PRESET
005364 012760 010000 000032      MOV    #FMT16,RMOF(R0) ;SET FMT16
    
```

;VERIFY THAT THE DRIVE STATUS IS CORRECT

```

005372 005037 001244      CLR    CKERR          ;CLEAR THE 'CHECK ERROR' INDICATOR
005376 016037 000012 001126      MOV    RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
005404 012737 000012 001122      MOV    #RMDS,$BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
005412 060037 001122      ADD    R0,$BDADR      ;ADD RH/RM BASE ADDRESS
005416 012737 011700 001124      MOV    #MOL!PGM!DPR!DRY!VV,$GDDAT ;WHAT REGISTER SHOULD BE
005424 013737 001126 001164      MOV    $BDDAT,$TMP0   ;MOVE REGISTER CONTENTS TO '$TMP0'
005432 042737 106077 001164      BIC    #^C71700,$TMP0 ;SAVE SPECIFIED BITS
005440 023737 001124 001164      CMP    $GDDAT,$TMP0   ;COMPARE THE BITS
005446 001414      BEQ    64$           ;BR IF OK
005450 013737 001126 001174      MOV    $BDDAT,$TMP4   ;COPY 'BAD DATA'
005456 042737 071700 001174      BIC    #71700,$TMP4   ;CLEAR THE MASKED BITS
005464 053737 001174 001124      BIS    $TMP4,$GDDAT   ;'OR' WITH GOOD DATA FOR TYPEOUT
005472 104010      EMT    10
005474 005137 001244      COM    CKERR          ;SET THE REGISTER COMPARE ERROR INDICATOR
005500 000240      64$:  NOP
    
```

;RELEASE THE DRIVE FROM PORT B

```

005502 113760 001226 000010      MOV    PORTB,RMCS2(R0) ;SELECT PORT B
005510 013737 001226 001234      MOV    PORTB,PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
005516 012760 000013 000000      MOV    #13,RMCS1(R0)  ;ISSUE RELEASE THROUGH PORT B
    
```

;VERIFY THAT THE DRIVE IS IN NEUTRAL

```

005524 005037 001250      CLR    RELERR        ;CLEAR THE 'RELEASE ERROR ' INDICATOR
005530 012737 000012 001122      MOV    #RMDS,$BDADR   ;FORM THE ADDRESS OF RMDS FOR TYPEOUT
005536 060037 001122      ADD    R0,$BDADR      ;ADD THE I/O BASE ADDRESS
005542 012737 011600 001124      MOV    #MOL!PGM!DPR!DRY,$GDDAT ;COMPARISON CONSTANT
005550 113760 001224 000010      MOV    PORTA,RMCS2(R0) ;SELECT PORT A.
005556 016037 000012 001170      MOV    RMDS(R0), $TMP2 ;GET THE DRIVE STATUS REGISTER FROM PORT A.
005564 013737 001170 001164      MOV    $TMP2,$TMP0   ;COPY IT INTO '$TMP0'
005572 042737 100100 001164      BIC    #ATA!VV,$TMP0  ;CLEAR PORT DEPENDENT BITS FROM THE COPY
005600 113760 001226 000010      MOV    PORTB,RMCS2(R0) ;SELECT PORT B.
005606 016037 000012 001172      MOV    RMDS(R0), $TMP3 ;GET THE DRIVE STATUS REGISTER FROM PORT B.
005614 013737 001172 001166      MOV    $TMP3,$TMP1   ;COPY IT INTO '$TMP1'
005622 042737 100100 001166      BIC    #ATA!VV,$TMP1  ;CLEAR PORT DEPENDENT BITS FROM THE COPY
005630 023737 001164 001166      CMP    $TMP0,$TMP1   ;IS THE STATUS REGISTER THE SAME FROM BOTH PORTS ?
005636 001006      BNE    66$           ;BR IF NOT
005640 005737 001164      TST    $TMP0          ;REGISTERS ARE THE SAME: ARE THEY ZERO ?
005644 001037      BNE    68$           ;BR IF NOT
005646 104034      EMT    34
005650 000137 006034      JMP    70$           ;BYPASS THE REST OF THE CHECKS
005654 013737 001170 001126      66$:  MOV    $TMP2,$BDDAT   ;SET UP POSSIBLE BAD DATA FOR ERROR MESSAGE
005662 013737 001226 001234      MOV    PORTB,PTNBR    ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
005670 113760 001226 000010      MOV    PORTB,RMCS2(R0) ;SELECT PORT B.
005676 005737 001164      TST    $TMP0          ;SEE IF STATUS EQ 0 FROM PORT A.
005702 001414      BEQ    67$           ;BR IF ZERO
005704 013737 001224 001234      MOV    PORTA,PTNBR    ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
005712 013737 001172 001126      MOV    $TMP3,$BDDAT   ;'BAD DATA' FOR ERROR TYPE OUT
005720 113760 001224 000010      MOV    PORTA,RMCS2(R0) ;SELECT PORT A.
005726 005737 001166      TST    $TMP1          ;SEE IF STATUS EQ ZERO FROM PORT B.
    
```



```

005732 001004          BNE      68$          ;BR IF NOT
005734 012737 177777 001250 67$:  MOV      #-1,RELERR  ;SET 'RELEASE ERROR' INDICATOR
005742 104036          EMT      36
005744 013737 001170 001126 68$:  MOV      $TMP2,$BDDAT ;LOOK FOR BIT FAILURES WHEN RMDS READ
005752 013737 001224 001234      MOV      PORTA,PTNBR  ;CHANGE PORT NUMBER
005760 042737 100100 001170      BIC      #ATA!VV,$TMP2 ;DON'T CHECK ATTN BIT OR VV BIT
005766 023737 001124 001170      CMP      $GDDAT,$TMP2 ;ALL BITS OK ?
005774 001401          BEQ      69$          ;BR IF OK FROM PORT A.
005776 104037          EMT      37
006000 013737 001172 001126 69$:  MOV      $TMP3,$BDDAT ;CHECK RMDS FOR BIT FAILURES - FROM PORT B.
006006 013737 001226 001234      MOV      PORTB,PTNBR  ;CHANGE PORT NUMBER
006014 042737 100100 001172      BIC      #ATA!VV,$TMP3 ;DON'T CHECK ATTN BIT OR VV BIT
006022 023737 001124 001172      CMP      $GDDAT,$TMP3 ;SEE IF READ OK FROM PORT B.
006030 001401          BEQ      70$          ;BR IF OK
006032 104037          EMT      37
006034 000240          70$:  NOP
006036 000004          SCOPE          ;LOOP ?
  
```

100
105
157

```

:*****
:*TEST 4          MEASURE THE TIMEOUT ONE-SHOT THROUGH PORT A
:*
:*MEASURE THE TIMEOUT ONE-SHOT VALUE THROUGH PORT A
:*
:*  A.  WRITE 0'S INTO RMDS THROUGH PORT A AND VERIFY THAT THE
:*      DRIVE HAS BEEN SEIZED.
:*
:*  B.  WAIT FOR TIMEOUT TO OCCUR.  MEASURE THE DURATION OF THE TIMEOUT
:*      ONE-SHOT AND SAVE THE VALUE FOR LATER USE.
:*
:*  C.  VERIFY THAT THE TIMEOUT OCCURRED AND THAT THE DRIVE RETURNS
:*      TO NEUTRAL
:*
:*****
  
```

```

006040          TST4:
006040 005737 001266      TST      KYBCTL      ;PERFORMING ONLY SINGLE TESTS ?
006044 001406          BEQ      2$          ;BR IF NOT
006046 100002          BPL      1$          ;BR IF JUST ENTERED TEST
006050 000137 002622      JMP      EXEC        ;RETURN & GET NEXT TEST NUMBER
006054 012737 177777 001266 1$:  MOV      #-1,KYBCTL  ;SET SINGLE TEST INDICATOR
006062 012737 006076 001106 2$:  MOV      #TEST4,$LPADR ;SETUP SCOPE LOOP ADDRESS
006070 012737 006076 001110      MOV      #TEST4,$LPERR ;SETUP ERROR LOOP ADDRESS
006076          TEST4:
006076 112737 000004 001102      MOVB     #4,$STSTM   ;MOVE #4 TEST NUMBER
006104 012706 001100      MOV      #STACK,SP  ;SETUP THE STACK POINTER
006110 012737 000001 001176      MOV      #1,$TIMES  ;DO 1 ITERATION

006116 005037 001256      CLR      TIMEA      ;CLEAR THE TIMEOUT VALUE STORAGE LOCATION
006122 005037 001260      CLR      TIMEAP    ;CLEAR THE + 25% TOLERANCE LOCATION

;START THE TIMER

006126 005037 001252      CLR      TIME      ;CLEAR THE ELAPSED TIME COUNTER
006132 012737 003720 001254      MOV      #2000.,WATCH ;SET WATCH TO 2000. MS
  
```

;SEIZE THE DRIVE THROUGH PORT A

```

006140 113760 001224 000010      MOVB   PORTA, RMCS2(R0) ;SELECT PORT A
006146 013737 001224 001236      MOV    PORTA, SEIZPT  ;STORE SEIZING PORT'S ADDRESS
006154 005060 000012                CLR    RMDS(R0)       ;WRITE RMDS
006160 113760 001226 000010      MOVB   PORTB, RMCS2(R0) ;SELECT PORT B
006166 013737 001226 001234      MOV    PORTB, PTNBR  ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
006174 013737 001226 001240      MOV    PORTB, OPPRT  ;'OPPOSITE' PORT ADDRESS
006202 016037 000012 001126      MOV    RMDS(R0), $BDDAT ;SEE IF DRIVE SEIZED BY PORT A
006210 010037 001122                MOV    R0, $BDADR    ;RH/RM BASE ADDRESS
006214 062737 000012 001122      ADD    #RMDS, $BDADR  ;GENERATE BAD REGISTER ADDRESS
006222 005037 001124                CLR    $GDDAT        ;REGISTER SHOULD BE ZERO
006226 023737 001124 001126      CMP    $GDDAT, $BDDAT ;IS THE REGISTER ZERO
006234 001403                BEQ    64$           ;BR IF IT IS
006236 104030                EMT    30
006240 000137 006754                JMP    4$           ;BYPASS REST OF THE SUBTEST
006244                                64$:
006244 113760 001224 000010      MOVB   PORTA, RMCS2(R0) ;SELECT PORT A
006252 013737 001224 001234      MOV    PORTA, PTNBR  ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
006260 016037 000012 001126      MOV    RMDS(R0), $BDDAT ;SEE IF SEIZING PORT SEES CORRECT STATUS
006266 012737 011700 001124      MOV    #MOL!PGM!DPR!DRY!VV, $GDDAT ;EXPECTED STATUS
006274 013737 001124 001166      MOV    $GDDAT, $TMP1  ;USE GOOD DATA AS A MASK
006302 005137 001166                COM    $TMP1         ;COMPLEMENT THE EXPECTED STATUS
006306 013737 001126 001164      MOV    $BDDAT, $TMP0  ;SAVE THE ACTUAL STATUS
006314 043737 001166 001164      BIC    $TMP1, $TMP0   ;CLEAR UNWANTED BITS
006322 023737 001124 001164      CMP    $GDDAT, $TMP0  ;ARE THE EXPECTED STATUS BITS SET ?
006330 001401                BEQ    65$           ;BR IF THEY ARE
006332 104031                EMT    31
006334 000240                                65$:
NOP
  
```

;WAIT FOR PORT A TO TIMEOUT

```

006336 113760 001226 000010      MOVB   PORTB, RMCS2(R0) ;SELECT PORT B
006344 013737 001226 001234      MOV    PORTB, PTNBR  ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
006352 005760 000012                1$:
006356 001006                TST    RMDS(R0)      ;WAIT FOR THE DRIVE TO TIMEOUT
006360 005737 001254                BNE    2$           ;BR WHEN TIMEOUT OCCURS
006364 001372                TST    WATCH        ;CHECK WATCH
006366 104006                BNE    1$           ;BR IF NOT ZERO
006370 000137 006426                EMT    6
006374 013737 001252 001256      JMP    3$           ;BYPASS THE REST OF THE TEST
006402 004537 013572                2$:
006406 001256                MOV    TIME, TIMEA   ;SAVE THE ELAPSED TIME FOR PORT A
006410 012637 001260                JSR    R5, TOLER    ;CALCULATE THE TOLERANCE
                                .WORD  TIMEA        ;TIMEOUT VALUE FOR PORT A
                                MOV    (SP)+, TIMEAP    ;+25% TOLERANCE
  
```

;VERIFY THAT THE TIMEOUT ONE-SHOT VALUE IS AT LEAST 500 MS

```

006414 023727 001256 000764      CMP    TIMEA, #500.  ;IS TIMEOUT VALUE AT LEAST 500 MS ?
006422 103001                BHIS   3$           ;BR IF IT IS
006424 104007                EMT    7
  
```

;VERIFY THAT THE DRIVE RETURNED TO NEUTRAL AFTER PORT A TIMED OUT

```

006426                                3$:
;VERIFY THAT THE DRIVE IS IN NEUTRAL
  
```

```

006426 005037 001250                CLR    RELERR       ;CLEAR THE 'RELEASE ERROR ' INDICATOR
  
```



```

006432 012737 000012 001122      MOV      #RMDS,$BDADR      ;FORM THE ADDRESS OF RMDS FOR TYPEOUT
006440 060037 001122              ADD      R0,$BDADR        ;ADD THE I/O BASE ADDRESS
006444 012737 011700 001124      MOV      #MOL!PGM!DPR!DRY!VV,$GDDAT ;COMPARISON CONSTANT
006452 113760 001224 000010      MOVVB   PORTA, RMCS2(R0) ;SELECT PORT A.
006460 016037 000012 001170      MOV      RMDS(R0),$TMP2   ;GET THE DRIVE STATUS REGISTER FROM PORT A.
006466 013737 001170 001164      MOV      $TMP2,$TMP0     ;COPY IT INTO '$TMP0'
006474 042737 100100 001164      BIC      #ATA!VV,$TMP0   ;CLEAR PORT DEPENDENT BITS FROM THE COPY
006502 113760 001226 000010      MOVVB   PORTB, RMCS2(R0) ;SELECT PORT B.
006510 016037 000012 001172      MOV      RMDS(R0),$TMP3   ;GET THE DRIVE STATUS REGISTER FROM PORT B.
006516 013737 001172 001166      MOV      $TMP3,$TMP1     ;COPY IT INTO '$TMP1'
006524 042737 100100 001166      BIC      #ATA!VV,$TMP1   ;CLEAR PORT DEPENDENT BITS FROM THE COPY
006532 023737 001164 001166      CMP      $TMP0,$TMP1     ;IS THE STATUS REGISTER THE SAME FROM BOTH PORTS ?
006540 001006              BNE      66$             ;BR IF NOT
006542 005737 001164              TST      $TMP0           ;REGISTERS ARE THE SAME: ARE THEY ZERO ?
006546 001045              BNE      68$             ;BR IF NOT
006550 104034              EMT      34
006552 000137 006752              JMP      70$             ;BYPASS THE REST OF THE CHECKS
006556 013737 001170 001126 66$:  MOV      $TMP2,$BDDAT    ;SET UP POSSIBLE BAD DATA FOR ERROR MESSAGE
006564 013737 001226 001234      MOV      PORTB,PTNBR     ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
006572 113760 001226 000010      MOVVB   PORTB, RMCS2(R0) ;SELECT PORT B.
006600 005737 001164              TST      $TMP0           ;SEE IF STATUS EQ 0 FROM PORT A.
006604 001414              BEQ      67$             ;BR IF ZERO
006606 013737 001224 001234      MOV      PORTA,PTNBR     ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
006614 013737 001172 001126      MOV      $TMP3,$BDDAT    ;'BAD DATA' FOR ERROR TYPE OUT
006622 113760 001224 000010      MOVVB   PORTA, RMCS2(R0) ;SELECT PORT A.
006630 005737 001166              TST      $TMP1           ;SEE IF STATUS EQ ZERO FROM PORT B.
006634 001012              BNE      68$             ;BR IF NOT
006636 012737 177777 001250 67$:  MOV      #-1,RELERR      ;SET 'RELEASE ERROR' INDICATOR
006644 012760 000011 000000      MOV      #11,RMCS1(R0)  ;CLEAR THE DRIVE
006652 012760 000013 000000      MOV      #13,RMCS1(R0)  ;RELEASE THE DRIVE
006660 104035              EMT      35
006662 013737 001170 001126 68$:  MOV      $TMP2,$BDDAT    ;LOOK FOR BIT FAILURES WHEN RMDS READ
006670 013737 001224 001234      MOV      PORTA,PTNBR     ;CHANGE PORT NUMBER
006676 042737 100000 001170      BIC      #ATA,$TMP2     ;DON'T CHECK THE ATTN BIT
006704 023737 001124 001170      CMP      $GDDAT,$TMP2   ;ALL BITS OK ?
006712 001401              BEQ      69$             ;BR IF OK FROM PORT A.
006714 104037              EMT      37
006716 013737 001172 001126 69$:  MOV      $TMP3,$BDDAT    ;CHECK RMDS FOR BIT FAILURES - FROM PORT B.
006724 013737 001226 001234      MOV      PORTB,PTNBR     ;CHANGE PORT NUMBER
006732 042737 100000 001172      BIC      #ATA,$TMP3     ;DON'T CHECK THE ATTN BIT
006740 023737 001124 001172      CMP      $GDDAT,$TMP3   ;SEE IF READ OK FROM PORT B.
006746 001401              BEQ      70$             ;BR IF OK
006750 104037              EMT      37
006752 000240 70$:  NOP
006754 000004 4$:  SCOPE ;LOOP ?
  
```

158

```

:*****
:*TEST 5      MEASURE THE TIMEOUT ONE-SHOT THROUGH PORT B
:*
:*MEASURE THE TIMEOUT ONE-SHOT VALUE THROUGH PORT B
:*
:*  A.  WRITE 0'S INTO RMDS THROUGH PORT B AND VERIFY THAT THE
:*      DRIVE HAS BEEN SEIZED.
:*
:*  B.  WAIT FOR TIMEOUT TO OCCUR.  MEASURE THE DURATION OF THE TIMEOUT
:*      ONE-SHOT AND SAVE THE VALUE FOR LATER USE.
  
```



```

007254 113760 001224 000010      MOVB  PORTA, RMCS2(R0)  ;SELECT PORT A
007262 013737 001224 001234      MOV   PORTA, PTNBR    ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
007270 005760 000012              1$:  TST   RMDS(R0)        ;WAIT FOR THE DRIVE TO TIMEOUT
007274 001006                    BNE   2$              ;BR WHEN TIMEOUT OCCURS
007276 005737 001254              TST   WATCH           ;CHECK WATCH
007302 001372                    BNE   1$              ;BR IF NOT ZERO
007304 104006                    EMT   6
007306 000137 007344              JMP   3$              ;BYPASS THE REST OF THE TEST
007312 013737 001252 001262      2$:  MOV   TIME, TIMEB     ;SAVE THE ELAPSED TIME FOR PORT B
007320 004537 013572              JSR   R5, TOLER       ;CALCULATE THE TOLERANCE
007324 001262                    .WORD TIMEB           ;TIMEOUT VALUE FOR PORT B
007326 012637 001264              MOV   (SP)+, TIMEBP   ;+25% TOLERANCE
  
```

;VERIFY THAT THE TIMEOUT ONE-SHOT VALUE IS AT LEAST 500 MS

```

007332 023727 001262 000764      CMP   TIMEB, #500.    ;IS TIMEOUT VALUE AT LEAST 500 MS ?
007340 103001                    BHIS  3$              ;BR IF IT IS
007342 104007                    EMT   7
  
```

;VERIFY THAT THE DRIVE RETURNED TO NEUTRAL AFTER PORT B TIMED OUT

```

007344
3$:
;VERIFY THAT THE DRIVE IS IN NEUTRAL
  
```

```

007344 005037 001250              CLR   RELERR          ;CLEAR THE 'RELEASE ERROR ' INDICATOR
007350 012737 000012 001122      MOV   #RMDS, $BDADR   ;FORM THE ADDRESS OF RMDS FOR TYPEOUT
007356 060037 001122              ADD   R0, $BDADR      ;ADD THE I/O BASE ADDRESS
007362 012737 011700 001124      MOV   #MOL!PGM!DPR!DRY!VV, $GDDAT ;COMPARISON CONSTANT
007370 113760 001224 000010      MOVB  PORTA, RMCS2(R0) ;SELECT PORT A.
007376 016037 000012 001170      MOV   RMDS(R0), $TMP2 ;GET THE DRIVE STATUS REGISTER FROM PORT A.
007404 013737 001170 001164      MOV   $TMP2, $TMP0    ;COPY IT INTO '$TMP0'
007412 042737 100100 001164      BIC   #ATA!VV, $TMP0  ;CLEAR PORT DEPENDENT BITS FROM THE COPY
007420 113760 001226 000010      MOVB  PORTB, RMCS2(R0) ;SELECT PORT B.
007426 016037 000012 001172      MOV   RMDS(R0), $TMP3 ;GET THE DRIVE STATUS REGISTER FROM PORT B.
007434 013737 001172 001166      MOV   $TMP3, $TMP1    ;COPY IT INTO '$TMP1'
007442 042737 100100 001166      BIC   #ATA!VV, $TMP1  ;CLEAR PORT DEPENDENT BITS FROM THE COPY
007450 023737 001164 001166      CMP   $TMP0, $TMP1    ;IS THE STATUS REGISTER THE SAME FROM BOTH PORTS ?
007456 001006                    BNE   66$            ;BR IF NOT
007460 005737 001164              TST   $TMP0           ;REGISTERS ARE THE SAME: ARE THEY ZERO ?
007464 001045                    BNE   68$            ;BR IF NOT
007466 104034                    EMT   34
007470 000137 007670              JMP   70$            ;BYPASS THE REST OF THE CHECKS
007474 013737 001170 001126      66$: MOV   $TMP2, $BDDAT    ;SET UP POSSIBLE BAD DATA FOR ERROR MESSAGE
007502 013737 001226 001234      MOV   PORTB, PTNBR    ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
007510 113760 001226 000010      MOVB  PORTB, RMCS2(R0) ;SELECT PORT B.
007516 005737 001164              TST   $TMP0           ;SEE IF STATUS EQ 0 FROM PORT A.
007522 001414                    BEQ   67$            ;BR IF ZERO
007524 013737 001224 001234      MOV   PORTA, PTNBR    ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
007532 013737 001172 001126      MOV   $TMP3, $BDDAT   ;'BAD DATA' FOR ERROR TYPE OUT
007540 113760 001224 000010      MOVB  PORTA, RMCS2(R0) ;SELECT PORT A.
007546 005737 001166              TST   $TMP1           ;SEE IF STATUS EQ ZERO FROM PORT B.
007552 001012                    BNE   68$            ;BR IF NOT
007554 012737 177777 001250      67$: MOV   #-1, RELERR    ;SET 'RELEASE ERROR' INDICATOR
007562 012760 000011 000000      MOV   #11, RMCS1(R0) ;CLEAR THE DRIVE
007570 012760 000013 000000      MOV   #13, RMCS1(R0) ;RELEASE THE DRIVE
007576 104035                    EMT   35
  
```

```

007600 013737 001170 001126 68$: MOV $TMP2,$BDDAT ;LOOK FOR BIT FAILURES WHEN RMD5 READ
007606 013737 001224 001234 MOV PORTA,PTNBR ;CHANGE PORT NUMBER
007614 042737 100000 001170 BIC #ATA,$TMP2 ;DON'T CHECK THE ATTN BIT
007622 023737 001124 001170 CMP $GDDAT,$TMP2 ;ALL BITS OK ?
007630 001401 BEQ 69$ ;BR IF OK FROM PORT A.
007632 104037 EMT 37
007634 013737 001172 001126 69$: MOV $TMP3,$BDDAT ;CHECK RMD5 FOR BIT FAILURES - FROM PORT B.
007642 013737 001226 001234 MOV PORTB,PTNBR ;CHANGE PORT NUMBER
007650 042737 100000 001172 BIC #ATA,$TMP3 ;DON'T CHECK THE ATTN BIT
007656 023737 001124 001172 CMP $GDDAT,$TMP3 ;SEE IF READ OK FROM PORT B.
007664 001401 BEQ 70$ ;BR IF OK
007666 104037 EMT 37
007670 000240 70$: NOP
007672 000004 4$: SCOPE ;LOOP ?
    
```

159
160
177
178

```

:*****
:*TEST 6 TEST 'PORT SELECT' SWITCH, DRIVE CYCLED UP
:*
:*TEST THE OPERATION OF THE 'PORT SELECT' SWITCH (DRIVE CYCLED UP).
:*
:* A. SWITCH TO PORT 'A' POSITION. VERIFY THAT THE DRIVE IS IN
:* NEUTRAL AND THAT THE STATUS BITS IN RMD5, AS READ THROUGH BOTH
:* PORTS, ARE CORRECT.
:*
:* B. SWITCH TO PORT 'B' POSITION. VERIFY THAT THE DRIVE IS IN
:* NEUTRAL AND THAT THE STATUS BITS IN RMD5, AS READ THROUGH BOTH
:* PORTS, ARE CORRECT.
:*
:* C. RETURN THE 'PORT SELECT' SWITCH TO THE 'A/B' POSITION. VERIFY
:* THE DRIVE STATE.
:*
:*****
    
```

```

007674 005737 001266 TST6: TST KYBCTL ;PERFORMING ONLY SINGLE TESTS ?
007700 001406 BEQ 2$ ;BR IF NOT
007702 100002 BPL 1$ ;BR IF JUST ENTERED TEST
007704 000137 002622 JMP EXEC ;RETURN & GET NEXT TEST NUMBER
007710 012737 177777 001266 1$: MOV #-1,KYBCTL ;SET SINGLE TEST INDICATOR
007716 012737 007732 001106 2$: MOV #TEST6,$LPADR ;SETUP SCOPE LOOP ADDRESS
007724 012737 007732 001110 MOV #TEST6,$LPERR ;SETUP ERROR LOOP ADDRESS
007732 TEST6: MOVB #6,$STNM ;MOVE #6 TEST NUMBER
007732 112737 000006 001102 MOV #STACK,SP ;SETUP THE STACK POINTER
007740 012706 001100 MOV #1,$TIMES ;DO 1 ITERATION
007744 012737 000001 001176
    
```

179
180

;CLEAR ATTENTION BITS FOR BOTH PORTS

```

007752 113760 001224 000010 MOVB PORTA,RMCS2(R0) ;SELECT PORT #A
007760 005060 000012 CLR RMD5(R0) ;SEIZE THE DRIVE
007764 012760 000011 000000 MOV #11,RMCS1(R0) ;ISSUE DRIVE CLEAR
007772 012760 000013 000000 MOV #13,RMCS1(R0) ;RELEASE THE DRIVE
010000 113760 001226 000010 MOVB PORTB,RMCS2(R0) ;SELECT PORT #B
010006 005060 000012 CLR RMD5(R0) ;SEIZE THE DRIVE THROUGH PORT 'B'
010012 012760 000011 000000 MOV #11,RMCS1(R0) ;ISSUE DRIVE CLEAR
010020 012760 000013 000000 MOV #13,RMCS1(R0) ;RELEASE THE DRIVE
    
```



```

181 010026 104401 020224 TYPE ,SWTCHA :SWITCH TO 'A'
182 010032 104401 020316 TYPE ,CONTUE :PRESS 'CONTINUE'
183 010036 000000 HALT
184
185
    
```

:VERIFY THAT THE DRIVE IS IN NEUTRAL

```

010040 005037 001250 CLR RELERR :CLEAR THE 'RELEASE ERROR' INDICATOR
010044 012737 000012 001122 MOV #RMDS,$BDADR :FORM THE ADDRESS OF RMDS FOR TYPEOUT
010052 060037 001122 ADD RO,$BDADR :ADD THE I/O BASE ADDRESS
010056 012737 011700 001124 MCV #MOL!PGM!DPR!DRY!VV,$GDDAT :COMPARISON CONSTANT
010064 113760 001224 000010 MOVVB PORTA, RMCS2(R0) :SELECT PORT A.
010072 016037 000012 001170 MOV RMDS(R0), $TMP2 :GET THE DRIVE STATUS REGISTER FROM PORT A.
010100 013737 001170 001164 MOV $TMP2, $TMP0 :COPY IT INTO '$TMP0'
010106 042737 100100 001164 BIC #ATA!VV, $TMP0 :CLEAR PORT DEPENDENT BITS FROM THE COPY
010114 113760 001226 000010 MOVVB PORTB, RMCS2(R0) :SELECT PORT B.
010122 016037 000012 001172 MOV RMDS(R0), $TMP3 :GET THE DRIVE STATUS REGISTER FROM PORT B.
010130 013737 001172 001166 MOV $TMP3, $TMP1 :COPY IT INTO '$TMP1'
010136 042737 100100 001166 BIC #ATA!VV, $TMP1 :CLEAR PORT DEPENDENT BITS FROM THE COPY
010144 023737 001164 001166 CMP $TMP0, $TMP1 :IS THE STATUS REGISTER THE SAME FROM BOTH PORTS ?
010152 001006 BNE 64$ :BR IF NOT
010154 005737 001164 TST $TMP0 :REGISTERS ARE THE SAME: ARE THEY ZERO ?
010160 001045 BNE 66$ :BR IF NOT
010162 104034 EMT 34
010164 000137 010364 JMP 68$ :BYPASS THE REST OF THE CHECKS
010170 013737 001170 001126 64$: MOV $TMP2, $BDDAT :SET UP POSSIBLE BAD DATA FOR ERROR MESSAGE
010176 013737 001226 001234 MOV PORTB, PTNBR :SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
010204 113760 001226 000010 MOVVB PORTB, RMCS2(R0) :SELECT PORT B.
010212 005737 001164 TST $TMP0 :SEE IF STATUS EQ 0 FROM PORT A.
010216 001414 BEQ 65$ :BR IF ZERO
010220 013737 001224 001234 MOV PORTA, PTNBR :SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
010226 013737 001172 001126 MOV $TMP3, $BDDAT :'BAD DATA' FOR ERROR TYPE OUT
010234 113760 001224 000010 MOVVB PORTA, RMCS2(R0) :SELECT PORT A.
010242 005737 001166 TST $TMP1 :SEE IF STATUS EQ ZERO FROM PORT B.
010246 001012 BNE 66$ :BR IF NOT
010250 012737 177777 001250 65$: MOV #-1, RELERR :SET 'RELEASE ERROR' INDICATOR
010256 012760 000011 000000 MOV #11, RMCS1(R0) :CLEAR THE DRIVE
010264 012760 000013 000000 MOV #13, RMCS1(R0) :RELEASE THE DRIVE
010272 104017 EMT 17
010274 013737 001170 001126 66$: MOV $TMP2, $BDDAT :LOOK FOR BIT FAILURES WHEN RMDS READ
010302 013737 001224 001234 MOV PORTA, PTNBR :CHANGE PORT NUMBER
010310 042737 100000 001170 BIC #ATA, $TMP2 :DON'T CHECK THE ATTN BIT
010316 023737 001124 001170 CMP $GDDAT, $TMP2 :ALL BITS OK ?
010324 001401 BEQ 67$ :BR IF OK FROM PORT A.
010326 104037 EMT 37
010330 013737 001172 001126 67$: MOV $TMP3, $BDDAT :CHECK RMDS FOR BIT FAILURES - FROM PORT B.
010336 013737 001226 001234 MOV PORTB, PTNBR :CHANGE PORT NUMBER
010344 042737 100000 001172 BIC #ATA, $TMP3 :DON'T CHECK THE ATTN BIT
010352 023737 001124 001172 CMP $GDDAT, $TMP3 :SEE IF READ OK FROM PORT B.
010360 001401 BEQ 68$ :BR IF OK
010362 104037 EMT 37
010364 000240 68$: NOP
186 010366 104401 020261 TYPE ,SWTCHB :SWITCH TO 'B'
187 010372 104401 020316 TYPE ,CONTUE :PRESS 'CONTINUE'
188 010376 000000 HALT
189
190
    
```

:VERIFY THAT THE DRIVE IS IN NEUTRAL

```

010400 005037 001250 CLR RELERR ;CLEAR THE 'RELEASE ERROR ' INDICATOR
010404 012737 000012 001122 MOV #RMDS,$BDADR ;FORM THE ADDRESS OF RMDS FOR TYPEOUT
010412 060037 001122 ADD R0,$BDADR ;ADD THE I/O BASE ADDRESS
010416 012737 011700 001124 MOV #MOL!PGM!DPR!DRY!VV,$GDDAT ;COMPARISON CONSTANT
010424 113760 001224 000010 MOV#B PORTA,RMCS2(R0) ;SELECT PORT A.
010432 016037 000012 001170 MOV RMDS(R0),$TMP2 ;GET THE DRIVE STATUS REGISTER FROM PORT A.
010440 013737 001170 001164 MOV $TMP2,$TMP0 ;COPY IT INTO '$TMP0'
010446 042737 100100 001164 BIC #ATA!VV,$TMP0 ;CLEAR PORT DEPENDENT BITS FROM THE COPY
010454 113760 001226 000010 MOV#B PORTB,RMCS2(R0) ;SELECT PORT B.
010462 016037 000012 001172 MOV RMDS(R0),$TMP3 ;GET THE DRIVE STATUS REGISTER FROM PORT B.
010470 013737 001172 001166 MOV $TMP3,$TMP1 ;COPY IT INTO '$TMP1'
010476 042737 100100 001166 BIC #ATA!VV,$TMP1 ;CLEAR PORT DEPENDENT BITS FROM THE COPY
010504 023737 001164 001166 CMP $TMP0,$TMP1 ;IS THE STATUS REGISTER THE SAME FROM BOTH PORTS ?
010512 001006 BNE 69$ ;BR IF NOT
010514 005737 001164 TST $TMP0 ;REGISTERS ARE THE SAME: ARE THEY ZERO ?
010520 001045 BNE 71$ ;BR IF NOT
010522 104034 EMT 34
010524 000137 010724 JMP 73$ ;BYPASS THE REST OF THE CHECKS
010530 013737 001170 001126 69$: MOV $TMP2,$BDAT ;SET UP POSSIBLE BAD DATA FOR ERROR MESSAGE
010536 013737 001226 001234 MOV PORTB,PTNBR ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
010544 113760 001226 000010 MOV#B PORTB,RMCS2(R0) ;SELECT PORT B.
010552 005737 001164 TST $TMP0 ;SEE IF STATUS EQ 0 FROM PORT A.
010556 001414 BEQ 70$ ;BR IF ZERO
010560 013737 001224 001234 MOV PORTA,PTNBR ;SEIZING PORT IF TEST SHOWS DRIVE NOT IN NEUTRAL
010566 013737 001172 001126 MOV $TMP3,$BDAT ;'BAD DATA' FOR ERROR TYPE OUT
010574 113760 001224 000010 MOV#B PORTA,RMCS2(R0) ;SELECT PORT A.
010602 005737 001166 TST $TMP1 ;SEE IF STATUS EQ ZERO FROM PORT B.
010606 001012 BNE 71$ ;BR IF NOT
010610 012737 177777 001250 70$: MOV #-1,RELERR ;SET 'RELEASE ERROR' INDICATOR
010616 012760 000011 000000 MOV #11,RMCS1(R0) ;CLEAR THE DRIVE
010624 012760 000013 000000 MOV #13,RMCS1(R0) ;RELEASE THE DRIVE
010632 104020 EMT 20
010634 013737 001170 001126 71$: MOV $TMP2,$BDAT ;LOOK FOR BIT FAILURES WHEN RMDS READ
010642 013737 001224 001234 MOV PORTA,PTNBR ;CHANGE PORT NUMBER
010650 042737 100000 001170 BIC #ATA,$TMP2 ;DON'T CHECK THE ATTN BIT
010656 023737 001124 001170 CMP $GDDAT,$TMP2 ;ALL BITS OK ?
010664 001401 BEQ 72$ ;BR IF OK FROM PORT A.
010666 104037 EMT 37
010670 013737 001172 001126 72$: MOV $TMP3,$BDAT ;CHECK RMDS FOR BIT FAILURES - FROM PORT B.
010676 013737 001226 001234 MOV PORTB,PTNBR ;CHANGE PORT NUMBER
010704 042737 100000 001172 BIC #ATA,$TMP3 ;DON'T CHECK THE ATTN BIT
010712 023737 001124 001172 CMP $GDDAT,$TMP3 ;SEE IF READ OK FROM PORT B.
010720 001401 BEQ 73$ ;BR IF OK
010722 104037 EMT 37
010724 000240 73$: NOP
191 010726 005737 001266 TST KYBCTL ;SINGLE TEST MODE ?
192 010732 001402 BEQ 1$ ;BR IF NOT
193 010734 104401 020156 TYPE ,SWTCHN ;RETURN SWITCH TO 'A/B'
194 010740 000004 1$: SCOPE ;LOOP ?
195
321
322

```

```

*****
*TEST 7 TEST 'PORT SELECT' SWITCH ON PORT A
*
*TEST THE OPERATION OF THE 'PORT SELECT' SWITCH (DRIVE CYCLED DOWN).
*

```


- * A. CYCLE THE DRIVE DOWN.
- * B. SWITCH TO PORT A POSITION. VERIFY THAT THE DRIVE IS IN NEUTRAL AND THAT THE STATUS BITS IN RMDS, AS READ THROUGH BOTH PORTS, ARE CORRECT.
- * C. SWITCH THE 'PORT SELECT' SWITCH TO A; CYCLE THE DRIVE UP.
- * D. WHEN THE DRIVE CYCLES UP, VERIFY THAT 'VV-A IS RESET, AND THAT 'ATA-A IS SET.
- * E. ISSUE A DRIVE CLEAR COMMAND AND A READIN PRESET COMMAND THROUGH PORT A.
- * F. VERIFY THAT THE DRIVE CANNOT BE ACCESSED THROUGH PORT B AND 'NED' SETS WHEN ATEMPTING TO ACCESS THE DRIVE THROUGH PORT B. ATTEMPT TO SET PORT REQUEST BY WRITING 0'S INTO RMDS THROUGH PORT B.
- * G. ISSUE A RELEASE COMMAND THROUGH PORT A. VERIFY THAT THE DRIVE REMAINS LOCKED ON PORT A.

```

010742
010742 005737 001266
010746 001406
010750 100002
010752 000137 002622
010756 012737 177777 001266
010764 012737 011000 001106
010772 012737 011000 001110
011000
011000 112737 000007 001102
011006 012706 001100
011012 012737 000001 001176

011020 113760 001224 000010
011026 013737 001224 001234
011034 104401 020367
011040 104401 020224
011044 104401 020407

011050 032760 010000 000012
011056 001374
011060 032760 010000 000012
011066 001774

011070 005037 001244
011074 016037 000012 001126
011102 012737 000012 001122
011110 060037 001122
011114 012737 110600 001124
011122 013737 001126 001164
011130 042737 066077 001164
011136 023737 001124 001164
    
```

```

TST7:
TST      KYBCTL      ;PERFORMING ONLY SINGLE TESTS ?
BEQ      2$          ;BR IF NOT
BPL      1$          ;BR IF JUST ENTERED TEST
JMP      EXEC        ;RETURN & GET NEXT TEST NUMBER
1$:      MOV      #-1,KYBCTL ;SET SINGLE TEST INDICATOR
2$:      MOV      #TEST7,$LPADR ;SETUP SCOPE LOOP ADDRESS
          MOV      #TEST7,$LPERR ;SETUP ERROR LOOP ADDRESS

TEST7:
          MOVB     #7,$STSTM    ;MOVE #7 TEST NUMBER
          MOV      #STACK,SP    ;SETUP THE STACK POINTER
          MOV      #1,$TIMES    ;DO 1 ITERATION

          MOVB     PORTA,RMCS2(R0) ;SELECT PORT A
          MOV      PORTA,PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
          TYPE     ,CYCLED      ;'CYCLE DOWN THE DRIVE'
          TYPE     ,SWTCHA      ;SWITCH TO 'A'
          TYPE     ,CYCLEU      ;'CYCLE UP THE DRIVE'

1$:      BIT      #MOL,RMDS(R0) ;IS 'MOL' RESET ?
          BNE     1$          ;BR IF NO (DRIVE NOT CYCLED DOWN)
2$:      BIT      #MOL,RMDS(R0) ;IS 'MOL' SET ?
          BEQ     2$          ;BR IF NO (DRIVE NOT CYCLED UP)

;DRIVE IS CYCLED UP, CHECK STATUS THROUGH PORT A

          CLR     CKERR        ;CLEAR THE 'CHECK ERROR' INDICATOR
          MOV     RMDS(R0),$BDDAT ;GET CONTENTS OF RMDS
          MOV     #RMDS,$BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
          ADD     R0,$BDADR    ;ADD RH/RM BASE ADDRESS
          MOV     #ATA!MOL!DPR!DRY,$GDDAT ;WHAT REGISTER SHOULD BE
          MOV     $BDDAT,$TMPO ;MOVE REGISTER CONTENTS TO '$TMPO'
          BIC     #^C111700,$TMPO ;SAVE SPECIFIED BITS
          CMP     $GDDAT,$TMPO ;COMPARE THE BITS
    
```

```

011144 001414          BEQ      64$          ;BR IF OK
011146 013737 001126 001174      MOV      $BDDAT,$TMP4      ;COPY 'BAD DATA'
011154 042737 111700 001174      BIC      #111700,$TMP4     ;CLEAR THE MASKED BITS
011162 053737 001174 001124      BIS      $TMP4,$GDDAT     ;'OR' WITH GOOD DATA FOR TYPEOUT
011170 104021          EMT      21
011172 005137 001244          COM      CKERR           ;SET THE REGISTER COMPARE ERROR INDICATOR
011176 000240          64$:  NOP
    
```

;SET VOLUME VALID FOR PORT A

```

011200 012760 000011 000000      MOV      #11,RMCS1(R0)    ;ISSUE A DRIVE CLEAR
011206 012760 000021 000000      MOV      #21,RMCS1(R0)    ;ISSUE A READIN PRESET
011214 012760 010000 000032      MOV      #FMT16,RMOF(R0) ;SET FMT16
    
```

;CHECK THE DRIVE STATUS THROUGH PORT B; VERIFY THAT 'NED'
 ;SETS WHEN THE DRIVE IS ACCESSED THROUGH PORT B.

```

011222 113760 001226 000010      MOVVB   PORTB,RMCS2(R0)   ;SELECT PORT B
011230 013737 001226 001234      MOV      PORTB,PTNBR     ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
011236 005037 001244          CLR      CKERR           ;CLEAR THE 'CHECK ERROR' INDICATOR
011242 016037 000012 001126      MOV      RMDS(R0),$BDDAT  ;GET CONTENTS OF RMDS
011250 012737 000012 001122      MOV      #RMDS,$BDADR    ;FORM REGISTER ADDRESS OF ERROR MESSAGE
011256 060037 001122          ADD     RO,$BDADR        ;ADD RH/RM BASE ADDRESS
011262 005037 001124          CLR      $GDDAT         ;WHAT REGISTER SHOULD BE
011266 013737 001126 001164      MOV      $BDDAT,$TMP0    ;MOVE REGISTER CONTENTS TO '$TMP0'
011274 042737 000077 001164      BIC      #^C177700,$TMP0 ;SAVE SPECIFIED BITS
011302 023737 001124 001164      CMP      $GDDAT,$TMP0    ;COMPARE THE BITS
011310 001414          BEQ     66$            ;BR IF OK
011312 013737 001126 001174      MOV      $BDDAT,$TMP4    ;COPY 'BAD DATA'
011320 042737 177700 001174      BIC      #177700,$TMP4   ;CLEAR THE MASKED BITS
011326 053737 001174 001124      BIS      $TMP4,$GDDAT    ;'OR' WITH GOOD DATA FOR TYPEOUT
011334 104022          EMT     22
011336 005137 001244          COM     CKERR           ;SET THE REGISTER COMPARE ERROR INDICATOR
011342 000240          66$:  NOP
011344 005037 001244          CLR     CKERR           ;CLEAR THE 'CHECK ERROR' INDICATOR
011350 016037 000010 001126      MOV      RMCS2(R0),$BDDAT ;GET CONTENTS OF RMCS2
011356 012737 000010 001122      MOV      #RMCS2,$BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
011364 060037 001122          ADD     RO,$BDADR        ;ADD RH/RM BASE ADDRESS
011370 012737 010000 001124      MOV      #NED,$GDDAT     ;WHAT REGISTER SHOULD BE
011376 013737 001126 001164      MOV      $BDDAT,$TMP0    ;MOVE REGISTER CONTENTS TO '$TMP0'
011404 042737 167777 001164      BIC      #^CNED,$TMP0    ;SAVE SPECIFIED BITS
011412 023737 001124 001164      CMP      $GDDAT,$TMP0    ;COMPARE THE BITS
011420 001414          BEQ     68$            ;BR IF OK
011422 013737 001126 001174      MOV      $BDDAT,$TMP4    ;COPY 'BAD DATA'
011430 042737 010000 001174      BIC      #NED,$TMP4      ;CLEAR THE MASKED BITS
011436 053737 001174 001124      BIS      $TMP4,$GDDAT    ;'OR' WITH GOOD DATA FOR TYPEOUT
011444 104023          EMT     23
011446 005137 001244          COM     CKERR           ;SET THE REGISTER COMPARE ERROR INDICATOR
011452 000240          68$:  NOP
011454 005060 000012          CLR     RMDS(R0)        ;TRY TO SET REQUEST BY WRITING THROUGH
    ;THE LOCKED OUT PORT (PORT 'B')
    
```

;VERIFY THAT DRIVE STAYS LOCKED ON PORT A

```

011460 113760 001224 000010      MOVVB   PORTA,RMCS2(R0)   ;SELECT PORT A
011466 013737 001224 001234      MOV      PORTA,PTNBR     ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
011474 012760 000013 000012      MOV      #13,RMDS(R0)    ;ISSUE A RELEASE THROUGH PORT A
    
```



```

011502 013737 001224 001236      MOV      PORTA,SEIZPT      ;ADDRESS OF 'LOCKED ON' PORT
011510 113760 001226 000010      MOVVB   PORTB,RMCS2(R0)  ;SELECT PORT B
011516 013737 001226 001234      MOV      PORTB,PTNBR     ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
011524 005037 001244                CLR      CKERR           ;CLEAR THE 'CHECK ERROR' INDICATOR
011530 016037 000012 001126      MOV      RMDS(R0),%BDDAT ;GET CONTENTS OF RMDS
011536 012737 000012 001122      MOV      %RMDS,%BDADR   ;FORM REGISTER ADDRESS OF ERROR MESSAGE
011544 060037 001122                ADD      R0,%BDADR      ;ADD RH/RM BASE ADDRESS
011550 005037 001124                CLR      %GDDAT        ;WHAT REGISTER SHOULD BE
011554 013737 001126 001164      MOV      %BDDAT,%STMP0  ;MOVE REGISTER CONTENTS TO '%STMP0'
011562 042737 000077 001164      BIC      #^C177700,%STMP0 ;SAVE SPECIFIED BITS
011570 023737 001124 001164      CMP      %GDDAT,%STMP0  ;COMPARE THE BITS
011576 001414                BEQ      70$           ;BR IF OK
011600 013737 001126 001174      MOV      %BDDAT,%STMP4  ;COPY 'BAD DATA'
011606 042737 177700 001174      BIC      #177700,%STMP4 ;CLEAR THE MASKED BITS
011614 053737 001174 001124      BIS      %STMP4,%GDDAT  ;'OR' WITH GOOD DATA FOR TYPEOUT
011622 104024                EMT      24
011624 005137 001244                COM      CKERR         ;SET THE REGISTER COMPARE ERROR INDICATOR
011630 000240                70$:  NOP
  
```

;IF ERROR OCCURRED, CHECK FOR LOOP ON TEST

```

011632 105737 001103                TSTB    $ERFLG         ;DID AN ERROR OCCUR
011636 001412                BEQ      3$           ;BR IF NOT
011640 032777 001000 167272      BIT      #SW09,@SWR    ;SEE IF LOOP ON ERROR (SWR9 = 1)
011646 001406                BEQ      3$           ;BR IF NOT
011650 105037 001103                CLRB    $ERFLG        ;CLEAR THE ERROR FLAG
011654 005037 001176                CLR      $TIMES       ;CLEAR THE MAX ITERATION COUNT
011660 000177 167224                JMP      @%$LPERR     ;GO TO THE LOOP ADDRESS
011664 005737 001266                3$:  TST      KYBCTL     ;IN SINGLE TEST MODE ?
011670 001460                BEQ      6$           ;BR IF NOT
011672 032777 040000 167240      BIT      #SW14,@SWR    ;LOOP ON TEST ?
011700 001054                BNE     6$           ;BR IF LOOPING
011702 104401 020367                TYPE    ,CYCLED       ;TYPE 'CYCLE DOWN'
011706 104401 020156                TYPE    ,SWTCHN       ;'SWITCH TO A/B'
011712 104401 020407                TYPE    ,CYCLEU       ;'CYCLE THE DRIVE UP'
011716 113760 001224 000010      MOVVB   PORTA,RMCS2(R0) ;SELECT PORT A
011724 013737 001224 001234      MOV      PORTA,PTNBR   ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
011732 032760 010000 000012      4$:  BIT      #MOL,RMDS(R0) ;IS 'MOL' RESET ?
011740 001374                BNE     4$           ;BR IF NO (DRIVE NOT CYCLED DOWN)
011742 032760 010000 000012      5$:  BIT      #MOL,RMDS(R0) ;IS 'MOL' SET ?
011750 001774                BEQ      5$           ;BR IF NO (DRIVE NOT CYCLED UP)
  
```

;SET VOLUME VALID FOR BOTH PORTS

```

011752 012760 000011 000000      MOV      #11,RMCS1(R0) ;ISSUE A DRIVE CLEAR THROUGH PORT A
011760 012760 000021 000000      MOV      #21,RMCS1(R0) ;ISSUE A READIN PRESET THROUGH PORT A
011766 012760 000013 000000      MOV      #13,RMCS1(R0) ;RELEASE PORT A
011774 113760 001226 000010      MOVVB   PORTB,RMCS2(R0) ;SELECT PORT B
012002 013737 001226 001234      MOV      PORTB,PTNBR   ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
012010 012760 000021 000000      MOV      #21,RMCS1(R0) ;ISSUE A READIN PRESET THROUGH PORT B
012016 012760 010000 000032      MOV      #FMT16,RMOF(R0) ;SET FMT16
012024 012760 000013 000000      MOV      #13,RMCS1(R0) ;RELEASE PORT B
012032 012737 011610 001254      6$:  MOV      #5000.,WATCH ;SPINDLE MOTOR 'COOL DOWN' DELAY
012040 005737 001254                7$:  TST      WATCH      ;FINISHED ?
012044 001375                BNE     7$           ;BR IF NOT
012046 000004                SCOPE
012050 000400                BR      TST10        ;GO TO NEXT TEST
  
```

323

- ```

*TEST 10 TEST 'PORT SELECT' SWITCH ON PORT B
*
*TEST THE OPERATION OF THE 'PORT SELECT' SWITCH (DRIVE CYCLED DOWN).
*
* A. CYCLE THE DRIVE DOWN.
*
* B. SWITCH TO PORT B POSITION. VERIFY THAT THE DRIVE IS IN
* NEUTRAL AND THAT THE STATUS BITS IN RMDS, AS READ THROUGH BOTH
* PORTS, ARE CORRECT.
*
* C. SWITCH THE 'PORT SELECT' SWITCH TO B; CYCLE THE DRIVE UP.
*
* D. WHEN THE DRIVE CYCLES UP, VERIFY THAT 'VV-B IS RESET, AND
* THAT 'ATA-B IS SET.
*
* E. ISSUE A DRIVE CLEAR COMMAND AND A READIN PRESET COMMAND THROUGH
* PORT B.
*
* F. VERIFY THAT THE DRIVE CANNOT BE ACCESSED THROUGH PORT A AND
* 'NED' SETS WHEN ATEMPTING TO ACCESS THE DRIVE THROUGH
* PORT A. ATTEMPT TO SET PORT REQUEST BY WRITING 0'S
* INTO RMDS THROUGH PORT A.
*
* G. ISSUE A RELEASE COMMAND THROUGH PORT B. VERIFY THAT THE
* DRIVE REMAINS LOCKED ON PORT B.
*
* H. CYCLE THE DRIVE DOWN. CHANGE THE 'PORT SELECT' SWITCH TO
* A/B; CYCLE THE DRIVE UP.
*
* I. VERIFY THAT BOTH PORTS CAN ACCESS THE DRIVE, THAT BOTH ATTENTION
* BITS ARE SET, AND THAT BOTH 'VV' BITS ARE RESET.

```

```

012052
012052 005737 001266
012056 001406
012060 100002
012062 000137 002622
012066 012737 177777 001266
012074 012737 012110 001106
012102 012737 012110 001110
012110
012110 112737 000010 001102
012116 012706 001100
012122 012737 000001 001176

012130 113760 001226 000010
012136 013737 001226 001234
012144 104401 020367
012150 104401 020261
012154 104401 020407

012160 032760 010000 000012
012166 001374
012170 032760 010000 000012

TST10:
TST KYBCTL ;PERFORMING ONLY SINGLE TESTS ?
BEQ 2$;BR IF NOT
BPL 1$;BR IF JUST ENTERED TEST
JMP EXEC ;RETURN & GET NEXT TEST NUMBER
1$: MOV #-1,KYBCTL ;SET SINGLE TEST INDICATOR
2$: MOV #TEST10,$LPADR ;SETUP SCOPE LOOP ADDRESS
 MOV #TEST10,$LPERR ;SETUP ERROR LOOP ADDRESS

TEST10:
MOVB #10,$TSTNM ;MOVE #10 TEST NUMBER
MOV #STACK,SP ;SETUP THE STACK POINTER
MOV #1,$TIMES ;;DO 1 ITERATION

MOVB PORTB,RMCS2(R0) ;SELECT PORT B
MOV PORTB,PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
TYPE ,CYCLED ;'CYCLE DOWN THE DRIVE'
TYPE ,SWTCHB ;SWITCH TO 'B'
TYPE ,CYCLEU ;'CYCLE UP THE DRIVE'

1$: BIT #MOL,RMDS(R0) ;IS 'MOL' RESET ?
 BNE 1$;BR IF NO (DRIVE NOT CYCLED DOWN)
2$: BIT #MOL,RMDS(R0) ;IS 'MOL' SET ?

```



```

012176 001774 BEQ 2$;BR IF NO (DRIVE NOT CYCLED UP)
 ;DRIVE IS CYCLED UP, CHECK STATUS THROUGH PORT B

012200 005037 001244 CLR CKERR ;CLEAR THE 'CHECK ERROR' INDICATOR
012204 016037 000012 001126 MOV RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
012212 012737 000012 001122 MOV #RMDS, $BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
012220 060037 001122 ADD R0, $BDADR ;ADD RH/RM BASE ADDRESS
012224 012737 110600 001124 MOV #ATA!MOL!DPR!DRY, $GDDAT ;WHAT REGISTER SHOULD BE
012232 013737 001126 001164 MOV $BDDAT, $TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
012240 042737 066077 001164 BIC #^C111700, $TMP0 ;SAVE SPECIFIED BITS
012246 023737 001124 001164 CMP $GDDAT, $TMP0 ;COMPARE THE BITS
012254 001414 BEQ 64$;BR IF OK
012256 013737 001126 001174 MOV $BDDAT, $TMP4 ;COPY 'BAD DATA'
012264 042737 111700 001174 BIC #111700, $TMP4 ;CLEAR THE MASKED BITS
012272 053737 001174 001124 BIS $TMP4, $GDDAT ;'OR' WITH GOOD DATA FOR TYPEOUT
012300 104021 EMT 21
012302 005137 001244 COM CKERR ;SET THE REGISTER COMPARE ERROR INDICATOR
012306 000240 NOP
64$:

```

;SET VOLUME VALID FOR PORT B

```

012310 012760 000011 000000 MOV #11, RMCS1(R0) ;ISSUE A DRIVE CLEAR
012316 012760 000021 000000 MOV #21, RMCS1(R0) ;ISSUE A READIN PRESET
012324 012760 010000 000032 MOV #FMT16, RMOF(R0) ;SET FMT16

```

;CHECK THE DRIVE STATUS THROUGH PORT A; VERIFY THAT 'NED'  
 ;SETS WHEN THE DRIVE IS ACCESSED THROUGH PORT A.

```

012332 113760 001224 000010 MOV PORTA, RMCS2(R0) ;SELECT PORT A
012340 013737 001224 001234 MOV PORTA, PTNBR ;MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
012346 005037 001244 CLR CKERR ;CLEAR THE 'CHECK ERROR' INDICATOR
012352 016037 000012 001126 MOV RMDS(R0), $BDDAT ;GET CONTENTS OF RMDS
012360 012737 000012 001122 MOV #RMDS, $BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
012366 060037 001122 ADD R0, $BDADR ;ADD RH/RM BASE ADDRESS
012372 005037 001124 CLR $GDDAT ;WHAT REGISTER SHOULD BE
012376 013737 001126 001164 MOV $BDDAT, $TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
012404 042737 000077 001164 BIC #^C177700, $TMP0 ;SAVE SPECIFIED BITS
012412 023737 001124 001164 CMP $GDDAT, $TMP0 ;COMPARE THE BITS
012420 001414 BEQ 66$;BR IF OK
012422 013737 001126 001174 MOV $BDDAT, $TMP4 ;COPY 'BAD DATA'
012430 042737 177700 001174 BIC #177700, $TMP4 ;CLEAR THE MASKED BITS
012436 053737 001174 001124 BIS $TMP4, $GDDAT ;'OR' WITH GOOD DATA FOR TYPEOUT
012444 104022 EMT 22
012446 005137 001244 COM CKERR ;SET THE REGISTER COMPARE ERROR INDICATOR
012452 000240 NOP
66$:
012454 005037 001244 CLR CKERR ;CLEAR THE 'CHECK ERROR' INDICATOR
012460 016037 000010 001126 MOV RMCS2(R0), $BDDAT ;GET CONTENTS OF RMCS2
012466 012737 000010 001122 MOV #RMCS2, $BDADR ;FORM REGISTER ADDRESS OF ERROR MESSAGE
012474 060037 001122 ADD R0, $BDADR ;ADD RH/RM BASE ADDRESS
012500 012737 010000 001124 MOV #NED, $GDDAT ;WHAT REGISTER SHOULD BE
012506 013737 001126 001164 MOV $BDDAT, $TMP0 ;MOVE REGISTER CONTENTS TO '$TMP0'
012514 042737 167777 001164 BIC #^CNED, $TMP0 ;SAVE SPECIFIED BITS
012522 023737 001124 001164 CMP $GDDAT, $TMP0 ;COMPARE THE BITS
012530 001414 BEQ 68$;BR IF OK
012532 013737 001126 001174 MOV $BDDAT, $TMP4 ;COPY 'BAD DATA'
012540 042737 010000 001174 BIC #NED, $TMP4 ;CLEAR THE MASKED BITS

```

```

012546 053737 001174 001124 BIS $TMP4,$GDDAT : 'OR' WITH GOOD DATA FOR TYPEOUT
012554 104023 EMT 23
012556 005137 001244 COM CKERR : SET THE REGISTER COMPARE ERROR INDICATOR
012562 000240 NOP
012564 005060 000012 68$: CLR RMDS(R0) : TRY TO SET REQUEST BY WRITING THROUGH
 : THE LOCKED OUT PORT (PORT 'A')

```

:VERIFY THAT DRIVE STAYS LOCKED ON PORT B

```

012570 113760 001226 000010 MOVB PORTB,RMCS2(R0) : SELECT PORT B
012576 013737 001226 001234 MOV PORTB,PTNBR : MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
012604 012760 000013 000012 MOV #13,RMDS(R0) : ISSUE A RELEASE THROUGH PORT B
012612 013737 001226 001236 MOV PORTB,SEIZPT : ADDRESS OF 'LOCKED ON' PORT
012620 113760 001224 000010 MOVB PORTA,RMCS2(R0) : SELECT PORT A
012626 013737 001224 001234 MOV PORTA,PTNBR : MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
012634 005037 001244 CLR CKERR : CLEAR THE 'CHECK ERROR' INDICATOR
012640 016037 000012 001126 MOV RMDS(R0),$BDDAT : GET CONTENTS OF RMDS
012646 012737 000012 001122 MOV #RMDS,$BDADR : FORM REGISTER ADDRESS OF ERROR MESSAGE
012654 060037 001122 ADD R0,$BDADR : ADD RH/RM BASE ADDRESS
012660 005037 001124 CLR $GDDAT : WHAT REGISTER SHOULD BE
012664 013737 001126 001164 MOV $BDDAT,$TMP0 : MOVE REGISTER CONTENTS TO '$TMP0'
012672 042737 000077 001164 BIC #^C177700,$TMP0 : SAVE SPECIFIED BITS
012700 023737 001124 001164 CMP $GDDAT,$TMP0 : COMPARE THE BITS
012706 001414 BEQ 70$: BR IF OK
012710 013737 001126 001174 MOV $BDDAT,$TMP4 : COPY 'BAD DATA'
012716 042737 177700 001174 BIC #177700,$TMP4 : CLEAR THE MASKED BITS
012724 053737 001174 001124 BIS $TMP4,$GDDAT : 'OR' WITH GOOD DATA FOR TYPEOUT
012732 104024 EMT 24
012734 005137 001244 COM CKERR : SET THE REGISTER COMPARE ERROR INDICATOR
012740 000240 NOP

```

:IF ERROR OCCURRED, CHECK FOR LOOP ON TEST

```

012742 105737 001103 TSTB $ERFLG : DID AN ERROR OCCUR
012746 001412 BEQ 3$: BR IF NOT
012750 032777 001000 166162 BIT #SW09,@SWR : SEE IF LOOP ON ERROR (SWR9 = 1)
012756 001406 BEQ 3$: BR IF NOT
012760 105037 001103 CLRB $ERFLG : CLEAR THE ERROR FLAG
012764 005037 001176 CLR $TIMES : CLEAR THE MAX ITERATION COUNT
012770 000177 166114 JMP @SLPERR : GO TO THE LOOP ADDRESS
012774 032777 040000 166136 3$: BIT #SW14,@SWR : LOOP ON TEST ?
013002 001054 BNE 6$: BR IF LOOPING
013004 104401 020367 TYPE ,CYCLED : TYPE 'CYCLE DOWN'
013010 104401 020156 TYPE ,SWTCHN : 'SWITCH TO A/B'
013014 104401 020407 TYPE ,CYCLEU : 'CYCLE THE DRIVE UP'
013020 113760 001226 000010 MOVB PORTB,RMCS2(R0) : SELECT PORT B
013026 013737 001226 001234 MOV PORTB,PTNBR : MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
013034 032760 010000 000012 4$: BIT #MOL,RMDS(R0) : IS 'MOL' RESET ?
013042 001374 BNE 4$: BR IF NO (DRIVE NOT CYCLED DOWN)
013044 032760 010000 000012 5$: BIT #MOL,RMDS(R0) : IS 'MOL' SET ?
013052 001774 BEQ 5$: BR IF NO (DRIVE NOT CYCLED UP)

```

:SET VOLUME VALID FOR BOTH PORTS

```

013054 012760 000011 000000 MOV #11,RMCS1(R0) : ISSUE A DRIVE CLEAR THROUGH PORT B
013062 012760 000021 000000 MOV #21,RMCS1(R0) : ISSUE A READIN PRESET THROUGH PORT B
013070 012760 000013 000000 MOV #13,RMCS1(R0) : RELEASE PORT B

```



```
013076 113760 001224 000010 MOVB PORTA, RMCS2(R0) :SELECT PORT A
013104 013737 001224 001234 MOV PORTA, PTNBR :MOVE PORT ADDRESS TO LOCATION FOR TYPEOUT
013112 012760 000021 000000 MGV #21, RMCS1(R0) :ISSUE A READIN PRESET THROUGH PORT A
013120 012760 010000 000032 MOV #FMT16, RMOF(R0) :SET FMT16
013126 012760 000013 000000 MOV #13, RMCS1(R0) :RELEASE PGRT A
013134 012737 011610 001254 6$: MOV #5000., WATCH :SPINDLE MOTOR 'COOL DOWN' DELAY
013142 005737 001254 7$: TST WATCH :FINISHED ?
013146 001375 BNE 7$:BR IF NOT
013150 000004 SCOPE :LOOP ?
013152 000137 013160 JMP $EOP :GO TO THE END OF PASS ROUTINE
```

324  
325  
326  
327

```
::*****
:PUT NEWTEST HERE
:*****
TST11: SCOPE
```

```
013156 000004
```

1

.SBTTL END OF PASS ROUTINE

```

*INCREMENT THE PASS NUMBER ($PASS)
*TYPE 'END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYYY'
*WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
*IF THERES A MONITOR GO TO IT
*IF THERE ISN'T JUMP TO TST1AA

```

```

013160 013160 005737 001266 $EOP: TST KYBCTL :ENTERED TEST VIA KEYBOARD COMMAND ?
013164 013164 001402 BEQ .+6 :BR IF NOT
013166 013166 000137 002622 JMP EXEC :RETURN TO KEYBOARD CONTROL
013172 013172 005037 001102 CLR $TSTNM :ZERO THE TEST NUMBER
013176 013176 005037 001176 CLR $TIMES :ZERO THE NUMBER OF ITERATIONS
013202 013202 005237 001100 INC $PASS :INCREMENT THE PASS NUMBER
013206 013206 042737 100000 001100 BIC #100000,$PASS :DON'T ALLOW A NEG. NUMBER
013214 013214 005327 DEC (PC)+ :LOOP?
013216 013216 000001 $EOPCT: .WORD 1
013220 013220 003066 BGT $DOAGN :YES
013222 013222 012737 MOV (PC)+,@(PC)+ :RESTORE COUNTER
013224 013224 000001 $ENDCT: .WORD 1
013226 013226 013216 $EOPCT TYPE .65$:TYPE ASCIZ STRING
013230 013230 104401 013236 BR 64$:GET OVER THE ASCIZ
013234 013234 000407 :.65$: .ASCIZ <12><15>/END PASS #/
013254 013254 013746 001100 64$: MOV $PASS,-(SP) :SAVE $PASS FOR TYPEOUT
013260 013260 104405 TYPDS :TYPE PASS NUMBER
013262 013262 005737 001112 TST $ERTTL :GO TYPE--DECIMAL ASCII WITH SIGN
013266 013266 001431 BEQ $GT42P :SEE IF ANY ERRORS THIS PASS
013270 013270 104401 013276 TYPE .67$:BR IF NO ERRORS TO REPORT
013274 013274 000421 BR 66$:TYPE ASCIZ STRING
013340 013340 013746 001112 :.67$: .ASCIZ / TOTAL ERRORS SINCE LAST REPORT /
013344 013344 104405 66$: MOV $ERTTL,-(SP) :SAVE $ERTTL FOR TYPEOUT
013346 013346 005037 001112 TYPDS :TOTAL NUMBER OF ERRORS
013352 013352 104401 001207 CLR $ERTTL :GO TYPE--DECIMAL ASCII WITH SIGN
013356 013356 013700 000042 $GT42P: TYPE .$CRLF :CLEAR ERROR TOTAL
013362 013362 001405 $GET42: MOV @#42,R0 :TYPE CARRIAGE RETURN, LINE FEED
013364 013364 000005 BEQ $DOAGN :GET MONITOR ADDRESS
013366 013366 004710 RESET :BRANCH IF NO MONITOR
013370 013370 000240 $ENDAD: JSR PC,(R0) :CLEAR THE WORLD
013372 013372 000240 NOP :GO TO MONITOR
013374 013374 000240 NOP :SAVE ROOM
013376 013376 000137 NOP :FOR
013400 013400 003104 $DOAGN: JMP @(PC)+ :ACT11
013402 013402 377 377 000 $RTNAD: .WORD TST1AA :RETURN
 $ENULL: .BYTE -1,-1,0 :NULL CHARACTER STRING
 .EVEN

```



```

2
3
4
5 013406 012737 013456 000004 CKCLK: MOV #CKCLK1,@#ERRVEC ;SET UP VECTOR FOR CLOCK CHECK
6 013414 005037 000006 CLR @#ERRVEC+2 ;NEW PSW
7 013420 005777 165566 TST @SLKCSR ;CHECK FOR KW11-P
8 013424 013701 001216 MOV $LPVEC,R1 ;KW11-P VECTOR ADDRESS
9 013430 012721 013540 MOV #CLOCK,(R1)+ ;SET UP KW11-P VECTOR
10 013434 012711 000300 MOV #300,(R1) ;PSW - PRI 6
11 013440 012777 177777 165546 MOV #-1,@SLKCSB ;LOAD COUNTER BUFFER WITH 1'S
12 013446 012777 000135 165536 MOV #135,@SLKCSR ;SET CLOCK - CNT UP, 16MS, CONT INT
13 013454 000425 BR CKCLK3
14 013456 062706 000004 CKCLK1: ADD #4,SP ;RESTORE THE STACK POINTER
15 013462 012737 013520 000004 MOV #CKCLK2,@#ERRVEC ;CHANGE ERROR VECTOR TO CHECK FOR KW11-L
16 013470 005777 165524 TST @SLKS ;LOOK FOR KW11-L
17 013474 013701 001222 MOV $LLVEC,R1 ;KW11-L VECTOR ADDRESS
18 013500 012721 013540 MOV #CLOCK,(R1)+ ;SET UP KW11-L VECTOR
19 013504 012711 000300 MOV #300,(R1) ;PSW - PRI 6
20 013510 012777 000100 165502 MOV #100,@SLKS ;SET KW11-L INTERRUPT
21 013516 000404 BR CKCLK3
22 013520 062706 000004 CKCLK2: ADD #4,SP ;RESTORE THE STACK POINTER
23 013524 062716 000002 ADD #2,(SP) ;INCREMENT RETURN, NO CLOCK
24 013530 012737 000006 000004 CKCLK3: MOV #6,@#ERRVEC ;RESTORE THE ERROR VECTOR
25 013536 000207 RTS PC
26
27
28
29 013540 062737 000021 001252 CLOCK: ADD #17,,TIME ;ADD 17 MS TO ELAPSED TIME COUNTER
30 013546 005737 001254 TST WATCH ;IS WATCH ALREADY ZERO ?
31 013552 001406 BEQ 1$;BR IF IT IS
32 013554 162737 000021 001254 SUB #17,,WATCH ;SUBTRACT 17 MS FROM WATCH DOG COUNTER
33 013562 100002 BPL 1$;BR IF NOT MINUS
34 013564 005037 001254 CLR WATCH ;CLEAR WATCH DOG COUNTER
35 013570 000002 1$: RTI ;RETURN
36
37
38
39 013572 005746 TOLER: TST -(SP) ;MAKE ROOM ON THE STACK
40 013574 016616 000002 MOV 2(SP),(SP) ;SAVE STACK
41 013600 013546 MOV @R5+,-(SP) ;GET TIME VALUE
42 013602 011666 000004 MOV (SP),4(SP) ;MOVE TIME VALUE
43 013606 006216 ASR (SP) ;DIVIDE BY 2
44 013610 006216 ASR (SP) ;DIVIDE BY 2 AGAIN (FOR A TOTAL OF 4)
45 013612 062666 000002 ADD (SP)+,2(SP) ;CALCULATE UPPER LIMIT FOR TIMEOUT
46 013616 000205 RTS R5 ;RETURN WITH TOLERANCES ON THE STACK

```

1

.SBTTL SCOPE HANDLER ROUTINE

```

*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
*SW14=1 LOOP ON TEST
*SW11=1 INHIBIT ITERATIONS
*CALL
* SCOPE ;;SCOPE=IOT

```

```

013620 $SCOPE:
013620 104407 CKSWR ;;TEST FOR CHANGE IN SOFT-SWR
013622 004737 014154 JSR PC_STOP
013626 032777 040000 165304 1$: BIT #BIT14,@SWR ;;LOOP ON PRESENT TEST?
013634 001402 BEQ 9$;;NO IF SW14=0
013636 000137 014136 JMP $OVER ;;JUMP OVER SCOPE ROUTINE
013642 9$:
013642 000416 :#####START OF CODE FOR THE XOR TESTER#####
$XTSTR: BR 6$
013644 013746 000004 MOV @#ERRVEC,-(SP) ;;IF RUNNING ON THE 'XOR' TESTER CHANGE
013650 012737 013670 000004 MOV #5$,@#ERRVEC ;;THIS INSTRUCTION TO A 'NOP' (NOP=240)
013656 005737 177060 TST @#177060 ;;SAVE THE CONTENTS OF THE ERROR VECTOR
013662 012637 000004 MOV (SP)+,@#ERRVEC ;;SET FOR TIMEOUT
013666 000517 BR $SVLAD ;;TIME OUT ON XOR?
013670 022626 5$: CMP (SP)+,(SP)+ ;;RESTORE THE ERROR VECTOR
013672 012637 000004 MOV (SP)+,@#ERRVEC ;;GO TO THE NEXT TEST
013676 000517 BR $OVER ;;CLEAR THE STACK AFTER A TIME OUT
013700 6$:#####END OF CODE FOR THE XOR TESTER#####
013700 105737 001103 2$: TSTB $ERFLG ;;RESTORE THE ERROR VECTOR
013704 001465 BEQ 3$;;LOOP ON THE PRESENT TEST
013706 022737 177777 014524 CMP #-1,CPSAVE ;;HAS AN ERROR OCCURRED?
013714 001455 BEQ 2003$;;BR IF NO
013716 013746 000004 MOV ERRVEC,-(SP) ;;SEE IF TIMEOUT WAS PREVIOUSLY RECORDED
013722 012737 013740 000004 MOV #2000$,ERRVEC ;;KICK AROUND ROUTINE IF SO
013730 013737 177766 014524 MOV 177766,CPSAVE ;;SAVE CONTENTS OF ERROR VECTOR
013736 000406 BR 2001$;;SETUP 'TRAP' RETURN ADDRESS
013740 012737 177777 014524 2000$: MOV #-1,CPSAVE ;;MOVE CPU ERROR REGISTER TO CPSAVE FOR TEST
013746 012716 013754 MOV #2001$,(SP) ;;SET CPU ERROR REGISTER TIMEOUT INDICATOR
013752 000002 RTI ;;SETUP RETURN ADDRESS
013754 012637 000004 2001$: MOV (SP)+,ERRVEC ;;RESTORE CONTENTS OF ERROR VECTOR
013760 022737 177777 014524 2002$: CMP #-1,CPSAVE ;;SEE IF CPSAVE HAS CPU ERR REG TIMEOUT INDICATION
013766 001430 BEQ 2003$;;BRANCH IF SO
013770 032737 000001 014524 BIT #BIT00,CPSAVE ;;SEE IF THE POWER MONITOR BIT IS ON
013776 001424 BEQ 2003$;;BRANCH TO CONTINUE ROUTINE IF CLEAR
014000 042737 000001 177766 BIC #BIT00,177766 ;;CLEAR THE BIT FOUND TO BE SET
014006 013746 001140 MOV SWR,-(SP) ;;SAVE SWR ADDRESS
014012 017646 000000 MOV @ (SP),-(SP) ;;SAVE SWR VALUE
014016 012737 000176 001140 MOV #176,SWR ;;GET SOFTWARE SWR ADDRESS
014024 011677 165110 MOV (SP),@SWR ;;GET CURRENT SWR VALUE
014030 042777 001000 165102 BIC #BIT09,@SWR ;;DON'T ALLOW LOOP ON ERROR ON THIS ERROR
014036 104177 EMT 177 ;;CALL SPECIAL POWER FAIL BIT ERROR CALL
014040 012676 000000 MOV (SP)+,@(SP) ;;RESTORE SWR TO ORIGINAL VALUE
014044 012637 001140 MOV (SP)+,SWR ;;RESTORE SWR ADDRESS

```



```

014050 2003$:
014050 105037 001103 4$: CLR $ERFLG ;;ZERO THE ERROR FLAG
014054 005037 001176 CLR $TIMES ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
014060 032777 004000 165052 3$: BIT #BIT11,@SWR ;;INHIBIT ITERATIONS?
014066 001011 BNE 1$;;BR IF YES
014070 005737 001100 TST $PASS ;;IF FIRST PASS OF PROGRAM
014074 001406 BEQ 1$;;INHIBIT ITERATIONS
014076 005237 001104 INC $ICNT ;;INCREMENT ITERATION COUNT
014102 023737 001176 001104 CMP $TIMES,$ICNT ;;CHECK THE NUMBER OF ITERATIONS MADE
014110 002012 BGE $OVER ;;BR IF MORE ITERATION REQUIRED
014112 012737 000001 001104 1$: MOV #1,$ICNT ;;REINITIALIZE THE ITERATION COUNTER
014120 013737 014152 001176 MOV $MXCNT,$TIMES ;;SET NUMBER OF ITERATIONS TO DO
014126 105237 001102 $SVLAD: INCB $TSTNM ;;COUNT TEST NUMBERS
014132 011637 001106 MOV (SP),$LPADR ;;SAVE SCOPE LOOP ADDRESS
014136 013777 001102 164776 $OVER: MOV $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
014144 013716 001106 MOV $LPADR,(SP) ;;FUDGE RETURN ADDRESS
014150 000002 RTI ;;FIXES PS
014152 000005 $MXCNT: 5. ;;MAX. NUMBER OF ITERATIONS

;DROP PRIORITY TO ALLOW CONSOLE INTERRUPT
2
3
4
5 014154 STOP:
014154 012746 000140 MOV #PR3,-(SP) ;;PUT NEW PS ON STACK
014160 012746 014166 MOV #64$,-(SP) ;;PUT NEW PC ON STACK
014164 000002 RTI ;;POP NEW PC AND PS
014166 64$:

;RAISE PRIORITY TO INHIBIT CONSOLE INTERRUPT
6
7
8
9 014166 012746 000240 MOV #PR5,-(SP) ;;PUT NEW PS ON STACK
014172 012746 014200 MOV #65$,-(SP) ;;PUT NEW PC ON STACK
014176 000002 RTI ;;POP NEW PC AND PS
014200 65$:
10 014200 000207 RTS PC ;;RETURN

```

1

.SBTTL ERROR HANDLER ROUTINE

```

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

```

```

014202 105037 014526 $ERROR: CLRB IBSAVE ;;CLEAR THE ITEM BYTE SAVE LOCATION
014206 104407 CKSWR ;;TEST FOR CHANGE IN SOFT-SWR
014210 113737 001102 001242 MOVB $STNM,TSTNUM
014216 105237 001103 7$: INCB $ERFLG ;;SET THE ERROR FLAG
014222 001775 BEQ 7$;;DON'T LET THE FLAG GO TO ZERO
014224 013777 001102 164710 MOV $STNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
014232 032777 002000 164700 BIT #BIT10,@SWR ;;BELL ON ERROR?
014240 001402 BEQ 1$;;NO - SKIP
014242 104401 001202 TYPE ,SBELL ;;RING BELL
014246 005237 001112 1$: INC $ERTTL ;;COUNT THE NUMBER OF ERRORS
014252 011637 001116 MOV (SP),$ERRPC ;;GET ADDRESS OF ERROR INSTRUCTION
014256 162737 000002 001116 SUB #2,$ERRPC
014264 117737 164626 001114 MOVB @$ERRPC,$ITEMB ;;STRIP AND SAVE THE ERROR ITEM CODE
014272 032777 001000 164640 BIT #BIT09,@SWR ;;SEE IF LOOP ON ERROR IS SET
014300 001060 BNE 1004$;;BRANCH AROUND ROUTINE IF SO
014302 122737 000177 001114 CMPB #177,$ITEMB ;;SEE IF THIS IS THE POWER FAIL CALL
014310 001454 BEQ 1004$;;BRANCH AROUND ROUTINE IF IT IS
014312 105737 014526 TSTB IBSAVE ;;SEE IF THIS IS THE 2ND ERROR CALL IN THIS ROUTINE
014316 001047 BNE 1003$;;BRANCH IF SO
014320 022737 177777 014524 CMP #-1,CPSAVE ;;SEE IF CPSAVE HAS CPU ERR REG TIMEOUT INDICATION
014326 001445 BEQ 1004$;;BRANCH IF SO
014330 013746 000004 MOV ERRVEC,-(SP) ;;SAVE CONTENTS OF ERROR VECTOR
014334 012737 014352 000004 MOV #1000$,ERRVEC ;;SETUP 'TRAP' RETURN ADDRESS
014342 013737 177766 014524 MOV 177766,CPSAVE ;;MOVE CPU ERROR REGISTER TO CPSAVE FOR TEST
014350 000406 BR 1001$
014352 012737 177777 014524 1000$: MOV #-1,CPSAVE ;;SET CPU ERROR REGISTER TIMEOUT INDICATOR
014360 012716 014366 MOV #1001$, (SP) ;;SETUP RETURN ADDRESS
014364 000002 RTI
014366 012637 000004 1001$: MOV (SP)+,ERRVEC ;;RESTORE CONTENTS OF ERROR VECTOR

014372 022737 177777 014524 1002$: CMP #-1,CPSAVE ;;SEE IF CPSAVE HAS CPU ERR REG TIMEOUT INDICATION
014400 001420 BEQ 1004$;;BRANCH IF SO
014402 032737 000001 014524 BIT #BIT00,CPSAVE ;;SEE IF POWER MONITOR BIT IS SET IN CPU ERR REG
014410 001414 BEQ 1004$;;BRANCH IF OK
014412 042737 000001 177766 BIC #BIT00,177766 ;;CLEAR THE BIT FOUND SET
014420 113737 001114 014526 MOVB $ITEMB,IBSAVE ;;MAKE IBSAVE NON-ZERO FOR DUAL ERROR CALL
014426 112737 000177 001114 MOVB #177,$ITEMB ;;SET $ITEMB TO SPECIAL POWER FAIL POINTER
014434 000402 BR 1004$;;BRANCH OVER IBSAVE CLEARING

014436 105037 014526 1003$: CLRB IBSAVE ;;CLEAR IBSAVE SO 2ND TIME THROUGH EXITS
014442 1004$:
014442 032777 020000 164470 BIT #BIT13,@SWR ;;SKIP TYPEOUT IF SET
014450 001004 BNE 20$;;SKIP TYPEOUTS
014452 004737 014530 JSR PC,$ERRTYP ;;GO TO USER ERROR ROUTINE

```



```

014456 104401 001207 TYPE .SCLRF
014462 20$:
014462 105737 014526 2$: TSTB IBSAVE ;;SEE IF IBSAVE IS LOADED
014466 001005 BNE 3$;;BRANCH IF NOT -- NO HALT ON PWR MON BIT ERROR
014470 005777 164444 TST @SWR ;;HALT ON ERROR
014474 100002 BPL 3$;;SKIP IF CONTINUE
014476 000000 HALT ;;HALT ON ERROR!
014500 104407 CKSWR ;;TEST FOR CHANGE IN SOFT-SWR
014502 3$:
014502 022737 013366 000042 CMP #SENDAD,@#42 ;;ACT-11 AUTO-ACCEPT?
014510 001001 BNE 6$;;BRANCH IF NO
014512 000000 HALT ;;YES
014514 6$:
014514 105737 014526 TSTB IBSAVE ;;SEE IF ITEM BYTE SAVE LOCATION HAS AN ERROR CALL
014520 001236 BNE 7$;;BRANCH BACK TO CALL ORIGINAL ERROR
014522 000002 RTI ;;RETURN
014524 000000 CPSAVE: .WORD 0 ;;LOCATION TO SAVE CPU ERROR REG CONTENTS
014526 000000 IBSAVE: .WORD 0 ;;LOCATION TO SAVE ITEM BYTE

```

.SBTTL ERROR MESSAGE TYPEOUT ROUTINE

```

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

```

```

014530 $ERRTYP:
014530 104401 001207 TYPE .,SCLRF ;;'CARRIAGE RETURN' & 'LINE FEED'
014534 010046 MOV R0,-(SP) ;;SAVE R0
014536 005000 CLR R0 ;;PICKUP THE ITEM INDEX
014540 153700 001114 BISB @#$ITEMB,R0
014544 001004 BNE 1$;;IF ITEM NUMBER IS ZERO, JUST
 ;;TYPE THE PC OF THE ERROR
014546 013746 001116 MOV $ERRPC,-(SP) ;;SAVE $ERRPC FOR TYPEOUT
 ;;ERROR ADDRESS
014552 104402 TYPOC
014554 000456 BR 10$;;GO TYPE--OCTAL ASCII(ALL DIGITS)
014556 122700 000177 1$: CMPB #177,R0 ;;GET OUT
014562 001006 BNE 1000$;;SEE IF THIS ERROR CALL IS SPECIAL POWER FAIL CALL
014564 113737 001102 015066 MOVVB $TSTNM,PFTSTN ;;BRANCH IF NOT
014572 012700 014726 MOV #PFECH,R0 ;;GET TEST NUMBER
014576 000406 BR 1001$;;MOVE POWER FAIL ERROR CALL TABLE TO R0
014600 005300 1000$: DEC R0 ;;BRANCH TO CALL ERROR
014602 006300 ASL R0 ;;ADJUST THE INDEX SO THAT IT WILL
014604 006300 ASL R0 ;;WORK FOR THE ERROR TABLE
014606 006300 ASL R0
014610 062700 001276 ADD #$ERRTB,R0 ;;FORM TABLE POINTER
014614 012037 014624 1001$: MOV (R0)+,2$;;PICKUP 'ERROR MESSAGE' POINTER
014620 001404 BEQ 3$;;SKIP TYPEOUT IF NO POINTER
014622 104401 TYPE
014624 000000 2$: .WORD 0 ;;TYPE THE 'ERROR MESSAGE'
014626 104401 001207 TYPE .,SCLRF ;;'ERROR MESSAGE' POINTER GOES HERE
014632 012037 014642 3$: MOV (R0)+,4$;;'CARRIAGE RETURN' & 'LINE FEED'
014636 001404 BEQ 5$;;PICKUP 'DATA HEADER' POINTER
014640 104401 TYPE
014642 000000 4$: .WORD 0 ;;SKIP TYPEOUT IF 0
014644 104401 001207 TYPE .,SCLRF ;;TYPE THE 'DATA HEADER'
014650 010146 5$: MOV R1,-(SP) ;;'DATA HEADER' POINTER GOES HERE
014652 012001 MOV (R0)+,R1 ;;'CARRIAGE RETURN' & 'LINE FEED'
014654 001415 BEQ 9$;;SAVE R1
014656 012000 MOV (R0)+,R0 ;;PICKUP 'DATA TABLE' POINTER
014660 105720 6$: TSTB (R0)+ ;;BR IF NO DATA TO BE TYPED
014662 001003 BNE 7$;;PICKUP 'DATA FORMAT' POINTER
014664 013146 MOV @(R1)+,-(SP) ;;'OCTAL' OR 'DECIMAL'
014666 104402 TYPOC ;;BR IF DECIMAL
014670 000402 BR 8$;;SAVE @(R1)+ FOR TYPEOUT
014672 7$: BR 8$;;GO TYPE--OCTAL ASCII(ALL DIGITS)
014672 013146 MOV @(R1)+,-(SP) ;;SAVE @(R1)+ FOR TYPEOUT
014674 104405 TYPDS ;;GO TYPE--DECIMAL ASCII WITH SIGN
014676 005711 8$: TST (R1) ;;IS THERE ANOTHER NUMBER?
014700 001403 BEQ 9$;;BR IF NO
014702 104401 014722 TYPE .11$;;TYPE TWO(2) SPACES
014706 000764 BR 6$;;LOOP
014710 012601 9$: MOV (SP)+,R1 ;;RESTORE R1
014712 012600 10$: MOV (SP)+,R0 ;;RESTORE R0

```



|        |        |        |        |         |                             |                                                     |  |                                         |
|--------|--------|--------|--------|---------|-----------------------------|-----------------------------------------------------|--|-----------------------------------------|
| 014714 | 104401 | 001207 |        |         | TYPE                        | ,\$CRLF                                             |  | ::"CARRIAGE RETURN" & "LINE FEED"       |
| 014720 | 000207 |        |        |         | RTS                         | PC                                                  |  | ::RETURN                                |
| 014722 | 040    | 040    | 000    | 11\$:   | .ASCIZ                      | / /                                                 |  | ::TWO(2) SPACES                         |
|        |        |        |        |         | .EVEN                       |                                                     |  |                                         |
| 014726 | 014736 | 015020 | 015052 | PFECH:  | PFECH1,PFECH2,PFECH3,PFECH4 |                                                     |  | ::WORDS DEFINING TABLES BELOW           |
| 014736 | 120    | 117    | 127    | PFECH1: | .ASCIZ                      | ?POWER MONITOR BIT IN CPU ERROR REGISTER FOUND SET? |  |                                         |
| 015020 | 124    | 105    | 123    | PFECH2: | .ASCIZ                      | ?TESTNO ERR PC CPUERREG?                            |  |                                         |
|        |        |        |        |         | .EVEN                       |                                                     |  |                                         |
| 015052 | 015066 | 001116 | 014524 | PFECH3: | .WORD                       | PFTSTN,\$ERRPC,CPSAVE,0                             |  |                                         |
| 015062 | 000    | 000    | 000    | PFECH4: | .BYTE                       | 0,0,0,0                                             |  |                                         |
| 015066 | 000000 |        |        | PFTSTN: | .WORD                       | 0                                                   |  | ::CONTAINS TEST NUMBER FOR PF BIT ERROR |

.SBTTL TYPE ROUTINE

```

:ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
:THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
:*NOTE1: $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
:*NOTE2: $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
:*NOTE3: $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
:

```

```

:*CALL:
:*1) USING A TRAP INSTRUCTION
:* TYPE ,MESADR ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
:*OR
:* TYPE
:* MESADR
:*

```

```

015070 105737 001157 $TYPE: TSTB $TPFLG ;;IS THERE A TERMINAL?
015074 100002 BPL 1$;;BR IF YES
015076 000000 HALT ;;HALT HERE IF NO TERMINAL
015100 000407 BR 3$;;LEAVE
015102 010046 1$: MOV R0,-(SP) ;;SAVE R0
015104 017600 000002 MOV @2(SP),R0 ;;GET ADDRESS OF ASCIZ STRING
015110 112046 2$: MOVB (R0)+,-(SP) ;;PUSH CHARACTER TO BE TYPED ONTO STACK
015112 001005 BNE 4$;;BR IF IT ISN'T THE TERMINATOR
015114 005726 TST (SP)+ ;;IF TERMINATOR POP IT OFF THE STACK
015116 012600 60$: MOV (SP)+,R0 ;;RESTORE R0
015120 062716 000002 3$: ADD #2,(SP) ;;ADJUST RETURN PC
015124 000002 RTI ;;RETURN
015126 122716 000011 4$: CMPB #HT,(SP) ;;BRANCH IF <HT>
015132 001430 BEQ 8$
015134 122716 000200 CMPB #CRLF,(SP) ;;BRANCH IF NOT <CRLF>
015140 001006 BNE 5$
015142 005726 TST (SP)+ ;;POP <CR><LF> EQUIV
015144 104401 TYPE ;;TYPE A CR AND LF
015146 001207 $CRLF
015150 105037 015356 CLRB $CHARCNT ;;CLEAR CHARACTER COUNT
015154 000755 BR 2$;;GET NEXT CHARACTER
015156 004737 015240 5$: JSR PC,$TYPEC ;;GO TYPE THIS CHARACTER
015162 123726 001156 6$: CMPB $FILLC,(SP)+ ;;IS IT TIME FOR FILLER CHARS.?
015166 001350 BNE 2$;;IF NO GO GET NEXT CHAR.
015170 013746 001154 MOV $NULL,-(SP) ;;GET # OF FILLER CHARS. NEEDED
;;AND THE NULL CHAR.
015174 105366 000001 7$: DECB 1(SP) ;;DOES A NULL NEED TO BE TYPED?
015200 002770 BLT 6$;;BR IF NO--GO POP THE NULL OFF OF STACK
015202 004737 015240 JSR PC,$TYPEC ;;GO TYPE A NULL
015206 105337 015356 DECB $CHARCNT ;;DO NOT COUNT AS A COUNT
015212 000770 BR 7$;;LOOP

```

;HORIZONTAL TAB PROCESSOR

```

015214 112716 000040 8$: MOVB #' ,(SP) ;;REPLACE TAB WITH SPACE
015220 004737 015240 9$: JSR PC,$TYPEC ;;TYPE A SPACE
015224 132737 000007 015356 BITB #7,$CHARCNT ;;BRANCH IF NOT AT
015232 001372 BNE 9$;;TAB STOP
015234 005726 TST (SP)+ ;;POP SPACE OFF STACK
015236 000724 BR 2$;;GET NEXT CHARACTER

```



|        |        |        |        |          |            |               |                                        |
|--------|--------|--------|--------|----------|------------|---------------|----------------------------------------|
| 015240 |        |        |        | \$TYPEC: | TSTB       | @\$TKS        | ::CHAR IN KYBD BUFFER?                 |
| 015240 | 105777 | 163700 |        |          | BPL        | 10\$          | ::BR IF NOT                            |
| 015244 | 100022 |        |        |          | MOV        | @\$TKB, -(SP) | ::GET CHAR                             |
| 015246 | 017746 | 163674 |        |          | BIC        | #177600, (SP) | ::STRIP EXTRANEIOUS BITS               |
| 015252 | 042716 | 177600 |        |          | CMPB       | #\$XOFF, (SP) | ::WAS CHAR XOFF                        |
| 015256 | 122716 | 000023 |        |          | BNE        | 102\$         | ::BR IF NOT                            |
| 015262 | 001012 |        |        |          |            |               |                                        |
| 015264 |        |        |        | 101\$:   | TSTB       | @\$TKS        | ::WAIT FOR CHAR                        |
| 015264 | 105777 | 163654 |        |          | BPL        | 101\$         |                                        |
| 015270 | 100375 |        |        |          | MOVB       | @\$TKB, (SP)  | ::GET CHAR                             |
| 015272 | 117716 | 163650 |        |          | BIC        | #177600, (SP) | ::STRIP IT                             |
| 015276 | 042716 | 177600 |        |          | CMPB       | #\$XON, (SP)  | ::WAS IT XON?                          |
| 015302 | 122716 | 000021 |        |          | BNE        | 101\$         | ::BR IF NOT                            |
| 015306 | 001366 |        |        |          |            |               |                                        |
| 015310 |        |        |        | 102\$:   | TST        | (SP)+         | ::FIX STACK                            |
| 015310 | 005726 |        |        |          |            |               |                                        |
| 015312 |        |        |        | 10\$:    | TSTB       | @\$TPS        | ::WAIT UNTIL PRINTER IS READY          |
| 015312 | 105777 | 163632 |        |          | BPL        | 10\$          |                                        |
| 015316 | 100375 |        |        |          | MOVB       | 2(SP), @\$TPB | ::LOAD CHAR TO BE TYPED INTO DATA REG. |
| 015320 | 116677 | 000002 | 163624 |          | CMPB       | #CR, 2(SP)    | ::IS CHARACTER A CARRIAGE RETURN?      |
| 015326 | 122766 | 000015 | 000002 |          | BNE        | 1\$           | ::BRANCH IF NO                         |
| 015334 | 001003 |        |        |          | CLRB       | \$CHARCNT     | ::YES--CLEAR CHARACTER COUNT           |
| 015336 | 105037 | 015356 |        |          | BR         | \$TYPEX       | ::EXIT                                 |
| 015342 | 000406 |        |        |          | CMPB       | #LF, 2(SP)    | ::IS CHARACTER A LINE FEED?            |
| 015344 | 122766 | 000012 | 000002 | 1\$:     | BEQ        | \$TYPEX       | ::BRANCH IF YES                        |
| 015352 | 001402 |        |        |          | INCB       | (PC)+         | ::COUNT THE CHARACTER                  |
| 015354 | 105227 |        |        |          | \$CHARCNT: | .WORD         | 0                                      |
| 015356 | 000000 |        |        |          | \$TYPEX:   | RTS           | PC                                     |
| 015360 | 000207 |        |        |          |            |               |                                        |

.SBTTL BINARY TO OCTAL (ASCII) AND TYPE

```

*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
*OCTAL (ASCII) NUMBER AND TYPE IT.
*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
*CALL:
* MOV NUM,-(SP) ;;NUMBER TO BE TYPED
* TYPOS ;;CALL FOR TYPEOUT
* .BYTE N ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
* .BYTE M ;;M=1 OR 0
* ;;1=TYPE LEADING ZEROS
* ;;0=SUPPRESS LEADING ZEROS

```

```

*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
*$TYPOS OR $TYPOC

```

```

*CALL:
* MOV NUM,-(SP) ;;NUMBER TO BE TYPED
* TYPON ;;CALL FOR TYPEOUT

```

```

*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER

```

```

*CALL:
* MOV NUM,-(SP) ;;NUMBER TO BE TYPED
* TYPOC ;;CALL FOR TYPEOUT

```

```

015362 017646 000000 $TYPOS: MOV @ (SP),-(SP) ;;PICKUP THE MODE
015366 116637 000001 015605 MOVVB 1(SP), $OFILL ;;LOAD ZERO FILL SWITCH
015374 112637 015607 MOVVB (SP)+, $OMODE+1 ;;NUMBER OF DIGITS TO TYPE
015400 062716 000002 ADD #2, (SP) ;;ADJUST RETURN ADDRESS
015404 000406 BR $TYPON
015406 112737 000001 015605 $TYPOC: MOVVB #1, $OFILL ;;SET THE ZERO FILL SWITCH
015414 112737 000006 015607 MOVVB #6, $OMODE+1 ;;SET FOR SIX(6) DIGITS
015422 112737 000005 015604 $TYPON: MOVVB #5, $OCNT ;;SET THE ITERATION COUNT
015430 010346 MOV R3,-(SP) ;;SAVE R3
015432 010446 MOV R4,-(SP) ;;SAVE R4
015434 010546 MOV R5,-(SP) ;;SAVE R5
015436 113704 015607 MOVVB $OMODE+1, R4 ;;GET THE NUMBER OF DIGITS TO TYPE
015442 005404 NEG R4
015444 062704 000006 ADD #6, R4 ;;SUBTRACT IT FOR MAX. ALLOWED
015450 110437 015606 MOVVB R4, $OMODE ;;SAVE IT FOR USE
015454 113704 015605 MOVVB $OFILL, R4 ;;GET THE ZERO FILL SWITCH
015460 016605 000012 MOV 12(SP), R5 ;;PICKUP THE INPUT NUMBER
015464 005003 CLR R3 ;;CLEAR THE OUTPUT WORD
015466 006105 1$: ROL R5 ;;ROTATE MSB INTO 'C'
015470 000404 BR 3$;;GO DO MSB
015472 006105 2$: ROL R5 ;;FORM THIS DIGIT
015474 006105 ROL R5
015476 006105 ROL R5
015500 010503 MOV R5, R3
015502 006103 3$: ROL R3 ;;GET LSB OF THIS DIGIT
015504 105337 015606 DECB $OMODE ;;TYPE THIS DIGIT?
015510 100016 BPL 7$;;BR IF NO
015512 042703 177770 BIC #177770, R3 ;;GET RID OF JUNK
015516 001002 BNE 4$;;TEST FOR 0
015520 005704 TST R4 ;;SUPPRESS THIS 0?
015522 001403 BEQ 5$;;BR IF YES
015524 005204 4$: INC R4 ;;DON'T SUPPRESS ANYMORE 0'S

```



|        |        |               |          |       |             |                                   |
|--------|--------|---------------|----------|-------|-------------|-----------------------------------|
| 015526 | 052703 | 000060        |          | BIS   | #'0,R3      | ::MAKE THIS DIGIT ASCII           |
| 015532 | 052703 | 000040        | 5\$:     | BIS   | #',R3       | ::MAKE ASCII IF NOT ALREADY       |
| 015536 | 110337 | 015602        |          | MOVB  | R3,8\$      | ::SAVE FOR TYPING                 |
| 015542 | 104401 | 015602        |          | TYPE  | ,8\$        | ::GO TYPE THIS DIGIT              |
| 015546 | 105337 | 015604        | 7\$:     | DECB  | \$OCNT      | ::COUNT BY 1                      |
| 015552 | 003347 |               |          | BGT   | 2\$         | ::BR IF MORE TO DO                |
| 015554 | 002402 |               |          | BLT   | 6\$         | ::BR IF DONE                      |
| 015556 | 005204 |               |          | INC   | R4          | ::INSURE LAST DIGIT ISN'T A BLANK |
| 015560 | 000744 |               |          | BR    | 2\$         | ::GO DO THE LAST DIGIT            |
| 015562 | 012605 |               | 6\$:     | MOV   | (SP)+,R5    | ::RESTORE R5                      |
| 015564 | 012604 |               |          | MOV   | (SP)+,R4    | ::RESTORE R4                      |
| 015566 | 012603 |               |          | MOV   | (SP)+,R3    | ::RESTORE R3                      |
| 015570 | 016666 | 000002 000004 |          | MOV   | 2(SP),4(SP) | ::SET THE STACK FOR RETURNING     |
| 015576 | 012616 |               |          | MOV   | (SP)+,(SP)  |                                   |
| 015600 | 000002 |               |          | RTI   |             | ::RETURN                          |
| 015602 | 000    |               | 8\$:     | .BYTE | 0           | ::STORAGE FOR ASCII DIGIT         |
| 015603 | 000    |               |          | .BYTE | 0           | ::TERMINATOR FOR TYPE ROUTINE     |
| 015604 | 000    |               | \$OCNT:  | .BYTE | 0           | ::OCTAL DIGIT COUNTER             |
| 015605 | 000    |               | \$OFILL: | .BYTE | 0           | ::ZERO FILL SWITCH                |
| 015606 | 000000 |               | \$OMODE: | .WORD | 0           | ::NUMBER OF DIGITS TO TYPE        |

.SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

\*\*\*\*\*  
 \*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT  
 \*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE  
 \*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED  
 \*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE  
 \*REPLACED WITH SPACES.

\*CALL:  
 \* MOV NUM,-(SP) ;:PUT THE BINARY NUMBER ON THE STACK  
 \* TYPDS ;:GO TO THE ROUTINE

|        |        |        |        |          |                    |                                            |
|--------|--------|--------|--------|----------|--------------------|--------------------------------------------|
| 015610 |        |        |        | \$TYPDS: | MOV R0,-(SP)       | :::PUSH R0 ON STACK                        |
| 015610 | 010046 |        |        |          | MOV R1,-(SP)       | :::PUSH R1 ON STACK                        |
| 015612 | 010146 |        |        |          | MOV R2,-(SP)       | :::PUSH R2 ON STACK                        |
| 015614 | 010246 |        |        |          | MOV R3,-(SP)       | :::PUSH R3 ON STACK                        |
| 015616 | 010346 |        |        |          | MOV R5,-(SP)       | :::PUSH R5 ON STACK                        |
| 015620 | 010546 |        |        |          | MOV #20200,-(SP)   | :::SET BLANK SWITCH AND SIGN               |
| 015622 | 012746 | 020200 |        |          | MOV 20(SP),R5      | :::GET THE INPUT NUMBER                    |
| 015626 | 016605 | 000020 |        |          | BPL 1\$            | :::BR IF INPUT IS POS.                     |
| 015632 | 100004 |        |        |          | NEG R5             | :::MAKE THE BINARY NUMBER POS.             |
| 015634 | 005405 |        |        |          | MOVB #'-,1(SP)     | :::MAKE THE ASCII NUMBER NEG.              |
| 015636 | 112766 | 000055 | 000001 | 1\$:     | CLR R0             | :::ZERO THE CONSTANTS INDEX                |
| 015644 | 005000 |        |        |          | MOV #SDBLK,R3      | :::SETUP THE OUTPUT POINTER                |
| 015646 | 012703 | 016024 |        |          | MOVB #' ,(R3)+     | :::SET THE FIRST CHARACTER TO A BLANK      |
| 015652 | 112723 | 000040 |        | 2\$:     | CLR R2             | :::CLEAR THE BCD NUMBER                    |
| 015656 | 005002 |        |        |          | MOV \$DTBL(R0),R1  | :::GET THE CONSTANT                        |
| 015660 | 016001 | 016014 |        | 3\$:     | SUB R1,R5          | :::FORM THIS BCD DIGIT                     |
| 015664 | 160105 |        |        |          | BLT 4\$            | :::BR IF DONE                              |
| 015666 | 002402 |        |        |          | INC R2             | :::INCREASE THE BCD DIGIT BY 1             |
| 015670 | 005202 |        |        |          | BR 3\$             |                                            |
| 015672 | 000774 |        |        |          | ADD R1,R5          | :::ADD BACK THE CONSTANT                   |
| 015674 | 060105 |        |        | 4\$:     | TST R2             | :::CHECK IF BCD DIGIT=0                    |
| 015676 | 005702 |        |        |          | BNE 5\$            | :::FALL THROUGH IF 0                       |
| 015700 | 001002 |        |        |          | TSTB (SP)          | :::STILL DOING LEADING 0'S?                |
| 015702 | 105716 |        |        |          | BMI 7\$            | :::BR IF YES                               |
| 015704 | 100407 |        |        |          | ASLB (SP)          | :::MSD?                                    |
| 015706 | 106316 |        |        | 5\$:     | BCC 6\$            | :::BR IF NO                                |
| 015710 | 103003 |        |        |          | MOVB 1(SP),-1(R3)  | :::YES--SET THE SIGN                       |
| 015712 | 116663 | 000001 | 177777 | 6\$:     | BIS #'0,R2         | :::MAKE THE BCD DIGIT ASCII                |
| 015720 | 052702 | 000060 |        | 7\$:     | BIS #' ,R2         | :::MAKE IT A SPACE IF NOT ALREADY A DIGIT  |
| 015724 | 052702 | 000040 |        |          | MOVB R2,(R3)+      | :::PUT THIS CHARACTER IN THE OUTPUT BUFFER |
| 015730 | 110223 |        |        |          | TST (R0)+          | :::JUST INCREMENTING                       |
| 015732 | 005720 |        |        |          | CMP R0,#10         | :::CHECK THE TABLE INDEX                   |
| 015734 | 020027 | 000010 |        |          | BLT 2\$            | :::GO DO THE NEXT DIGIT                    |
| 015740 | 002746 |        |        |          | BGT 8\$            | :::GO TO EXIT                              |
| 015742 | 003002 |        |        |          | MOV R5,R2          | :::GET THE LSD                             |
| 015744 | 010502 |        |        |          | BR 6\$             | :::GO CHANGE TO ASCII                      |
| 015746 | 000764 |        |        | 8\$:     | TSTB (SP)+         | :::WAS THE LSD THE FIRST NON-ZERO?         |
| 015750 | 105726 |        |        |          | BPL 9\$            | :::BR IF NO                                |
| 015752 | 100003 |        |        |          | MOVB -1(SP),-2(R3) | :::YES--SET THE SIGN FOR TYPING            |
| 015754 | 116663 | 177777 | 177776 | 9\$:     | CLRB (R3)          | :::SET THE TERMINATOR                      |
| 015762 | 105013 |        |        |          | MOV (SP)+,R5       | :::POP STACK INTO R5                       |
| 015764 | 012605 |        |        |          | MOV (SP)+,R3       | :::POP STACK INTO R3                       |
| 015766 | 012603 |        |        |          | MOV (SP)+,R2       | :::POP STACK INTO R2                       |
| 015770 | 012602 |        |        |          | MOV (SP)+,R1       | :::POP STACK INTO R1                       |
| 015772 | 012601 |        |        |          |                    |                                            |



|        |        |        |        |         |             |                       |
|--------|--------|--------|--------|---------|-------------|-----------------------|
| 015774 | 012600 |        |        | MOV     | (SP)+,R0    | ::POP STACK INTO R0   |
| 015776 | 104401 | 016024 |        | TYPE    | \$DBLK      | ::NOW TYPE THE NUMBER |
| 016002 | 016666 | 000002 | 000004 | MOV     | 2(SP),4(SP) | ::ADJUST THE STACK    |
| 016010 | 012616 |        |        | MOV     | (SP)+,(SP)  |                       |
| 016012 | 000002 |        |        | RTI     |             | ::RETURN TO USER      |
| 016014 | 023420 |        |        | \$DTBL: | 10000.      |                       |
| 016016 | 001750 |        |        |         | 1000.       |                       |
| 016020 | 000144 |        |        |         | 100.        |                       |
| 016022 | 000012 |        |        |         | 10.         |                       |
| 016024 |        |        |        | \$DBLK: | .BLKW 4     |                       |

.SBTTL TTY INPUT ROUTINE

016034 000000  
 016036 000000  
 016040 000000  
 016042 016043

```

ENABL LSB
$TKCNT: .WORD 0 ::NUMBER OF ITEMS IN QUEUE
$TKQIN: .WORD 0 ::INPUT POINTER
$TKQOUT: .WORD 0 ::OUTPUT POINTER
$TKQSR: .BLKB 1 ::TTY KEYBOARD QUEUE
$TKQEND=.
.EVEN

```

```

;*TK INITIALIZE ROUTINE
;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT

```

016044 005037 016034  
 016050 012737 016042 016036  
 016056 013737 016036 016040  
 016064 012737 016114 000060  
 016072 012737 000200 000062  
 016100 005777 163042  
 016104 012777 000100 163032  
 016112 000207

```

;*CALL:
;* JSR PC,$TKINT
;* RETURN
$TKINT: CLR $TKCNT ::CLEAR COUNT OF ITEMS IN QUEUE
 MOV #$TKQSR,$TKQIN ::MOVE THE STARTING ADDRESS OF THE
 MOV $TKQIN,$TKQOUT ::QUEUE INTO THE INPUT & OUTPUT POINTERS.
 MOV #$TKSRV,@#TKVEC ::INITIALIZE THE KEYBOARD VECTOR
 MOV #200,@#TKVEC+2 ::'BR' LEVEL 4
 TST @$TKB ::CLEAR DONE FLAG
 MOV #100,@$TKS ::ENABLE TTY KEYBOARD INTERRUPT
 RTS PC ::RETURN TO CALLER

```

```

;*TK SERVICE ROUTINE
;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
;*IT IN THE QUEUE.
;*IF THE CHARACTER IS A "CONTROL-C" (^C) $TKINT IS CALLED AND
;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (START)

```

016114 117746 163026  
 016120 042716 177600  
 016124 021627 000021  
 016130 001002  
 016132 005726  
 016134 000002  
 016136  
 016136 021627 000003  
 016142 001007  
 016144 104401 017242  
 016150 004737 016044  
 016154 005726  
 016156 000137 001766  
 016162 021627 000007  
 016166 001004  
 016170 022737 000176 001140  
 016176 001500  
  
 016200  
 016200 022737 000001 016034  
 016206 001004  
 016210 104401 001202

```

$TKSRV: MOV @$TKB,-(SP) ::PICKUP THE CHARACTER
 BIC #^C177,(SP) ::STRIP THE JUNK
 CMP (SP),#$XON ::IS IT A RANDOM XON?
 BNE 30$::BRANCH IF NO
 TST (SP)+ ::CLEAN RANDOM XON OFF STACK
 RTI ::RETURN
30$: CMP (SP),#3 ::IS IT A CONTROL C?
 BNE 1$::BRANCH IF NO
 TYPE ,%CNTLC ::TYPE A CONTROL-C (^C)
 JSR PC,$TKINT ::INIT THE KEYBOARD
 TST (SP)+ ::CLEAN UP STACK
 JMP START ::CONTROL C RESTART
1$: CMP (SP),#7 ::IS IT A CONTROL G?
 BNE 2$::BRANCH IF NO
 CMP #SWREG,SWR ::IS SOFT-SWR SELECTED?
 BEQ 6$::GO TO SWR CHANGE
2$: CMP #1,$TKCNT ::IS THE QUEUE FULL?
 BNE 3$::BRANCH IF NO
 TYPE ,%BELL ::RING THE TTY BELL

```



```

016214 005726 TST (SP)+ ;;CLEAN CHARACTER OFF OF STACK
016216 000451 BR 5$;;EXIT
016220 021627 000023 3$: CMP (SP),#23 ;;IS IT A CONTROL-S?
016224 001021 BNE 32$;;BRANCH IF NO
016226 005077 162712 CLR @STKS ;;DISABLE TTY KEYBOARD INTERRUPTS
016232 005726 TST (SP)+ ;;CLEAN CHAR OFF STACK
016234 105777 162704 31$: TSTB @STKS ;;WAIT FOR A CHAR
016240 100375 BPL 31$;;LOOP UNTIL ITS THERE
016242 117746 162700 MOVB @STKB,-(SP) ;;GET THE CHARACTER
016246 042716 177600 BIC #^C177,(SP) ;;MAKE IT 7-BIT ASCII
016252 022627 000021 CMP (SP)+,#21 ;;IS IT A CONTROL-Q?
016256 001366 BNE 31$;;BRANCH IF NO
016260 012777 000100 162656 MOV #100,@STKS ;;REENABLE TTY KEYBOARD INTERRUPTS
016266 000002 RTI ;;RETURN
016270 005237 016034 32$: INC $TKCNT ;;COUNT THIS CHARACTER
016274 021627 000140 CMP (SP),#140 ;;IS IT UPPER CASE?
016300 002405 BLT 4$;;BRANCH IF YES
016302 021627 000175 CMP (SP),#175 ;;IS IT A SPECIAL CHAR?
016306 003002 BGT 4$;;BRANCH IF YES
016310 042716 000040 BIC #40,(SP) ;;MAKE IT UPPER CASE
016314 112677 177516 4$: MOVB (SP)+,@STKQIN ;;AND PUT IT IN QUEUE
016320 005237 016036 INC $TKQIN ;;UPDATE THE POINTER
016324 023727 016036 016043 CMP $TKQIN,$TKQEND ;;GO OFF THE END?
016332 001003 BNE 5$;;BRANCH IF NO
016334 012737 016042 016036 MOV #$TKQSRRT,$TKQIN ;;RESET THE POINTER
016342 000002 5$: RTI ;;RETURN

```

\*\*\*\*\*

;;\*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.  
 ;;\*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL  
 ;;\*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP  
 ;;\*CALL WHEN OPERATING IN TTY INTERRUPT MODE.

```

016344 022737 000176 001140 $CKSWR: CMP #SWREG,SWR ;;IS THE SOFT-SWR SELECTED
016352 001124 BNE 15$;;EXIT IF NOT
016354 105777 162564 TSTB @STKS ;;IS A CHAR WAITING?
016360 100121 BPL 15$;;IF NOT, EXIT
016362 117746 162560 MOVB @STKB,-(SP) ;;YES
016366 042716 177600 BIC #^C177,(SP) ;;MAKE IT 7-BIT ASCII
016372 021627 000007 CMP (SP),#7 ;;IS IT A CONTROL-G?
016376 001300 BNE 2$;;IF NOT, PUT IT IN THE TTY QUEUE
 ;;AND EXIT

```

\*\*\*\*\*

;;\*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE  
 ;;\*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A  
 ;;\*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.

```

016400 123727 001134 000001 6$: CMPB $AUTOB,#1 ;;ARE WE RUNNING IN AUTO-MODE?
016406 001674 BEQ 2$;;BRANCH IF YES
016410 005726 TST (SP)+ ;;CLEAR CONTROL-G OFF STACK
016412 004737 016044 JSR PC,$TKINT ;;FLUSH THE TTY INPUT QUEUE
016416 005077 162522 CLR @STKS ;;DISABLE TTY KEYBOARD INTERRUPTS
016422 112737 000001 001135 MOVB #1,$INTAG ;;SET INTERRUPT MODE INDICATOR

016430 104401 017254 $GTSWR: TYPE ,$CNTLG ;;ECHO THE CONTROL-G (^G)
016434 104401 017261 TYPE ,$MSWR ;;TYPE CURRENT CONTENTS
016440 013746 000176 MOV SWREG,-(SP) ;;SAVE SWREG FOR TYPEOUT
016444 104402 TYPOC ;;GO TYPE--OCTAL ASCII(ALL DIGITS)

```

|        |        |        |        |  |      |               |                                     |
|--------|--------|--------|--------|--|------|---------------|-------------------------------------|
| 016446 | 104401 | 017272 |        |  | TYPE | ,\$MNEW       | ::PROMPT FOR NEW SWR                |
| 016452 | 005046 |        | 19\$:  |  | CLR  | -(SP)         | ::CLEAR COUNTER                     |
| 016454 | 005046 |        |        |  | CLR  | -(SP)         | ::THE NEW SWR                       |
| 016456 | 105777 | 162462 | 7\$:   |  | TSTB | @\$TKS        | ::CHAR THERE?                       |
| 016462 | 100375 |        |        |  | BPL  | 7\$           | ::IF NOT TRY AGAIN                  |
| 016464 | 117746 | 162456 |        |  | MOVB | @\$TKB, -(SP) | ::PICK UP CHAR                      |
| 016470 | 042716 | 177600 |        |  | BIC  | #^C177, (SP)  | ::MAKE IT 7-BIT ASCII               |
| 016474 | 021627 | 000003 |        |  | CMP  | (SP), #3      | ::IS IT A CONTROL-C?                |
| 016500 | 001015 |        |        |  | BNE  | 9\$           | ::BRANCH IF NOT                     |
| 016502 | 104401 | 017242 |        |  | TYPE | ,\$CNTLC      | ::YES, ECHO CONTROL-C (^C)          |
| 016506 | 062706 | 000006 |        |  | ADD  | #6, SP        | ::CLEAN UP STACK                    |
| 016512 | 123727 | 001135 | 000001 |  | CMPB | \$INTAG, #1   | ::REENABLE TTY KEYBOARD INTERRUPTS? |
| 016520 | 001003 |        |        |  | BNE  | 8\$           | ::BRANCH IF NO                      |
| 016522 | 012777 | 000100 | 162414 |  | MOV  | #100, @\$TKS  | ::ALLOW TTY KEYBOARD INTERRUPTS     |
| 016530 | 000137 | 001766 | 8\$:   |  | JMP  | START         | ::CONTROL-C RESTART                 |
| 016534 | 021627 | 000025 | 9\$:   |  | CMP  | (SP), #25     | ::IS IT A CONTROL-U?                |
| 016540 | 001005 |        |        |  | BNE  | 10\$          | ::BRANCH IF NOT                     |
| 016542 | 104401 | 017247 |        |  | TYPE | ,\$CNTLU      | ::YES, ECHO CONTROL-U (^U)          |
| 016546 | 062706 | 000006 | 20\$:  |  | ADD  | #6, SP        | ::IGNORE PREVIOUS INPUT             |
| 016552 | 000737 |        |        |  | BR   | 19\$          | ::LET'S TRY IT AGAIN                |
| 016554 | 021627 | 000015 | 10\$:  |  | CMP  | (SP), #15     | ::IS IT A <CR>?                     |
| 016560 | 001022 |        |        |  | BNE  | 16\$          | ::BRANCH IF NO                      |
| 016562 | 005766 | 000004 |        |  | TST  | 4(SP)         | ::YES, IS IT THE FIRST CHAR?        |
| 016566 | 001403 |        |        |  | BEQ  | 11\$          | ::BRANCH IF YES                     |
| 016570 | 016677 | 000002 | 162342 |  | MOV  | 2(SP), @SWR   | ::SAVE NEW SWR                      |
| 016576 | 062706 | 000006 | 11\$:  |  | ADD  | #6, SP        | ::CLEAR UP STACK                    |
| 016602 | 104401 | 001207 | 14\$:  |  | TYPE | ,\$CRLF       | ::ECHO <CR> AND <LF>                |
| 016606 | 123727 | 001135 | 000001 |  | CMPB | \$INTAG, #1   | ::RE-ENABLE TTY KBD INTERRUPTS?     |
| 016614 | 001003 |        |        |  | BNE  | 15\$          | ::BRANCH IF NOT                     |
| 016616 | 012777 | 000100 | 162320 |  | MOV  | #100, @\$TKS  | ::RE-ENABLE TTY KBD INTERRUPTS      |
| 016624 | 000002 |        | 15\$:  |  | RTI  |               | ::RETURN                            |
| 016626 | 004737 | 015240 | 16\$:  |  | JSR  | PC, \$TYPEC   | ::ECHO CHAR                         |
| 016632 | 021627 | 000060 |        |  | CMP  | (SP), #60     | ::CHAR < 0?                         |
| 016636 | 002420 |        |        |  | BLT  | 18\$          | ::BRANCH IF YES                     |
| 016640 | 021627 | 000067 |        |  | CMP  | (SP), #67     | ::CHAR > 7?                         |
| 016644 | 003015 |        |        |  | BGT  | 18\$          | ::BRANCH IF YES                     |
| 016646 | 042726 | 000060 |        |  | BIC  | #60, (SP)+    | ::STRIP-OFF ASCII                   |
| 016652 | 005766 | 000002 |        |  | TST  | 2(SP)         | ::IS THIS THE FIRST CHAR            |
| 016656 | 001403 |        |        |  | BEQ  | 17\$          | ::BRANCH IF YES                     |
| 016660 | 006316 |        |        |  | ASL  | (SP)          | ::NO, SHIFT PRESENT                 |
| 016662 | 006316 |        |        |  | ASL  | (SP)          | ::CHAR OVER TO MAKE                 |
| 016664 | 006316 |        |        |  | ASL  | (SP)          | ::ROOM FOR NEW ONE.                 |
| 016666 | 005266 | 000002 | 17\$:  |  | INC  | 2(SP)         | ::KEEP COUNT OF CHAR                |
| 016672 | 056616 | 177776 |        |  | BIS  | -2(SP), (SP)  | ::SET IN NEW CHAR                   |
| 016676 | 000667 |        |        |  | BR   | 7\$           | ::GET THE NEXT ONE                  |
| 016700 | 104401 | 001206 | 18\$:  |  | TYPE | ,\$QUES       | ::TYPE ?<CR><LF>                    |
| 016704 | 000720 |        |        |  | BR   | 20\$          | ::SIMULATE CONTROL-U                |
|        |        |        | .DSABL |  | LSB  |               |                                     |

::\*\*\*\*\*



```

::*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
::*CALL:
::* RDCHR ::GET A CHARACTER FROM THE QUEUE
::* RETURN HERE ::CHARACTER IS ON THE STACK
::* ::WITH PARITY BIT STRIPPED OFF
::

016706 011646 $RDCHR: MOV (SP),-(SP) ::PUSH DOWN THE PC AND
016710 016666 000004 000002 MOV 4(SP),2(SP) ::THE PS
016716 005066 000004 CLR 4(SP) ::GET READY FOR A CHARACTER
016722 005046 CLR -(SP) ::PUT NEW PS ON STACK
016724 012746 016732 MOV #64$,-(SP) ::PUT NEW PC ON STACK
016730 000002 RTI ::POP NEW PC AND PS
016732
016732 005737 016034 64$: TST $TKCNT ::WAIT ON A CHARACTER
016736 001775 1$: BEQ 1$
016740 005337 016034 DEC $TKCNT ::DECREMENT THE COUNTER
016744 117766 177070 000004 MOVB @STKQOUT,4(SP) ::GET ONE CHARACTER
016752 005237 016040 INC $TKQOUT ::UPDATE THE POINTER
016756 023727 016040 016043 CMP $TKQOUT,#$TKQEND ::DID IT GO OFF OF THE END?
016764 001003 BNE 2$::BRANCH IF NO
016766 012737 016042 016040 MOV #$TKQSRT,$TKQOUT ::RESET THE POINTER
016774 000002 2$: RTI ::RETURN
::*****
::*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
::*CALL:
::* RDLIN ::INPUT A STRING FROM THE TTY
::* RETURN HERE ::ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
::* ::TERMINATOR WILL BE A BYTE OF ALL 0'S
::

016776 010346 $RDLIN: MOV R3,-(SP) ::SAVE R3
017000 005046 CLR -(SP) ::CLEAR THE RUBOUT KEY
017002 012703 017232 1$: MOV #$TTYIN,R3 ::GET ADDRESS
017006 022703 017242 2$: CMP #$TTYIN+8.,R3 ::BUFFER FULL?
017012 101456 BLOS 4$::BR IF YES
017014 104410 RDCHR ::GO READ ONE CHARACTER FROM THE TTY
017016 112613 MOVB (SP)+,(R3) ::GET CHARACTER
017020 122713 000177 10$: CMPB #177,(R3) ::IS IT A RUBOUT
017024 001022 BNE 5$::BR IF NO
017026 005716 TST (SP) ::IS THIS THE FIRST RUBOUT?
017030 001007 BNE 6$::BR IF NO
017032 112737 000134 017230 MOVB #'\",9$::TYPE A BACK SLASH
017040 104401 017230 TYPE ,9$
017044 012716 177777 6$: MOV #-1,(SP) ::SET THE RUBOUT KEY
017050 005303 DEC R3 ::BACKUP BY ONE
017052 020327 017232 CMP R3,$TTYIN ::STACK EMPTY?
017056 103434 BLO 4$::BR IF YES
017060 111337 017230 MOVB (R3),9$::SETUP TO TYPEOUT THE DELETED CHAR.
017064 104401 017230 TYPE ,9$
017070 000746 BR 2$::GO TYPE
017072 005716 5$: TST (SP) ::GO READ ANOTHER CHAR.
017074 001406 BEQ 7$::RUBOUT KEY SET?
017076 112737 000134 017230 MOVB #'\",9$::BR IF NO
017104 104401 017230 TYPE ,9$
017110 005016 CLR (SP) ::TYPE A BACK SLASH
017112 122713 000025 7$: CMPB #25,(R3) ::CLEAR THE RUBOUT KEY
017116 001003 BNE 8$::IS CHARACTER A CTRL U?
::BR IF NO

```

```

017120 104401 017247 TYPE ,SCNTLU ;;TYPE A CONTROL 'U'
017124 000726 BR 1$;;GO START OVER
017126 122713 000022 8$: CMPB #22,(R3) ;;IS CHARACTER A '^R'?
017132 001011 BNE 3$;;BRANCH IF NO
017134 105013 CLRB (R3) ;;CLEAR THE CHARACTER
017136 104401 001207 TYPE ,SCRLF ;;TYPE A 'CR' & 'LF'
017142 104401 017232 TYPE ,STTYIN ;;TYPE THE INPUT STRING
017146 000717 BR 2$;;GO PICKUP ANOTHER CHACTER
017150 104401 001206 4$: TYPE ,SQUES ;;TYPE A '?'
017154 000712 BR 1$;;CLEAR THE BUFFER AND LOOP
017156 111337 017230 3$: MOVB (R3),9$;;ECHO THE CHARACTER
017162 104401 017230 TYPE ,9$
017166 122723 000015 CMPB #15,(R3)+ ;;CHECK FOR RETURN
017172 001305 BNE 2$;;LOOP IF NOT RETURN
017174 105063 177777 CLRB -1(R3) ;;CLEAR RETURN (THE 15)
017200 104401 001210 TYPE ,SLF ;;TYPE A LINE FEED
017204 005726 TST (SP)+ ;;CLEAN RUBOUT KEY FROM THE STACK
017206 012603 MOV (SP)+,R3 ;;RESTORE R3
017210 011646 MOV (SP),-(SP) ;;ADJUST THE STACK AND PUT ADDRESS OF THE
017212 016666 000004 000002 MOV 4(SP),2(SP) ;; FIRST ASCII CHARACTER ON IT
017220 012766 017232 000004 MOV #STTYIN,4(SP)
017226 000002 RTI
017230 000 9$: .BYTE 0 ;;RETURN
017231 000 .BYTE 0 ;;STORAGE FOR ASCII CHAR. TO TYPE
017232 $TTYIN: .BLKB 8. ;;TERMINATOR
017242 136 103 015 $CNTLC: .ASCIZ /^C/<15><12> ;;RESERVE 8 BYTES FOR TTY INPUT
017247 136 125 015 $CNTLU: .ASCIZ /^U/<15><12> ;;CONTROL 'C'
017254 136 107 015 $CNTLG: .ASCIZ /^G/<15><12> ;;CONTROL 'U'
017261 015 012 123 $MSWR: .ASCIZ <15><12>/SWR = / ;;CONTROL 'G'
017272 040 040 116 $MNEW: .ASCIZ / NEW = /
.EVEN

```



.SBTTL READ AN OCTAL NUMBER FROM THE TTY

```

*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
*CHANGE IT TO BINARY.
*THE INPUT CHARACTERS WILL BE CHECKED TO INSURED THEY ARE LEGAL
*OCTAL DIGITS. IF AN ILLEGAL CHARACTER IS READ A '?' WILL BE TYPED
*FOLLOWED BY A CARRIAGE RETURN-LINE FEED. THE COMPLETE NUMBER MUST
*THEN BE RETYPED. THE INPUT IS TERMINATED BY TYPING A CARRIAGE RETURN.
*CALL:
* RDOCT ::READ AN OCTAL NUMBER
* RETURN HERE ::LOW ORDER BITS ARE ON TOP OF THE STACK
* ::HIGH ORDER BITS ARE IN $HIOCT

```

|        |        |        |        |                |             |                                |
|--------|--------|--------|--------|----------------|-------------|--------------------------------|
| 017304 | 011646 |        |        | \$RDOCT: MOV   | (SP),-(SP)  | ::PROVIDE SPACE FOR THE        |
| 017306 | 016666 | 000004 | 000002 | MOV            | 4(SP),2(SP) | ::INPUT NUMBER                 |
| 017314 | 010046 |        |        | MOV            | R0,-(SP)    | ::PUSH R0 ON STACK             |
| 017316 | 010146 |        |        | MOV            | R1,-(SP)    | ::PUSH R1 ON STACK             |
| 017320 | 010246 |        |        | MOV            | R2,-(SP)    | ::PUSH R2 ON STACK             |
| 017322 | 104411 |        |        | 1\$: RDLIN     |             | ::READ AN ASCII LINE           |
| 017324 | 012600 |        |        | MOV            | (SP)+,R0    | ::GET ADDRESS OF 1ST CHARACTER |
| 017326 | 010037 | 017432 |        | MOV            | R0,5\$      | ::AND SAVE IT                  |
| 017332 | 005001 |        |        | CLR            | R1          | ::CLEAR DATA WORD              |
| 017334 | 005002 |        |        | CLR            | R2          |                                |
| 017336 | 112046 |        |        | 2\$: MOVB      | (R0)+,-(SP) | ::PICKUP THIS CHARACTER        |
| 017340 | 001420 |        |        | BEQ            | 3\$         | ::IF ZERO GET OUT              |
| 017342 | 122716 | 000060 |        | CMPB           | #'0,(SP)    | ::MAKE SURE THIS CHARACTER     |
| 017346 | 003026 |        |        | BGT            | 4\$         | ::IS AN OCTAL DIGIT            |
| 017350 | 122716 | 000067 |        | CMPB           | #'7,(SP)    |                                |
| 017354 | 002423 |        |        | BLT            | 4\$         |                                |
| 017356 | 006301 |        |        | ASL            | R1          | ::*2                           |
| 017360 | 006102 |        |        | ROL            | R2          |                                |
| 017362 | 006301 |        |        | ASL            | R1          | ::*4                           |
| 017364 | 006102 |        |        | ROL            | R2          |                                |
| 017366 | 006301 |        |        | ASL            | R1          | ::*8                           |
| 017370 | 006102 |        |        | ROL            | R2          |                                |
| 017372 | 042716 | 177770 |        | BIC            | #^C7,(SP)   | ::STRIP THE ASCII JUNK         |
| 017376 | 062601 |        |        | ADD            | (SP)+,R1    | ::ADD IN THIS DIGIT            |
| 017400 | 000756 |        |        | BR             | 2\$         | ::LOOP                         |
| 017402 | 005726 |        |        | 3\$: TST       | (SP)+       | ::CLEAN TERMINATOR FROM STACK  |
| 017404 | 010166 | 000012 |        | MOV            | R1,12(SP)   | ::SAVE THE RESULT              |
| 017410 | 010237 | 017442 |        | MOV            | R2,\$HIOCT  |                                |
| 017414 | 012602 |        |        | MOV            | (SP)+,R2    | ::POP STACK INTO R2            |
| 017416 | 012601 |        |        | MOV            | (SP)+,R1    | ::POP STACK INTO R1            |
| 017420 | 012600 |        |        | MOV            | (SP)+,R0    | ::POP STACK INTO R0            |
| 017422 | 000002 |        |        | RTI            |             | ::RETURN                       |
| 017424 | 005726 |        |        | 4\$: TST       | (SP)+       | ::CLEAN PARTIAL FROM STACK     |
| 017426 | 105010 |        |        | CLRB           | (R0)        | ::SET A TERMINATOR             |
| 017430 | 104401 |        |        | TYPE           |             | ::TYPE UP THRU THE BAD CHAR.   |
| 017432 | 000000 |        |        | 5\$: .WORD     | 0           |                                |
| 017434 | 104401 | 001206 |        | TYPE           | ,\$QUES     | ::'?' 'CR' & 'LF'              |
| 017440 | 000730 |        |        | BR             | 1\$         | ::TRY AGAIN                    |
| 017442 | 000000 |        |        | \$HIOCT: .WORD | 0           | ::HIGH ORDER BITS GO HERE      |

.SBTTL SAVE AND RESTORE R0-R5 ROUTINES

```

*SAVE R0-R5
*CALL:
* SAVREG
*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
*
*TOP---(+16)
* +2---(+18)
* +4---R5
* +6---R4
* +8---R3
*+10---R2
*+12---R1
*+14---R0

```

```

017444
017444 010046
017446 010146
017450 010246
017452 010346
017454 010446
017456 010546
017460 016646 000022
017464 016646 000022
017470 016646 000022
017474 016646 000022
017500 000002

```

```

$SAVREG:
 MOV R0,-(SP) ;;PUSH R0 ON STACK
 MOV R1,-(SP) ;;PUSH R1 ON STACK
 MOV R2,-(SP) ;;PUSH R2 ON STACK
 MOV R3,-(SP) ;;PUSH R3 ON STACK
 MOV R4,-(SP) ;;PUSH R4 ON STACK
 MOV R5,-(SP) ;;PUSH R5 ON STACK
 MOV 22(SP),-(SP) ;;SAVE PS OF MAIN FLOW
 MOV 22(SP),-(SP) ;;SAVE PC OF MAIN FLOW
 MOV 22(SP),-(SP) ;;SAVE PS OF CALL
 MOV 22(SP),-(SP) ;;SAVE PC OF CALL
 RTI

```

```

017502
017502 012666 000022
017506 012666 000022
017512 012666 000022
017516 012666 000022
017522 012605
017524 012604
017526 012603
017530 012602
017532 012601
017534 012600
017536 000002

```

```

*RESTORE R0-R5
*CALL:
* RESREG
$RESREG:
 MOV (SP)+,22(SP) ;;RESTORE PC OF CALL
 MOV (SP)+,22(SP) ;;RESTORE PS OF CALL
 MOV (SP)+,22(SP) ;;RESTORE PC OF MAIN FLOW
 MOV (SP)+,22(SP) ;;RESTORE PS OF MAIN FLOW
 MOV (SP)+,R5 ;;POP STACK INTO R5
 MOV (SP)+,R4 ;;POP STACK INTO R4
 MOV (SP)+,R3 ;;POP STACK INTO R3
 MOV (SP)+,R2 ;;POP STACK INTO R2
 MOV (SP)+,R1 ;;POP STACK INTO R1
 MOV (SP)+,R0 ;;POP STACK INTO R0
 RTI

```



.SBTTL TRAP DECODER

\*\*\*\*\*  
 \*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION  
 \*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS  
 \*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL  
 \*GO TO THAT ROUTINE.

|        |        |        |         |      |                |                          |
|--------|--------|--------|---------|------|----------------|--------------------------|
| 017540 | 010046 |        | \$TRAP: | MOV  | R0,-(SP)       | ::SAVE R0                |
| 017542 | 016600 | 000002 |         | MOV  | 2(SP),R0       | ::GET TRAP ADDRESS       |
| 017546 | 005740 |        |         | TST  | -(R0)          | ::BACKUP BY 2            |
| 017550 | 111000 |        |         | MOVB | (R0),R0        | ::GET RIGHT BYTE OF TRAP |
| 017552 | 006300 |        |         | ASL  | R0             | ::POSITION FOR INDEXING  |
| 017554 | 016000 | 017574 |         | MOV  | \$TRPAD(R0),R0 | ::INDEX TO TABLE         |
| 017560 | 000200 |        |         | RTS  | R0             | ::GO TO ROUTINE          |

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

|        |        |        |          |     |             |                     |
|--------|--------|--------|----------|-----|-------------|---------------------|
| 017562 | 011646 |        | \$TRAP2: | MOV | (SP),-(SP)  | ::MOVE THE PC DOWN  |
| 017564 | 016666 | 000004 |          | MOV | 4(SP),2(SP) | ::MOVE THE PSW DOWN |
| 017572 | 000002 | 000002 |          | RTI |             | ::RESTORE THE PSW   |

.SBTTL TRAP TABLE

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

|        |        |  |          |          |               |                                                       |
|--------|--------|--|----------|----------|---------------|-------------------------------------------------------|
|        |        |  | :        | ROUTINE  |               |                                                       |
|        |        |  | :        | -----    |               |                                                       |
| 017574 | 017562 |  | \$TRPAD: | .WORD    | \$TRAP2       |                                                       |
| 017576 | 015070 |  |          | \$TYPE   | ::CALL=TYPE   | TRAP+1(104401) TTY TYPEOUT ROUTINE                    |
| 017600 | 015406 |  |          | \$TYPOC  | ::CALL=TYPOC  | TRAP+2(104402) TYPE OCTAL NUMBER (WITH LEADING ZEROS) |
| 017602 | 015362 |  |          | \$TYPOS  | ::CALL=TYPOS  | TRAP+3(104403) TYPE OCTAL NUMBER (NO LEADING ZEROS)   |
| 017604 | 015422 |  |          | \$TYPON  | ::CALL=TYPON  | TRAP+4(104404) TYPE OCTAL NUMBER (AS PER LAST CALL)   |
| 017606 | 015610 |  |          | \$TYPDS  | ::CALL=TYPDS  | TRAP+5(104405) TYPE DECIMAL NUMBER (WITH SIGN)        |
| 017610 | 016434 |  |          | \$GTSWR  | ::CALL=GTSWR  | TRAP+6(104406) GET SOFT-SWR SETTING                   |
| 017612 | 016344 |  |          | \$CKSWR  | ::CALL=CKSWR  | TRAP+7(104407) TEST FOR CHANGE IN SOFT-SWR            |
| 017614 | 016706 |  |          | \$RDCHR  | ::CALL=RDCHR  | TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE          |
| 017616 | 016776 |  |          | \$RDLIN  | ::CALL=RDLIN  | TRAP+11(104411) TTY TYPEIN STRING ROUTINE             |
| 017620 | 017304 |  |          | \$RDOCT  | ::CALL=RDOCT  | TRAP+12(104412) READ AN OCTAL NUMBER FROM TTY         |
| 017622 | 017444 |  |          | \$SAVREG | ::CALL=SAVREG | TRAP+13(104413) SAVE R0-R5 ROUTINE                    |
| 017624 | 017502 |  |          | \$RESREG | ::CALL=RESREG | TRAP+14(104414) RESTORE R0-R5 ROUTINE                 |

.SBTTL TELETYPE MESSAGES

|    |        |     |     |                                                                                          |
|----|--------|-----|-----|------------------------------------------------------------------------------------------|
| 2  |        |     |     |                                                                                          |
| 3  | 017626 | 200 | 105 | 116 ENTERA: .ASCIZ <CRLF>/ENTER DRIVE ADDRESS: /                                         |
| 4  | 017655 | 040 | 077 | 111 ADRERR: .ASCIZ / ?INVALID ADDRESS/<CRLF>                                             |
| 5  | 017700 | 200 | 120 | 117 PORTAIS: .ASCIZ <CRLF>/PORT 'A' ADDRESS IS: /                                        |
| 6  | 017727 | 200 | 120 | 117 PORTBIS: .ASCIZ <CRLF>/PORT 'B' ADDRESS IS: /                                        |
| 7  | 017756 | 200 | 123 | 131 NOCLOCK: .ASCIZ <CRLF>/SYSTEM MUST HAVE 'L' OR 'P' CLOCK/<CRLF><LF>                  |
| 8  | 020023 | 012 | 105 | 116 TESTNO: .ASCIZ <LF>/ENTER TEST #: /                                                  |
| 9  | 020043 | 040 | 077 | 111 BADNO: .ASCIZ / ?INVALID TEST NUMBER/<CRLF>                                          |
| 10 | 020072 | 200 | 012 | 122 ADDRIS: .ASCIZ <CRLF><LF>@RH/RM ADDRESS (RMCS1) IS: @                                |
| 11 | 020127 | 012 | 105 | 116 NTRH: .ASCIZ <LF>@ENTER RH/RM ADDRESS: @                                             |
| 12 | 020156 | 200 | 122 | 105 SWTCHN: .ASCIZ <CRLF>@RETURN 'PORT SELECT' SWITCH TO 'A/B'@                          |
| 13 | 020224 | 200 | 123 | 127 SWTCHA: .ASCIZ <CRLF>/SWITCH 'PORT SELECT' TO 'A' /                                  |
| 14 | 020261 | 200 | 123 | 127 SWTCHB: .ASCIZ <CRLF>/SWITCH 'PORT SELECT' TO 'B' /                                  |
| 15 | 020316 | 200 | 124 | 110 CONTUE: .ASCIZ <CRLF>/THEN PRESS 'CONTINUE' ON THE PROCESSOR/<CRLF>                  |
| 16 | 020367 | 200 | 123 | 124 CYCLED: .ASCIZ <CRLF>/STOP THE DRIVE /                                               |
| 17 | 020407 | 200 | 123 | 124 CYCLEU: .ASCIZ <CRLF>/START THE DRIVE, THE PROGRAM WILL WAIT FOR 'MOL' TO SET/<CRLF> |



| Line | Code   | Port | EM  | Message                                                                          |
|------|--------|------|-----|----------------------------------------------------------------------------------|
| 1    |        |      |     | .SBTTL TEST ERROR MESSAGES                                                       |
| 2    |        |      |     |                                                                                  |
| 3    | 020501 | 104  | 122 | 111 EM1: .ASCIZ /DRIVE IS NON-EXISTENT ('NED' BIT SET)/                          |
| 4    | 020547 | 127  | 122 | 117 EM2: .ASCIZ /WRONG DRIVE TYPE/                                               |
| 5    | 020570 | 120  | 117 | 122 EM3: .ASCIZ @PORT SELECT SWITCH ON DRIVE, NOT IN 'A/B'@                      |
| 6    | 020642 | 104  | 122 | 111 EM4: .ASCIZ /DRIVE NOT ON LINE/                                              |
| 7    | 020664 | 123  | 105 | 122 EM5: .ASCIZ /SERIAL NUMBER READ THROUGH EACH PORT NOT THE SAME/              |
| 8    | 020746 | 124  | 111 | 115 EM6: .ASCIZ /TIMEOUT HAS NOT OCCURRED WITHIN 2 SECONDS/                      |
| 9    | 021020 | 124  | 111 | 115 EM7: .ASCIZ /TIMEOUT ONE-SHOT IS LESS THAN 500 MS/                           |
| 10   | 021065 | 122  | 105 | 101 EM10: .ASCIZ /READ IN PRESET DOES NOT SET VOLUME VALID FOR THE PORT/         |
| 11   | 021153 | 047  | 107 | 117 EM11: .ASCIZ /'GO' BIT RESET DURING UNLOAD COMMAND/                          |
| 12   | 021220 | 111  | 116 | 103 EM12: .ASCIZ /INCORRECT STATUS DURING UNLOAD COMMAND/                        |
| 13   | 021267 | 104  | 122 | 111 EM13: .ASCIZ /DRIVE DID NOT RETURN TO NEUTRAL AFTER UNLOAD COMMAND/          |
| 14   | 021354 | 101  | 124 | 124 EM14: .ASCIZ /ATTENTION BIT SET ON 'OPPOSITE PORT' AFTER UNLOAD/             |
| 15   | 021436 | 101  | 124 | 124 EM15: .ASCIZ /ATTENTION BIT NOT SET ON PORT WHICH ISSUED 'UNLOAD'/           |
| 16   | 021522 | 104  | 122 | 111 EM16: .ASCII /DRIVE NOT IN NEUTRAL AFTER UNLOAD WITH 'PORT/<CR><LF>          |
| 17   | 021600 | 123  | 105 | 114 .ASCIZ @SELECT' SWITCH MOVED FROM 'A/B' @                                    |
| 18   | 021641 | 104  | 122 | 111 EM17: .ASCIZ /DRIVE LOCKED ON PORT 'A' BY SWITCH WHILE CYCLED UP/            |
| 19   | 021724 | 104  | 122 | 111 EM20: .ASCIZ /DRIVE LOCKED ON PORT 'B' BY SWITCH WHILE CYCLED UP/            |
| 20   | 022007 | 123  | 124 | 101 EM21: .ASCIZ /STATUS INCORRECT FOR PORT AFTER CYCLE UP/                      |
| 21   | 022060 | 122  | 105 | 107 EM22: .ASCIZ /REGISTER CONTENTS SEEN WHEN DRIVE SWITCHED ON 'OPPOSITE' PORT/ |
| 22   | 022156 | 047  | 116 | 105 EM23: .ASCIZ /'NED' NOT SET WHEN RMDs ACCESSED THROUGH PORT NOT SWITCHED/    |
| 23   | 022251 | 104  | 122 | 111 EM24: .ASCIZ /DRIVE SWITCHED TO LOCKED OUT PORT WHEN RELEASED/               |
| 24   | 022331 | 122  | 110 | 057 EM25: .ASCIZ @RH/RM DIDN'T RESPOND TO ADDRESSING@                            |
| 25   | 022374 | 104  | 122 | 111 EM30: .ASCIZ /DRIVE NOT SEIZED BY PORT/                                      |
| 26   | 022425 | 127  | 122 | 117 EM31: .ASCIZ /WRONG STATUS SEEN BY THE SEIZING PORT/                         |
| 27   | 022473 | 122  | 105 | 107 EM32: .ASCIZ /REGISTER CONTENTS WRONG/                                       |
| 28   | 022523 | 103  | 117 | 116 EM33: .ASCIZ /CONTROL BUS PARITY ERROR READING INDICATED REGISTER/           |
| 29   | 022607 | 103  | 101 | 116 EM34: .ASCIZ /CAN'T ACCESS DRIVE THROUGH EITHER PORT/                        |
| 30   | 022656 | 104  | 122 | 111 EM35: .ASCIZ /DRIVE NOT IN NEUTRAL AFTER RELEASE - REQUEST NOT SET/          |
| 31   | 022743 | 104  | 122 | 111 EM36: .ASCIZ /DRIVE NOT IN NEUTRAL AFTER TIMEOUT - REQUEST NOT SET/          |
| 32   | 023030 | 122  | 105 | 107 EM37: .ASCIZ /REGISTER CONTENTS WRONG AFTER RELEASE OR TIMEOUT/              |
| 33   | 023111 | 104  | 122 | 111 EM40: .ASCIZ /DRIVE IN NEUTRAL AFTER RELEASE - REQUEST SET/                  |
| 34   | 023166 | 122  | 105 | 107 EM41: .ASCIZ /REGISTER WRONG AFTER RELEASE WITH REQUEST SET/                 |

TEST ERROR MESSAGES

|    |        |        |        |        |       |        |                                                       |         |         |               |                   |
|----|--------|--------|--------|--------|-------|--------|-------------------------------------------------------|---------|---------|---------------|-------------------|
| 1  | 023244 | 124    | 105    | 123    | DH1:  | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | REG ADR       | CONTENTS/         |
| 2  | 023315 | 124    | 105    | 123    | DH2:  | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | REG ADR       | GOOD BAD/         |
| 3  | 023371 | 124    | 105    | 123    | DH5:  | .ASCIZ | /TEST #                                               | ERR PC  | REG ADR | PORT A        | PORT B/           |
| 4  | 023440 | 124    | 105    | 123    | DH6:  | .ASCIZ | /TEST #                                               | ERR PC  | PORT #/ |               |                   |
| 5  | 023467 | 124    | 105    | 123    | DH7:  | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | TIME (IN MS)/ |                   |
| 6  | 023534 | 040    | 040    | 040    | DH13: | .ASCII | /                                                     |         | SEIZE/  | <CRLF>        |                   |
| 7  | 023562 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #/ |               |                   |
| 8  | 023611 | 040    | 040    | 040    | DH14: | .ASCII | /                                                     |         | SEIZE   | ERROR/        | <CRLF>            |
| 9  | 023647 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | PORT #        | REG ADR CONTENTS/ |
| 10 | 023730 | 124    | 105    | 123    | DH17: | .ASCIZ | /TEST #                                               | ERR PC/ |         |               |                   |
| 11 | 023747 | 040    | 040    | 040    | DH24: | .ASCII | /                                                     |         | LOCKED  | SWITCHED TO/  | <CRLF>            |
| 12 | 024013 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | PORT #/       |                   |
| 13 | 024052 | 044    | 122    | 115    | DH25: | .ASCIZ | /\$RMADR/                                             |         |         |               |                   |
| 14 | 024061 | 040    | 040    | 040    | DH30: | .ASCII | /                                                     |         | SEIZE   | ERROR/        | <CRLF>            |
| 15 | 024117 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | PORT #        | REG ADR GOOD BAD/ |
| 16 | 024203 | 040    | 040    | 040    | DH34: | .ASCII | /                                                     |         | PORT A  | PORT B/       | <CRLF>            |
| 17 | 024242 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | RMDS    | RMDS/         |                   |
| 18 | 024277 | 040    | 040    | 040    | DH35: | .ASCII | /                                                     |         | RELSNG  | ERROR/        | <CRLF>            |
| 19 | 024335 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | PORT #/       |                   |
| 20 | 024374 | 040    | 040    | 040    | DH37: | .ASCII | /                                                     |         | RELSNG  | ERROR/        | <CRLF>            |
| 21 | 024432 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | PORT #        | REG ADR GOOD BAD/ |
| 22 | 024516 | 040    | 040    | 040    | DH40: | .ASCII | /                                                     |         | RELSNG  | RQSTNG/       | <CRLF>            |
| 23 | 024555 | 124    | 105    | 123    |       | .ASCIZ | /TEST #                                               | ERR PC  | PORT #  | PORT #/       |                   |
| 24 |        |        |        |        |       |        |                                                       |         |         |               |                   |
| 25 |        |        |        |        |       | .EVEN  |                                                       |         |         |               |                   |
| 26 |        |        |        |        |       |        |                                                       |         |         |               |                   |
| 27 | 024614 | 001242 | 001116 | 001234 | DT1:  | .WORD  | TSTNUM,\$ERRPC,PTNBR,\$BDADR,\$BDDAT,0                |         |         |               |                   |
| 28 | 024630 | 001242 | 001116 | 001234 | DT2:  | .WORD  | TSTNUM,\$ERRPC,PTNBR,\$BDADR,\$GDDAT,\$BDDAT,0        |         |         |               |                   |
| 29 | 024646 | 001242 | 001116 | 001122 | DT5:  | .WORD  | TSTNUM,\$ERRPC,\$BDADR,\$GDDAT,\$BDDAT,0              |         |         |               |                   |
| 30 | 024662 | 001242 | 001116 | 001234 | DT6:  | .WORD  | TSTNUM,\$ERRPC,PTNBR,0                                |         |         |               |                   |
| 31 | 024672 | 001242 | 001116 | 001234 | DT7:  | .WORD  | TSTNUM,\$ERRPC,PTNBR,TIME,0                           |         |         |               |                   |
| 32 | 024704 | 001242 | 001116 | 001236 | DT13: | .WORD  | TSTNUM,\$ERRPC,SEIZPT,0                               |         |         |               |                   |
| 33 | 024714 | 001242 | 001116 | 001236 | DT14: | .WORD  | TSTNUM,\$ERRPC,SEIZPT,PTNBR,\$BDADR,\$BDDAT,0         |         |         |               |                   |
| 34 | 024732 | 001242 | 001116 | 000000 | DT17: | .WORD  | TSTNUM,\$ERRPC,0                                      |         |         |               |                   |
| 35 | 024740 | 001242 | 001116 | 001236 | DT24: | .WORD  | TSTNUM,\$ERRPC,SEIZPT,PTNBR,0                         |         |         |               |                   |
| 36 | 024752 | 001272 | 000000 |        | DT25: | .WORD  | \$RMADR,0                                             |         |         |               |                   |
| 37 | 024756 | 001242 | 001116 | 001236 | DT30: | .WORD  | TSTNUM,\$ERRPC,SEIZPT,PTNBR,\$BDADR,\$GDDAT,\$BDDAT,0 |         |         |               |                   |
| 38 | 024776 | 001242 | 001116 | 001170 | DT34: | .WORD  | TSTNUM,\$ERRPC,\$TMP2,\$TMP3,0                        |         |         |               |                   |
| 39 | 025010 | 001242 | 001116 | 001236 | DT35: | .WORD  | TSTNUM,\$ERRPC,SEIZPT,PTNBR,0                         |         |         |               |                   |
| 40 | 025022 | 001242 | 001116 | 001236 | DT40: | .WORD  | TSTNUM,\$ERRPC,SEIZPT,OPPR,0                          |         |         |               |                   |
| 41 |        |        |        |        |       |        |                                                       |         |         |               |                   |
| 42 | 025034 | 000    | 000    | 001    | DF1:  | .BYTE  | 0,0,1,0,0                                             |         |         |               |                   |
| 43 | 025041 | 000    | 000    | 001    | DF2:  | .BYTE  | 0,0,1,0,0,0                                           |         |         |               |                   |
| 44 | 025047 | 000    | 000    | 000    | DF5:  | .BYTE  | 0,0,0,0,0                                             |         |         |               |                   |
| 45 | 025054 | 000    | 000    | 001    | DF6:  | .BYTE  | 0,0,1                                                 |         |         |               |                   |
| 46 | 025057 | 000    | 000    | 001    | DF7:  | .BYTE  | 0,0,1,1                                               |         |         |               |                   |
| 47 | 025063 | 000    | 000    | 001    | DF14: | .BYTE  | 0,0,1,1,0,0                                           |         |         |               |                   |
| 48 | 025071 | 000    | 000    |        | DF17: | .BYTE  | 0,0                                                   |         |         |               |                   |
| 49 | 025073 | 000    | 000    |        | DF25: | .BYTE  | 0                                                     |         |         |               |                   |
| 50 | 025074 | 000    | 000    | 001    | DF30: | .BYTE  | 0,0,1,1,0,0,0                                         |         |         |               |                   |
| 51 | 025103 | 000    | 000    | 000    | DF34: | .BYTE  | 0,0,0,0                                               |         |         |               |                   |
| 52 |        |        |        |        |       | .EVEN  |                                                       |         |         |               |                   |



```
1 .SBTTL CONSTANTS, TABLES, ETC
2 ;TABLE OF TEST STARTING ADDRESSES
3
4 025110 003122 TSTADR: .WORD TST1 ;STARTING ADDRESS OF TEST 1
7 025112 004474 .WORD TST2 ;STARTING ADDRESS OF TEST 2
 025114 005256 .WORD TST3 ;STARTING ADDRESS OF TEST 3
 025116 006040 .WORD TST4 ;STARTING ADDRESS OF TEST 4
 025120 006756 .WORD TST5 ;STARTING ADDRESS OF TEST 5
 025122 007674 .WORD TST6 ;STARTING ADDRESS OF TEST 6
 025124 010742 .WORD TST7 ;STARTING ADDRESS OF TEST 7
 025126 012052 .WORD TST10 ;STARTING ADDRESS OF TEST 10
8
9 ;ATTENTION BIT TABLE
10
11 025130 001 ATABIT: .BYTE 1 ;ATTENTION BIT FOR DRIVE 0
12 025131 002 .BYTE 2 ;ATTENTION BIT FOR DRIVE 1
13 025132 004 .BYTE 4 ;ATTENTION BIT FOR DRIVE 2
14 025133 010 .BYTE 10 ;ATTENTION BIT FOR DRIVE 3
15 025134 020 .BYTE 20 ;ATTENTION BIT FOR DRIVE 4
16 025135 040 .BYTE 40 ;ATTENTION BIT FOR DRIVE 5
17 025136 100 .BYTE 100 ;ATTENTION BIT FOR DRIVE 6
18 025137 200 .BYTE 200 ;ATTENTION BIT FOR DRIVE 7
19
22 025140 000011 MAXTN: .WORD 11 ;MAXIMUM TEST NUMBER
23
24 .END 200
```

ADDRIS 020072  
 ADRERR 017655  
 AOE = 001000  
 ASR1 001232  
 ATA = 100000  
 ATABIT 025130  
 ATO = 000001  
 AT1 = 000002  
 AT2 = 000004  
 AT3 = 000010  
 AT4 = 000020  
 AT5 = 000040  
 AT6 = 000100  
 AT7 = 000200  
 A16 = 000400  
 A17 = 001000  
 BADNO 020043  
 BADTMO 001706  
 BAI = 000010  
 BIT0 = 000001  
 BIT00 = 000001  
 BIT01 = 000002  
 BIT02 = 000004  
 BIT03 = 000010  
 BIT04 = 000020  
 BIT05 = 000040  
 BIT06 = 000100  
 BIT07 = 000200  
 BIT08 = 000400  
 BIT09 = 001000  
 BIT1 = 000002  
 BIT10 = 002000  
 BIT11 = 004000  
 BIT12 = 010000  
 BIT13 = 020000  
 BIT14 = 040000  
 BIT15 = 100000  
 BIT2 = 000004  
 BIT3 = 000010  
 BIT4 = 000020  
 BIT5 = 000040  
 BIT6 = 000100  
 BIT7 = 000200  
 BIT8 = 000400  
 BIT9 = 001000  
 BPTVEC = 000014  
 CHANGE 002774  
 CHGADR 001270  
 CKCLK 013406  
 CKCLK1 013456  
 CKCLK2 013520  
 CKCLK3 013530  
 CKERR 001244  
 CKSWR = 104407  
 CLOCK 013540  
 CLR = 000040  
 CONTUE 020316

CPSAVE 014524  
 CR = 000015  
 CRLF = 000200  
 CYCLED 020367  
 CYCLEU 020407  
 DCK = 100000  
 DDISP = 177570  
 DE1 = 000040  
 DFF20 = 000002  
 DF1 025034  
 DF14 025063  
 DF17 025071  
 DF2 025041  
 DF25 025073  
 DF30 025074  
 DF34 025103  
 DF5 025047  
 DF6 025054  
 DF7 025057  
 DH1 023244  
 DH13 023534  
 DH14 023611  
 DH17 023730  
 DH2 023315  
 DH24 023747  
 DH25 024052  
 DH30 024061  
 DH34 024203  
 DH35 024277  
 DH37 024374  
 DH40 024516  
 DH5 023371  
 DH6 023440  
 DH7 023467  
 DIGB = 000004  
 DISPLA 001142  
 DISPRE 000174  
 DLT = 100000  
 DL64 = 000020  
 DMD = 000001  
 DPE = 000010  
 DPR = 000400  
 DRQ = 004000  
 DRY = 000200  
 DSWR = 177570  
 DTE = 010000  
 DT00 = 000001  
 DT01 = 000002  
 DT02 = 000004  
 DT03 = 000010  
 DT04 = 000020  
 DT05 = 000040  
 DT06 = 000100  
 DT07 = 000200  
 DT08 = 000400  
 DT1 024614  
 DT13 024704

DT14 024714  
 DT17 024732  
 DT2 024630  
 DT24 024740  
 DT25 024752  
 DT30 024756  
 DT34 024776  
 DT35 025010  
 DT40 025022  
 DT5 024646  
 DT6 024662  
 DT7 024672  
 DVA = 004000  
 DVC = 000200  
 ECH = 000100  
 ECI = 004000  
 EMTVEC = 000030  
 EM1 020501  
 EM10 021065  
 EM11 021153  
 EM12 021220  
 EM13 021267  
 EM14 021354  
 EM15 021436  
 EM16 021522  
 EM17 021641  
 EM2 020547  
 EM20 021724  
 EM21 022007  
 EM22 022060  
 EM23 022156  
 EM24 022251  
 EM25 022331  
 EM3 020570  
 EM30 022374  
 EM31 022425  
 EM32 022473  
 EM33 022523  
 EM34 022607  
 EM35 022656  
 EM36 022743  
 EM37 023030  
 EM4 020642  
 EM40 023111  
 EM41 023166  
 EM5 020664  
 EM6 020746  
 EM7 021020  
 ENTERA 017626  
 ERR = 040000  
 ERROR = 104000  
 ERRVEC = 000004  
 EXEC 002622  
 FER = 000020  
 FMT16 = 010000  
 F0 = 000002  
 F1 = 000004

F2 = 000010  
 F3 = 000020  
 F4 = 000040  
 GO = 000001  
 GRV = 000010  
 GTSWR = 104406  
 HCE = 000200  
 HCI = 002000  
 HCRC = 000400  
 HT = 000011  
 IAE = 002000  
 IBSAVE 014526  
 IE = 000100  
 ILF = 000001  
 ILR = 000002  
 IOTVEC = 000020  
 IR = 000100  
 IVC = 010000  
 KYBCTL 001266  
 LBC = 002000  
 LBT = 002000  
 LF = 000012  
 LSC = 004000  
 MAXTN 025140  
 MCPE = 020000  
 MDPE = 000400  
 MOH = 020000  
 MOL = 010000  
 MXF = 001000  
 NBA = 100000  
 NED = 010000  
 NEM = 004000  
 NOATA = 000000  
 NOCLOC 017756  
 NOSEIZ 001246  
 NTRH 020127  
 OFD = 000200  
 OPE = 020000  
 OPI = 020000  
 OPPRT 001240  
 OR = 000200  
 PAR = 000010  
 PAT = 000020  
 PFECHE 014726  
 PFECHE1 014736  
 PFECHE2 015020  
 PFECHE3 015052  
 PFECHE4 015062  
 PFTSTN 015066  
 PGE = 002000  
 PGM = 001000  
 PIP = 020000  
 PIRQ = 177772  
 PIRQVE = 000240  
 PORTA 001224  
 PORTAI 017700  
 PORTB 001226

PORTBI 017727  
 PORTC 001230  
 PRO = 000000  
 PR1 = 000040  
 PR2 = 000100  
 PR3 = 000140  
 PR4 = 000200  
 PR5 = 000240  
 PR6 = 000300  
 PR7 = 000340  
 PS = 177776  
 PSEL = 002000  
 PSW = 177776  
 PTNBR 001234  
 PWRVEC = 000024  
 RDCHR = 104410  
 RDLIN = 104411  
 RDOCT = 104412  
 RDY = 000200  
 RELERR 001250  
 RELOK = 000001  
 RESREG = 104414  
 RESVEC = 000010  
 RMAS = 000016  
 RMBA = 000004  
 RMCS1 = 000000  
 RMCS2 = 000010  
 RMDA = 000006  
 RMDB = 000022  
 RMDC = 000034  
 RMDS = 000012  
 RMDT = 000026  
 RMEC1 = 000044  
 RMEC2 = 000046  
 RMER1 = 000014  
 RMER2 = 000042  
 RMLA = 000020  
 RMMR1 = 000024  
 RMMR2 = 000040  
 RMOF = 000032  
 RMR = 000004  
 RMSN = 000030  
 RMWC = 000002  
 R6 = %000006  
 R7 = %000007  
 SAVREG = 104413  
 SC = 100000  
 SCOPE = 000004  
 SC0 = 000100  
 SC1 = 000200  
 SC2 = 000400  
 SC3 = 001000  
 SC4 = 002000  
 SEIZPT 001236  
 SKI = 100000  
 STACK = 001100  
 START 001766



|                 |                |                |                 |                 |
|-----------------|----------------|----------------|-----------------|-----------------|
| START1 001774   | TEST3 005314   | WCE = 040000   | \$GTSWR 016434  | \$SVPC = 000210 |
| START2 002002   | TEST4 006076   | WCF = 000040   | \$GT42P 013352  | \$SWR = 166000  |
| STKLMT= 177774  | TEST5 007014   | WLE = 004000   | \$HD = 000000   | \$SWRMK= 000000 |
| STOP 014154     | TEST6 007732   | WRL = 004000   | \$HIUCT 017442  | \$TIMES 001176  |
| SWR 001140      | TEST7 011000   | \$AUTOB 001134 | \$ICNT 001104   | \$TKB 001146    |
| SWREG 000176    | TIME 001252    | \$BDADR 001122 | \$INTAG 001135  | \$TKCNT 016034  |
| SWTCHA 020224   | TIMEA 001256   | \$BDDAT 001126 | \$ITEMB 001114  | \$TKINT 016044  |
| SWTCHB 020261   | TIMEAP 001260  | \$BELL 001202  | \$LF 001210     | \$TKQEN= 016043 |
| SWTCHN 020156   | TIMEB 001262   | \$CHARC 015356 | \$LKCSB 001214  | \$TKQIN 016036  |
| SWO = 000001    | TIMEBP 001264  | \$CKSWR 016344 | \$LKCSR 001212  | \$TKQOU 016040  |
| SWCO = 000001   | TKVEC = 000060 | \$CMTAG 001100 | \$LKS 001220    | \$TKQSR 016042  |
| SW01 = 000002   | TOLER = 013572 | \$CM1 = 000001 | \$LLVEC 001222  | \$TKS 001144    |
| SW02 = 000004   | TPVEC = 000064 | \$CM2 = 000002 | \$LPADR 001106  | \$TKSRV 016114  |
| SW03 = 000010   | TRAPVE= 000034 | \$CM3 = 000001 | \$LPERR 001110  | \$TMP0 001164   |
| SW04 = 000020   | TRE = 040000   | \$CM4 = 000005 | \$LPVEC 001216  | \$TMP1 001166   |
| SW05 = 000040   | TRTVEC= 000014 | \$CNTLC 017242 | \$MNEW 017272   | \$TMP2 001170   |
| SW06 = 000100   | TSTADR 025110  | \$CNTLG 017254 | \$MSWR 017261   | \$TMP3 001172   |
| SW07 = 000200   | TSTNUM 001242  | \$CNTLU 017247 | \$MXCNT 014152  | \$TMP4 001174   |
| SW08 = 000400   | TST1 003122    | \$CRLF 001207  | \$NULL 001154   | \$TN = 000012   |
| SW09 = 001000   | TST1AA 003104  | \$DBLK 016024  | \$NWTST= 000000 | \$TPB 001152    |
| SW1 = 000002    | TST10 012052   | \$DOAGN 013376 | \$OCNT 015604   | \$TPFLG 001157  |
| SW10 = 002000   | TST11 013156   | \$DTBL 016014  | \$OMODE 015606  | \$TPS 001150    |
| SW11 = 004000   | TST2 004474    | \$ENDAD 013366 | \$OVER 014136   | \$TRAP 017540   |
| SW12 = 010000   | TST3 005256    | \$ENDCT 013224 | \$PASS 001100   | \$TRAP2 017562  |
| SW13 = 020000   | TST4 006040    | \$ENULL 013402 | \$QUES 001206   | \$TRP = 000015  |
| SW14 = 040000   | TST5 006756    | \$EOP 013160   | \$RDCHR 016706  | \$TRPAD 017574  |
| SW15 = 100000   | TST6 007674    | \$EOPCT 013216 | \$RDLIN 016776  | \$TSTNM 001102  |
| SW2 = 000004    | TST7 010742    | \$ERFLG 001103 | \$RDOCT 017304  | \$TTYIN 017232  |
| SW3 = 000010    | TYPDS = 104405 | \$ERMAX 001115 | \$RDSZ = 000010 | \$TYPDS 015610  |
| SW4 = 000020    | TYPE = 104401  | \$ERROR 014202 | \$REGAD 001160  | \$TYPE 015070   |
| SW5 = 000040    | TYPOC = 104402 | \$ERRPC 001116 | \$REGO 001162   | \$TYPEC 015240  |
| SW6 = 000100    | TYPON = 104404 | \$ERRTB 001276 | \$RESRE 017502  | \$TYPEX 015360  |
| SW7 = 000200    | TYPOS = 104403 | \$ERRTY 014530 | \$RMADR 001272  | \$TYPOC 015406  |
| SW8 = 000400    | UNS = 040000   | \$ERTTL 001112 | \$RMVEC 001274  | \$TYPON 015422  |
| SW9 = 001000    | UPE = 020000   | \$ESCAP 001200 | \$RTNAD 013400  | \$TYPOS 015362  |
| TAP = 040000    | UO = 000001    | \$FILLC 001156 | \$SAVRE 017444  | \$XOFF = 000023 |
| TBITVE = 000014 | U1 = 000002    | \$FILLS 001155 | \$SCOPE 013620  | \$XON = 000021  |
| TESTNO 020023   | U3 = 000004    | \$GDADR 001120 | \$SETUP= 000127 | \$XTSTR 013642  |
| TEST1 003160    | VV = 000100    | \$GDDAT 001124 | \$STUP = 177777 | \$GET4= 000000  |
| TEST10 012110   | VVSET = 000001 | \$GET42 013356 | \$SVLAD 014126  | \$OFILL 015605  |
| TEST2 004532    | WATCH 001254   |                |                 |                 |

. ABS. 025142 000  
000000 001

ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 54784 WORDS ( 214 PAGES)  
DYNAMIC MEMORY AVAILABLE FOR 70 PAGES  
CZRMSB.BIN,CZRMSB/C=CZRMSB.DOC,CZRMSB.SYSMAC/M





|         |         |         |         |         |         |         |         |         |         |         |         |        |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|---------|---------|
|         | 25-29   | 25-37   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$GET42 | 11-1#   |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$GT42P | 11-1    | 11-1#   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$GTSWR | 19-1#   | 22-1    | 22-1    |         |         |         |         |         |         |         |         |        |         |         |
| \$HD    | 4-516   | 4-516   | 4-516   |         |         |         |         |         |         |         |         |        |         |         |
| \$HIOCT | 20-1#   | 20-1*   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$ICNT  | 6-0#    | 9-93*   | 13-1    | 13-1    | 13-1    | 13-1*   | 13-1*   |         |         |         |         |        |         |         |
| \$INTAG | 6-0#    | 19-1    | 19-1    | 19-1    | 19-1    | 19-1*   | 19-1*   |         |         |         |         |        |         |         |
| \$ITEMB | 6-0#    | 14-1    | 14-1    | 14-1    | 14-1    | 14-1*   | 14-1*   | 15-1    |         |         |         |        |         |         |
| \$LF    | 6-0#    | 14-1    | 14-1    | 16-1    | 16-1    | 19-1    | 19-1    | 19-1    | 20-1    | 20-1    |         |        |         |         |
| \$LKCSB | 7-0#    | 12-11*  |         |         |         |         |         |         |         |         |         |        |         |         |
| \$LKCSR | 7-0#    | 12-7    | 12-12*  |         |         |         |         |         |         |         |         |        |         |         |
| \$LKS   | 7-0#    | 12-16   | 12-20*  |         |         |         |         |         |         |         |         |        |         |         |
| \$LLVEC | 7-0#    | 12-17   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$LPADR | 6-0#    | 9-24*   | 9-78*   | 10-20*  | 10-98*  | 10-99*  | 10-157* | 10-158* | 10-178* | 10-322* | 10-323* | 13-1   | 13-1    | 13-1    |
| \$LPERR | 13-1*   |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$LPVEC | 6-0#    | 9-24*   | 9-79*   | 10-20*  | 10-98*  | 10-99*  | 10-157* | 10-158* | 10-178* | 10-322  | 10-322* | 10-323 | 10-323* |         |
| \$MAIL  | 7-0#    | 12-8    |         |         |         |         |         |         |         |         |         |        |         |         |
| \$MNEW  | 9-24    | 9-29    | 13-1    | 14-1    | 16-1    |         |         |         |         |         |         |        |         |         |
| \$MSWR  | 19-1    | 19-1#   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$MXCNT | 19-1    | 19-1#   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$NULL  | 13-1    | 13-1    | 13-1    | 13-1#   |         |         |         |         |         |         |         |        |         |         |
| \$NWTST | 6-0#    | 16-1    | 16-1    | 16-1    |         |         |         |         |         |         |         |        |         |         |
| \$OCNT  | 10-20   | 10-20   | 10-20#  | 10-20#  | 10-98   | 10-98   | 10-98#  | 10-98#  | 10-99   | 10-99   | 10-99#  | 10-99# | 10-157  | 10-157  |
| \$OMODE | 10-157# | 10-157# | 10-158  | 10-158  | 10-158# | 10-158# | 10-178  | 10-178  | 10-178# | 10-178# | 10-322  | 10-322 | 10-322# | 10-322# |
| \$OVER  | 10-323  | 10-323  | 10-323# | 10-323# | 10-327# | 10-327# |         |         |         |         |         |        |         |         |
| \$PASS  | 17-1#   | 17-1*   | 17-1*   | 17-1*   | 17-1*   | 17-1*   |         |         |         |         |         |        |         |         |
| \$PERR  | 17-1    | 17-1#   | 17-1*   | 17-1*   | 17-1*   | 17-1*   |         |         |         |         |         |        |         |         |
| \$PVEC  | 13-1    | 13-1    | 13-1    | 13-1#   |         |         |         |         |         |         |         |        |         |         |
| \$QUES  | 6-0#    | 9-76*   | 11-1    | 11-1    | 11-1    | 11-1*   | 11-1*   | 13-1    | 13-1    | 13-1    |         |        |         |         |
| \$R2A   | 6-0#    | 14-1    | 14-1    | 16-1    | 16-1    | 19-1    | 19-1    | 19-1    | 19-1    | 20-1    | 20-1    | 20-1   |         |         |
| \$RDCHR | 22-1    |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$RDDEC | 19-1#   | 22-1    | 22-1    |         |         |         |         |         |         |         |         |        |         |         |
| \$RDLIN | 22-1    |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$RDOCT | 19-1#   | 22-1    | 22-1    |         |         |         |         |         |         |         |         |        |         |         |
| \$RDSZ  | 20-1#   | 22-1    | 22-1    |         |         |         |         |         |         |         |         |        |         |         |
| \$REGO  | 19-1    | 19-1#   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$REGAD | 6-0#    |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$RESRE | 6-0#    |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$RMADR | 21-1#   | 22-1    |         |         |         |         |         |         |         |         |         |        |         |         |
| \$RMVEC | 7-0#    | 9-70    | 9-103   | 9-110*  | 9-113   | 10-17   | 25-36   |         |         |         |         |        |         |         |
| \$RTNAD | 7-0#    |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$SAVRE | 11-1#   |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$SCOPE | 21-1#   | 22-1    | 22-1    |         |         |         |         |         |         |         |         |        |         |         |
| \$SETUP | 9-24    | 13-1#   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$SSTUP | 4-705   | 4-705   | 4-705   | 4-705   | 4-705   | 4-705   | 4-705#  | 4-705#  | 4-705#  | 4-705#  | 4-705#  | 4-705# | 9-24    | 9-24    |
| \$SVLAD | 9-24    | 9-24    | 9-24    | 9-24    | 9-24    | 9-24    | 9-24    | 9-24    | 9-24    | 9-24    | 9-29    | 9-29   | 9-24    | 9-24    |
| \$SVP   | 13-1    | 14-1    | 14-1    | 14-1    | 14-1    | 19-1    | 19-1    | 19-1    | 19-1    | 19-1    | 19-1    | 19-1   | 11-1    | 11-1    |
| \$SWR   | 4-705   | 4-705   | 4-705   | 4-705   | 4-705   | 4-705#  | 4-705#  | 4-705#  | 4-705#  | 4-705#  | 4-705#  | 4-705# | 4-705#  | 4-705#  |
| \$SVP   | 4-705#  |         |         |         |         |         |         |         |         |         |         |        |         |         |
| \$SVP   | 13-1    | 13-1#   |         |         |         |         |         |         |         |         |         |        |         |         |
| \$SVP   | 5-5     | 5-5#    |         |         |         |         |         |         |         |         |         |        |         |         |
| \$SVP   | 4-512#  | 4-516   | 4-517   | 4-517   | 4-517   | 4-517   | 4-517   | 4-517   | 4-517   | 4-517   | 6-0     | 6-0    | 6-0     | 9-24    |
| \$SVP   | 9-24    | 9-24    | 9-24    | 9-24    | 10-20   | 10-98   | 10-99   | 10-157  | 10-158  | 10-178  | 10-322  | 10-323 | 10-327  | 11-1    |
| \$SVP   | 11-1    | 11-1    | 11-1    | 11-1    | 12-48#  | 13-1    | 13-1    | 13-1    | 13-1    | 13-1    | 13-1    | 13-1   | 13-1    | 13-1    |
| \$SVP   | 13-1    | 13-1    | 13-1    | 13-1    | 13-1    | 13-1    | 13-1    | 13-1    | 14-1    | 14-1    | 14-1    | 14-1   | 14-1    | 14-1    |

14-1

14-1

14-1

14-1

14-1

D 7

SEQ 0081







STYRON 17-1 17-1# 22-1

F 7

SEG 0083











D100

4-632#

J 7

SEQ 0087







EM6

8-39

24-80

L 7

SEQ 0089





OP1

4-608#

N 7

SEQ 0091







RMAS

4-692#

C 8

SEQ 0093





Sw1

4-519#

E 8

SEQ 0095





TYPE 9-6 9-29 9-33 9-38 9-46 9-48 9-50<sup>G</sup> 8 9-61 9-69 9-80 9-87 9-102 9-105 9-106  
SEQ 0097









