VT20

DIAGNOSTIC TEST

MD-11-DBVTA-C

EP DBVTA C DL A

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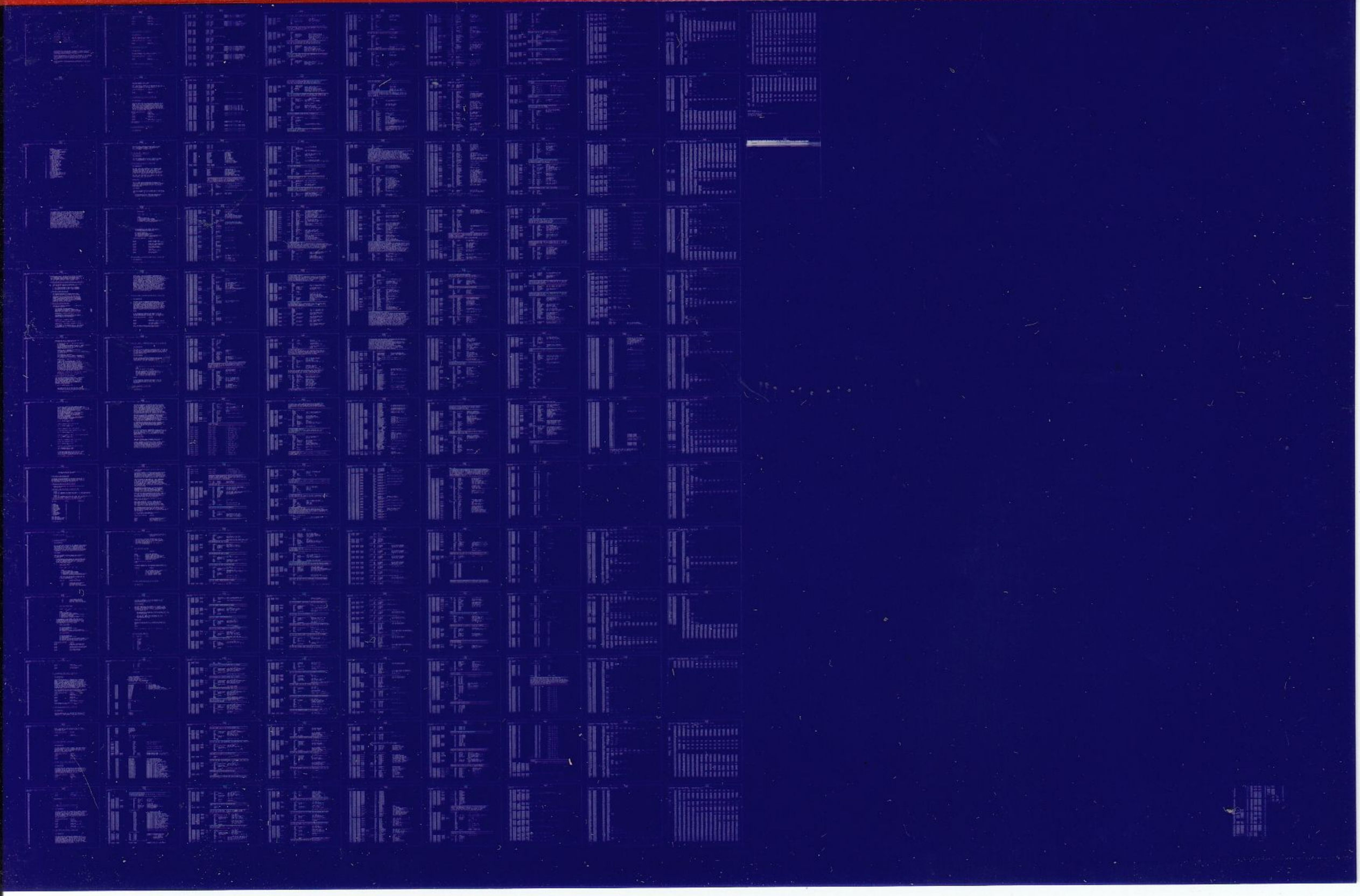
MADE IN USA



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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DBVTA-C-D

PRODUCT NAME: VT2D DIAGNOSTIC TEST

DATE CREATED: JUNE 17, 1973

DATE REVISED: OCTOBER, 1975

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: ED BADGER/P. NELSON

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1. A B S T R A C T
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THIS PROGRAM TESTS, EXERCISES AND DIAGNOSES THE VT20 SYSTEM (KEYBOARDS & DISPLAYS) IN ITS ENTIRETY. THE PROGRAM CONSISTS OF EIGHTEEN INDIVIDUALLY SELECTABLE TESTS WHICH FACILITATE IN CHECKOUT AND ACCEPTANCE OF THE VT20. THE SYSTEM IS TESTED ON A UNIT (1 KEYBOARD & 1 DISPLAY) BASES. THIS HOLDS TRUE IN ALL TESTS EXCEPT FOR TEST 21. HERE, THE VT20 IS TESTED AS A SLAVE SYSTEM IN CONFIGURATION WITH EITHER A PDP-8 OR PDP-11 HOST COMPUTER. THIS TEST REQUIRES FOR THE VT20 TO BE CABLED VIA SERIAL LINE INTERFACE TO THE HOST COMPUTER. THE HOST DIAGNOSTIC, EITHER MD-11-DZVTE(PDP-11 W/DL11'S), MD-11-DZVTG(PDP-11 W/DH11'S) OR MD-08-DIVTB(PDP-8 W/ KL8J'S) IS TO BE LOADED INTO THE HOST COMPUTER. THIS PROGRAM ACTS AS SERIAL LINE INTERFACE DIAGNOSTIC AND A DATA RECEIVE/TRANSMIT ROUTINE. REFER TO THE SPECIFIC MAINDEC FOR A FURTHER EXPLAINATION. THIS DIAGNOSTIC IS SET UP TO OPERATE 'WITH' OR 'WITHOUT' A TELETYPE. IF A TELETYPE ISN'T AVAILABLE PROGRAM 'HALTS' ARE USED TO REPORT ERRORS AND COLLECT NEEDED INFORMATION. THE PROGRAM

RESPONDS FUNCTIONALLY THE SAME WITH OR WITHOUT THE TELETYPE.
IT IS IMPERATIVE THAT THE DISPLAY TESTS BE RUN AND PROVED
FULLY OPERATIONAL BEFORE RUNNING THE KEYBOARD TESTS.
THIS IS NECESSARY SINCE THE DISPLAY IS USED IN CONJUNCTION
WITH THE 'KBD' (FUNCTIONAL & ASCII KEYBOARD) TESTS.

2. REQUIREMENTS (EQUIPMENT & MEMORY)

A. VT20 WITH EITHER 8 OR 16K OF MEMORY AND 1 TO 4 TUBES.
B. HOST COMPUTER W/ CONSOLE DEVICE (TEST 21 ONLY)

   1. MD-11-DZVTE FOR PDP-11 HOST W/DL11 INTERFACE
   2. MD-11-DZVTG FOR PDP-11 HOST W/ DH11 INTERFACE
   3. MD-08-DIVTB FOR PDP-8 HOST W/ KL8J INTERFACE

3. LOADING PROCEDURE

A. USE STANDARD PROCEDURE FOR LOADING BINARY TAPES
   IF A READ IN DEVICE (PC11 OR ASR-33) IS AVAILABLE.

B. THIS PROGRAM MAY ALSO BE BOOTED OVER FROM THE HOST
   DIAGNOSTIC. THIS IS DONE BY MODIFING THE BOOTSTRAP
   LOADED. SIMPLY REPLACE THE PC11 OR TTY CSR ADDRESS
   IN LOCATION 37776 WITH ONE OF THE DL11 CSR ADDRESSES
   (175610 OR 175620). REFER TO THE PARTICULAR MAINDEC
   BEING USED FOR THE BOOT PROCEDURE.

4. STARTING PROCEDURE

A. THERE ARE TWO STARTING ADDRESSES. (1) WITH TELETYPE AND
   (2) WITHOUT A TELETYPE.

   1. WITH TELETYPE (OR OTHER TERMINAL).
      LOAD AND START THE PROGRAM AT ADDRESS '200'.
      WHEN STARTED THE PROGRAM WILL PRINT THE PROGRAM
      HEADER AND THEN A SERIES OF QUESTIONS ARE ASKED.

      QUESTION NO.1 "FOREIGN CHARACTER SET (Y OR N)?"

      THIS ENABLES THE PROGRAM TO DISPLAY THE FOREIGN
      CHARACTER SET IN THE CHARACTER DISPLAY TESTS IF THE
      FOREIGN CHARACTER ROMS ARE PRESENT.

      QUESTION NO.2 - "NUMBER OF TUBES?"

      TYPE IN THE NUMBER OF TUBES ON SYSTEM (1,2,3 OR 4)

      QUESTION NO.3 - "ARE DEFAULT ADDRESSES & VECTORS OK (Y OR N)?

      IF THE ANSWER TO THIS QUESTION WAS 'Y', THEN STANDARD
      'FK' KEYBOARD AND 'VT' DEVICE ADDRESSES AND VECTOR
      ADDRESSES WILL BE USED. IT WILL ALSO AUTOMATICALLY

ASSOCIATE THE 1ST DL (175610) WITH THE FIRST TUBE,
DL-175620 WITH THE 2ND TUBE AND SO ON.

IF QUESTION NO.3 WAS 'N', THEN THE NEXT QUESTIONS
WILL BE ASKED:
"FK VECTOR AND DEVICE ADDRESS FOR UNIT X" (WHERE X REPRESENTS
THE UNIT ADDRESS TO BE SET UP. RESPOND TO THIS
QUESTION BY TYPING THE FK 'VECTOR' AND 'DEVICE'
ADDRESS SEPERATED BY A COMMA.

AFTER ALL THE FK ADDRESSES HAVE BEEN SETUP,
THE PROGRAM WILL THEN PRINT:
"VT VECTOR AND DEVICE ADDRESS FOR UNIT X" - ANSWER SAME AS
ABOVE ONLY FOR VT.

THE PROGRAM WILL THEN PRINT:
"DL11 VECTOR FOR UNIT X" - WHERE X REPRESENTS THE
UNIT NUMBER OF THE ASSICIATED DL11. RESPONSE
TO THIS QUESTION BY TYPING THE DL11 VECTOR ADDRESS.

QUESTION NO.3 - "TUBE '0','1','2','3',OR '4'"

TO RUN A TEST ON A SELECTED TUBE, TYPE THE
NUMBER OF THE TUBE TO BE TESTED (0,1,2 OR 3)
AND (CR). ALSO, AN OPTION TO THIS IS TO TYPE
A '4'. THIS WILL CAUSE THE PROGRAM TO TEST ALL
AVAILABLE TUBES, ONE AT A TIME ON ANY SELECTED
TEST 1-15. THUS, AFTER ONE TUBE HAS COMPLETED
A TEST, THE NEXT SEQUENTIAL TUBE WILL AUTOMATICALLY
BE TESTED. AFTER THE LAST TUBE HAS BEEN TESTED,
THE PROGRAM WILL RE-CYCLE AND AGAIN BE TESTED.
THIS OPTION CAN ALSO BE USED TO RUN EVERY TEST
(1-15) ON EVERY TUBE (REFER TO SECTION 14.).

QUESTION NO.4 "TYPE TEST NO. TO BE EXECUTED" - RESPOND

BY TYPING THE TEST NO: '0-21' YOU WISH TO RUN.

2. WITHOUT TELETYPE (OR OTHER TERMINAL)

LOAD AND START PROGRAM AT ADDRESS '204'. THE PROGRAM
WILL THEN EXECUTE A SERIES OF HALTS, THESE HALTS
ENABLE THE USER TO ANSWER QUESTIONS TO THE PROGRAM
VIA THE SWITCH REGISTER. PDP 11/05, 11/10 HALT
HALT LOCATIONS ARE INDICATED BY THE LOCATIONS ON
BRACKETS. THESE HALTS WITH THEIR ASSOCIATED HALT
ADDRESSES ARE NOW DESCRIBED:

A. HALT AT ADDRESS 001734 (1736)

HALT USED TO ASK YOU IF YOUR VT20 HAS A FOREIGN
CHARACTER SET, IF SO SET THE SWITCH REGISTER EQUAL TO
A 1 (IF NOT CLEAR THE SWITCH REGISTER) THEN PRESS CONTINUE.

B. HALT AT ADDRESS 001746 (1750)

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                                        ------

                                AT THIS HALT, ENTER THE OCTAL NUMBER OF TUBES YOU
                                HAVE (1 THROUGH 4) INTO THE SWITCH REGISTER.  ALSO IF YOU
                                WISH TO ENTER THE ADDRESSES AND VECTORS OF THE FK, VT, OR
                                DL11'S, SET SWR (SWITCH REGISTER) BIT 15 TO A 1, OTHERWISE LEAVE
                                SWR BIT 15=0 (CLEARED) AND DEFAULT ADDRESS.
                                AND VECTORS WILL BE USED.
                                IF YOU INDICATED IN HALT 'B', VIA SETTING SW15=1,
                                THAT DEFAULT ADDRESSES ARE NOT TO BE USED,
                                THEN HALTS 'C' THRU 'G' WILL BE EXECUTED. THIS
                                WILL ENABLE YOU TO SELECT YOUR OWN DEVICE,
                                VECTOR & DL11 ADDRESSES.
                                NOTE: THIS SERIES OF HALTS WILL OCCUR SEQUENTIALLY
                                FOR EACH TUBE THAT YOU INDICATED SO PAY HEED
                                TO THE HALT ADDRESS - PLEASE.

                        C.  HALT AT ADDRESS 002010 (2012)
                                        ------

                                ENTER FK VECTOR OF UNIT N INTO THE SWR.

                        D.  HALT AT ADDRESS 002022 (2024)
                                        ------

                                ENTER FK ADDRESS OF UNIT N INTO THE SWR.

                        *.  AT THIS POINT HALTS C AND D REPEATED FOR ALL TUBES.

                        E.  HALT AT ADDRESS 002050 (2052)
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                                ENTER THE VT VECTOR OF TUBE N - INTO THE SWITCH REGISTER.

                        F.  HALT AT ADDRESS 002060 (2062)
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                                ENTER THE VT ADDRESS OF TUBE N INTO THE SWR

                        *.  HALTS E AND F REPEATED FOR ALL TUBES.

                        G.  HALT AT ADDRESS 002114 (2116)
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                                ENTER DL11 VECTOR ADDRESS FOR TUBE N INTO SWR.

                        *.  HALT G REPEATED FOR ALL TUBES.
                        H.  HALT AT ADDRESS 002136 (2140)
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                                AT THIS HALT ENTER INTO THE SWR THE OCTAL NUMBER
                                OF THE TUBE TO BE TESTED (0,1,2,3 OR 4).  IF
                                OCTAL 4 IS ENTERED IN THE SWR, ALL UNITS WILL
                                BE AUTOMATICALLY ALTERNATED AFTER PASS COMPLETION.

                        I.  HALT AT ADDRESS 002634 (2636)
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THIS HALT IS FOR THE TEST NUMBER TO BE RUN. ENTER THE NUMBER AND PRESS CONTINUE.

5. R E S T A R T P R O C E D U R E
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THE PROGRAM SHOULD BE RESTARTED AT THE SAME LOCATION THAT IT WAS ORIGINALLY STARTED UNLESS A NEW TUBE IS TO BE TESTED. IN THIS CASE TYPE A '↑A' IF A TELETYPE IS BEING USED. OTHERWISE, HALT AND RESTART THE PROGRAM AT LOCATION '210'.

6. C O N S O L E S W I T C H S E T T I N G S
****

A. REFER TO THE INDIVIDUAL TEST DESCRIPTIONS FOR APPLICABLE 'SWR' SETTINGS.

7. C O N T R O L S W I T C H E S (T E L E T Y P E)
****

A. CONTROL <C>
TYPING '↑C' (OBTAINED VIA TYPING THE 'CNTR' & 'C' KEYS SIMULTAEOUSLY) AT ANY TIME ENABLES THE PROGRAM TO RETURN TO THE KEYBOARD MONITOR.

B. CONTROL <A>
TYPING '↑A' (OBTAINED VIA TYPING THE 'CNTRL' AND 'A' KEYS SIMULTANEOUSLY) AT ANY TIME CAUSES A RESTART OF THE CURRENT TEST BEING RUN.

8. P R O G R A M T E S T T A B L E & D I R E C T O R Y
****

TEST NAME	TEST NO.	DESCRIPTION
VT LOGIC	00	9
VT CHARACTER	01	10
VT FIELD MODE	02	11
VT CSR PRESET	03	12
VT END OF LINE	04	13
VT END OF SCREEN	05	14
VT BLANK CONTROL	06	15
VT ALIGNMENT	07	16
VT FOCUS	10	17
VT WORST CASE	11	18
VT CURSOR CONTROL	12	19
VT ODD ADDRESS	13	20
VT RUN-ALL	14	21
ASCII KBD LOGIC	15	22
ASCII KBD SWITCH & LIGHT	16	23
ASCII KBD CHARACTER SET	17	24
ASCII KBD REPEATIBILITY	20	25
VT/KBD SYSTEM TEST	21	26

9. V T L O G I C T E S T (0)

A. TEST DESCRIPTION

THE 'VT' LOGIC TEST CONSISTS OF '28' SUBTESTS WHICH EXERCISE AND DIAGNOSE THE 'VT' LOGIC. EACH SUBTEST IS LOOPED '100' TIMES TO TEST LOGIC RELIABILITY. THESE TESTS ARE RUN AS A UNIT WHEN THE 'VT' LOGIC TEST IS SELECTED OR MAY BE SELECTED INDIVIDUALLY BY THE FK/VT SUBTEST SELECTOR (REFER TO SECTION 27). AT THE END OF EACH SUBTEST THE 'AUDIO BEEP' IS SOUNDED TO INDICATE A NEW SUBTEST IS BEING EXECUTED.

B. LOGIC ERRORS

THERE ARE TWO ERROR REPORTING SCHEMES USED FOR REPORTING 'VT' LOGIC ERRORS, (1) WITH TELETYPE AND (2) WITH PROGRAM HALTS.

1. ON ENCOUNTERING A LOGIC ERROR (ALL DATA SWITCHES DOWN) THE FAILING SUBTEST NUMBER ERROR ADDRESS,AND CONTENTS OF THE 'VT' REGISTERS ARE TYPED OUT. THERE ARE TWO ERROR FORMATS USED, (A) NORMAL 'VT' LOGIC ERROR OR (B) 'VT' SHIFT LOGIC ERROR.

(A). NORMAL ERROR FORMAT

TST NO.	PASS	MA	CSR	MAR
A	B	C	D	E

WHERE:
A= FAILING SUBTEST NO.
B= PASS ON WHICH ERROR OCCURRED.
C= ERROR ADDRESS (MEMORY ADDRESS)
D= CONTENTS OF CONTROL & STATUS ADDRESS REGISTER
E= CONTENTS OF MAINTENANCE ADDRESS REGISTER*

*'SWR' BITS '2-0' MAY BE SET TO SELECT ANY ONE OF THE '8' ADDRESSES THAT CAN BE READ BACK VIA THE MAINTENANCE REGISTER.

'SWR' 2-0	ADDRESS DATA SELECTED
000	COMMAND AND STATUS REGISTER
001	DATA ADDRESS REGISTER
010	SHIFT REG. INPUT DATA(EVEN ROW)
011	SHIFT REG. OUTPUT DATA(EVEN ROW)

```
                        100         CURSOR ADDRESS REGISTER
                        101         STARTING ADDRESS REGISTER
                        110         SHIFT REG. INPUT DATA(ODD ROW)
                        111         SHIFT REG. OUTPUT DATA(ODD ROW)


                (B).  SHIFT LOGIC ERROR FORMAT
                      ------------------------

                      TST NO.    MA      SHIFT    IN/OUT     EXPT'D     RECV'D
                         A       B         C        D          E          F

                      WHERE:
                      A= FAILING SUBTEST NO.
                      B= ERROR ADDRESS (MEMORY ADDRESS).
                      C= THE SHIFT IN OCTAL ON WHICH ERROR OCCURRED (1-32).
                      D= DIRECTION OF DATA SHIFT
                      E= EXPECTED DATA (SHIFTED IN FROM SHIFT TABLE).
                      F= RECEIVED DATA (CONTENTS OF 'MAR').

        2.  ON ENCOUNTERING A LOGIC ERROR (WITH DATA SW15 UP)
            THE PROGRAM WILL SOUND THE AUDIO BEEP AND LOAD THE
            INTERNAL REGISTERS WITH ERROR DATA AND HALT. THESE
            REGISTERS ARE SET UP IN ONE OF TWO WAYS: (A) NORMAL
            LOGIC ERROR AND (B) SHIFT LOGIC ERROR.

                (A).  NORMAL LOGIC ERROR
                      ------------------

                      R0= FAILING SUBTEST NO.
                      R1= PASS ON WHICH ERROR OCCURRED
                      R2= ERROR ADDRESS
                      R3= CONTENTS OF CONTROL & STATUS ADDRESS REG.
                      R4= CONTENTS OF MAINTENANCE ADDRESS REG *(REFER ABOVE).

                (B).  SHIFT LOGIC ERROR
                      -----------------

                      R0= FAILING SUBTEST NO.
                      R1= PASS ON WHICH ERROR OCCURED
                      R2= ERROR ADDRESS
                      R3= THE SHIFT IN OCTAL ON WHICH ERROR OCCURRED (1-100).
                      R4= EXPECTED DATA (SHIFTED IN FROM THE SHIFT TABLE).
                      R5= ACTUAL CONTENTS OF MAINTENANCE ADDRESS REG.

    C.  CONSOLE SWITCH SETTINGS     FUNCTION
        ------------------------    --------
        SW11=0                      NORMAL RUN [100 PASSES/TEST]
        SW11=1                      SUPPRESS SUBTEST ITERATIONS

        SW12=0                      CONTINUE SHIFTING ON SHIFT ERROR
        SW12=1                      ABORT SHIFTING ON SHIFT ERROR

        SW13=0                      PRINT ERROR MESSAGES
        SW13=1                      INHIBIT ERROR TYPEOUT
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                        SW14=0                  NORMAL RUN
                        SW14=1                  LOOP ON CURRENT SUBTEST

                        SW15=0                  CONTINUE ON ERROR
                        SW15=1                  HALT ON ERROR



10.     V T  ' C H A R A C T E R  S E T '  T E S T (1)
        ********************************************

        A.  TEST DESCRIPTION
            ----------------

            THIS TEST DISPLAYS THE 'VT' CHARACTER SET IN NUMERICAL
            ORDER.  THE CHARACTER SET IS REPEATED UNTIL THE ENTIRE
            SCREEN IS FILLED.  THE TEST STARTS DISPLAYING A BLANK
            SCREEN.  AS EACH CHARACTER IS CREATED IT IS DISPLAYED FOR
            APPROXIMATELY ONE SECOND AND THEN THE NEXT CHARACTER IS
            DISPLAYED.  THE DISPLAY BUFFER IS SET UP SO THAT EACH LINE
            (EXCEPT THE LAST LINE) IS TERMINATED WITH EITHER VISIBLE 'END
            OF LINE' OR VISIBLE 'END OF PARAGRAPH'. THE LAST LINE IS
            TERMINATED WITH 'VISIBLE END OF SCREEN'.  WHEN THE ENTIRE
            SCREEN HAS BEEN FILLED THE TEST IS RESTARTED.

            NOTE: THE CHARACTER SET MAY CONTAIN BLANK SPACES. THESE ARE
            CODES RESERVED FOR FUTURE SPECIAL TYPESETTING CHARACTERS.

        B.  CONSOLE SWITCH SETTINGS     FUNCTION
            -----------------------     --------
            SW11=0                      NORMAL RUN
            SW11=1                      INHIBIT DISPLAY DELAY

            SW12=0                      NORMAL RUN
            SW12=1                      ADVANCE TO NEXT*

            SW14=0                      NORMAL RUN
            SW14=1                      HOLD ON CURRENT CHARACTER

            *THIS ADVANCE WILL ONLY TAKE PLACE AFTER THE CURRENT
             TEST HAS BEEN COMPLETED.


11.     V T  ' F I E L D  C O N T R O L '  T E S T (2)
        **********************************************

        A.  TEST DESCRIPTION
            ----------------

            THIS TEST DISPLAYS THE 'VT' CHARACTER SET USING ALL FIVE
            'FIELD CONTROL' MODES: NORMAL, BLINK, BOLD, BLANK AND
            UNDERLINE.  THE TEST BREAKS THE CHARACTER SET INTO THREE
```

PARTS. EACH PART IS THEN DISPLAYED IN ALL '5' MODES.
THIS ENABLES THE USER TO VIEW EACH CHARACTER IN A STRAIGHT
LINE IN EVERY MODE.

B. CONSOLE SWITCH SETTING FUNCTION

SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT TEST

12. VT 'CSR PRESET' TEST (3)

A. TEST DESCRIPTION

THIS TEST CONSISTS OF FOUR (4) PARTS. EACH PART DISPLAYS AN ENTIRE SCREEN OF THE 'VT' CHARACTER SET USING A 'CSR' PRESET FUNCTION. THE SELECTED PRESET FUNCTIONS IN ORDER ARE: BOLD, BLINK, BLANK, & UNDERLINE. AN IDENTIFYING MESSAGE WILL PRECEDE EACH PART.

B. CONSOLE SWITCH SETTINGS FUNCTION

SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT TEST*
SW14=0	NORMAL RUN
SW14=1	HALT ON CURRENT PRESET

13. VT 'END OF LINE' TEST (4)

A. TEST DESCRIPTION

THIS TESTS THAT THE 'VISIBLE END OF LINE' CHARACTER CAN BE PLACED IN ANY OF THE '1024' CHARACTER POSITIONS ON THE SCREEN. THIS IS DONE BY STARTING ALL '16' LINES WITH A VISIBLE END OF LINE CHARACTER AND THEN INCREMENTING THESE CHARACTERS ACROSS THE SCREEN. AS THE 'EOL' CHARACTER IS MOVED AN ASTERISK IS DISPLAYED IN ITS PLACE.

B. CONSOLE SWITCH SETTINGS FUNCTION

SW11=0	NORMAL RUN
SW11=1	INHIBIT DISPLAY DELAY
SW12=0	NORMAL RUN

```
                        SW12=1                      ADVANCE TO NEXT TEST*

                        SW14=0                      NORMAL RUN
                        SW14=1                      HOLD CURRENT 'EOL' POSITION

                    * THIS ADVANCE WILL ONLY TAKE PLACE AFTER THE CURRENT TEST HAS
                      BEEN COMPLETED.



14.     V T  ' E N D  O F  S C R E E N '  T E S T (5)
        ********************************************

        A.  TEST DESCRIPTION
            ----------------

            THIS TEST TESTS THAT THE 'VISIBLE END OF SCREEN' CHARACTER
            CAN BE PLACED IN ANY OF THE '1024' CHARACTER POSITIONS ON
            THE SCREEN. THIS IS DONE BY FIRST PRE-LOADING THE DATA
            BUFFER WITH QUESTION MARKS (THESE WILL BE DISPLAYED IF
            THE EOS IS SKIPPED). THE 'EOS' CHARACTER IS THEN INCREMENTED
            THRU THIS BUFFER REPLACING THESE QUESTION MARKS BEHIND
            THE 'EOS' WITH DOTS.

        B.  CONSOLE SWITCH SETTINGS     FUNCTION
            -----------------------     --------
            SW11=0                      NORMAL RUN
            SW11=1                      INHIBIT DISPLAY DELAY

            SW12=0                      NORMAL RUN
            SW12=I                      ADVANCE TO NEXT TEST

            SW14=0                      NORMAL RUN
            SW14=1                      HOLD CURRENT 'EOS' POSITION


15.     V T  ' B L A N K  C O N T R O L '  T E S T (6)
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        A.  TEST DESCRIPTION
            ----------------

            THIS TEST TESTS THE 'BLANK' FIELD CONTROL LOGIC BY
            INCREMENTING THE 'BLANK' CONTROL CHARACTER THRU A BUFFER
            OF ASTERISK CHARACTERS.  THE TEST STARTS USING THE BLANK
            CONTROL CHARACTER AT THE START OF THE 'VT' BUFFER.  THE
            SCREEN SHOULD START OFF BLANK AND AS THE BLANK CONTROL
            CHARACTER IS INCREMENTED THRU THE 'VT' BUFFER ASTERISKS
            WILL START APPEARING ON THE SCREEN.  THE TEST WILL RESTART
            AFTER THE ENTIRE SCREEN HAS BEEN FILLED.
```

B. CONSOLE SWITCH SETTINGS — FUNCTION

CONSOLE SWITCH SETTINGS	FUNCTION
SW11=0	NORMAL RUN
SW11=1	INHIBIT DISPLAY DELAY
SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT TEST
SW14=0	NORMAL RUN
SW14=1	HOLD CURRENT BLANK POSITION

16. VT 'ALIGNMENT' TEST(7)

A. TEST DESCRIPTION

THIS TEST DISPLAYS A FULL SCREEN OF THE CHARACTER 'E' TO ENABLE A VISUAL ALIGNMENT OF THE 'VT'.

B. CONSOLE SWITCH SETTINGS — FUNCTION

CONSOLE SWITCH SETTINGS	FUNCTION
SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT TEST

17. VT 'FOCUS' TEST(10)

A. TEST DESCRIPTION

THIS TEST DISPLAYS A FULL SCREEN OF ALTERNATE ASTERISKS AND ONE'S TO ENABLE A VISUAL FOCUS OF THE 'VT'.

B. CONSOLE SWITCH SETTINGS — FUNCTION

CONSOLE SWITCH SETTINGS	FUNCTION
SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT TEST

18. VT 'WORST CASE' TEST(11)

A. TEST DESCRIPTION

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THIS TEST DISPLAYS A FULL SCREEN OF THE WORST CASE CHARACTER PATTERN '125 & 252'.

NOTE: CODE 125 WILL DISPLAY A "U" AND CODE 252 WILL DISPLAY EITHER A BLANK OR A SPECIAL TYPESETTING CHARACTER, THIS BEING DEPENDENT ON THE CHARACTER SET.

B. CONSOLE SWITCH SETTING — FUNCTION

CONSOLE SWITCH SETTING	FUNCTION
SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT TEST

19. VT 'C U R S O R C O N T R O L' T E S T (12)

A. TEST DESCRIPTION

THIS TEST TESTS THAT THE CURSOR CONTROL CHARACTER CAN BE PLACED IN ANY OF THE '1024' CHARACTER POSITIONS ON THE SCREEN. THIS IS DONE BY DISPLAYING A 'CURSOR EOS' AND INCREMENTING IT THRU A PRE-LOADED BUFFER OF QUESTION MARKS. AS THE CURSOR CONTROL CHARACTER IS MOVED ALONG ASTERISKS ARE FILLED IN BEHIND THE CURSOR CHARACTER. WHEN THE TEST IS COMPLETE THE ENTIRE SCREEN SHOULD BE FILLED WITH ASTERISKS AND WITH NO QUESTION MARKS VISIBLE.

B. CONSOLE SWITCH SETTINGS — FUNCTION

CONSOLE SWITCH SETTINGS	FUNCTION
SW11=0	NORMAL RUN
SW11=1	INHIBIT DISPLAY DELAY
SW12=0	NORMAL RUN
SW12=1	ADVANCE TO NEXT*
SW14=0	NORMAL RUN
SW14=1	HOLD ON CURRENT CHARACTER

* THIS ADVANCE WILL ONLY TAKE PLACE AFTER THE CURRENT TEST HAS BEEN COMPLETED.

20. V T 'O D D A D R E S S' T E S T (13)

A. TEST DESCRIPTION

THIS TEST SIMPLY DISPLAYS A MESSAGE WHICH IS LOADED
FROM AN ODD STARTING ADDRESS. THE MESSAGE SHOULD
SAY: THIS MESSAGE IS BEING LOADED FROM AN ODD
STARTING ADDRESS. HOW DOES IT LOOK?

21. VT 'RUNALL' TEST (14)

A. TEST DESCRIPTION

THIS TEST ENABLES TESTS '0-13,15' TO BE RUN IN ORDER.
IF A '4' WAS SELECTED AS THE TUBE NUMBER, THESE TESTS
WILL BE RUN SEQUENTIALLY ON ALL AVAILABLE TUBES.

22. ASCII KBD 'LOGIC' TEST (15)

A. TEST DESCRIPTION

THE 'KBD' LOGIC TEST CONSISTS OF '19' SUBTESTS WHICH
EXERCISE AND DIAGNOSE THE 'KBD' LOGIC. EACH SUBTEST
IS LOOPED '100' TIMES TO TEST LOGIC RELIABILITY.
THESE TESTS ARE RUN AS A UNIT WHEN THE 'KBD' LOGIC TEST
IS SELECTED BUT THEY MAY ALSO BE SELECTED INDIVIDUALLY
BY THE 'FK/VT' SUBTEST SELECTOR (REFER TO SECTION 27).

THE 'KBD' LOGIC TEST DOES 'NOT' CHECKOUT THE LIGHT AND
SWITCH LOGIC. THIS LOGIC IS CHECKED BY THE 'KBD FUNCTION
LIGHT & SWITCH TEST' (SECTION 23).

B. RESTRICTIONS

THE 'VT' LOGIC MUST BE OPERATIONAL AS REQUESTS FOR
'KBD' KEYBOARD INPUTS ARE REQUESTED BY MESSAGES DISPLAYED
ON THE 'VT'. CARE SHOULD BE TAKEN THAT ONLY ONE KEY BE
STRUCK EACH TIME THIS REQUEST IS MADE TO AVOID FALSE
ERROR INDICATIONS.

C. LOGIC ERRORS

THERE ARE TWO ERROR REPORTING SCHEMES USED FOR REPORTING
'KBD' LOGIC ERRORS, (1) WITH TELETYPE AND (2) WITH PROGRAM
HALTS.

1. ON ENCOUNTERING A LOGIC ERROR (ALL DATA SWITCHES DOWN)
    THE FAILING SUBTEST NO., THE ERROR ADDRESS AND
    CONTENTS OF THE 'KBD' REGISTERS ARE TYPED OUT.

A. ERROR FORMAT

TST NO. PASS MA CSR DATA
A B C D E

WHERE:
A= FAILING SUBTEST NO.
B= PASS ON WHICH ERROR OCCURRED.
C= ERROR ADDRESS (MEMORY ADDRESS)
D= CONTENTS OF CONTROL & STATUS ADDRESS REGISTER
E= CONTENTS OF DATA ADDRESS REGISTER.

2. ON ENCOUNTERING A LOGIC ERROR (DATA SW15 UP)
THE PROGRAM LOADS THE INTERNAL REGISTERS WITH
THE FOLLOWING ERROR DATA AND HALTS.

R0= FAILING SUBTEST NO.
R1= PASS ON WHICH ERROR OCCURRED.
R2= FAILING ERROR ADDRESS
R3= CONTENTS OF CONTROL & STATUS REGISTER ADDRESS
R4= CONTENTS OF THE DATA ADDRESS REGISTER.

D. CONSOLE SWITCH SETTINGS FUNCTION

CONSOLE SWITCH SETTINGS	FUNCTION
SW10=0	REQUEST KEYWARD INPUT
SW10=1	INHIBIT KEYWARD INPUT REQUEST
SW11=0	NORMAL RUN [100 PASSES/TEST]
SW11=1	SUPPRESS SUBTEST ITERATIONS
SW13=0	PRINT ERROR MESSAGES
SW13=1	SUPPRESS ERROR MESSAGES
SW14=0	NORMAL RUN
SW14=1	LOOP ON CURRENT SUBTEST
SW15=0	CONTINUE ON ERROR
SW15=1	HALT ON ERROR

23. A S C I I K B D ' L I G H T & S W I T C H ' T E S T (16)

****

A. TEST DESCRIPTION

THIS TEST IS USED TO CHECK OUT THE KBD FUNCTION LIGHT AND

SWITCH LOGIC. THIS IS AN OPERATOR INTERVENTION TEST
WHICH MONITORS THE FUNCTION KEYS. WHEN A FUNCTION KEY OR
KEYS ARE HELD DOWN ITS CORRESPONDING FUNCTION LIGHT IS LIT.
IF THE KEY IS HELD DOWN A SECOND TIME THE CORRESPONDING FUNCTION
LITE IS TURNED OFF. IT SHOULD BE A NOTED THAT THESE ARE
INTERVAL SWITCHES AND THE SIGNAL LEVEL WHICH INDICATES THAT
A KEY IS PRESSED WILL REMAIN TRUE FOR THE LENGTH OF TIME
THE KEY IS HELD DOWN. SINCE THERE IS NO WAY FOR THE
PROGRAM TO TELL IF A KEY IS BEING HELD DOWN OR IF IT HAS
BEEN STRUCK A SECOND TIME THE LIGHT DATA WILL BE COMPLI-
MENTED EVERY TIME THE SIGNAL IS PRESENT. TO ALLEVIATE THIS
PROBLEM THE PROGRAM ONLY READS THE SWITCHES EVERY '512'
INTERVAL TIME FLAGS. SO IF A SWITCH IS HELD DOWN IT
WILL BE TURNED ON AT THE BEGINNING OF THIS COUNT AND TURNED
OFF AT THE END OF THE COUNT IF THE SWITCH REMAINS DOWN.
TO SWITCH TO TESTING THE NEXT TUBE (IF RUNALL IS SELECTED)
TYPE ↑C ON THE TUBE BEING TESTED.

.24. A S C I I K B D 'C H A R A C T E R S E T' T E S T (17)

****

A. TEST DESCRIPTION

THIS TEST IS ALSO AN OPERATOR INTERVENTION TEST. IT IS USED
TO VERIFY THAT ALL CHARACTERS CAN BE TRANSMITTED BY THE
ASCII KEYBOARD. THE TEST REQUESTS THREE COMPLETE PASSES
(LOWER CASE, UPPER CASE AND CONTROL) TO BE TYPED IN BY
THE OPERATOR. A MESSAGE IS DISPLAYED ON THE 'VT' FOR THE
CASE TO BE INPUTED. EACH PASS MUST START IN THE UPPER LEFT
HAND CORNER OF THE KEYBOARD AND END WITH SPACE. AS EACH
CHARACTER IS TRANSMITTED FROM THE KEYBOARD IT IS VERIFIED
AGAINST A CHARACTER BUFFER AND DISPLAYED ON THE 'VT'.

B. ERRORS

IF THE TRANSMITTED CHARACTER CODE DOESN'T MATCH THE
EXPECTED CHARACTER CODE THE AUDIO 'BEEP' IS SOUNDED AND
THE RECEIVED CHARACTER IS DISPLAYED IN 'BOLD-UNDERLINED'.

C. CONSOLE SWITCH SETTINGS

CONSOLE SWITCH SETTINGS	FUNCTION
SW14=0	NORMAL RUN
SW14=1	LOOP ON THE CURRENT CHARACTER
SW15=0	LOOP UNTIL CORRECT CODE RECEIVED
SW15=1	SKIP BAD CHARACTER

NOTE: FOR PROPER OPERATION SW15 SHOULD BE RE-SET TO '0'
AS SOON AS THE NEXT CHARACTER HAS BEEN INPUTED.

25. A S C I I K B D 'R E P E A T I B I L I T Y' T E S T (20)

****

A. TEST DESCRIPTION

THIS TEST IS ALSO AN OPERATOR INTERVENTION TEST. THE TEST HAS TWO FUNCTIONS. IT CAN BE USED AS A BACKUP FOR THE 'CHARACTER SET' TEST TO TEST ANYONE SELECTED CHARACTER CODE OR, SECOND, IT CAN BE USED TO TEST KEYBOARD REPEATIBILITY BETWEEN ANY TWO SELECTED CHARACTER CODES.

B. STARTING SEQUENCE

THE TEST VERIFIES UP TO TWO CHARACTERS RECEIVED FROM THE KEYBOARD AGAINST THE CHARACTER CODE(S) LOADED BY THE OPERATOR.
THESE CHARACTER CODES ARE LOADED ONE OF TWO WAY, (1) VIA TELETYPE OR (2) VIA 'SWR' ON PROGRAM HALTS.

(25. CONT)

1. TYPE: NNN[,NNN] (CR) (I.E. 101,141 UPPER CASE A AND LOWER A)

   WHERE:
   NNN IS THE CODE(S) TO BE VERIFIED.

2. WHEN TEST IS SELECTED THE PROGRAM WILL HALT.
   LOAD THE CHARACTER CODE TO BE VERIFIED IN THE 'SWR'
   AND PRESS CONTINUE. A SECOND HALT WILL OCCUR.
   IF TWO CHARACTERS ARE TO BE VERIFIED
   LOAD THE CODE OF THE SECOND CHARACTER IN THE
   'SWR', OTHERWISE JUST PRESS CONTINUE.

C. ERRORS

IF THE TRANSMITTED CHARACTER CODE DOESN'T MATCH THE EXPECTED CHARACTER CODE THE AUDIO 'BEEP' IS SOUNDED AND THE RECEIVED CHARACTER IS DISPLAYED IN 'BOLD-UNDERLINED'.

26. V T 2 0 S Y S T E M T E S T (21)

****

A. TEST DESCRIPTION

THIS TEST IS DESIGNED TO EXERCISE THE VT20 IN A SYSTEM
TYPE OF ENVIRONMENT. THE TEST UTILIZES THE ENTIRE VT20
SYSTEM (ALL TUBES) IN CONJUNCTION WITH A HOST COMPUTER.
THE HOST COMPUTER MAY BE EITHER A PDP-11 OR A PDP-8. THE
HOST IS TO BE CABLED VIA SERIAL LINE INTERFACE TO THE VT20
SYSTEM. ONE INTERFACE LINE IS REQUIRED FOR EACH UNIT.
THE HOST DIAGNOSTIC, EITHER MD-11-DZVTE(FOR A PDP-11
HOST W/DL11'S), MD-11-DZVTG (FOR A PDP-11 HOST W/DH11'S)
OR MD-08-DIVTB (FOR A PDP-8 HOST W/KL8J'S) MUST BE LOADED
AND RUNNING BEFORE ATTEMPTING TO TRANSFER DATA VIA THIS TEST.

WHEN TEST 21 IS SELECTED, A MESSAGE REMINDER FOR SETTING UP
THE HOST DIAGNOSTIC WILL BE DISPLAYED. THIS MESSAGE
WILL THEN MOMENTARILY BE REPLACED WITH A TUBE STATUS
HEADER. IN THIS HEADER WILL BE DISPLAYED: NO. OF CHARACTERS
ON THE SCREEN, NO. OF CHARACTERS RECEIVED FROM THE
HOST, NO. OF BLOCKS TRANSFERRED AND NO. OF ERRORS ENCOUNTERED.
THIS MESSAGE ALSO INDICATES THAT THE TEST IS READY.

AS CHARACTERS ARE RECEIVED FROM THE ASCII KEYBOARD, THEY
THEY ARE TESTED FOR BEING PROGRAM CONTROL CHARACTERS,
AND IF NOT, THEY ARE TREATED AS DATA AND DISPLAYED. THE
PROGRAM WILL ACCEPT UP TO 384 DATA CHARACTERS OR 6
COMPLETE LINES.

B. DATA CREATION

DATA CAN BE AUTOMATICALLY GENERATED BY TYPING EITHER A (↑A)
OR A (↑W). THE (↑A) WILL ENABLE FOR A INCREMENTAL CHARACTER
SET OF THE CHARACTERS '40-177' TO BE CREATED UNTIL THE
SCREEN BUFFER IS FULL. A (↑W) WILL ENABLE FOR A WORST
CASE PATTERN OF '125-252' TO BE PRODUCED UNTIL THE SCREEN
BUFFER IS FILLED.

C. TRANSMITTING MODES

THERE ARE TWO MODES USED TO TRANSMIT DATA TO THE HOST
COMPUTER: SINGLE TRANSFER OR CONTINCUS TRANSFER.

A SINGLE TRANSFER IS INITIATED BY TYPING 'ALTMODE' AFTER
THE DATA HAS BEEN INPUTTED. ON RECIVING THE ALTMODE
THE INPUTED DATA IS TRANSFERED TO THE HOST COMPUTER.
THE DATA IS BUFFERED THERE AND TRANSMITTED BACK TO THE VT20
ON RECEIVING THE END OF PARAGRAPH. AS THE DATA IS
RECEIVED IT IS DISPLAYED BELOW THE ORIGINAL DATA.
AFTER EXAMINING THE DATA THE OPERATOR MAY TYPE '↑C' TO

CLEAR THE SCREEN AND RESTART THE TEST OR START A CONTIN-
OUS TRANSFER.

A CONTINOUS TRANSFER IS INITIATED AFTER THE DATA HAS BEEN
INPUTTED VIA TYPING A '↑T'. THIS MODE OPERATES IN THE
SAME MANNER AS A SINGLE TRANSFER EXCEPT UPON RECEVING THE
DATA BACK FROM THE HOST COMPUTER IT IS AUTOMATICALLY RE-
TRANSMITTED. TYPING A SECOND '↑T' WILL STOP THE CONTINOUS
TRANSFER AFTER THE CURRENT TRANSFER HAS BEEN COMPLETED.

THIS DATA IS SENT IN THE FORMAT OF: 4 NULL CHARACTERS
(000), A START CODE CHARACTER (377), DATA (ORIGINATED
BY THE USER), AND A END OF PARAGRAPH CHARACTER (14).
ON RECEIPT OF THE 'EOP' (END OF PARAGRAPH) CHARACTER,
THE HOST COMPUTER WILL TRANSMIT THE DATA, IN THE FORMAT
IT WAS RECEIVED, BACK TO THE VT20. ON RECEIPT OF THE START
CODE CHARACTER (377), THE VT20 DISPLAYS A UP-ARROW(↑) TO INDICATE
THE DATA HAS RETURNED.

EACH CHARACTER IS VERIFIED AS IT IS RECEIVED AGAINST
CORRESPONDING CHARACTER TRANSMITTED. IF A RECEIVED
CHARACTER DOESN'T MATCH THE CORRESPONDING TRANSMITTED
CHARACTER. IT IS DISPLAYED AS 'BOLD-UNDERLINED'.
THIS ERROR WOULD ALSO BE RECORDED IN THE ERROR HEADER.

ERROR CHECKING CAN BE INHIBITED BY SETTING DATA 'SW00' TO
A '1'(UP). ALL DATA THEN RECEIVED FROM THE HOST COMPUTER
WILL SIMPLY BE DISPLAYED. THIS SWITCH SHOULD ONLY
BE SET WHEN THE HOST COMPUTER IS ORGINATING DATA USING
THE SEND MODE (REFER TO THE HOST DIAGNOSTIC).

THERE IS ALSO ANOTHER OPTION AVAILABLE TO THE USER
RUNNING WITH MD-11-DZVTG.

SW00 & SW01 CAN BE SET. THIS WILL ENABLE THE DATA
BEING RECEIVED FROM THE HOST WILL BE DISPLAYED IN
OCTAL FORM. THE DATA WILL ALSO BE ECHOED BACK TO THE
HOST. THIS OPTION IS USED WHEN RUNNING THE HOST VERIFY
TEST. REFER TO MD-11-DZVTG FOR FULL DETAILS OF THE TEST.

IF A TRANSFER IS INITIATED AND FOR ONE REASON OR ANOTHER IT
FAILS TO RETURN BACK TO THE VT20, THE TEST WILL APP-
EAR HUNG SINCE NO KEYBOARD COMMANDS WILL BE RECOGNIZED. IN THIS
CASE AND ONLY IN THIS CASE TYPE '↑E' TO ESCAPE THE TRANSFER
MODE AND RESTART.

IF '↑E' IS TYPED IN THE MIDDLE OF A TRANSFER, IT
WILL CAUSE MULTIPLE RECEIVER ERRORS.

C. CONSOLE SWITCH SETTINGS — FUNCTION

CONSOLE SWITCH SETTINGS	FUNCTION
SW15=0	*CONTINUE TRNANSFERING ON ERROR
SW15=1	HALT TRANSFERING ON ERROR
SW00=0	VERIFY RECEIVER DATA
SW00=1	**INHIBIT VERIFING RECEIVER DATA

SW00 & SW01=1 ***DISPLAY RECEIVED CHARACTER IN OCTAL FORM AND ECHO IT BACK TO THE HOST.

* SW15 APPLIES TO CONTINOUS TRANSFERS ONLY AND THE HALT WILL OCCUR AT THE END OF THE CURRENT TRANSFER.
** THIS SWITCH MUST BE SET IF THE HOST IS TRANSMITTING DATA USING THE SEND MODE.
*** THIS OPTION SHOULD ONLY BE USED WHEN RUNNING THE VERIFY TEST OF MD-11-DZVTG.

(26. CONT)

D. ASCII KRB CONTROL SWITCHES

KEY	FUNCTION
RUBOUT	DELETE LAST CHARACTER.
ALTMODE	INITIATE SINGLE TRANSFER.
↑A (CTRL A)	GENERATE INCREMENTAL CHARACTER SET.
↑T (CTRL T)	ENABLE/DISABLE CONTINUOUS TRANS.
↑W	GENERATE WORST CASE CHARACTER PATTERN
↑C (CTRL C)	CLEAR SCREEN AND RESTART
↑E (CTRL E)	*ESCAPE AND RESTART

* USE WITH CAUTION AS NOTED ABOVE.

E. ERRORS

TO INDICATE TRANSMITTER, RECEIVER AND KEYBOARD ERRORS THE FOLLOWING CHARACTERS WILL BE DISPLAYED USING THE BLINK MODE.

CHARACTER	MEANING
K	ASCII KBD ERROR FLAG SET (OVERRUN ERROR)
T	ILLEGAL TRANSMITTER INTERRUPT
R	ILLEGAL RECEIVER INTERRUPT
O	DL11 RECEIVER 'OVERRUN' ERROR
F	DL11 RECEIVER 'FRAMING' ERROR
P	DL11 RECEIVER 'PARITY' ERROR

27. V T / K B D S U B T E S T S E L E C T O R (22)

A. TEST DESCRIPTION

THIS TEST IS DESIGNED TO ALLOW THE OPERATOR TO LOOP
ON ANY SELECTED 'KBD' OR 'VT' LOGIC SUBTEST WITHOUT
RUNNING THE ENTIRE LOGIC TEST

B. STARTING SEQUENCE

THIS TEST ACCEPTS AN OCTAL ADDRESS OF A 'SUBTEST' TO BE
EXECUTED. THE PROGRAM THEN SETS UP THE PROPER PARAMETERS
AND EXECUTES THE SELECTED 'SUBTEST'. THE SUBTEST ADDRESS
IS LOADED ONE OF TWO WAYS, (1) VIA TELETYPE OR (2) VIA
'SWR' ON PROGRAM HALT.

1. WHEN SELECTED THE PROGRAM WILL TYPE THE MESSAGE 'TEST ADDR.?'.
   THE OPERATOR SHOULD THEN TYPE IN THE 'SCOPE ADDRESS' OF THE
   TEST TO BE EXECUTED.

2. WHEN THE TEST IS SELECTED THE PROGRAM WILL HALT. LOAD
   THE ADDRESS OF THE TEST TO BE EXECUTED INTO THE
   'SWR' AND PRESS CONTINUE.

C. RESTRICTIONS

DATA "SW11" MUST BE DOWN [0] TO INHIBIT THE PROGRAM FROM
ESCAPING THE SELECTED TEST AND CONTINUING THRU THE LOGIC
TEST.

D. ERRORS

REFER TO THE RESPECTIVE 'KBD' OR 'VT' ERROR SECTION.

29. EXECUTION TIMES

TEST	PASS TIME	NOTES
0	7.5 MINS	
1	4 MINS	
2	N/A	*
3	30 SECS	
4	25 SECS	
5	6 MINS	
6	6 MINS	
7	N/A	*
10	N/A	*
11	N/A	*
12	6 MINS	
13	N/A	*
14	TOTAL OF ABOVE + TEST 15	

```
                                        15      75 SECS
                                        16      N/A
                                        17      N/A
                                        20      N/A
                                        21      N/A

                                        * IN RUN-ALL (TEST 14), THESE RUN FOR 3 SECS EACH.


                                30.     L I S T I N G
                                        *************

                                        %

                                .TITLE  VT20 SYSTEM DIAGNOSTIC TEST PROGRAM
                                ;MAINDEC-11-DBVTA-C-D
                                ;COPYRIGHT SEPTEMBER 5, 1974,1975
                                ;REVISED: APRIL 25, 1975
                                ;DIGITAL EQUIPMENT CORP. MAYNARD MASS. 01754
                                ;PROGRAMMER: EARL L. BOUSE/ED BADGER

                                ;SWITCH REGISTER DEFINITIONS AND FUNCTIONS:

100000                          SW15=100000                     ;=1, HALT ON ERROR
040000                          SW14=40000                      ;=1, LOOP ON CURRENT TEST
020000                          SW13=20000                      ;=1, SUPPRESS ERROR TYPEOUT
010000                          SW12=10000                      ;=1, HALT SHIFTING ON SHIFT ERROR.
004000                          SW11=4000                       ;=1, SUPPRESS 'SUBPROGRAM' ITERATIONS
002000                          SW10=2000                       ;=1, INHIBIT ASCII KRB MANUAL INTERVENTION
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

                                ;REGISTER DEFINITIONS

000000                          R0=%0
000001                          R1=%1
000002                          R2=%2
000003                          R3=%3
000004                          R4=%4
000005                          R5=%5
000006                          SP=%6
000007                          PC=%7

                                ;INSTRUCTIONS DEFINITIONS

000004                          FKCSR4=%4
000004                          VTCSR4=%4
000005                          VTMAR5=%5
```

```
1224            005726                  POP1SP=5726
1225            005746                  PUSH1SP=5746
1226            024646                  PUSH2SP=24646
1227            022626                  POP2SP=22626
1228            000240                  NOP=240
1229            000002                  X=2
1230            000002                  Y=2
1231
1232                                    ;LOAD TRAP CATCHER INTO LOC'S 0-1000
1233            000000                          .=0
1234                                    .REPT   200
1235                                            .+2
1236                                            4
1237                                    .ENDR
1238            000020                          .=20
1239  000020    016456                          ERTRAP                  ;ERROR TRAP REPORTER ROUTINE
1240            000024                          .=24
1241  000024    016014                          PWRFAL                  ;POWER FAIL HANDLER
1242  000026    000340                          340
1243            000030                          .=30
1244  000030    001200                          EMTSRV                  ;EMT TRAP, EMT DISPATCH SERVICE
1245  000032    000340                          340
1246  000034    017442                          FKERR                   ;TRAP TRAP, LOGIC ERROR TRAP
1247  000036    000340                          340
1248            000060                          .=60
1249  000060    014350                          XTTYIN                  ;TELEPRINTER KEYBOARD ROUTINE
1250            000200                          .=200
1251  000200    000137  001624                  JMP     INITTY          ;PROGRAM STARTING ADDR. IF TTY AVAILABLE.
1252  000204    000137  001634                  JMP     NOTTY           ;PROGRAM STARTING ADDR. IN 'NO' TTY.
1253  000210    000137  002136                  JMP     INITBA          ;PROGRAM RE-START ADDR. TO SELECT NEW UNIT.
1254
1255                                    ;TRAP EQUIVALENCE TABLE:
1256
1257            104400                  ERROR=TRAP                      ;LOGIC TEST ERROR ROUTINE
1258            104000                  DISPLAY=EMT                     ;'VT' MESSAGE DISPLAY ROUTINE
1259            104001                  SCOPE=EMT+1                     ;LOGIC TEST SCOPE SUBROUTINE
1260            104002                  SAVREG=EMT+2                    ;SUBROUTINE TO SAVE 'R0-R5' ON STACK
1261            104003                  GETREG=EMT+3                    ;SUBROUTINE TO GET 'R0-R5' FROM STACK
1262            104004                  DELAY=EMT+4                     ;3 SEC. DISPLAY DELAY
1263            104005                  EOSBUF=EMT+5                    ;SUBROUTINE TO LOAD VT BUFER W/ 'EOS'
1264            104006                  ENDTST=EMT+6                    ;SUBROUTINE TO CHECK DATA SW.'S
1265            104007                  SETLNE=EMT+7                    ;SUBROUTINE TO SET UP A LINE TO CHAR.'S
1266            104010                  LDLINE=EMT+10                   ;SUBROUTINE TO LOAD A 'VT' BUFFER LINE
1267            104011                  PRELOAD=EMT+11                  ;SUBROUTINE TO PRE-LOAD 'VT' DATA BUFFER
1268            104012                  PRINT=EMT+12                    ;SUBROUTINE TO PRINT ASCII MESSAGES.
1269            104013                  TTYIN=EMT+13                    ;SUBROUTINE TO INPUT VIA KEYBOARD
1270            104014                  PRTOCT=EMT+14                   ;SUBROUTINE TO PRINT A 6 DIGIT OCTAL NO.
1271            104015                  ASEMBL=EMT+15                   ;SUBROUTINE TO ASSEMLE CHARACTERS INTO OCTAL VALUE
1272            104016                  SPACE=EMT+16                    ;SUBROUTINE TO PRINT SPACES
1273            104017                  TSTTKS=EMT+17                   ;SUBROUTINE TO TEST FOR KEYBOARD FLAGS
1274            104020                  DELAYL=EMT+20                   ;SUBROUTINE TO SETUP A LONG DISPLAY DELAY
1275            104021                  WAITSY=EMT+21                   ;SUBROUTINE TO WAIT FOR VERTICAL SYNC
1276            104022                  NULL=EMT+22                     ;SUBROUTINE TO TRANSMIT A NULL PRINTER CHAR.
1277            104023                  THEND=EMT+23                    ;SUBROUTINE ENTERED AT END OF DISP. TEST
1278            104024                  BINDEC=EMT+24                   ;SUBROUTINE TO CONVERT 'BCD' TO DECIMAL
1279
```

```
                                ;*****************************************************************************
                                ;EMT DISPATCH SERVICE ROUTINE
                                ;ARGUMENT OF EMT IS EXTRACTED AND USED AS OFFSET TO OBTAIN POINTER
                                ;TO THE SELECTED SUBROUTINE.
                                ;*****************************************************************************

                        001200          .=1200
001200  011646          EMTSRV: MOV     (SP),-(SP)      ;GET PC FOR TO RETURN
001202  162716  000002          SUB     #2,(SP)         ;PC OF EMT
001206  017616  000000          MOV     @(SP),(SP)      ;GET EMT
001212  005716                  TST     (SP)            ;IS EMT VALID?
001214  001001                  BNE     EMTOK
001216  000000                  HALT                    ;INVALID EMT
001220  006316          EMTOK:  ASL     (SP)            ;MULTIPLY EMT ARG BY '2'
001222  042716  177001          BIC     #177001,(SP)    ;CLEAR UNWANTED BITS
001226  062716  001240          ADD     #EMTTAB,(SP)    ;POINTER TO SUBROUTINE ADDRESS
001232  017616  000000          MOV     @(SP),(SP)      ;SUBROUTINE ADDRESS
001236  000136                  JMP     @(SP)+          ;GO TO SUBROUTINE

                                ;EMT DISPATCH TABLE

001240  017246          EMTTAB: VTMES                   ;'VT' MESSAGE DISPLAY ROUTINE
001242  020266                  SCOPEC                  ;LOGIC TEST SCOPE ROUTINE
001244  016122                  XSAVRG                  ;SUBROUTINE TO SAVE 'R0-R5' ON STACK
001246  016176                  XGETRG                  ;SUBROUTINE TO GET 'R0-R5' FROM STACK
001250  015540                  XDELAY                  ;SUBROUTINE TO SETUP 3 SEC. DISPLAY DELAY
001252  015656                  XEOSBF                  ;SUBROUTINE TO LOAD VT BUFFER W/ VISIBLE 'EOS'
001254  015732                  XENDT                   ;SUBROUTINE TO CHECK DATA SW.'S
001256  017024                  XSTLNE                  ;SUBROUTINE TO SET UP A 'VT' BUFFER LINE
001260  015632                  XLDLNE                  ;SUBROUTINE TO LOAD A 'VT' BUFFER LINE
001262  016252                  XPRELD                  ;SUBROUTINE TO PRE-LOAD THE DATA BUFFER
001264  014754                  TYPMES                  ;SUBROUTINE TO PRINT ASCII MESSAGES.
001266  014350                  XTTYIN                  ;SUBROUTINE TO INPUT VIA KEYBOARD
001270  015056                  OCTPRT                  ;SUBROUTINE TO PRINT A 6 DIGIT OCTAL NO.
001272  017104                  XASEMB                  ;SUBROUTINE TO ASSEMLE CHARACTERS INTO OCTAL VALUE
001274  014276                  XSPACE                  ;SUBROUTINE TO PRINT SPACES
001276  014330                  TKSFLG                  ;SUBROUTINE TO TEST FOR KEYBOARD FLAGS
001300  015550                  XDLAYL                  ;SUBROUTINE TO SET UP LONG DISPLAY DELAY
001302  015476                  XWAITS                  ;SUBROUTINE TO WAIT FOR VERT. SYNC
001304  017360                  XNULL                   ;SUBROUTINE TO TRANSMIT A 'NULL' CHAR.
001306  015726                  XTHEND
001310  016546                  XBINDEC                 ;SUBROUTINE TO CONVERT 'BCD' TO DECIMAL

                                ;REGISTER ADDRESSES

001312  177776          PSW:    177776                  ;ADDRESS OF PROCESSOR STATUS REG.
001314  177560          TKS:    177560                  ;ADDRESS OF KEYBOARD STATUS REG.
001316  177562          TKB:    177562                  ;   "       "       "    BUFFER  "
001320  177564          TPS:    177564                  ;   "       "  PRINTER STATUS REG.
001322  177566          TPB:    177566                  ;   "       "  PRINTER BUFFER REG.
001324  177570          SWR:    177570                  ;   "       "  SWITCH REG.
001326  177571          SWR0:   177571                  ;   "       "       "       " HIGH BYTE
                                ;'FK' UNIT 0'S REGISTER ADDRESSES.

001330  170330          FKOLDB: 170330                  ;ADDRESS OF UNIT 0'S 'LIGHT DATA B'
001332  170332          FKOLDA: 170332                  ;ADDRESS OF UNIT 0'S 'LIGHT DATA A'
```

```
1336  001334  170334          FK0CSR: 170334                  ;ADDRESS OF UNIT 0'S 'CONTROL & STATUS' REG.
1337  001336  170336          FK0DAT: 170336                  ;ADDRESS OF UNIT 0'S 'KEYBORAD DATA' REG.
1338  001340  000320          FK0INT: 320                     ;ADDRESS OF UNIT 0'S 'INTERRUPT VECTOR'
1339  001342  000322          FK0LVL: 322                     ;ADDRESS OF UNIT 0'S 'INTERRUPT LEVEL'
1340
1341                          ;'FK' UNIT 1'S REGISTER ADDRESSES.
1342
1343  001344  170340          FK1LDB: 170340                  ;ADDRESS OF UNIT 1'S 'LIGHT DATA B'
1344  001346  170342          FK1LDA: 170342                  ;ADDRESS OF UNIT 1'S 'LIGHT DATA A'
1345  001350  170344          FK1CSR: 170344                  ;ADDRESS OF UNIT 1'S 'CONTROL & STATUS' REG.
1346  001352  170346          FK1DAT: 170346                  ;ADDRESS OF UNIT 1'S 'KEYBOARD DATA' REG.
1347  001354  000324          FK1INT: 324                     ;ADDRESS OF UNIT 1'S 'INTERRUPT VECTOR'
1348  001356  000326          FK1LVL: 326                     ;ADDRESS OF UNIT 1'S 'INTERRUPT LEVEL'
1349
1350                          ;'FK' UNIT 2'S REGISTER ADDRESSES
1351
1352  001360  170360          FK2LDB: 170360
1353  001362  170362          FK2LDA: 170362
1354  001364  170364          FK2CSR: 170364
1355  001366  170366          FK2DAT: 170366
1356  001370  000350          FK2INT: 350
1357  001372  000352          FK2LVL: 352
1358
1359                          ;'FK' UNIT 3'S REGISTER ADDRESSES
1360
1361  001374  170370          FK3LDB: 170370
1362  001376  170372          FK3LDA: 170372
1363  001400  170374          FK3CSR: 170374
1364  001402  170376          FK3DAT: 170376
1365  001404  000354          FK3INT: 354
1366  001406  000356          FK3LVL: 356
1367
1368                          ;'VT' UNIT 0'S REGISTER ADDRESSES.
1369
1370  001410  170300          VT0CAR: 170300                  ;ADDRESS OF UNIT 0'S CURSOR ADDRESS REG.
1371  001412  170302          VT0SAR: 170302                  ;ADDRESS OF UNIT 0'S STATING ADDRESS REG.
1372  001414  170304          VT0CSR: 170304                  ;ADDRESS OF UNIT 0'S COMMAND & STATUS REG.
1373  001416  170306          VT0MAR: 170306                  ;ADDRESS OF UNIT 0'S MAINTENANCE REG.
1374  001420  000330          VT0INT: 330                     ;ADDRESS OF UNIT 0'S INTERRUPT VECTOR
1375  001422  000332          VT0LVL: 332                     ;ADDRESS OF UNIT 0'S INTERRUPT LEVEL
1376
1377                          ;'VT' UNIT 1'S REGISTER ADDRESSES.
1378
1379  001424  170310          VT1CAR: 170310                  ;ADDRESS OF UNIT 1'S CURSOR ADDRESS REG.
1380  001426  170312          VT1SAR: 170312                  ;ADDRESS OF UNIT 1'S STATING ADDRESS REG.
1381  001430  170314          VT1CSR: 170314                  ;ADDRESS OF UNIT 1'S COMMAND & STATUS REG.
1382  001432  170316          VT1MAR: 170316                  ;ADDRESS OF UNIT 1'S MAINTENANCE REG.
1383  001434  000340          VT1INT: 340                     ;ADDRESS OF UNIT 1'S INTERRUPT VECTOR
1384  001436  000342          VT1LVL: 342                     ;ADDRESS OF UNIT 1'S INTERRUPT LEVEL
1385
1386                          ;'VT' UNIT 2'S REGISTER ADDRESSES
1387
1388  001440  170320          VT2CAR: 170320
1389  001442  170322          VT2SAR: 170322
1390  001444  170324          VT2CSR: 170324
1391  001446  170326          VT2MAR: 170326
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1392  001450  000360                VT2INT: 360
1393  001452  000362                VT2LVL: 362
1394
1395                                ;'VT' UNIT 3'S REGISTER ADDRESSES
1396
1397  001454  170350                VT3CAR: 170350
1398  001456  170352                VT3SAR: 170352
1399  001460  170354                VT3CSR: 170354
1400  001462  170356                VT3MAR: 170356
1401  001464  000370                VT3INT: 370
1402  001466  000372                VT3LVL: 372
1403
1404  001470  170330                FKLDB:  170330
1405  001472  170332                FKLDA:  170332
1406  001474  170334                FKCSR:  170334          ;TEMPORARY STORAGE OF FK ADDRESSES
1407  001476  170336                FKDATA: 170336
1408  001500  000320                FKINT:  320
1409  001502  000322                FKLVL:  322
1410
1411  001504  170300                VTCAR:  170300
1412  001506  170302                VTSAR:  170302
1413  001510  170304                VTCSR:  170304          ;TEMPORARY STORAGE OF VT ADDRESSES
1414  001512  170306                VTMAR:  170306
1415  001514  000330                VTINT:  330
1416  001516  000332                VTLVL:  332
1417
1418                                ;DL11 REGISTER ADDRESSES
1419
1420  001520  175610                RCSR0:  175610          ;ADDRESS OF UNIT 0'S DL11 REC. CSR
1421  001522  175620                RCSR1:  175620          ;ADDRESS OF UNIT 1'S DL11 REC. CSR
1422  001524  175630                RCSR2:  175630          ;ADDRESS OF UNIT 2'S DL11 REC. CSR
1423  001526  175640                RCSR3:  175640          ;ADDRESS OF UNIT 3'S DL11 REC. CSR
1424  001530  175612                RBUF0:  175612          ;ADDRESS OF UNIT 0'S DL11 REC. BUFFER
1425  001532  175622                RBUF1:  175622          ;ADDRESS OF UNIT 1'S DL11 REC. BUFFER
1426  001534  175632                RBUF2:  175632
1427  001536  175642                RBUF3:  175642
1428  001540  000300                RINT0:  300             ;ADDRESS OF UNIT 0'S REC. VECTOR
1429  001542  000302                RLVL0:  302
1430  001544  000310                RINT1:  310             ;ADDRESS OF UNIT 1'S REC. VECTOR
1431  001546  000312                RLVL1:  312
1432  001550  000400                RINT2:  400
1433  001552  000402                RLVL2:  402
1434  001554  000410                RINT3:  410
1435  001556  000412                RLVL3:  412
1436
1437  001560  175614                XCSR0:  175614          ;ADDRESS OF UNIT 0'S TRANS. CSR
1438  001562  175624                XCSR1:  175624          ;ADDRESS OF UNIT 1'S DL11 TRANS. CSR
1439  001564  175634                XCSR2:  175634
1440  001566  175644                XCSR3:  175644
1441  001570  175616                XBUF0:  175616          ;ADDRESS OF UNIT 0'S DL11 TRANS. BUFFER
1442  001572  175626                XBUF1:  175626          ;ADDRESS OF UNIT 1'S DL11 TRANS. BUFFER
1443  001574  175636                XBUF2:  175636
1444  001576  175646                XBUF3:  175646
1445  001600  000304                XINT0:  304             ;ADDRESS OF UNIT 0'S DL11 TRANS. VECTOR
1446  001602  000306                XLVL0:  306
1447  001604  000314                XINT1:  314             ;ADDRESS OF UNIT 1'S DL11 TRANS. VECTOR
```

```
1448  001606  000316                  XLVL1:  316
1449  001610  000404                  XINT2:  404
1450  001612  000406                  XLVL2:  406
1451  001614  000414                  XINT3:  414
1452  001616  000416                  XLVL3:  416
1453
1454                                  ;DEFINITIONS OF 'VT FIELD CONTROL' FUNCTIONS
1455
1456          000370                  UNLINE=370                      ;UNDERLINE PRESET
1457          000364                  BOLD=364                        ;BOLD PRESET
1458          000361                  BLANK=361                       ;BLANK PRESET
1459          000362                  BLINK=362                       ;BLINK PRESET
1460          000200                  AUDIO=200                       ;AUDIO PRESET
1461          000012                  EOL=12                          ;END OF LINE
1462          000014                  EOP=14                          ;END OF PARAGRAPH
1463          000031                  EOS=31                          ;END OF SCREEN
1464          000360                  CLRFLD=360                      ;CLR FIELD CONTROL
1465          000212                  VISEOL=212                      ;VISIBLE END OF LINE
1466          000214                  VISEOP=214                      ;VISIBLE END OF PARAGRAPH
1467          000231                  VISEOS=231                      ;VISIBLE END OF SCREEN
1468
1469  001620  000000                  FCSET:  000000
1470  001622  000000                  FCSET1: 000000
1471
1472                                  ;DEFINITIONS OF 'MAINTENANCE' FUNCTIONS ( SELECTED VIA THE 'CSR')
1473
1474          000000                  CSR=000                         ;COMMAND & STATUS REG.
1475          000002                  DAR=2                           ;DATA ADDRESS REG.
1476          000004                  SRIDE=4                         ;SHIFT REG. INPUT DATA (EVEN)
1477          000006                  SRODE=6                         ;SHIFT REG. OUTPUT DATA (EVEN)
1478          000010                  CAR=10                          ;CURSOR ADDRESS REG.
1479          000012                  SAR=12                          ;START ADDRESS REG.
1480          000014                  SRIDO=14                        ;SHIFT REG. INPUT DATA (ODD)
1481          000016                  SRODO=16                        ;SHIFT REG. OUTPUT DATA (ODD)
1482
1483                                  ;*****************************************************************
1484                                  ;TEST INITIALIZATION ROUTINE. IF THE PROGRAM IS STARTED AT LOCATION
1485                                  ;'200' THE PROGRAM IS SET UP TO RUN VIA A TELETYPE MONITOR. IF THE PRO-
1486                                  ;GRAM IS  STARTED AT LOCATION '204' THE PROGRAM USES PROGRAM 'HALTS'
1487                                  ;TO COLLECT NEEDED INFORMATION AND TO REPORT ERRORS.
1488                                  ;*****************************************************************
1489
1490  001624  012737  000001  024160  INITTY: MOV     #1,TTYSWH       ;TTY AVAILABLE, SET SOFTWARE SW.
1491  001632  000402                  BR      .+6
1492  001634  005037  024160          NOTTY:  CLR     TTYSWH          ;CLR TTY AVAILABLE SOFTWARE SWITCH.
1493  001640  012777  000340  177444          MOV     #340,@PSW
1494  001646  013706  024136                  MOV     STACK,SP        ;INIT STACK POINTER=1000
1495  001652  000240                          NOP
1496  001654  000240                          NOP
1497  001656  000240                          NOP                     ;INITIALIZATION SWITCH TEST REMOVED TO ALLOW RE-SELECT
1498  001660  000240                          NOP
1499  001662  000240                          NOP
1500  001664  012737  001702  000004  1$:     MOV     #CORSIZ,@#4     ;RESET TIMEOUT
1501  001672  012701  020000                  MOV     #20000,R1       ;TEST CORE SIZE
1502  001676  005721                          TST     (R1)+
1503  001700  000776                          BR      .-2
```

```
1504  001702  162701  002000          CORSIZ: SUB     #2000,R1        ;SAVE LAST 1K FOR 'VT' TEST
1505  001706  010137  024144                  MOV     R1,MEMSIZ
1506  001712  012737  000006  000004          MOV     #6,@#4          ;RESET TIMEOUT TO 'ERTRAP'
1507  001720  012737  000004  000006          MOV     #4,@#6
1508  001726  005737  024160          INITB:  TST     TTYSWH          ;TTY AVAILABLE?
1509  001732  001106                          BNE     INITC           ;YES, INIT VIA TTY.
1510  001734  000000                          HALT                    ;SEE IF FORIEGN CHAR SET EXISTS
1511  001736  000240                          NOP                     ;BY EXAMINING THE SWITCH REGISTER
1512  001740  017737  177360  001620          MOV     @SWR,FCSET      ;IF CLEAR THEN NOT FORIEGN SET
1513  001746  000000                          HALT                    ;GET # OF TUBES FROM SWITCHES
1514  001750  000240                          NOP
1515  001752  017737  177346  024142          MOV     @SWR,   UNITNO
1516  001760  042737  177770  024142          BIC     #177770,UNITNO
1517  001766  005777  177332                  TST     @SWR            ;IF BIT 15 IN SWR IS SET THEN
1518  001772  100402                          BMI     4$              ;LET USER INPUT DEVICE ADDRESSES
1519  001774  000137  002436                  JMP     INITCB          ;DEFAULT DEVICES & VECTORS REQUESTED
1520
1521  002000  013700  024142          4$:     MOV     UNITNO,R0
1522  002004  012705  001330                  MOV     #FKOLDB,R5
1523  002010  000000          1$:     HALT                            ;HALT FOR FK VECTOR
1524  002012  017737  177306  001500          MOV     @SWR,FKINT
1525  002020  000240                          NOP
1526  002022  000000                          HALT                    ;HALT FOR FK ADDR.
1527  002024  017704  177274                  MOV     @SWR,R4
1528  002030  004737  002700                  JSR     PC,SETED
1529  002034  005300                          DEC     R0
1530  002036  001364                          BNE     1$
1531
1532  002040  012705  001410                  MOV     #VTOCAR,R5
1533  002044  013700  024142                  MOV     UNITNO,R0
1534  002050  000000          2$:     HALT                            ;HALT FOR VT VECTOR
1535  002052  017737  177246  001500          MOV     @SWR,FKINT
1536  002060  000240                          NOP
1537  002062  000000                          HALT                    ;HALT FOR VT ADDR.
1538  002064  017704  177234                  MOV     @SWR,R4
1539  002070  004737  002700                  JSR     PC,SETED
1540  002074  005300                          DEC     R0
1541  002076  001364                          BNE     2$
1542  002100  013700  024142                  MOV     UNITNO,R0
1543  002104  012702  001540                  MOV     #RINTO,R2
1544  002110  012705  001600                  MOV     #XINTO,R5
1545  002114  000000          3$:     HALT                            ;HALT FOR DL11 VECTOR
1546  002116  017703  177202                  MOV     @SWR,R3
1547  002122  012322                          MOV     (3)+,(2)+
1548  002124  012322                          MOV     (3)+,(2)+
1549  002126  012325                          MOV     (3)+,(5)+
1550  002130  012325                          MOV     (3)+,(5)+
1551  002132  005300                          DEC     R0
1552  002134  001367                          BNE     3$
1553  002136  000000          INITBA: HALT                            ;GET TUBE NO. FROM SWITCHES
1554  002140  017737  177160  024140          MOV     @SWR,UNITFG     ;SAVE TUBE NO.
1555  002146  000543                          BR      INITD
1556  002150  005737  024172          INITC:  TST     MTRSWH          ;TYPE HEADER
1557  002154  001002                          BNE     .+6             ;NO, ITS BEEN TYPED
1558  002156  104012                          PRINT
1559  002160  021023                          TITLE                   ;PRINT PROGRAM HEADER
```

```
 1560  002162  104012                          PRINT                   ;SEE IF FORIEGN CHARACTER SET EXISTS
 1561  002164  021445                          MFCP
 1562  002166  104015                          ASEMBL
 1563  002170  042703  177776                  BIC     #177776,R3
 1564  002174  010337  001620                  MOV     R3,FCSET
 1565  002200  104012                          PRINT                   ;REQUEST NO. OF TUBES
 1566  002202  024006                          MED1
 1567  002204  104015                          ASEMBL                  ;GET INPUT
 1568  002206  010337  024142                  MOV     R3,UNITNO
 1569  002212  104012  021165                  PRINT,  MES1A           ;TEXT 'ARE DEFAULT ADDR. & VECT. OK?'
 1570  002216  104015                          ASEMBL                  ;WAIT FOR HIS ANSWER
 1571  002220  005703                          TST     R3              ;WAS 'CR' TYPED?
 1572  002222  001505                          BEQ     INITCB          ;YES, USE DEFAULT ADDRESSES
 1573  002224  022703  000001                  CMP     #1,R3           ;WAS 'Y' TYPED?
 1574  002230  001502                          BEQ     INITCB          ;YES, IT SURE WAS
 1575  002232  012705  001330          INITAC: MOV     #FKOLDB,R5      ;NO, LET USER DEFINE HIS OWN ADDRESSES
 1576  002236  013700  024142          1$:     MOV     UNITNO,R0       ;WE HAVE ASK HIM FOR ADDRESSES
 1577  002242  112737  000260  014750          MOVB    #260,MRUNN1
 1578  002250  104012                  2$:     PRINT                   ;FIRST GET FK ADDRESS
 1579  002252  024037                          MFKP
 1580  002254  104012                          PRINT                   ;PRINT UNIT NO
 1581  002256  014750                          MRUNN1
 1582  002260  104015                          ASEMBL
 1583  002262  010337  001500                  MOV     R3,FKINT
 1584  002266  001770                          BEQ     2$
 1585  002270  004737  002700                  JSR     PC,SETED
 1586  002274  105237  014750                  INCB    MRUNN1
 1587  002300  005300                          DEC     R0
 1588  002302  001362                          BNE     2$
 1589  002304  012705  001410                  MOV     #VTOCAR,R5      ;GET VT VECTORS AND ADDRESS
 1590  002310  013700  024142                  MOV     UNITNO,R0       ;NUMBER OF TUBES
 1591  002314  112737  000260  014750          MOVB    #260,MRUNN1
 1592
 1593  002322  104012                  3$:     PRINT
 1594  002324  024032                          MUTP
 1595  002326  104012                          PRINT
 1596  002330  024043                          MAUFK
 1597  002332  104012                          PRINT
 1598  002334  014750                          MRUNN1
 1599  002336  104015                          ASEMBL
 1600  002340  010337  001500                  MOV     R3,FKINT
 1601  002344  001766                          BEQ     3$
 1602  002346  004737  002700                  JSR     PC,SETED
 1603  002352  105237  014750                  INCB    MRUNN1
 1604  002356  005300                          DEC     R0
 1605  002360  001360                          BNE     3$
 1606
 1607  002362  013700  024142                  MOV     UNITNO,R0       ;ASK FOR DL11 VECTORS
 1608  002366  012702  001540                  MOV     #RINTO,R2
 1609  002372  012705  001600                  MOV     #XINTO,R5
 1610  002376  112737  000260  014750          MOVB    #260,MRUNN1
 1611
 1612  002404  104012                  4$:     PRINT                   ;PRINT MESSAGE
 1613  002406  024101                          MDLVA
 1614  002410  104012                          PRINT
 1615  002412  014750                          MRUNN1
```

```
1616  002414  104015                    ASEMBL
1617  002416  012322                    MOV     (3)+,(2)+
1618  002420  012322                    MOV     (3)+,(2)+
1619  002422  012325                    MOV     (3)+,(5)+
1620  002424  012325                    MOV     (3)+,(5)+
1621  002426  105237  014750            INCB    MRUNN1
1622  002432  005300                    DEC     R0
1623  002434  001363                    BNE     4$
1624
1625  002436  005737  024160  INITCB:   TST     TTYSWH
1626  002442  001635                    BEQ     INITBA
1627  002444  104012                    PRINT
1628  002446  021403                    MES5                    ;REQUEST UNIT NO.
1629  002450  104015                    ASEMBL                  ;DECODE IT.
1630  002452  010337  024140            MOV     R3,UNITFG       ;SAVE IT
1631  002456  013737  024140  024132  INITD:  MOV     UNITFG,PIMP
1632  002464  005037  024170            CLR     SWAPEM          ;CLR SWAP SW.
1633  002470  022737  000004  024140    CMP     #4,UNITFG
1634  002476  001004                    BNE     .+12
1635  002500  005037  024140            CLR     UNITFG          ;YES, SET UP UNIT '0'
1636  002504  005237  024170            INC     SWAPEM          ;SET SWAP SW.
1637  002510  004737  016320            JSR     PC,STUNIT       ;SET UP SELECTED UNIT ADDRESSES
1638  002514  005737  024160            TST     TTYSWH          ;TTY AVAILABLE?
1639  002520  001402                    BEQ     MONITR          ;NO
1640  002522  104012                    PRINT                   ;YES,
1641  002524  021270                    MES3                    ;TEXT 'TYPE IN TST NO. TO BE EXECUTED'.
1642                        ;*****************************************************************
1643                        ;TEST SELECTION ROUTINE. IF NO TTY IS AVAILABLE THE PROGRAM WILL HALT
1644                        ;AND WAIT FOR A TEST NO. TO BE LOADED VIA THE SW.'S. IF A TTY IS
1645                        ;AVAIBLE, A REQUEST IS MADE VIA THE PRINTER FOR THE SELECTED TEST
1646                        ;NUMBER TO BE TYPED IN.
1647                        ;*****************************************************************
1648
1649  002526  000005  MONITR: RESET                           ;INITIALIZE ON ENTRY
1650  002530  104022            NULL                          ;NULL FOR PRINTER.
1651  002532  013706  024136    MOV     STACK,SP              ;RESET STACK POINTER
1652  002536  005037  024170    CLR     SWAPEM
1653  002542  022737  000004  024132  CMP     #4,PIMP         ;DOES HE WANT TO SWAP?
1654  002550  001006            BNE     1$
1655  002552  005037  024140    CLR     UNITFG
1656  002556  005237  024170    INC     SWAPEM
1657  002562  004737  016320    JSR     PC,STUNIT
1658  002566  012737  001726  024134  1$:  MOV     #INITB,AVECTR ;SET UP '↑A' RESTART ADDR.
1659  002574  004737  016710    JSR     PC,CLRFKV             ;CLR 'FK' INTR ADDR TO HALT
1660  002600  004737  016774    JSR     PC,CLRVTV             ;CLR 'VT' INTR ADDR TO HALT
1661  002604  012737  000001  024172  MOV     #1,MTRSWH       ;SET MONITOR SW.
1662  002612  005037  024154    CLR     RUNSWH                ;CLR 'RUN ALL' SOFTWARE SW.
1663  002616  005037  024244    CLR     HOLDSO
1664  002622  005037  024166    CLR     DONESW
1665  002626  005737  024160    TST     TTYSWH                ;TTY AVAILABLE?
1666  002632  001004            BNE     TTYMTR                ;YES, REQUEST TEST NO.
1667  002634  000000            HALT                          ;GET TEST NO. FROM DATA SW'S
1668  002636  017703  175462    MOV     @SWR,R3               ;SAVE TEST NO.
1669  002642  000403            BR      TTYMT1                ;EXECUTE SELECTED TEST
1670  002644  104012  TTYMTR:   PRINT
1671  002646  023000            CNTRLC
```

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1672  002650  104015                        ASEMBL                  ;DECODE IT
1673  002652  042703  177740        TTYMT1: BIC     #177740,R3      ;CLR UN-WANTED BITS
1674  002656  006303                        ASL     R3
1675  002660  020327  000044                CMP     R3,#44
1676  002664  003002                        BGT     .+6             ;TYPE '?' IF NUMBER TO BIG
1677  002666  000173  002750                JMP     @TESTOO(R3)     ;EXECUTE SELECTED TEST
1678  002672  104012                        PRINT
1679  002674  023013                        QMARK                   ;TYPE '?' ON ILLEGAL NO.'S
1680  002676  000714                        BR      MONITR+2        ;RE-START
1681  002700  010146        SETED:  MOV     R1,-(6)         ;SAVE R1
1682  002702  012701  000004                MOV     #4,R1
1683  002706  010425        1$:     MOV     R4,(5)+         ;MOV ADDR TO ADDR. POINTER
1684  002710  062704  000002                ADD     #2,R4
1685  002714  005301                        DEC     R1
1686  002716  001373                        BNE     1$
1687  002720  013725  001500                MOV     FKINT,(5)+      ;MOV VECTOR ADDR TO ADDR POINTER
1688  002724  062737  000002  001500        ADD     #2,FKINT
1689  002732  013725  001500                MOV     FKINT,(5)+
1690  002736  012601                        MOV     (6)+,R1
1691  002740  062737  000002  001500        ADD     #2,FKINT
1692  002746  000207                        RTS     PC
1693                          ;*****************************************************************
1694                          ;'VT20' TEST TABLE
1695                          ;*****************************************************************
1696
1697  002750  003122        TESTOO: VTLOGIC                 ;VT 'LOGIC' TEST
1698
1699  002752  005166        TEST01: VTCHAR                  ;VT 'CHARACTER DISPLAY' TEST
1700
1701  002754  005226        TEST02: VTMOD1                  ;VT 'FIELD MODE' TEST '1'
1702
1703  002756  005322        TEST03: VTMOD2                  ;VT 'CSR PRESET' TEST
1704
1705  002760  005454        TEST04: VTEOL                   ;VT 'END OF LINE' TEST
1706
1707  002762  005574        TEST05: VTEOS                   ;VT 'END OF SCREEN' TEST
1708
1709  002764  005660        TEST06: VTBLANK                 ;VT 'BLANK CONTROL' TEST
1710
1711  002766  005740        TEST07: VTALINE                 ;VT 'ALIGNMENT' TEST
1712
1713  002770  005766        TEST10: VTFOCUS                 ;VT 'FOCUS' TEST
1714
1715  002772  006014        TEST11: VTWORST                 ;VT 'WORST CASE' TEST
1716
1717  002774  006042        TEST12: VTCURSR                 ;VT 'CURSOR CONTROL' TEST
1718
1719  002776  006136        TEST13: VTODD                   ;VT 'ODD ADDRESS' TEST.
1720
1721  003000  003016        TEST14: VTRUN                   ;VT 'RUN ALL' TEST
1722
1723  003002  006236        TEST15: FKLOGIC                 ;FK 'LOGIC' TEST
1724
1725  003004  007416        TEST16: FKFUN                   ;FK 'FUNCTION' TEST
1726
1727  003006  007576        TEST17: FKCHAR                  ;FK 'CHARACTER' TEST
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                                TEST20: FKREPT                  ;FK 'REPEATIBILITY' TEST

                                TEST21: SYSTST                  ;VT 'SYSTEM EXERCISER' TEST

                                TEST22: TESTX                   ;FK/VT 'LOGIC SUBTEST' SELECTION

                                ;*************************************************************************
                                ;SUBROUTINE  ENTERED VIA SELECTING 'VTRUN'.THIS ROUTINE SETS A
                                ;SOFTWARE SW. WHICH ENABLES THE VT LOGIC TEST, ALL DISPLAY TESTS, AND
                                ;THE ASCII KEYBOARD TEST TO BE RUN IN ORDER. THESE TESTS WILL BE RUN
                                ;ON BOTH UNITS IF UNIT '2' WAS SELECTED.
                                ;*************************************************************************

003016  005237  024154          VTRUN:  INC     RUNSWH          ;SET SOFTWARE SW.
003022  000137  003122                  JMP     VTLOGIC         ;START 1ST TEST.
                                ;*************************************************************************
                                ;VT20 LOGIC TEST (00)
                                ;*************************************************************************

003026  013704  001510          SETUPV: MOV     VTCSR,VTCSR4    ;LOAD 'R4' WITH THE 'CSR' ADDRESS
003032  013705  001512                  MOV     VTMAR,VTMAR5    ;LOAD 'R5' WITH THE 'MAINT' ADDR. REG.
003036  005037  024450                  CLR     MESPRT          ;CLR PRINT INHIBIT SW.
003042  005037  024452                  CLR     MESPT1          ;CLR PRINT INHIBIT SW.
003046  012737  000100  020376          MOV     #100,ICOUNT
003054  012737  017526  000034          MOV     #VTERR,@#34     ;LOAD THE TRAP 'TRAP' WITH LOGIC ERROR TRAP
003062  012737  003142  020402          MOV     #VT1,RETURN     ;SET UP 'SCOPE' RETURN ADDRESS
003070  012777  000340  176214          MOV     #340,@PSW       ;SET PROCESSOR PRIORITY TO '7'
003076  012737  000001  024146          MOV     #1,TSTNUM       ;SET UP TEST NO.
003104  005037  024436                  CLR     SHFTSW
003110  005037  024440                  CLR     SHFPRT
003114  005037  020400                  CLR     SCOPEF
003120  000207                          RTS     PC

003122  005737  024160          VTLOGIC:TST     TTYSWH          ;TTY AVAILABLE?
003126  001403                          BEQ     .+10            ;NO
003130  104012                          PRINT
003132  023017                          MES20                   ;TEXT 'VT20 LOGIC TEST'
003134  104022                          NULL
003136  004737  003026          VTREST: JSR     PC,SETUPV       ;INITIALIZE THE LOGIC TEST

                                ;*************************************************************************
                                ;TEST THAT THE 'CSR' WAS INITIALIZED CORRECTLY
                                ;*************************************************************************

003142  000240                  VT1:    NOP                     ;'VT' TEST 1
003144  000240                          NOP
003146  012714  125212                  MOV     #125212,@VTCSR4
003152  000005                          RESET
003154  011401                          MOV     @VTCSR4,R1      ;READ CONTENTS OF THE 'CSR'
003156  042701  050000                  BIC     #50000,R1       ;IGNORE 'BIT 12' AND 'BIT 14'
003162  001401                          BEQ     .+4             ;RESET SHOULD HAVE CLEARED 'CSR'
003164  104400                          ERROR                   ;'CSR' SHOULD = '0 OR 50000'

                                ;*************************************************************************
                                ;TEST THAT THE 'MAINTENANCE' REGISTER WAS INITIALIZED TO '0'
```

```
                                        ;*****************************************************************
        003166  104001  000002          VT2:    SCOPE,2                         ;'VT' TEST 2
        003172  000005                          RESET
        003174  011501                          MOV     @VTMAR5,R1              ;READ CONTENTS OF THE 'MAR'
        003176  042701  050000                  BIC     #50000,R1               ;IGNORE 'BIT 12' AND 'BIT 14'
        003202  001401                          BEQ     .+4
        003204  104400                          ERROR                           ;RESET DIDN'T CLR THE 'MAINT' REG. (EXCEPT BIT '12' AND
                                        ;*****************************************************************
                                        ;TEST FOR WRITING THE 'CSR' TO 125212
                                        ;*****************************************************************
        003206  104001  000003          VT3:    SCOPE,3                         ;'VT' TEST 3
        003212  012714  125212                  MOV     #125212,@VTCSR4         ;WRITE 'CSR' TO '125212'
        003216  011401                          MOV     @VTCSR4,R1              ;READ CONTENTS OF THE 'CSR'
        003220  042701  050000                  BIC     #50000,R1               ;IGNORE 'BIT 12' AND 'BIT 14'
        003224  022701  125212                  CMP     #125212,R1
        003230  001401                          BEQ     .+4
        003232  104400                          ERROR                           ;'CSR' SHOULD = '125212'
        003234  005014                          CLR     @VTCSR4
                                        ;*****************************************************************
                                        ;TEST FOR WRITING THE 'CSR' TO '52504'
                                        ;*****************************************************************
        003236  104001  000004          VT4:    SCOPE,4                         ;'VT' TEST 4
        003242  012714  052504                  MOV     #52504,@VTCSR4          ;WRITE 'CSR' TO '52504'
        003246  104021                                  WAITSYNC
        003250  022714  052504                  CMP     #52504,@VTCSR4
        003254  001401                          BEQ     .+4                     ;**BEWARE** BIT 6 IS CLEARED ON TYPEOUT
        003256  104400                          ERROR                           ;'CSR' SHOULD = '52504'
        003260  005014                          CLR     @VTCSR4                 ;WRITE 'CSR' TO '0'
                                        ;*****************************************************************
                                        ;TEST FOR READING THE 'CSR' VIA THE 'MAINT' REG.
                                        ;*****************************************************************
        003262  104001  000005          VT5:    SCOPE,5                         ;'VT' TEST 5
        003266  012714  157760                  MOV     #157760,@VTCSR4         ;SELECT 'MAINT CSR' VIA THE 'CSR'
        003272  104021                                  WAITSYNC
        003274  022715  157760                  CMP     #157760,@VTMAR5         ;MAINT SHOULD='CSR'
        003300  001401                          BEQ     .+4                     ;**BEWARE** BIT 6 IS CLEARED ON TYPEOUT
        003302  104400                          ERROR                           ;MAINT REG. NOT ='CSR' (157760)
        003304  005014                          CLR     @VTCSR4                 ;CLR 'CSR'
        003306  011501                          MOV     @VTMAR5,R1
        003310  042701  050000                  BIC     #50000,R1
        003314  005701                          TST     R1                      ;'MAR' SHOULD = 'CSR' (0)
        003316  001401                          BEQ     .+4
        003320  104400                          ERROR                           ;MAINT REG. NOT='CSR' (0)
                                        ;*****************************************************************
                                        ;WRITE THE 'CURSOR' ADDRESS REGISTER TO '125252'
                                        ;*****************************************************************
        003322  104001  000006          VT6:    SCOPE,6                         ;'VT' TEST 6
        003326  012777  125252  176150          MOV     #125252,@VTCAR          ;WRITE REG. TO ALTERNATE 1'S
```

```
1840  003334  012777  000010  176146          MOV     #CAR,@VTCSR     ;SELECT 'CURSOR' ADDRESS VIA 'CSR'
1841  003342  022715  125252                  CMP     #125252,@VTMAR5 ;READ CURSOR ADDRESS VIA 'MAINT'
1842  003346  001401                          BEQ     .+4
1843  003350  104400                          ERROR                   ;CURSOR ADDRESS SHOULD=125252
1844  003352  005077  176132                  CLR     @VTCSR
1845  003356  005077  176122                  CLR     @VTCAR
1846
1847                                  ;*************************************************************************
1848                                  ;WRITE THE 'CURSOR' ADDRESS REGISTER TO '52525'
1849                                  ;*************************************************************************
1850
1851  003362  104001  000007          VT7:    SCOPE,7                 ;'VT' TEST 7
1852  003366  012777  052525  176110          MOV     #52525,@VTCAR   ;WRITE COMPLIMENT OF PART I
1853  003374  012777  000010  176106          MOV     #CAR,@VTCSR     ;SELECT 'CURSOR' ADDRESS VIA 'CSR'
1854  003402  022715  052525                  CMP     #52525,@VTMAR5  ;READ 'CAR' VIA 'MAR'
1855  003406  001401                          BEQ     .+4
1856  003410  104400                          ERROR                   ;'CAR' SHOULD=52525
1857  003412  005077  176072                  CLR     @VTCSR
1858  003416  005077  176062                  CLR     @VTCAR
1859
1860                                  ;*************************************************************************
1861                                  ;WRITE THE 'CURSOR' ADDRESS REGISTER TO '0'
1862                                  ;*************************************************************************
1863
1864  003422  104001  000010          VT10:   SCOPE,10                        ;'VT' TEST 10
1865  003426  012777  177777  176050          MOV     #-1,@VTCAR      ;WRITE REG. TO -1
1866  003434  012714  000010                  MOV     #CAR,@VTCSR4    ;SELECT CURSOR ADDRESS
1867  003440  005077  176040                  CLR     @VTCAR          ;WRITE REG. TO '0'
1868  003444  005715                          TST     @VTMAR5
1869  003446  001401                          BEQ     .+4
1870  003450  104400                          ERROR                   ;CURSOR ADDRESS SHOULD='0'
1871
1872                                  ;*************************************************************************
1873                                  ;TEST THAT THE 'CURSOR ADDRESS' REG. IS CLEARED VIA 'RESET'
1874                                  ;*************************************************************************
1875
1876  003452  104001  000011          VT11:   SCOPE,11                        ;'VT' TEST 11
1877  003456  012777  177777  176020          MOV     #-1,@VTCAR      ;WRITE REG. =-1
1878  003464  000005                          RESET                   ;ISSUE 'RESET' TO CLR REG.
1879  003466  012714  000010                  MOV     #CAR,@VTCSR4    ;SELECT 'CAR' VIA 'CSR'
1880  003472  005715                          TST     @VTMAR5         ;TEST IF 'CAR' WAS CLEARED
1881  003474  001401                          BEQ     .+4
1882  003476  104400                          ERROR                   ;RESET DIDN'T CLR 'CAR' REG.
1883                                  ;*************************************************************************
1884                                  ;TEST FOR ROTATING A '1' THRU THE 'CAR'.
1885                                  ;*************************************************************************
1886
1887  003500  104001  000012          VT12:   SCOPE,12                        ;'VT' TEST 12
1888  003504  012703  000001                  MOV     #1,R3           ;LOAD THE TEST REG. WITH '1'
1889  003510  010377  175770          LOOP12: MOV     R3,@VTCAR       ;LOAD THE 'CAR' WITH THE TEST REG.
1890  003514  012714  000010                  MOV     #CAR,@VTCSR4
1891  003520  020315                          CMP     R3,@VTMAR5
1892  003522  001401                          BEQ     .+4
1893  003524  104400                          ERROR                   ;'CAR' SHOULD = CONTAINS OF R3
1894  003526  005014                          CLR     @VTCSR4
1895  003530  005077  175750                  CLR     @VTCAR
```

```
1896  003534  006103                          ROL     R3              ;ROTATE BIT
1897  003536  001364                          BNE     LOOP12
1898                                  ;*************************************************************************
1899                                  ;TEST FOR WRITING THE 'STARTING ADDRESS' REG. TO '125252'
1900                                  ;*************************************************************************
1901
1902  003540  104001  000013         VT13:   SCOPE,13                        ;'VT' TEST 13
1903  003544  012777  024500  175734         MOV     #VTBUFF,@VTSAR  ;LOAD LEGAL ADDR. TO PREVENT TIMEOUT
1904  003552  012714  000012                MOV     #SAR,@VTCSR4    ;SELECT 'SAR' TO MAINT VIA 'CSR'
1905  003556  012777  125252  175722         MOV     #125252,@VTSAR  ;WRITE REG. TO ALTERNATE 1'S
1906  003564  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1907  003566  022715  125252                CMP     #125252,@VTMAR5
1908  003572  001401                         BEQ     .+4
1909  003574  104400                         ERROR                   ;STARTING ADDR. REG. SHOULD=125252
1910
1911                                  ;*************************************************************************
1912                                  ;TEST FOR WRITING THE 'STARTING ADDRESS' REG. TO '52525'
1913                                  ;*************************************************************************
1914
1915  003576  104001  000014         VT14:   SCOPE,14                        ;'VT' TEST 14
1916  003602  012777  024500  175676         MOV     #VTBUFF,@VTSAR  ;LOAD LEGAL ADDR. TO PREVENT TIMEOUT
1917  003610  012714  000012                MOV     #SAR,@VTCSR4    ;SELECT 'SAR' TO MAINT VIA 'CSR'
1918  003614  012777  052525  175664         MOV     #52525,@VTSAR   ;WRITE COMPLIMENT OF PART I
1919  003622  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1920  003624  022715  052525                CMP     #52525,@VTMAR5
1921  003630  001401                         BEQ     .+4
1922  003632  104400                         ERROR                   ;'SAR' SHOULD =52525
1923                                  ;*************************************************************************
1924                                  ;TEST FOR WRITING THE 'STARTING ADDRESS' REG. TO '0'
1925                                  ;*************************************************************************
1926
1927  003634  104001  000015         VT15:   SCOPE,15                        ;'VT' TEST 15
1928  003640  012777  024500  175640         MOV     #VTBUFF,@VTSAR  ;LOAD LEGAL ADDR. TO PREVENT TIMEOUT
1929  003646  012714  000012                MOV     #SAR,@VTCSR4    ;SELECT 'STARTING ADDR.' REG.
1930  003652  005077  175630                CLR     @VTSAR          ;WRITE REG. TO '0'
1931  003656  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1932  003660  005715                         TST     @VTMAR5         ;CHECK FOR '0'
1933  003662  001401                         BEQ     .+4
1934  003664  104400                         ERROR                   ;STARTING ADDRESS REG. SHOULD='0'
1935                                  ;*************************************************************************
1936                                  ;TEST FOR ROTATING A '1' THUR THE STARTING ADDRESS REG.
1937                                  ;NOTE: 'R3' IS USED AS A CHECKING ADDRESS AND WILL CONTAIN THE
1938                                  ;EXPECTED DATA ON A FAILURE.
1939                                  ;*************************************************************************
1940
1941  003666  104001  000016         VT16:   SCOPE,16                        ;'VT' TEST 16
1942  003672  012777  024500  175606         MOV     #VTBUFF,@VTSAR  ;LOAD LEGAL ADDR. TO PREVENT TIMEOUT
1943  003700  012703  000001                MOV     #1,R3           ;LOAD THE TEST REG. WITH '1'
1944  003704  012714  000012        LOOP16: MOV     #SAR,@VTCSR4    ;SELECT 'STARTING ADDR.' REG.
1945  003710  010377  175572                MOV     R3,@VTSAR       ;LOAD 'SAR' FROM 'R3'
1946  003714  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1947  003716  020315                         CMP     R3,@VTMAR5      ;CHECK IF REG. LOADED CORRECTLY.
1948  003720  001401                         BEQ     .+4
1949  003722  104400                         ERROR                   ;'SAR SHOULD = CONTAINS OF 'R3'
1950  003724  006103                         ROL     R3              ;ROTATE BIT
1951  003726  001366                         BNE     LOOP16          ;LOOP  UNTIL CARRY IS SET
```

```
1952                                    ;*************************************************************************
1953                                    ;TEST THAT 'RESET' WILL CLR THE 'STARTING ADDRESS' REG.
1954                                    ;*************************************************************************
1955
1956  003730  104001  000017           VT17:   SCOPE,17                        ;'VT' TEST 17
1957  003734  012777  024500  175544           MOV     #VTBUFF,@VTSAR  ;LOAD LEGAL ADDR. TO PREVENT TIMEOUT
1958  003742  012714  000012                   MOV     #SAR,@VTCSR4    ;SELECT 'STARTING ADDRESS' REG.
1959  003746  012777  177777  175532         MOV     #-1,@VTSAR      ;WRITE REG. TO '-1'
1960  003754  000005                         RESET                   ;RESET SHOULD CLR REG.
1961  003756  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1962  003760  012714  000012                 MOV     #SAR,@VTCSR4    ;RE-SELECT THE 'SAR'
1963  003764  005715                         TST     @VTMAR5
1964  003766  001401                         BEQ     .+4
1965  003770  104400                         ERROR                   ;RESET DIDN'T CLR 'SAR'
1966
1967                                    ;*************************************************************************
1968                                    ;TEST THAT THE 'DAR' (DATA ADDRESS REG.) IS LOADED FROM 'SAR' (START ADDR. REG.)
1969                                    ;*************************************************************************
1970
1971  003772  104001  000020           VT20:   SCOPE,20                        ;'VT' TEST 20
1972  003776  012777  125252  175502           MOV     #125252,@VTSAR  ;LOAD THE 'SAR'
1973  004004  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1974  004006  012714  000002                 MOV     #DAR,@VTCSR4    ;SELECT MAINT. 'DAR' VIA 'CSR'
1975  004012  022715  125252                 CMP     #125252,@VTMAR5
1976  004016  001401                         BEQ     .+4
1977  004020  104400                         ERROR                   ;'DAR' WASN'T LOADED FROM 'SAR'
1978  004022  005014                         CLR     @VTCSR4
1979
1980                                    ;*************************************************************************
1981                                    ;ISSUE RESET TO CLR TIME-OUT FROM PREVIOUS TEST
1982                                    ;*************************************************************************
1983
1984  004024  104001  000021           VT21:   SCOPE,21                        ;'VT' TEST 21
1985  004030  000005                         RESET
1986
1987                                    ;*************************************************************************
1988                                    ;TEST THAT THE 'DAR' (DATA ADDRESS REG.) IS LOADED FROM 'SAR' (START ADDR. REG.)
1989                                    ;*************************************************************************
1990
1991  004032  104001  000022           VT22:   SCOPE,22                        ;'VT' TEST 22
1992  004036  012777  052525  175442           MOV     #052525,@VTSAR  ;LOAD THE 'SAR'
1993  004044  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
1994  004046  012714  000002                 MOV     #DAR,@VTCSR4    ;SELECT MAINT. 'DAR'
1995  004052  022715  052524                 CMP     #052524,@VTMAR5
1996  004056  001401                         BEQ     .+4
1997  004060  104400                         ERROR                   ;'DAR' WASN'T LOADED FROM 'SAR'
1998  004062  005014                         CLR     @VTCSR4
1999                                    ;*************************************************************************
2000                                    ;ISSUE RESET TO CLR TIME-OUT FROM PREVIOUS TEST
2001                                    ;*************************************************************************
2002
2003  004064  104001  000023           VT23:   SCOPE,23                        ;'VT' TEST 23
2004  004070  000005                         RESET
2005                                    ;*************************************************************************
2006                                    ;TEST FOR ROTATING A '1' THUR THE 'DAR' (DAR IS LOADED FROM THE SAR).
2007                                    ;*************************************************************************
```

```
2008
2009  004072  104001  000024          VT24:   SCOPE,24                          ;'VT' TEST 24
2010  004076  012703  000002                  MOV     #2,R3                   ;LOAD THE TEST REG. WITH '2'
2011  004102  010377  175400          LOOP24: MOV     R3,@VTSAR               ;LOAD THE 'SAR'
2012  004106  104021                          WAITSYNC                        ;WAIT FOR VERTICAL SYNC.
2013  004110  012714  000002                  MOV     #DAR,@VTCSR4            ;SELECT MAINT. 'DAR' VIA 'CSR'
2014  004114  020315                          CMP     R3,@VTMAR5              ;TEST 'DAR'
2015  004116  001401                          BEQ     .+4
2016  004120  104400                          ERROR                           ;'DAR' WASN'T LOADED FROM 'SAR'
2017  004122  005014                          CLR     @VTCSR4
2018  004124  006103                          ROL     R3                      ;ROTATE BIT
2019  004126  001365                          BNE     LOOP24                  ;ROTATE THRU REG.
2020
2021                                  ;*************************************************************************
2022                                  ;ISSUE RESET TO CLR TIME-OUT FROM PREVIOUS TEST
2023                                  ;*************************************************************************
2024
2025  004130  104001  000025          VT25:   SCOPE,25                        ;'VT' TEST 25
2026  004134  000005                  RESET
2027
2028                                  ;*************************************************************************
2029                                  ;TEST THAT THE 'CURSOR ADDR.' BIT IS SET IN THE 'CSR' IF THE 'CAR'
2030                                  ;AND THE 'SAR' ARE SET EQUAL.  ALSO BIT 14 CLEARS IF CAR=SAR
2031                                  ;*************************************************************************
2032
2033  004136  104001  000026          VT26:   SCOPE,26                        ;'VT' TEST 26
2034  004142  012777  020723  175336          MOV     #SHFTBF+1,@VTSAR        ;LOAD 'SAR'
2035  004150  104021                          WAITSYNC                        ;WAIT FOR VERTICAL SYNC.
2036  004152  012777  020723  175324          MOV     #SHFTBF+1,@VTCAR        ;LOAD 'CAR' = 'SAR'
2037  004160  012714  000004                  MOV     #SRIDE,@VTCSR4          ;FORCE 'NPR' TRANSFER
2038  004164  032714  010000                  BIT     #10000,@VTCSR4          ;TEST IF BIT 12 (CAR BIT) SET
2039  004170  001001                          BNE     .+4
2040  004172  104400                          ERROR                           ;'CAR' BIT IN 'CSR' DIDN'T SET W/'CAR' = 'SAR'
2041  004174  032714  040000                  BIT     #40000,@VTCSR4          ;TEST IF BIT14 CLEAR
2042  004200  001401                          BEQ     .+4                     ;SHOULD BE WHEN SAR=CAR
2043  004202  104400                          ERROR                           ;BIT 14 NOT CLEAR
2044  004204  005014                          CLR     @VTCSR4
2045                                  ;*************************************************************************
2046                                  ;TEST THAT THE 'CURSOR ADDR.' BIT IS CLEARED IF THE 'CAR' AND 'SAR'
2047                                  ;ARE NOT SET EQUAL.
2048                                  ;*************************************************************************
2049
2050  004206  104001  000027          VT27:   SCOPE,27                        ;'VT' TEST 27
2051  004212  012777  020735  175266          MOV     #SHFTBF+13,@VTSAR       ;LOAD 'SAR'
2052  004220  104021                          WAITSYNC                        ;WAIT FOR VERTICAL SYNC.
2053  004222  012777  020733  175254          MOV     #SHFTBF+11,@VTCAR       ;LOAD 'CAR' = 'SAR'
2054  004230  012714  000004                  MOV     #SRIDE,@VTCSR4  ;FORCE 'NPR' TRANSFER
2055  004234  032715  010000                  BIT     #10000,@VTMAR5          ;TEST IF BIT 12 (CAR BIT) SET
2056  004240  001401                          BEQ     .+4
2057  004242  104400                          ERROR                           ;'CAR' SET W/ 'CAR' NOT = 'SAR'
2058  004244  032777  004000  175236          BIT     #4000,@VTCSR    ;SEE IF BIT 14 IN CSR, SET SHOULD BE
2059  004252  001001                          BNE     .+4             ;WHEN CAR <> SAR WITH ECO FOR BIT 14
2060  004254  000240                          NOP                             ;NOP IF NO ECO, PUT IN 104400 IN THIS
2061                                                                          ;LOCATION IF ECO IS IN.
2062  004256  005014                          CLR     @VTCSR4
2063                                  ;*************************************************************************
```

```
                                        ;TEST THE 'EOS' (END OF SCREEN) BIT IS SET IF THE 'EOS' CHAR. IS TRANSFERRED
                                        ;*************************************************************************
                                
004260  104001  000030        VT30:   SCOPE,30                        ;'VT' TEST 30
004264  012777  021020  175214        MOV     #SHFEND,@VTSAR          ;LOAD 'SAR'
004272  104021                       WAITSYNC                        ;WAIT FOR VERTICAL SYNC.
004274  012714  000004               MOV     #SRIDE,@VTCSR4          ;FORCE 'NPR' TRANSFER
004300  032714  020000               BIT     #20000,@VTCSR4          ;TEST IF BIT 13 (EOS)
004304  001001                       BNE     .+4
004306  104400                       ERROR                           ;'EOS' DIDN'T SET IN 'CSR'
004310  005014                       CLR     @VTCSR4
                                
                                        ;*************************************************************************
                                        ;TEST THE 'SHIFT REG. INPUT DATA EVEN' GETS TRANSFERRED FROM THE DATA BUFFER
                                        ;TO THE 'MAR'.  A SERIES OF '64' SHIFTS ARE DONE AND THE 'MAR' IS COMPARED
                                        ;TO THE DATA BUFFER AFTER EACH SHIFT.
                                        ;*************************************************************************
                                
004312  104001  000031        VT31:   SCOPE,31                        ;'VT' TEST 31
004316  000005                       RESET
004320  012737  000010  020376       MOV     #10,ICOUNT              ;RESET ITERATION COUNT TO '8'
004326  012737  023550  020022       MOV     #MES37,SHFMES           ;SET UP TO PRINT ON ERROR
004334  012737  000004  024434       MOV     #SRIDE,SELECT           ;SELECT 'SHIFT INPUT DATA EVEN'
004342  004737  004752               JSR     PC,INITSF               ;INITIALIZE SHIFT TEST
004346  004737  005004               JSR     PC,SHIFT                ;SUBROUTINE TO FORCE '64' 'NPR' XFER
004352  104400                       ERROR                           ;'SHIFT INPUT DATA EVEN' SHIFT ERROR
004354  000415                       BR      TAGVB                   ;EXIT ON ERROR
                                        ;*************************************************************************
                                        ;AT THIS POINT '64' SHIFTS HAVE BEEN MADE TO THE 'SHIFT REG. INPUT DATA
                                        ;EVEN'. THE NEXT TEST EXECUTES '63' MORE SHIFTS VALIDATING THE
                                        ;'SHIFT REG. OUTPUT DATA EVEN' INPUTTED FROM THE PREVIOUS TEST.
                                        ;*************************************************************************
                                
004356  012737  023561  020022               MOV     #MES38,SHFMES
004364  012737  000006  024434               MOV     #SRODE,SELECT   ;SELECT 'SHIFT OUTPUT DATA EVEN'
004372  004737  004752               JSR     PC,INITSF               ;INITIALIZE SHIFT TEST
004376  005722                       TST     (R2)+                   ;UPDATE BUFFER COMPARE POINTER BY '2'
004400  005200                       INC     R0                      ;SHIFT ONLY 63 TIMES FOR OUTPUT
004402  004737  005004               JSR     PC,SHIFT                ;SUBROUTINE TO FORCE THE '63' NPR XFERS
004406  104400                       ERROR                           ;'SHIFT OUTPUT DATA EVEN' SHIFT ERROR
004410  000240                TAGVB: NOP
                                        ;*************************************************************************
                                        ;TEST THE 'SHIFT REG. INPUT DATA ODD' GETS TRANSFERRED FROM THE DATA BUFFER
                                        ;TO THE 'MAR'.  A SERIES OF '64' SHIFTS ARE DONE AND THE 'MAR' IS COMPARED
                                        ;TO THE DATA BUFFER AFTER EACH SHIFT.
                                        ;*************************************************************************
                                
004412  104001  000032        VT32:   SCOPE,32                        ;'VT' TEST 32
004416  000005                       RESET
004420  012737  023550  020022       MOV     #MES37,SHFMES
004426  012737  000014  024434       MOV     #SRIDO,SELECT           ;SELECT 'SHIFT INPUT DATA ODD'
004434  004737  004752               JSR     PC,INITSF               ;INITIALIZE SHIFT TEST
004440  004737  005004               JSR     PC,SHIFT                ;SUBROUTINE TO FORCE '1' 'NPR' XFER
004444  104400                       ERROR                           ;'SHIFT INPUT DATA ODD' SHIFT ERROR
004446  000415                       BR      TAGVC                   ;EXIT ON ERROR
```

```
                                ;*************************************************************************
                                ;AT THIS POINT '64' SHIFTS HAVE BEEN MADE TO THE 'SHIFT REG. INPUT DATA
                                ;ODD'. THIS NEXT TEST EXECUTES '63' MORE SHIFTS VALIDATING THE
                                ;'SHIFT REG. OUTPUT DATA ODD' INPUTTED FROM THE PREVIOUS TEST.
                                ;*************************************************************************

004450  012737  023561  020022          MOV     #MES38,SHFMES
004456  012737  000016  024434          MOV     #SRODO,SELECT   ;SELECT 'SHIFT OUTPUT DATA ODD'
004464  004737  004752                  JSR     PC,INITSF       ;INITIALIZE SHIFT TEST
004470  005722                          TST     (R2)+           ;UPDATE BUFFER COMPARE POINTER BY '2'
004472  005200                          INC     R0              ;SHIFT ONLY 63 TIMES FOR OUTPUT
004474  004737  005004                  JSR     PC,SHIFT        ;SUBROUTINE TO FORCE THE '64' NPR XFERS
004500  104400                          ERROR                   ;'SHIFT OUTPUT DATA ODD' SHIFT ERROR
004502  000240                  TAGVC:  NOP
                                ;*************************************************************************
                                ;TEST 'NXM' FOR CAUSING AN INTERRUPT VIA LOADING A 'NXM' ADDRESS IN THE 'SAR'
                                ;NOTE: THIS IS THE FIRST TIME THAT THE 'INTR. ENABLE BIT IS SET OR USED.
                                ;*************************************************************************

004504  104001  000033          VT33:   SCOPE,33                        ;'VT' TEST 33
004510  012737  000100  020376          MOV     #100,ICOUNT             ;RESET ITERATION COUNT TO '100'
004516  005037  024436                  CLR     SHFTSW          ;CLR SOFTWARE SW.
004522  012777  173000  174756          MOV     #173000,@VTSAR  ;LOAD 'SAR' W/ 'NXM' ADDRESS
004530  004737  016740                  JSR     PC,LDVTVT       ;LOAD THE 'VT' VECTOR ADDRESS
004534  004544                          TAGVA
004536  104021                          WAITSYNC                ;WAIT FOR INTERRUPT
004540  104021                          WAITSYNC
004542  104400                          ERROR                   ;SETTING 'SAR' TO 'NXM' ADDR. DIDN'T ERROR
004544  013706  024136          TAGVA:  MOV     STACK,SP        ;RESET STACK POINTER
004550  004737  016774                  JSR     PC,CLRVTV       ;RESET 'VT' VECTOR ADDR. TO HALT
004554  005714                          TST     @VTCSR4         ;TEST THE 'NXM' SET THE ERROR BIT
004556  100401                          BMI     .+4
004560  104400                          ERROR                   ;'NXM' FAILED TO SET 'ERROR' BIT
004562  000005                          RESET

                                ;*************************************************************************
                                ;TEST THAT NO INTERRUPT OCCURS WITH PROC. AT PRIORITY '5'
                                ;*************************************************************************

004564  104001  000034          VT34:   SCOPE,34                        ;'VT' TEST 34
004570  012777  173000  174710          MOV     #173000,@VTSAR
004576  004737  016740                  JSR     PC,LDVTVT       ;LOAD 'VT' INTERRUPT VECTOR
004602  004624                          TAGVD
004604  012777  000240  174500          MOV     #240,@PSW
004612  012700  170000                  MOV     #170000,R0
004616  005200                          INC     R0
004620  001376                          BNE     .-2
004622  000403                          BR      .+10            ;'OK', NO INTERRUPT OCCURRED
004624  104400                  TAGVD:  ERROR                   ;INTERRUPTED WITH PROC @ PRIOR '5'
004626  013706  024136                  MOV     STACK,SP
004632  000005                          RESET
004634  004737  016774                  JSR     PC,CLRVTV
                                ;*************************************************************************
                                ;TEST THAT NO 'NXM' ERRORS OCCUR IF THE 'VT' IS RUNNING AND THE
                                ;STARTING ADDRESS REG. IS CHANGED.
                                ;*************************************************************************
```

```
2176
2177  004640  104001  000035          VT35:   SCOPE,35                        ;'VT' TEST 35
2178  004644  012701  000010                  MOV     #10,R1          ;SET UP A LOOP COUNTER
2179  004650  012700  020724                  MOV     #SHFTBF+2,R0
2180  004654  012777  020722  174624          MOV     #SHFTBF,@VTSAR
2181  004662  104021                         WAITSYNC                ;WAIT FOR VERICAL SYNC
2182  004664  004737  016740                  JSR     PC,LDVTVT       ;LOAD 'VT' INTERRUPT VECTOR ADDR.
2183  004670  004716                         TAGVF
2184  004672  005002                 TAGVE:  CLR     R2
2185  004674  005202                         INC     R2              ;EVERYTIME 'R2' OVERFLOWS THE
2186  004676  001376                         BNE     .-2             ;'SAR' IS RELOADED
2187  004700  010077  174602                 MOV     R0,@VTSAR       ;RELOAD 'SAR'
2188  004704  005720                         TST     (R0)+
2189  004706  104021                         WAITSYNC                ;WAIT FOR VERICAL SYNC
2190  004710  005301                         DEC     R1
2191  004712  001367                         BNE     TAGVE
2192  004714  000403                         BR      .+10            ;OK, NO INTERRUPTS OCCURRED
2193  004716  104400                 TAGVF:  ERROR                   ;'NXM' ERROR OCCURRED WHEN 'SAR' WAS CHANGED
2194  004720  013706  024136                 MOV     STACK,SP
2195  004724  004737  016774                 JSR     PC,CLRVTV
2196
2197                                  ;*************************************************************************
2198                                  ;'VT' LOGIC TEST COMPLETE
2199                                  ;*************************************************************************
2200
2201  004730  104001  000036          VT36:   SCOPE,36                        ;'VT' TEST 36
2202  004734  104012                         PRINT
2203  004736  021615                         MES7                    ;TEXT 'TEST COMPLETE'
2204  004740  104006                         ENDTST                  ;END OF TEST
2205  004742  000401                         BR      .+4
2206  004744  000510                         BR      VTCHAR          ;CONTINUE TO CHARACTER TEST
2207  004746  000137  003136                 JMP     VTREST          ;RESTART THE LOGIC TEST.
2208
2209                                  ;*************************************************************************
2210                                  ;SUBROUTINE TO INITIALIZE THE 'SAR', 'CAR' AND SHIFT COUNTER FOR THE
2211                                  ;'VT' LOGIC SHIFT TEST.
2212                                  ;*************************************************************************
2213
2214  004752  012777  020722  174526  INITSF: MOV     #SHFTBF,@VTSAR  ;LOAD 'STARTING ADDR'
2215  004760  012703  020722                  MOV     #SHFTBF,R3
2216  004764  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
2217  004766  012702  020722                  MOV     #SHFTBF,R2
2218  004772  005000                         CLR     R0              ;CLR 'SHIFT' COUNTER
2219  004774  012737  000001  024436          MOV     #1,SHFTSW       ;SET SOFTWARE SW.
2220  005002  000207                         RTS     PC
2221                                  ;*************************************************************************
2222                                  ;SUBROUTINE TO FORCE THE 'NPR' XFER FOR THE 'VT' LOGIC SHIFT TEST.
2223                                  ;THE ADDRESS 'SELECT' CONTAINS THE SELECTED SHIFT FUNCTION (SHIFT INPUT
2224                                  ;DATA EVEN, ETC.) WHICH IS EXECUTED.
2225                                  ;*************************************************************************
2226
2227  005004  005200                 SHIFT:  INC     R0              ;INCREMENT SOFTWARE SHIFT COUNTER
2228  005006  013714  024434                  MOV     SELECT,@VTCSR4  ;FORCE 'NPR' TRANSFER
2229  005012  005723                         TST     (R3)+           ;UPDATE STARTING ADDRESS BY '2'
2230  005014  010377  174466                 MOV     R3,@VTSAR       ;SET UP TO GET NEXT BUFFER WORD.
2231  005020  104021                         WAITSYNC                ;WAIT FOR VERTICAL SYNC.
```

```
2232  005022  012201                        MOV     (R2)+,R1        ;GET XFER'D WORD FROM DATA BUFFER
2233  005024  042701  000360                BIC     #360,R1         ;CLR UNWANTED BITS FROM CONTROL WORD
2234  005030  000301                        SWAB    R1              ;SWAP BYTES TO COMPARE TO 'MAR'
2235  005032  022700  000040        SHFLST: CMP     #32.,R0         ;IS THIS THE '32' SHIFT?
2236  005036  001010                        BNE     SHF64           ;NO, CHECK FOR '64' SHIFT
2237  005040  022715  020031                CMP     #20031,@VTMAR5  ;YES,END OF SCREEN SHOULD BE SET IN 'MAR'
2238  005044  001013                        BNE     SHFBAD          ;NO, 32ND SHIFT IS BAD
2239  005046  004737  004752        SHF32:  JSR     PC,INITSF       ;RE-INITIALIZE SOFWARE POINTERS FOR '32' MORE SHIFTS
2240  005052  012700  000040                MOV     #32.,R0         ;RESET SHIFT COUNTER TO COUNT TO '64'
2241  005056  000752                        BR      SHIFT           ;DO IT.
2242  005060  022700  000100        SHF64:  CMP     #64.,R0         ;IS THIS THE LAST SHIFT
2243  005064  001006                        BNE     TSTSHF          ;NO, COMPARE DATA TO 'MAR' DIRECTLY
2244  005066  022715  020031                CMP     #20031,@VTMAR5  ;YES, 'EOS' SHOULD BE SET
2245  005072  001432                        BEQ     EXITSF          ;EXIT
2246  005074  052701  020000        SHFBAD: BIS     #20000,R1       ;SET UP 'R1' TO = EXPECTED WORD
2247  005100  000412                        BR      REPORT          ;REPORT ERROR
2248  005102  032701  000400        TSTSHF: BIT     #400,R1         ;COMPLIMENT BLANK BIT FOR COMPARE
2249  005106  001003                        BNE     .+10
2250  005110  052701  000400                BIS     #400,R1
2251  005114  000402                        BR      .+6
2252  005116  042701  000400                BIC     #400,R1
2253  005122  020115                        CMP     R1,@VTMAR5      ;DOES 'MAR' = EXPT'D WORD?
2254  005124  001727                        BEQ     SHIFT           ;YES, FORCE NEXT SHIFT
2255  005126  022700  000100        REPORT: CMP     #64.,R0         ;IS ERROR ON THE LAST SHIFT?
2256  005132  001404                        BEQ     .+12            ;YES,EXIT
2257  005134  032777  010000  174162        BIT     #SW12,@SWR      ;NO, IS SW SET TO CONTINUE SHIFTING?
2258  005142  001401                        BEQ     .+4             ;YES
2259  005144  000207                        RTS     PC              ;RETURN TO SUBTEST AND REPORT ERROR
2260  005146  104400                        ERROR                   ;PRINT ERROR DATA
2261  005150  022700  000040                CMP     #32.,R0         ;IS THIS THE '32' SHIFT
2262  005154  001734                        BEQ     SHF32           ;YES, RE-INITIALIZE BUFFER
2263  005156  000712                        BR      SHIFT           ;NO,CONTINUE SHIFTING
2264  005160  062716  000004        EXITSF: ADD     #4,(SP)         ;SET UP STACK TO SKIP OVER ERROR
2265  005164  000207                        RTS     PC
2266                          ;*********************************************************************
2267                          ;VT 'CHARACTER DISPLAY' TEST (1)
2268                          ;THIS TEST DISPLAYS ALL '160' VT CHARACTERS ONE AT A TIME UNTIL THE ENTIRE
2269                          ;'VT' SCREEN IS FILLED. EACH CHARACTER IS DISPLAYED FOR APPROXIMATELY '3' SECONDS
2270                          ;BEFORE THE NEXT CHARACTER IS DISPLAYED.  ON EACH LINE,THE '64' CHARACTER IS DIS-
2271                          ;PLAYED AS EITHER A 'VISIBLE END OF LINE OR A 'VISIBLE END OF PARAGRAPH'.
2272                          ;DATA 'SW14' MAY BE SET AT ANYTIME TO HOLD ON ANY INDIVIDUAL CHARACTER.
2273                          ;*********************************************************************
2274
2275  005166  012737  005166  020402 VTCHAR: MOV     #VTCHAR,RETURN
2276  005174  104000                        DISPLAY
2277  005176  023210                        MES24                   ;TEXT "VT CHARACTER DISPLAY TEST".
2278  005200  104005                        EOSBUF                  ;LOAD 'VT' BUFFER WITH 'EOS'.
2279  005202  005037  024156                CLR     INTSWH          ;SUBROUTINE SOFTWARE SW.
2280  005206  000401                        BR      .+4
2281  005210  104004                        DELAY                   ;3 SEC. DELAY.
2282  005212  004737  015170                JSR     PC,INTCHR       ;CREATE & DISPLAY NEXT CHAR.
2283  005216  000240                        NOP                     ;NORMAL RETURN TO HERE
2284  005220  000773                        BR      .-10            ;END OF LINE RETURNS HERE
2285  005222  104006                        ENDTST
2286  005224  000760                        BR      VTCHAR          ;END OF SCREEN RETURN HERE
2287
```

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                                        ;*************************************************************************
                                        ;VT 'FIELD CONTROL' TEST (2)
                                        ;THIS TEST DISPLAYS THE 'VT' CHARACTER SET USING ALL '5' FIELD CONTROL MODES.
                                        ;(NORMAL,BLINK,BOLD,BLANK AND UNDERLINE). THE TEST DISPLAYS CHARACTERS
                                        ;'40-136' ON LINES '1-5' USING ALL '5' MODES. CHARACTERS '137-240 (WITH THE
                                        ;EXCEPTION OF CHARACTERS 212,214 & 231) ON LINES '6-10'. CHARACTERS
                                        ;'241-277' ARE DISPLAYED ON THE LAST '5' LINES.
                                        ;*************************************************************************

005226  012737  005226  020402  VTMOD1: MOV     #VTMOD1,RETURN
005234  104000                          DISPLAY
005236  023244                          MES25                           ;TEXT 'VT FIELD CONTROL TEST'.
005240  104005                          EOSBUF                          ;LOAD 'VT' BUFFER WITH 'VISIBLE EOS'.
005242  012737  024500  024464          MOV     #VTBUFF,KSTOR1
005250  005037  024156                  CLR     INTSWH                  ;CLR SOFTWARE SWITCH
005254  012737  177775  024470          MOV     #-3,KSTOR3              ;SET UP FOR '3' SETS OF CHAR.'S
005262  004737  005274                  JSR     PC,VTMD1A               ;LOAD CHAR.'S
005266  104023                          THEND
005270  000756                          BR      VTMOD1
005272  000413                          BR      VTMOD2                  ;GO TO NEXT TEST IF SW. IS SET

005274  004737  015170          VTMD1A: JSR     PC,INTCHR               ;CREATE AND LOAD CHAR.
005300  000775                          BR      .-4                     ;LOOP UNTIL LINE IS FULL
005302  000240                          NOP                             ;END OF LINE RETURNS HERE
005304  104007                          SETLNE                          ;SET UP '4' LINES USING ALL MODES
005306  010037  024464                  MOV     R0,KSTOR1               ;SAVE ST. ADDR. FOR NEXT BUFFERED LINE
005312  005237  024470                  INC     KSTOR3                  ;FINISHED?
005316  001366                          BNE     VTMD1A                  ;NO, CREATE NEXT SET
005320  000207                          RTS     PC                      ;YES, EXIT

                                        ;*************************************************************************
                                        ;VT 'CSR PRESET' TEST (3)
                                        ;THIS TEST DISPLAYS THE 'VT' CHARACTER SET IN ALL FIELD CONTROL MODES
                                        ;(BOLD,BLINK,BLANK & UNDERLINE). THE FIELD CONTROL IS SELECTED VIA THE
                                        ;'CSR' BEFORE EACH CHARACTER SET IS DISPLAYED.
                                        ;*************************************************************************

005322  012737  005322  020402  VTMOD2: MOV     #VTMOD2,RETURN
005330  104000                          DISPLAY
005332  023274                          MES26                           ;TEXT 'VT' CSR PRESET TEST'.
005334  104005                          EOSBUF                          ;LOAD 'VT' BUFFER W/ 'EOS'.
005336  104000                          DISPLAY
005340  023572                          MES39                           ;TEXT 'BOLD PRESET TEST'
005342  012777  002001  174140  VTMD2A: MOV     #2001,@VTCSR            ;SELECT 'BOLD' PRESET & GO
005350  004737  005434                  JSR     PC,VTMD2B               ;LOAD CHAR.'S
005354  104000                          DISPLAY
005356  023615                          MES40                           ;TEXT 'BLINK PRESET TEST'
005360  012777  001001  174122          MOV     #1001,@VTCSR             ;SELECT 'BLINK' PRESET
005366  004737  005434                  JSR     PC,VTMD2B               ;LOAD CHAR.'S
005372  104000                          DISPLAY
005374  023641                          MES41                           ;TEXT 'BLANK PRESET TEST'
005376  012777  000401  174104          MOV     #401,@VTCSR             ;SELECT 'BLANK' PRESET
005404  004737  005434                  JSR     PC,VTMD2B               ;LOAD CHAR.'S
005410  104000                          DISPLAY
005412  023665                          MES42                           ;TEXT 'UNDERLINE PRESET TEST'
005414  012777  004001  174066          MOV     #4001,@VTCSR            ;SELECT 'UNDERLINE' PRESET
005422  004737  005434                  JSR     PC,VTMD2B               ;LOAD CHAR.'S
```

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2344  005426  104006                          ENDTST
2345  005430  000734                          BR      VTMOD2                  ;RE-CYCLE
2346  005432  000410                          BR      VTEOL                   ;BRANCH TO NEXT TEST IS SW. SET
2347
2348  005434  005037  024156          VTMD2B: CLR     INTSWH                  ;CLR SOFTWARE SW.
2349  005440  004737  015170                  JSR     PC,INTCHR               ;CREATE & DISPLAY CHAR.
2350  005444  000240                          NOP
2351  005446  000774                          BR      .-6                     ;LOOP UNTIL SCREEN IF FILLED
2352  005450  104020                          DELAYL                          ;6 SEC. DELAY
2353  005452  000207                          RTS     PC                      ;EXIT
2354                          ;*****************************************************************************
2355                          ;VT 'END OF LINE' TEST (4)
2356                          ;THIS TEST TESTS THAT THE 'END OF LINE' CHARACTER CAN BE PLACED IN
2357                          ;ANY OF THE '1024' CHARACTER POSITIONS ON THE SCREEN. THIS IS DONE BY
2358                          ;STARTING ALL 16 LINES WITH A 'VISIBLE END OF LINE' CHARACTER AND
2359                          ;THEN INCREMENTING THESE CHARACTERS ACROSS THE SCREEN.
2360                          ;*****************************************************************************
2361
2362  005454  012737  005454  020402  VTEOL:  MOV     #VTEOL, RETURN
2363  005462  104000                          DISPLAY
2364  005464  023321                          MES27                           ;TEXT 'VT END OF LINE TEST'
2365  005466  104005                          EOSBUF                          ;LOAD 'VT' BUFFER & START
2366  005470  005001                          CLR     R1                      ;CLR LINE CNTR.
2367  005472  112720  000212          RESCNT: MOVB    #VISEOL,(R0)+           ;TERMINATE LINE W/ 'EOL'
2368  005476  012703  000077                  MOV     #63.,R3                 ;SAVE '63' BYTES BEFORE NEXT LINE
2369  005502  105020                          CLRB    (R0)+
2370  005504  005303                          DEC     R3
2371  005506  001375                          BNE     .-4
2372  005510  005201                          INC     R1                      ;INCREMENT LINE CNTR.
2373  005512  022701  000021                  CMP     #17.,R1                 ;DONE '16' LINES ?
2374  005516  001365                          BNE     RESCNT                  ;NO, CREATE NEXT LINE
2375  005520  104004                          DELAY                           ;DISPLAY THE 1ST 16 LINES OF 'EOL'
2376
2377                          ;AT THIS POINT 16 LINES EACH CONTAINING 1 'EOL' AND 63 SPACES HAVE
2378                          ;BEEN SET UP IN MEMORY. THE FOLLOWING SUBROUTINE GOES THRU ONE
2379                          ;BY ONE REPLACING THE 'EOL' WITH AN '*' AND MOVING THE 'EOL'
2380                          ;INTO THE NEXT SPACE UNTIL THE ENTIRE LINE HAS BEEN CHECKED.
2381
2382  005522  012705  000077                  MOV     #63.,R5                 ;SET UP FOR '63' SHIFTS
2383  005526  012704  000020          SRHEOL: MOV     #16.,R4
2384  005532  012700  024500                  MOV     #VTBUFF,R0              ;RESET BUFFER ADDR. POINTER
2385  005536  122027  000212          SHFEOL: CMPB    (R0)+,#VISEOL           ;SEARCH BUFFER FOR "EOL"
2386  005542  001375                          BNE     .-4
2387  005544  112740  000052                  MOVB    #52,-(R0)               ;REPLACE 'EOL' W/ '*'
2388  005550  105720                          TSTB    (R0)+                   ;RESET POINTER
2389  005552  112720  000212                  MOVB    #VISEOL,(R0)+           ;MOVE 'EOL' OVER '1'
2390  005556  005304                          DEC     R4                      ;DONE '16' LINES
2391  005560  001366                          BNE     SHFEOL                  ;NO, SHIFT NEXT 'EOL'
2392  005562  104004                          DELAY                           ;3 SEC. DISPLAY DELAY
2393  005564  005305                          DEC     R5                      ;DONE '63' SHIFTS
2394  005566  001357                          BNE     SRHEOL                  ;NO, LOOP AGAIN
2395  005570  104006                          ENDTST
2396  005572  000730                          BR      VTEOL                   ;YES, RESTART TEST
2397                          ;*****************************************************************************
2398                          ;VT 'END OF SCREEN' TEST (5)
2399                          ;THIS TEST TESTS THAT THE 'VISIBLE END OF SCEEEN' CHARACTER CAN
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```
                                        ;BE PLACED IN ALL '1024' CHARACTER POSITIONS ON THE SCREEN. THIS
                                        ;IS DONE BY FIRST PRE-LOADING THE  BUFFER TO BE DISPLAYED WITH
                                        ;QUESTION MARKS. THE 'EOS' CHARACTER IS THEN INCREMENTED THRU THIS
                                        ;BUFFER REPLACING THE QUESTION MARKS BEHIND THE 'EOS' CHARACTER WITH
                                        ;DOTS.
                                        ;*************************************************************************

005574  012737  005574  020402  VTEOS:  MOV     #VTEOS, RETURN
005602  104000                          DISPLAY
005604  023345                          MES30                   ;TEXT 'VT END OF SCREEN TEST'
005606  104011                          PRELOAD                 ;PRE-LOAD THE BUFFER WITH '?'
005610     077                          .BYTE   77
005611     077                          .BYTE   77
005612  012701  002000                  MOV     #1024.,R1       ;SET UP CHAR. CNTR.
005616  012700  024500                  MOV     #VTBUFF,R0      ;SET UP BUFFER POINTER
005622  112710  000231                  MOVB    #VISEOS,(R0)    ;LOAD 1ST CHAR. WITH 'EOS'
005626  012777  000001  173654          MOV     #1,@VTCSR       ;ST DISPLAY
005634  104004          SRHEOS: DELAY
005636  005301                          DEC     R1              ;DONE
005640  001405                          BEQ     ENDEOS          ;YES, EXIT
005642  012720  000056                  MOV     #56,(R0)+       ;NO, REPLACE THE 'EOS' W/ DOT.
005646  112710  000231                  MOVB    #VISEOS,(R0)    ;MOVE 'EOS' OVER '1' PLACE
005652  000770                          BR      SRHEOS
005654  104006          ENDEOS: ENDTST
005656  000746                          BR      VTEOS           ;YES, RESTART TEST

                                        ;*************************************************************************
                                        ;VT 'BLANK CONTROL' TEST (6)
                                        ;THIS TEST INCREMENTS THE 'BLANK' CONTROL CHARACTER (361) THRU A
                                        ;FULL SCREEN BUFFER OF ?'S. THE SCREEN STARTS BLANK AND END'S
                                        ;UP FULL OF *'S.
                                        ;*************************************************************************

005660  012737  005660  020402  VTBLANK:MOV     #VTBLANK,RETURN
005666  104000                          DISPLAY
005670  023375                          MES31                   ;TEXT 'VT BLANKING' TEST
005672  104011                          PRELOAD                 ;PRELOAD DATA BUFFER
005674     077                          .BYTE   77              ;W/ ?'S
005675     077                          .BYTE   77
005676  112710  000361                  MOVB    #BLANK,(R0)     ;SET UP BLANK CONTROL CHAR.
005702  012701  002000                  MOV     #1024.,R1       ;SET UP CNTR
005706  012777  000001  173574          MOV     #1,@VTCSR       ;ST. DISPLAY
005714  104004                          DELAY                   ;3 SEC. DISPLAY DELAY
005716  112720  000052          MOVBLK: MOVB    #52,(R0)+       ;REPLACE, 'BLANK' CHAR. W/*
005722  112710  000361                  MOVB    #BLANK,(R0)     ;MOVE 'BLANK' CHAR. UP '1'
005726  104004                          DELAY
005730  005301                          DEC     R1              ;MOVED 'BLANK' THUR BUFFER
005732  001371                          BNE     MOVBLK          ;NO
005734  104006                          ENDTST
005736  000750                          BR      VTBLANK         ;RESTART TEST

                                        ;*************************************************************************
                                        ;VT 'ALIGNMENT' TEST (7)
                                        ;THIS TEST DISPLAYS A FULL SCREEN OF THE CHAR. 'E' TO ENABLE A VISUAL
                                        ;ALIGNMENT OF THE 'VT'.
                                        ;*************************************************************************
```

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005740  012737  005740  020402  VTALIN: MOV      #VTALIN,RETURN
005746  104000                          DISPLAY
005750  023425                          MES33                         ;TEXT 'VT' 'ALIGNMENT' TEST
005752  104011                          PRELOAD                       ;PRELOAD 'VT' DATA BUFFER
005754     105                          .BYTE    105                  ;W/ E'S
005755     105                          .BYTE    105
005756  005277  173526                  INC      @VTCSR               ;ST. DISPLAY
005762  104023                          THEND

005764  000765                          BR       VTALIN
                                ;***********************************************************************
                                ;VT 'FOCUS' TEST (10)
                                ;THIS TEST DISPLAYS A FULL SCREEN OF ALTERNATE *'S & 1'S TO ENABLE A VISUAL
                                ;FOCUS OF THE 'VT'.
                                ;***********************************************************************

005766  012737  005766  020402  VTFOCUS:MOV      #VTFOCUS,RETURN
005774  104000                          DISPLAY
005776  023451                          MES34                         ;TEXT 'VT FOCUS TEST'
006000  104011                          PRELOAD                       ;LOAD 'VT' DATA BUFFER
006002     052                          .BYTE    52                   ;WITH *'S
006003     061                          .BYTE    61                   ;AND 1'S
006004  005277  173500                  INC      @VTCSR               ;ST. DISPLAY
006010  104023                          THEND
006012  000765                          BR       VTFOCUS

                                ;*********************************************************************
                                ;VT 'WORST CASE' TEST (11)
                                ;THIS TEST DISPLAYS A FULL SCREEN OF THE WORST  CASE PATTERN '125 & 252'.
                                ;***********************************************************************

006014  012737  006014  020402  VTWORST:MOV      #VTWORST,RETURN
006022  104000                           DISPLAY
006024  023471                          MES35                         ;TEXT 'VT WORST  CASE TEST'
006026  104011                          PRELOAD                       ;LOAD 'VT' BUFFER W/ WORST CASE
006030     125                          .BYTE    125                  ;CHAR. 125
006031     252                          .BYTE    252                  ;CHAR. 252
006032  005277  173452                  INC      @VTCSR               ;ST. DISPLAY
006036  104023                          THEND
006040  000765                          BR       VTWORST
                                ;*********************************************************************
                                ;VT 'CURSOR MOVEMENT' TEST (12)
                                ;THIS TEST TESTS THAT THE CURSOR CONTROL CHARACTER CAN BE PLACED
                                ;IN ANY POSITION ON THE SCREEN.THIS IS DONE BY DISPLAYING A 'CURSOR EOS'
                                ;BEING INCREMENTED ACROSS THE SCREEN. AS THE CURSOR IS INCREMENTED ALONG
                                ;ASTRICKS ARE FILLED IN BEHIND IT AND WHEN THE TEST IS COMPLETE THE
                                ;ENTIRE SCREEN WILL BE FILLED WITH *'S.
                                ;**********************************************************************

006042  012737  006042  020402  VTCURSR:MOV      #VTCURSR,RETURN
006050  104000                          DISPLAY
006052  023516                                   MES36                ;TEXT 'VT CURSOR MOVEMENT TEST'
006054  104011                          PRELOAD                      ;PRE-LOAD THE BUFFER WITH '?'
006056     077                          .BYTE    77
006057     077                          .BYTE    77
```

```
2512  006060  012701  002000          MOV     #1024.,R1       ;SET UP CHAR. CNTR.
2513  006064  012700  024500          MOV     #VTBUFF,R0      ;SET UP BUFFER POINTER
2514  006070  010077  173410          MOV     R0,@VTCAR       ;LOAD 'CURSOR' ADDRESS REG.
2515  006074  012710  000231          MOV     #VISEOS,(R0)    ;LOAD 1ST CHAR. WITH 'EOS'
2516  006100  012777  000001  173402  MOV     #1,@VTCSR       ;ST DISPLAY
2517  006106  104004          SHFCUR: DELAY
2518  006110  005301                  DEC     R1              ;DONE
2519  006112  001407                  BEQ     ENDCUR          ;YES, EXIT
2520  006114  012720  000056          MOV     #56,(R0)+       ;NO, REPLACE THE 'EOS' W/ DOT.
2521  006120  010077  173360          MOV     R0,@VTCAR       ;UPDATE 'CAR' TO STAY WITH 'EOS'
2522  006124  012710  000231          MOV     #VISEOS,(R0)    ;MOVE 'EOS' OVER '1' PLACE
2523  006130  000766                  BR      SHFCUR
2524  006132  104006          ENDCUR: ENDTST
2525  006134  000742                  BR      VTCURSR         ;YES, RESTART TEST
2526
2527                  ;*************************************************************************
2528                  ;VT 'ODD ADDRESS' TEST (13)
2529                  ;THIS TEST SIMPLY DISPLAYS A MESSAGE WHICH IS LOADED FROM AN ODD
2530                  ;STARTING ADDRESS.
2531                  ;*************************************************************************
2532
2533  006136  012737  006136  020402  VTODD:  MOV     #VTODD, RETURN
2534  006144  104000                  DISPLAY
2535  006146  022104                  MES10                   ;TEXT 'VT ODD ADDRESS TEST'
2536  006150  005077  173334          CLR     @VTCSR          ;STOP DISPLAY
2537  006154  012777  022255  173324  MOV     #MES11,@VTSAR   ;LOAD 'SAR' W/ MESSAGE FROM ODD ADDRESS.
2538  006162  005277  173322          INC     @VTCSR          ;START & DISPLAY MESSAGE
2539  006166  104023                  THEND
2540  006170  000762                  BR      VTODD
2541  006172  000421                  BR      FKLOGIC         ;CONTINUE TO FK LOGIC TEST
2542                  ;*************************************************************************
2543                  ;FK11 FUNCTION KEYBOARD LOGIC TEST (15)
2544                  ;THIS IS AN OPERATOR INTERVENTION TEST WHICH TESTS THE FUNCTION KEYBOARD LOGIC.
2545                  ;REQUESTS ARE MADE FROM THE PROGRAM FOR INPUTS FROM THE FUNCTION KEYBOARD.
2546                  ;*************************************************************************
2547
2548  006174  013704  001474  SETUPF: MOV     FKCSR,FKCSR4            ;MOVE 'CSR' ADDR. TO R4
2549  006200  005037  024450          CLR     MESPRT                  ;CLR PRINT INHIBIT SW.
2550  006204  012737  000400  020376  MOV     #400,ICOUNT             ;INITIALIZE THE ITERATION COUNT
2551  006212  012737  017442  000034  MOV     #FKERR,@#34             ;LOAD 'TRAP' VECTOR FOR ERROR HANDLER
2552  006220  012737  006246  020402  MOV     #FKT1,RETURN            ;SET UP THE RETURN ADDRESS FOR SCOPE
2553  006226  012737  000001  024146  MOV     #1,TSTNUM               ;INIT TEST NO. CNTR.
2554  006234  000207                  RTS     PC
2555
2556  006236  104000          FKLOGIC:DISPLAY
2557  006240  021245                  MES2                    ;TEXT 'FK LOGIC TEST;
2558  006242  004737  006174          JSR     PC,SETUPF       ;INITIALIZE THE 'FK' LOGIC TEST
2559
2560                  ;*************************************************************************
2561                  ;ISSUE 'RESET' AND CHECK THAT THE 'CONTROL REG. IS INITIALIZED CORRECTLY
2562                  ;*************************************************************************
2563
2564  006246  000240          FKT1:   NOP                     ;FK TEST '1'
2565  006250  000240                  NOP
2566  006252  000005                  RESET
2567  006254  005714                  TST     @FKCSR4         ;'RESET' SHOULD OF CLEARED REGISTER
```

```
                        BEQ     FKT2                    ;BRANCH IF CLEARED
                        ERROR                           ;FK 'CSR' WASN'T CLEARED VIA ' RESET'

                ;*************************************************************************
                ;TEST THAT THE 'ERROR', 'ASCII FLAG', & 'GO' BITS CAN BE WROTE TO '1'
                ;*************************************************************************

FKT2:   SCOPE,2                         ;'FK' TEST 2
                        BIS     #177665,@FKCSR4         ;WRITE ALL 'CSR' BITS EXCEPT '6' TO 1'S
                        MOV     @FKCSR4,R0
                        BIC     #2000,R0                        ;CLR INTERVAL TIMING BIT
                        CMP     #100201,R0              ;TEST IF BITS '15,7,0' SET
                        BEQ     .+4
                        ERROR                           ;BITS '15,7&0' FAILED TO WRITE TO 1 IN 'CSR'
                        MOV     #12,@FKCSR4             ;CLR FLAGS

                ;*************************************************************************
                ;TEST THAT THE  'GO' BIT CAN BE WROTE TO '0'
                ;*************************************************************************

FKT3:   SCOPE,3                         ;'FK' TEST 3
                        BIS     #177665,@FKCSR4         ;WRITE ALL 'CSR' BITS TO '1'
                        CLR     @FKCSR4                 ;WRITE BITS TO '0'
                        BIT     #1,@FKCSR4              ;TEST IF 'GO' BIT CLEARED
                        BEQ     .+4
                        ERROR                           ;THE 'GO' BIT DIDN'T CLR
                        MOV     #12,@FKCSR4             ;CLR FLAGS
                ;*************************************************************************
                ;TEST THAT THE 'ERROR', 'ASCII FLAG' & 'GO' BITS CAN BE CLEARED VIA 'RESET'
                ;*************************************************************************

FKT4:   SCOPE,4                         ;'FK' TEST 4
                        BIS     #177665,@FKCSR4         ;WRITE BITS TO 1
                        RESET
                        TST     @FKCSR4                 ;TEST IF 'RESET' CLEARED 'CSR'
                        BEQ     .+4
                        ERROR                           ;RESET FAILED TO CLR 'CSR'

                ;*************************************************************************
                ;TEST THAT THE 'INTERVAL TIMER' FLAG DOESN'T SET IF 'GO' IS CLEARED
                ;*************************************************************************

FKT5:   SCOPE,5                         ;'FK' TEST 5
                        MOV     #-2000,R0               ;SET UP WAIT LOOP
                        INC     R0                      ;WAIT FOR INTERVAL TIMER FLAG
                        BNE     .-2
                        BIT     #2000,@FKCSR4
                        BEQ     .+4
                        ERROR                           ;INTERVAL TIMER FLAG SET W/GO CLEARED.
                        MOV     #12,@FKCSR4             ;CLR FLAGS

                ;*************************************************************************
                ;TEST THAT THE 'INTERVAL TIMER' FLAG WILL SET IF GO IS SET
                ;*************************************************************************

FKT6:   SCOPE,6                         ;'FK' TEST 6
```

```
2624  006416  012700  176000          MOV     #-2000,R0               ;SET UP WAIT LOOP
2625  006422  052714  000001          BIS     #1,@FKCSR4              ;SET 'GO'
2626  006426  005200                  INC     R0                      ;GIVE FLAG A CHANCE TO SET
2627  006430  001376                  BNE     .-2
2628  006432  032714  002000          BIT     #2000,@FKCSR4           ;TEST IF FLAG SET
2629  006436  001001                  BNE     .+4
2630  006440  104400                  ERROR                           ;INTERVAL TIMER FLAG DIDN'T SET W/GO SET
2631  006442  012714  000012          MOV     #12,@FKCSR4             ;CLR FLAGS
2632
2633                                  ;*****************************************************************
2634                                  ;TEST THAT THE INTERVAL TIMER FLAG CAN BE CLEARED VIA SETTING BIT 1
2635                                  ;*****************************************************************
2636
2637  006446  104001  000007  FKT7:   SCOPE,7                         ;'FK' TEST 7
2638  006452  052714  000001          BIS     #1,@FKCSR4              ;SET 'GO'
2639  006456  032714  002000          BIT     #2000,@FKCSR4           ;WAIT FOR FLAG
2640  006462  001775                  BEQ     .-4
2641  006464  042714  000001          BIC     #1,@FKCSR4              ;CLR 'GO'
2642  006470  052714  000002          BIS     #2,@FKCSR4              ;CLR INTERVAL TIMER FLAG
2643  006474  032714  002000          BIT     #2000,@FKCSR4           ;SEE IF FLAG CLEARED
2644  006500  001401                  BEQ     .+4
2645  006502  104400                  ERROR                           ;SETTING BIT '1' DIDN'T CLR INTERVAL FLAG.
2646                                  ;*****************************************************************
2647                                  ;TEST THAT 'RESET' WILL CLR THE 'INTERVAL TIMER' FLAG.
2648                                  ;*****************************************************************
2649
2650  006504  104001  000010  FKT10:  SCOPE,10                        ;'FK' TEST 10
2651  006510  052714  000001          BIS     #1,@FKCSR4              ;SET 'GO'
2652  006514  032714  002000          BIT     #2000,@FKCSR4           ;WAIT FOR FLAG
2653  006520  001775                  BEQ     .-4
2654  006522  000005                  RESET                           ;CLR FLAG W/RESET
2655  006524  005714                  TST     @FKCSR4                 ;RESET SHOULD OF CLEARED REG.
2656  006526  001401                  BEQ     .+4
2657  006530  104400                  ERROR                           ;'RESET' DIDN'T CLR INTERVAL FLAG
2658
2659                                  ;*****************************************************************
2660                                  ;TEST THAT THE INTERVAL TIMER FLAG CAUSES AN INTERRUPT WITH PROCESSOR PRIORITY @ 0
2661                                  ;*****************************************************************
2662
2663  006532  104001  000011  FKT11:  SCOPE,11                        ;'FK' TEST 11
2664  006536  012700  176000          MOV     #-2000,R0               ;SET UP A WAIT LOOP
2665  006542  004737  016654          JSR     PC,LDFKVT               ;SET UP 'FK' INTR. ADDR.
2666  006546  006560                  TAGA                            ;INTERRUPT SERVICE ADDR.
2667  006550  005200                  INC     R0                      ;WAIT FOR INTERRUPT
2668  006552  001376                  BNE     .-2
2669  006554  104400                  ERROR                           ;INTERVAL TIMER FLAG DIDN'T CAUSE INTERRUPT
2670  006556  000401                  BR      .+4
2671  006560  022626          TAGA:   POP2SP                          ;RESET THE STACK
2672  006562  004737  016710          JSR     PC,CLRFKV               ;CLR 'FK' INTR. ADDR.
2673
2674                                  ;*****************************************************************
2675                                  ;TEST THAT 'NO' INTERRUPT OCCURRS IF 'GO' IS CLEARED
2676                                  ;*****************************************************************
2677
2678  006566  104001  000012  FKT12:  SCOPE,12                        ;'FK' TEST 12
2679  006572  012777  006630  172700          MOV     #TAGAB,@FKINT   ;SET UP THE INTERRUPT ADDRESS
```

```
2680  006600  012777  000340  172674          MOV     #340,@FKLVL
2681  006606  012700  176000                  MOV     #-2000,R0               ;SET UP A WAIT LOOP
2682  006612  005077  172474                  CLR     @PSW                    ;CLR PROC. PRIORITY
2683  006616  012714  000100                  MOV     #100,@FKCSR4            ;SET INTR. ENABLE
2684  006622  005200                          INC     R0
2685  006624  001376                          BNE     .-2
2686  006626  000402                          BR      .+6                     ;OK, NO INTERRUPT OCCURRED.
2687  006630  022626                  TAGAB:  POP2SP                          ;RESET THE STACK
2688  006632  104400                          ERROR                           ;INTERRUPT OCCURRED W/ 'GO' CLR
2689  006634  004737  016710                  JSR     PC,CLRFKV               ;CLR 'FK' INTR. ADDR.
2690                                  ;*************************************************************************
2691                                  ;TEST THAT 'NO' INTERRUPT OCCURS WITH PROC. @ PRIORITY '4'
2692                                  ;*************************************************************************
2693
2694  006640  104001  000013          FKT13:  SCOPE,13                        ;'FK' TEST 13
2695  006644  012777  006704  172626          MOV     #TAGB,@FKINT            ;SET UP THE INTERRUPT ADDRESS
2696  006652  012777  000340  172622          MOV     #340,@FKLVL
2697  006660  012700  176000                  MOV     #-2000,R0               ;SET UP A WAIT LOOP
2698  006664  012777  000200  172420          MOV     #200,@PSW               ;SET PROC. @ PRIORITY '4'
2699  006672  012714  000101                  MOV     #101,@FKCSR4            ;SET INTR. ENABLE & GO.
2700  006676  005200                          INC     R0
2701  006700  001376                          BNE     .-2
2702  006702  000402                          BR      .+6                     ;OK, NO INTERRUPT OCCURRED.
2703  006704  022626                  TAGB:   POP2SP                          ;RESET THE STACK
2704  006706  104400                          ERROR                           ;INTERRUPT OCCURRED W/ PROC. @ PRIORITY '4'
2705  006710  004737  016710                  JSR     PC,CLRFKV               ;CLR 'FK' INTR. ADDR.
2706                                  ;*************************************************************************
2707                                  ;TEST THAT 'NO' INTERRUPT OCCURRES W/ PROC. @ PRIORITY '5'
2708                                  ;*************************************************************************
2709
2710  006714  104001  000014          FKT14:  SCOPE,14                        ;'FK' TEST 14
2711  006720  012777  006760  172552          MOV     #TAGC,@FKINT            ;SET UP THE INTERRUPT VECTOR
2712  006726  012777  000340  172546          MOV     #340,@FKLVL
2713  006734  012700  176000                  MOV     #-2000,R0               ;SET UP WAIT LOOP
2714  006740  012777  000240  172344          MOV     #240,@PSW               ;SET PROC. @ PRIORITY '5'
2715  006746  012714  000101                  MOV     #101,@FKCSR4            ;SET INTER. ENABLE & GO
2716  006752  005200                          INC     R0
2717  006754  001376                          BNE     .-2
2718  006756  000402                          BR      .+6                     ;OK, NO INTERRUPT OCCURRED
2719  006760  022626                  TAGC:   POP2SP                          ;RESET STACK POINTER
2720  006762  104400                          ERROR                           ;FK INTERRUPTED WITH PROC. @ PRIORITY '5'
2721  006764  004737  016710                  JSR     PC,CLRFKV               ;CLR 'FK' INTR. ADDR.
2722
2723                                  ;*************************************************************************
2724                                  ;TEST THAT THE INTERVAL TIMER FLAG IS SET APPROXIMATELY EVERY '500' USEC.
2725                                  ;*************************************************************************
2726
2727  006770  104001  000015          FKT15:  SCOPE,15                        ;'FK' TEST 15
2728  006774  005001                          CLR     R1
2729  006776  004737  016654                  JSR     PC,LDFKVT               ;SET UP THE INTR. ADDR.
2730  007002  007010                          TAGFA
2731  007004  005201                          INC     R1
2732  007006  001376                          BNE     .-2
2733
2734  007010  022626                  TAGFA:  POP2SP                          ;RESET STACK
2735  007012  004737  016710                  JSR     PC,CLRFKV               ;CLR 'FK' VECTOR ADDR.
```

```
 2736  007016  022701  000400          CMP     #400,R1                 ;CHECK LOW LIMIT
 2737  007022  101402                  BLOS    .+6                     ;BRANCH IF HIGHER
 2738  007024  104400                  ERROR                           ;INTERVAL CLOCK FREQ. TO FAST
 2739  007026  000404                  BR      FKT16                   ;EXIT ON ERROR
 2740  007030  022701  000600          CMP     #600,R1                 ;CHECK HIGH LIMIT
 2741  007034  103001                  BHIS    .+4                     ;BRANCH IF LOWER
 2742  007036  104400                  ERROR                           ;INTERVAL CLOCK FREQ. TO SLOW
 2743                          ;*****************************************************************
 2744                          ;TEST THAT 'CLR ASCII' (BIT3) WILL CLEAR THE KEYBOARD FLAG & ERROR BIT.
 2745                          ;*****************************************************************
 2746
 2747  007040  104001  000016  FKT16:  SCOPE,16                        ;'FK' TEST 16
 2748  007044  052714  100200          BIS     #100200,@FKCSR4         ;SET THE KEYBOARD FLAG
 2749  007050  105714                  TSTB    @FKCSR4                 ;TEST THAT DONE WAS SET
 2750  007052  100401                  BMI     .+4
 2751  007054  104400                  ERROR                           ;'DONE' DIDN'T SET
 2752  007056  052714  000010          BIS     #10,@FKCSR4             ;SET 'CLR FLAG'
 2753  007062  032714  100200          BIT     #100200,@FKCSR4         ;TEST IF FLAGS CLEARED
 2754  007066  001401                  BEQ     .+4
 2755  007070  104400                  ERROR                           ;SETTING BIT 3 DIDN'T CLR ASCII FLAGS
 2756
 2757                          ;*****************************************************************
 2758                          ;TEST THAT THE KEYBOARD FLAG IS CLEARED WHEN THE KEYBOARD DATA IS READ
 2759                          ;*****************************************************************
 2760
 2761  007072  104001  000017  FKT17:  SCOPE,17                        ;'FK' TEST 17
 2762  007076  052714  000201          BIS     #201,@FKCSR4            ;SET THE KEYBOARD FLAG
 2763  007102  005777  172370          TST     @FKDATA                 ;READ KEYBOARD DATA
 2764  007106  105714                  TSTB    @FKCSR4                 ;RE-TEST IF FLAG CLEARED
 2765  007110  100001                  BPL     .+4
 2766  007112  104400                  ERROR                           ;READING KEYBOARD DATA DIDN'T CLR FLAG
 2767  007114  012714  000012          MOV     #12,@FKCSR4             ;CLR FLAGS
 2768
 2769                          ;*****************************************************************
 2770                          ;TEST THAT THE 'ERROR' FLAG IS CLEARED WHEN THE KEYBOARD DATA IS READ.
 2771                          ;*****************************************************************
 2772
 2773  007120  104001  000020  FKT20:  SCOPE,20                        ;'FK' TEST 20
 2774  007124  052714  100001          BIS     #100001,@FKCSR4         ;SET THE ERROR BIT
 2775  007130  005714                  TST     @FKCSR4                 ;TEST THAT ERROR SET
 2776  007132  100401                  BMI     .+4
 2777  007134  104400                  ERROR                           ;ERROR WASN'T SET
 2778  007136  005777  172334          TST     @FKDATA                 ;READ THE KEYBOARD DATA
 2779  007142  005714                  TST     @FKCSR4                 ;RE-TEST THE ERROR FLAG
 2780  007144  100001                  BPL     .+4
 2781  007146  104400                  ERROR                           ;READING KEYBOARD DATA DIDN'T CLR 'ERROR'
 2782  007150  005014                  CLR     @FKCSR4                 ;CLR 'GO'
 2783  007152  052714  000012          BIS     #12,@FKCSR4             ;CLR FLAGS
 2784  007156  104001                  SCOPE
 2785  007160  000020                  20
 2786  007162  005037  020376          CLR     ICOUNT                  ;RUN FOLLOWING TESTS '1' PASS ONLY
 2787                          ;*****************************************************************
 2788                          ;TEST THAT THE KEYBOARD FLAG CAN BE SET VIA THE KEYBOARD.
 2789                          ;*****************************************************************
 2790
 2791  007166  104001  000021  FKT21:  SCOPE,21                        ;'FK' TEST 21
```

```
 2792  007172  032777  002000  172124          BIT     #2000,@SWR              ;IS MANUAL INHIBIT SW. SET?
 2793  007200  001076                          BNE     FKT24+4                 ;YES, TEST COMPLETE
 2794  007202  012737  007210  020402          MOV     #TAGFH,RETURN           ;RE-SET SCOPE ADDRESS
 2795  007210  052714  000001          TAGFH:  BIS     #1,@FKCSR4              ;SET 'GO'
 2796  007214  104000                          DISPLAY
 2797  007216  021513                          MES6                            ;REQUEST CHAR.
 2798  007220  005077  172264                  CLR     @VTCSR                  ;CLEAR MESSAGE
 2799  007224  012700  177773                  MOV     #-5,R0
 2800  007230  005001          TAGH:   CLR     R1
 2801  007232  005201                  INC     R1
 2802  007234  001376                  BNE     .-2
 2803  007236  005200                  INC     R0
 2804  007240  001373                  BNE     TAGH
 2805  007242  105714                  TSTB    @FKCSR4                 ;TEST IF KEYBOARD FLAG SET
 2806  007244  100401                  BMI     .+4
 2807  007246  104400                  ERROR                           ;KEYBOARD FLAG DIDN'T SET
 2808  007250  012714  000012                  MOV     #12,@FKCSR4             ;CLR FLAGS
 2809
 2810                          ;*************************************************************************
 2811                          ;TEST THAT THE 'ASCII' FLAG ISN'T SET IF 'GO' IS CLEARED
 2812                          ;*************************************************************************
 2813
 2814  007254  104001  000022  FKT22:  SCOPE,22                        ;'FK' TEST 22
 2815  007260  104000                  DISPLAY
 2816  007262  021541                  MES6A                           ;REQUEST CHAR.
 2817  007264  005077  172220                  CLR     @VTCSR                  ;CLEAR MESSAGE
 2818  007270  012700  177773                  MOV     #-5,R0
 2819  007274  005001          TAGAH:  CLR     R1
 2820  007276  005201                  INC     R1
 2821  007300  001376                  BNE     .-2
 2822  007302  005200                  INC     R0
 2823  007304  001373                  BNE     TAGAH
 2824  007306  105714                  TSTB    @FKCSR4                 ;TEST IF KEYBOARD FLAG SET
 2825  007310  100001                  BPL     .+4
 2826  007312  104400                  ERROR                           ;ASCII FLAG SET W/ 'GO'CLEARED
 2827  007314  012714  000012                  MOV     #12,@FKCSR4             ;CLR FLAGS
 2828                          ;*************************************************************************
 2829                          ;TEST THAT THE 'ERROR' FLAG IS SET IF THE KEYBOARD FLAG ISN'T CLEARED
 2830                          ;*************************************************************************
 2831
 2832  007320  104001  000023  FKT23:  SCOPE,23                        ;'FK' TEST 23
 2833  007324  012714  000201                  MOV     #201,@FKCSR4            ; SET 'GO'
 2834  007330  104000                  DISPLAY
 2835  007332  021567                  MES6B                           ;REQUEST CHAR.
 2836  007334  005077  172150                  CLR     @VTCSR                  ;CLEAR MESSAGE
 2837  007340  012700  177773                  MOV     #-5,R0
 2838  007344  005001          TAGI:   CLR     R1
 2839  007346  005201                  INC     R1
 2840  007350  001376                  BNE     .-2
 2841  007352  005200                  INC     R0
 2842  007354  001373                  BNE     TAGI
 2843  007356  005714                  TST     @FKCSR4                 ;TEST IF 'ERROR SET'
 2844  007360  100401                  BMI     .+4
 2845  007362  104400                  ERROR                           ;ERROR DIDN'T SET ON 2ND CHAR.
 2846  007364  005014                  CLR     @FKCSR4                 ;CLR 'GO'
 2847  007366  052714  000012                  BIS     #12,@FKCSR4             ;CLR FLAGS
```

```
                                        ;*****************************************************************************
                                        ;END OF 'FK' LOGIC TEST.
                                        ;*****************************************************************************

007372  104001  000024        FKT24:  SCOPE,24                        ;'FK' TEST 24
007376  104000                        DISPLAY
007400  021615                        MES7                            ;TEXT 'LOGIC OK;
007402  104006                        ENDTST                          ;END OF TEST
007404  000402                        BR      .+6
007406  000137  003122                JMP     VTLOGIC                 ;RESTART THE 'VT' LOGIC TEST
007412  000137  006236                JMP     FKLOGIC                 ;RE-RUN 'FK' LOGIC TEST
                                        ;*****************************************************************************
                                        ;FK11 FUNCTION KEYBOARD LIGHT & SWITCH TEST. (16)
                                        ;THIS IS AN OPERATOR INTERVENTION TEST WHICH MONITORS THE FUNCTION KEYS.
                                        ;WHEN A FUNCTION KEY OR KEYS ARE STRUCK ITS CORRESPONDING FUNCTION LIGHT
                                        ;IS LIT.  IF THE KEY IS STRUCK A SECOND TIME THE CORRESPONDING FUNCTION
                                        ;LIGHT IS TURNED OFF.
                                        ;*****************************************************************************

007416  012737  007416  020402  FKFUN:  MOV     #FKFUN, RETURN
007424  104000                        DISPLAY
007426  021112                        MES1                            ;TEXT 'FK FUNCTION KEYBOARD LIGHT TEST'
007430  005000                        CLR     R0                      ;CLR WORKINGS REG'S
007432  005001                        CLR     R1
007434  005002                        CLR     R2
007436  004737  016654                JSR     PC,LDFKVT               ;LOAD THE INTR. ADDR.
007442  007450                        SRRVFK                          ;INTR SERVICE ROUTINE
007444  000001                        WAIT                            ;WAIT FOR INTERRUPT
007446  000776                        BR      .-2

                                        ;ROUTINE TO 'SERVICE' FUNCTION KEYBOARD INTERRUPTS

007450  005202                SRRVFK: INC     R2                      ;INTR. CNTR. (EVERY 1000, LITE DATA UPDATED)
007452  105777  172016                TSTB    @FKCSR
007456  100004                        BPL     1$
007460  022777  000003  172010        CMP     #3,@FKDATA              ;CONTROL C TYPED?
007466  001436                        BEQ     EXITF1                  ;IF SO-EXITF1
007470  022702  001000        1$:     CMP     #1000,R2                        ;SERVICED '512' FLAGS?
007474  001023                        BNE     EXITF0                  ;NO, EXIT
007476  005002                        CLR     R2                      ;CLR CNTR.
007500  017704  171766                MOV     @FKLDA,R4               ;READ SWITCH DATA 'A'
007504  001406                        BEQ     SRVF0B                  ;SW. DATA PRESENT?
007506  010037  024442                MOV     R0,SAVOLD               ;SAVE 'OLD' KEYBOARD DATA
007512  040400                        BIC     R4,R0                   ;CLR ALL CORRESPONDING BITS IN 'OLD' NO.
007514  043704  024442                BIC     SAVOLD,R4               ;CLR ALL CORRESPONDING BITS IN 'NEW' NO.
007520  050400                        BIS     R4,R0                   ;SET REMAINING BITS FOR 'NEW' VALUE
007522  017704  171742        SRVF0B: MOV     @FKLDB,R4               ;READ SWITCH DATA 'B'
007526  001406                        BEQ     EXITF0                  ;SW. DATA PRESENT?
007530  010137  024442                MOV     R1,SAVOLD
007534  040401                        BIC     R4,R1                   ;CLR ALL CORRESPONDING BITS IN 'OLD' WRD.
007536  043704  024442                BIC     SAVOLD,R4               ;CLR ALL CORRESPONDING BITS IN 'NEW WRD.
007542  050401                        BIS     R4,R1                   ;UPDATE 'OLD' WRD WITH ' NEW' WRD.
007544  010077  171722        EXITF0: MOV     R0,@FKLDA               ;TRANSMIT UPDATED LIGHT DATA 'A'
007550  010177  171714                MOV     R1,@FKLDB               ;TRANSMIT UPDATED LIGHT DATA 'B'
007554  052777  000012  171712        BIS     #12,@FKCSR              ;CLR FLAGS.
```

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007562  000002                                  RTI
007564  052777  000012  171702  EXITF1:  BIS     #12,@FKCSR
007572  104006                                  ENDTST
007574  000710                                  BR      FKFUN
                                        ;*******************************************************************************
                                        ;KEYBOARD CHARACTER TEST (17)
                                        ;THIS TEST VERIFIES THAT ALL CHARACTERS CAN BE TRANSMITTED VIA THE FK11 KEYBOARD.
                                        ;WHEN THE TEST IS STARTED, THE TEXT "READY FOR INPUT" IS DISPLAYED ON THE 'VT'.
                                        ;THE OPERATOR THEN TYPES IN THREE PASSES OF THE ENTIRE KEYBOARD
                                        ;(LOWER CASE, SHIFT AND CONTROL) STARTING AT THE TOP LEFT HAND SIDE OF THE
                                        ;KEYBOARD FOR EACH PASS.  EACH CHARACTER TRANSMITTED FROM THE KEYBOARD IS VERIFIED
                                        ;AGAINST A CHARACTER BUFFER AND DISPLAYED ON THE 'VT'.  IF THE TRANSMITTED
                                        ;CHARACTER DOESN'T MATCH THE EXPECTED CHARACTER AN AUDIO 'BEEP' IS HEARD
                                        ;AND THE CHARACTER IS DISPLAYED IN BOLD UNDERLINED.  ALL CHARACTERS RECEIVED
                                        ;FROM THIS POINT ON WILL BE TRANSMITTED IN THIS MODE UNTIL EITHER THE CORRECT
                                        ;CHARACTER CODE IS RECEIVED OR DATA 'SW15' IS SET TO A '1' ALLOWING THE PROGRAM
                                        ;TO CONTINUE.  DATA 'SW14' MAY ALSO BE SET TO A '1' AT ANYTIME TO LOOP ON
                                        ;THE CURRENT CHARACTER.
                                        ;*******************************************************************************

007576  012737  007576  020402  FKCHAR:  MOV     #FKCHAR,RETURN
007604  104000                                  DISPLAY
007606  021317                                  MES4                    ;TEXT 'FK CHARACTER TEST'
007610  012701  020457                          MOV     #CHRTAB-1,R1    ;SET UP CHAR. TABLE POINTER
007614  005037  024150                          CLR     FIELDSW         ;CLR FIELD CONTROL SOFTWARE SW.
007620  005037  024444                          CLR     TEMP1           ;SET UP SOFTWARE SW.'S
007624  005037  024446                          CLR     TEMP2
007630  005037  024464                          CLR     KSTOR1
007634  004737  016654                          JSR     PC,LDFKVT       ;LOAD 'FK' VECTOR ADDR.
007640  007646                                  CHKFK0
007642  000001                                  WAIT                    ;WAIT FOR 'FK' INTERRUPTS
007644  000776                                  BR      .-2

                                        ;ENTERED HERE ON 'FK' INTERRUPTS

007646  105777  171622          CHKFK0:  TSTB    @FKCSR          ;ASCII FLAG SET?
007652  100071                                  BPL     EXTCHR          ;NO, INTERVAL TIMER FLAG
007654  117702  171616                          MOVB    @FKDATA,R2      ;READ & SAVE DATA
007660  032777  040000  171436                  BIT     #SW14,@SWR      ;IS THE LOOP SW. SET?
007666  001007                                  BNE     CHKFK1+2        ;YES, DON'T UPDATE POINTER
007670  005737  024150                          TST     FIELDSW         ;NO, IS THE ERROR FLAG SET?
007674  001403                                  BEQ     CHKFK1          ;NO, UPDATE POINTER
007676  005777  171422                          TST     @SWR            ;YES, IS SCOPE SW. SET?
007702  100001                                  BPL     CHKFK1+2        ;YES, LOOP ON CURRENT CHAR.
007704  105721                  CHKFK1:  TSTB    (R1)+           ;NO, UPDATE POINTER
007706  120211                                  CMPB    R2,(R1)         ;DOES RECV'D CHAR.=EXPT'D CHAR.
007710  001073                                  BNE     CHRERR          ;NO CHAR. ERROR
007712  005737  024150                          TST     FIELDSW         ;IS FIELD SW. SET?
007716  001404                                  BEQ     CHKFK2          ;NO
007720  005037  024150                          CLR     FIELDSW         ;YES, CLR IT
007724  112720  000360                          MOVB    #360,(R0)+      ;CLR FIELD CONTROL CHAR.
007730  022702  000033          CHKFK2:  CMP     #33,R2
007734  001403                                  BEQ     .+10
007736  005737  024464                          TST     KSTOR1          ;DOING CONTROL PASS?
007742  001402                                  BEQ     .+6             ;NO, CONTINUE
007744  052702  000100                          BIS     #100,R2         ;YES, ADD BIT SO CHAR. IS VISIBLE
```

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2960  007750  110220                          MOVB    R2,(R0)+        ;MOV RECV'D CHAR. TO 'VT' BUFFER.
2961  007752  005737  024444                  TST     TEMP1
2962  007756  001012                          BNE     CHKFK4
2963  007760  022701  020545                  CMP     #UPCASE-1,R1    ;STARTING 'UPPER CASE' PASS?
2964  007764  001007                          BNE     CHKFK4          ;NO
2965  007766  104000                          DISPLAY
2966  007770  023103                          MES22                   ;TEXT "INPUT UPPER CASE"
2967  007772  012737  007576  024134          MOV     #FKCHAR,AVECTR  ;RE-SET '↑A' RESTART ADDR.
2968  010000  005237  024444                  INC     TEMP1           ;SET PRINT INHIBIT SW.
2969  010004  005737  024446          CHKFK4: TST     TEMP2
2970  010010  001012                          BNE     EXTCHR
2971  010012  022701  020633                  CMP     #CONTRL-1,R1    ;STARTING CONTROL PASS?
2972  010016  001007                          BNE     EXTCHR          ;NO
2973  010020  104000                          DISPLAY
2974  010022  023147                          MES23                   ;TEXT "INPUT CONROL CHAR.S"
2975  010024  012737  007576  024134          MOV     #FKCHAR,AVECTR  ;RE-SET '↑A' RESTART ADDR.
2976  010032  005237  024446                  INC     TEMP2           ;SET DISPLAY INHIBIT SW.
2977  010036  022701  020647          EXTCHR: CMP     #CNTRIT,R1      ;STARTING CONTROL PASS
2978  010042  001002                          BNE     .+6             ;NO, CONTINUE
2979  010044  005237  024464                  INC     KSTOR1          ;YES, SET UP TO DISPLAY INVISIBLE CHAR.
2980  010050  052777  000002  171416          BIS     #2,@FKCSR       ;CLR INTERVAL TIMER FLAG
2981  010056  022701  020722                  CMP     #CHREND+1,R1    ;FINISHED?
2982  010062  001401                          BEQ     .+4             ;YES, RE-START TEST
2983  010064  000002                          RTI                     ;EXIT
2984  010066  004737  016710                  JSR     PC,CLRFKV       ;CLR INTERRUPT VECTOR
2985  010072  022626                          POP2SP                  ;RESET STACK
2986  010074  104006                          ENDTST
2987  010076  000637                          BR      FKCHAR          ;RESTART TEST
2988  010100  052777  000200  171402  CHRERR: BIS     #200,@VTCSR     ;ISSUE AUDIO BEEP ON ERROR
2989  010106  005737  024150                  TST     FIELDSW         ;IS FIELD SW SET?
2990  010112  001306                          BNE     CHKFK2          ;YES
2991  010114  005237  024150                  INC     FIELDSW         ;NO, SET 'FIELD' SW.
2992  010120  112720  000374                  MOVB    #374,(R0)+      ;SELECT 'BOLD-UNDERLINE'
2993  010124  000701                          BR      CHKFK2          ;SET FIELD CONTROL SOFTWARE SW.
2994                        ;*****************************************************************************
2995                        ;FUNCTION KEYBOARD REPEATIBILITY TEST (20)
2996                        ;THIS TEST VERIFIES THAT A SELECTED CHARACTER OR CHARACTERS (MAXIMUM OF TWO)
2997                        ;ARE RECEIVED CORRECTLY FROM THE KEYBOARD.  WHEN THE 'REPEATIBILITY' TEST IS
2998                        ;SELECTED THE PROGRAM HALTS.  LOAD THE CODE FOR THE CHARACTER TO BE VERIFIED
2999                        ;IN THE DATA SWITCHES AND PRESS CONTINUE.  THE PROGRAM WILL HALT AGAIN.
3000                        ;LOAD THE CODE FOR THE 2ND CHARACTER TO BE VERIFIED.  IF ONLY
3001                        ;ONE CHARACTER IS BEING CHECKED, PRESS CONTINUE THE 2ND TIME WITHOUT CHANG-
3002                        ;ING THE SWITCH SETTING.  AS INPUTTED CHARACTERS ARE VERIFIED THEY ARE
3003                        ;ALSO DISPLAYED ON THE 'VT'.  IF AN ERROR IS DETECTED, THE AUDIO 'BEEP' IS
3004                        ;SOUNDED AND THE RECEIVED CHARACTER IS DISPLAYED AS 'BOLD-UNDERLINED'.
3005                        ;*****************************************************************************
3006
3007  010126  005737  024160          FKREPT: TST     TTYSWH          ;TTY AVAILABLE?
3008  010132  001404                          BEQ     FKRPTA          ;NO, HALT TO GET CHAR. CODE
3009  010134  104012                          PRINT                   ;YES,
3010  010136  022512                          MES15                   ;REQUEST CHAR. CODES
3011  010140  104015                          ASEMBL                  ;DECODE CODES
3012  010142  000406                          BR      FKRPTB
3013  010144  000000                  FKRPTA: HALT                    ;GET 1ST CHAR. FROM THE SWITCHES
3014  010146  117703  171152                  MOVB    @SWR,R3         ;SAVE 1ST CHAR.
3015  010152  000000                          HALT                    ;GET 2ND CHAR. FROM THE SWITCHES
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3016  010154  117704  171144            FKRPTB: MOVB    @SWR,R4         ;SAVE '2ND' CHAR.
3017  010160  042703  000200                    BIC     #200,R3
3018  010164  042704  000200                    BIC     #200,R4
3019  010170  012737  010160  020402            MOV     #FKRPTB,RETURN
3020  010176  104000                            DISPLAY
3021  010200  022437                            MES14                   ;TEXT 'FK REPEATIBILITY TEST'
3022  010202  012737  010126  024134            MOV     #FKREPT,AVECTR
3023  010210  005037  024150                    CLR     FIELDSW         ;CLR FIELD CONTROL SOFTWARE SW.
3024  010214  005005                            CLR     R5              ;CLR WORKING REG.
3025  010216  004737  017062                    JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
3026  010222  004737  016654                    JSR     PC,LDFKVT       ;LOAD 'FK' INTR. ADDR.
3027  010226  010234                            FREPTO
3028  010230  000001                            WAIT                    ;WAIT FOR 'FK' INTR.
3029  010232  000776                            BR      .-2
3030                            ;ENTERED HERE ON 'FK' INTERRUPTS FOR THE REPEATIBILITY TEST
3031
3032  010234  105777  171234            FREPTO: TSTB    @FKCSR          ;ASCII FLAG SET?
3033  010240  100035                            BPL     EXREPT          ;NO, INTERVAL TIMER FLAG
3034  010242  117701  171230                    MOVB    @FKDATA,R1      ;YES, READ & SAVE DATA
3035  010246  005705                            TST     R5              ;COMPARE 1ST OR 2ND CHAR.?
3036  010250  001003                            BNE     FREPT1          ;2ND
3037  010252  120103                            CMPB    R1,R3           ;RECV'D = EXPT'D CHAR.?
3038  010254  001416                            BEQ     REPTOK          ;YES
3039  010256  000402                            BR      REPTER          ;NO, SET UP ERROR
3040  010260  120104                    FREPT1: CMPB    R1,R4           ;RECV'D = EXPT'D CHAR.?
3041  010262  001413                            BEQ     REPTOK          ;YES
3042  010264  052777  000200  171216    REPTER: BIS     #AUDIO, @VTCSR  ;ISSUE AUDIO BEEP
3043  010272  005737  024150                    TST     FIELDSW         ;FIELD SW. SET?
3044  010276  001014                            BNE     FREPT2          ;YES
3045  010300  005237  024150                    INC     FIELDSW         ;NO, SET IT
3046  010304  112720  000374                    MOVB    #374,(R0)+      ;SEND BAD CHAR. AS 'BOLD-UNDERLINED'
3047  010310  000407                            BR      FREPT2
3048  010312  005737  024150            REPTOK: TST     FIELDSW         ;FIELD SW. SET
3049  010316  001404                            BEQ     FREPT2          ;YES
3050  010320  005037  024150                    CLR     FIELDSW         ;NO, CLR IT
3051  010324  112720  000360                    MOVB    #360,(R0)+      ;CLR FIELD CONTROL CHAR.
3052  010330  005105                    FREPT2: COM     R5              ;SET UP SOFTWARE SW.
3053  010332  110120                            MOVB    R1,(R0)+        ;TRANSMIT RECV'D CHAR.
3054  010334  052777  000002  171132    EXREPT: BIS     #2,@FKCSR       ;CLR INTERVAL TIMER FLAG
3055  010342  000002                            RTI
3056                            ;*****************************************************************************
3057                            ;VT20 SYSTEM EXERCISER TEST. (TEST 21)
3058                            ;THIS TEST IS DESIGNED TO EXERCISE THE VT20 IN A SYSTEM ENVIRONMENT. THE
3059                            ;TEST UTILIZES THE VT20 (DISPLAYS & KEYBOARDS) AND ALL ASSOCIATED DL11'S
3060                            ;IN CONJUNCTION WITH A HOST COMPUTER. TO RUN THIS TEST THE DL11 DATA
3061                            ;HANDLING ROUTINE MUST BE LOADED INTO THE HOST COMPUTER. THIS ROUTINE
3062                            ;RECEIVES AND RE-TRANSMITS DATA TO VT20 BEING TESTED. WHEN THE SYSTEM TEST
3063                            ;IS STARTED THE PROGRAM WAITS FOR CHARACTERS TO BE INPUTTED FROM THE
3064                            ;KEYBOARD.  AS THESE CHARACTERS ARE RECEIVED THEY ARE STORED IN A VT BUFFER
3065                            ;AND DISPLAYED. THE PROGRAM WILL ACCEPT UP TO 384 CHARACTERS (6 COMPLETE
3066                            ;LINES) FROM THE KEYBOARD. THESE 384 CHARACTERS, OR ANY PART THERE OF,
3067                            ;CAN BE AUTOMATICALLY GENERATED BY TYPING A '↑A'.  THE OPERATOR MAY AT
3068                            ;THIS TIME OR ANYTIME PRIOR TO THIS, TYPE 'ALTMODE'. THIS WILL ENABLE
3069                            ;THE INPUTTED CHARACTERS TO BE TRANSMITTED TO THE HOST COMPUTER.
3070                            ;UPON RECEIVING THE COMPLETE DATA TRANSFER, THE HOST COMPUTER WILL
3071                            ;RE-TRANSMIT THE DATA BACK TO THE VT20. THE RECEIVED DATA IS THEN
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                                        ;VERIFIED AGAINST THE DATA ORGINALLY TRANSMITTED AND THEN DISPLAYED.
                                        ;IF THE RECEIVED DATA DOESN'T MATCH THE TRANSMITTED DATA, THE RECEIVED
                                        ;CHACACTER IS DISPLAYED AS 'BOLD-UNDERLINED'.
                                        ;THE SYSTEM TEST USES AN ERROR REPORTING SCHEME OF DISPLAYING ALL
                                        ;ERRORS AS THEY ARE ENCOUNTERED AS UNIQUE CURSOR CHARACTERS. THESE
                                        ;CHARACTERS IDENTIFY THE PARTICULAR ERROR DETECTED. TYPING A '↑C' AT
                                        ;ANYTIME WILL ENABLE THE TEST TO BE RE-STARTED.
                                        ;TYPING A '↑T' AFTER THE DATA HAS BEEN INPUTTED WILL ENABLE
                                        ;FOR A CONTINUOUS TRANSFER OF DATA.  TYPING '↑T' A SECOND TIME
                                        ;WILL STOP THE DATA TRANSFER (ON COMPLETION OF CURRENT TRANSFER)
                                        ;AND ALLOW THE PROGRAM TO RESUME NORMAL OPERATION.
                                        ;*************************************************************************

010344  012737  010344  020402  SYSTST: MOV     #SYSTST,RETURN
010352  000005                          RESET
010354  012737  010344  024134          MOV     #SYSTST,@VECTR          ;SET UP THE RESTART ADDR.
010362  012777  021656  171022          MOV     #MES9,@VT0SAR           ;DISPLAY TEST HEADER ON UNIT '0'
010370  012777  021656  171030          MOV     #MES9,@VT1SAR           ;DISPLAY TEST HEADER ON UNIT '1'
010376  022737  000004  024142          CMP     #4,     UNITNO  ;4 UNITS?
010404  001013                          BNE     2$
010406  012777  021656  171042          MOV     #MES9,  @VT3SAR ;DISPLAY TEST HEADER ON UNIT '3'
010414  005277  171040                  INC     @VT3CSR
010420  012777  021656  171014  1$:     MOV     #MES9,  @VT2SAR ;DISPLAY TEST HEADER ON UNIT '2'
010426  005277  171012                  INC     @VT2CSR
010432  000404                          BR      3$

010434  022737  000003  024142  2$:     CMP     #3,     UNITNO  ;3 UNITS?
010442  001766                          BEQ     1$
010444  005277  170744          3$:     INC     @VT0CSR
010450  005277  170754                  INC     @VT1CSR
010454  104020                          DELAYL
010456  104020                          DELAYL
010460  104005                          EOSBUF                          ;RE-LOAD DATA BUFFER W/ 'EOS'
010462  012777  000340  170622  SYSIT1: MOV     #340,@PSW               ;SET PROC. PRIO. @7
010470  012700  024174                  MOV     #RECSW0,R0              ;SET UP TO CLR SOFTWARE USER SW.'S
010474  005020                          CLR     (R0)+
010476  022700  024430                  CMP     #START,R0               ;DONE?
010502  001374                          BNE     .-6                     ;NO
010504  012777  011766  171026          MOV     #RECV0,@RINT0           ;LOAD DL11 REC. VECTOR ADDR.'S
010512  012777  000200  171022          MOV     #200,@RLVL0             ;BR LEVEL '4'
010520  012777  012000  171016          MOV     #RECV1,@RINT1
010526  012777  000200  171012          MOV     #200,@RLVL1
010534  012777  011706  171036          MOV     #TRAN0,@XINT0           ;LOAD DL11 TRANS. VECTOR ADDR.'S
010542  012777  000200  171032          MOV     #200,@XLVL0
010550  012777  011722  171026          MOV     #TRAN1,@XINT1
010556  012777  000200  171022          MOV     #200,@XLVL1
010564  012777  011626  170546          MOV     #SERFK0,@FK0INT         ;LOAD 'FK' VECTOR ADDRESSES
010572  012777  000200  170542          MOV     #200,@FK0LVL
010600  012777  011642  170546          MOV     #SERFK1,@FK1INT
010606  012777  000200  170542          MOV     #200,@FK1LVL
010614  012700  024500                  MOV     #VTBUFF,R0              ;LOAD 'VT' BUFFER POINTERS
010620  010002                          MOV     R0,R2
010622  004737  011610                  JSR     PC,DISPMS               ;DISPLAY HEADER MESSAGE
010626  012702  026450                  MOV     #VTBUFF+1000.,R2
010632  010077  170554                  MOV     R0,@VT0SAR              ;LOAD 'VT' STARTING ADDR. REG.'S
010636  010277  170564                  MOV     R2,@VT1SAR
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3128  010642  004737  011610            JSR     PC,DISPMS
3129  010646  012700  024567            MOV     #VTBUFF+55.,R0
3130  010652  010037  024410            MOV     R0,BUF0R0               ;R0 BUFFER POINTER FOR UNIT '0'
3131  010656  010037  024420            MOV     R0,BUF0R1               ;R1 BUFFER POINTER FOR UNIT '0'
3132  010662  012702  026537            MOV     #VTBUFF+1055.,R2
3133  010666  010237  024412            MOV     R2,BUF1R0               ;R0 BUFFER POINTER FOR UNIT '1'
3134  010672  010237  024422            MOV     R2,BUF1R1               ;R1 BUFFER POINTER FOR UNIT '1'
3135  010676  012737  010726  000004    MOV     #DL11A,@#4      ;SET UP TIME-OUT FOR MISSING DL'S
3136  010704  012737  000340  000006    MOV     #340,@#6
3137  010712  012777  000100  170600    MOV     #100,@RCSR0             ;ENABLE DL11 REC. INTR'S
3138  010720  012777  000100  170632    MOV     #100,@XCSR0             ;ENABLE DL11 TRANS, INTR.'S
3139  010726  012737  010750  000004  DL11A:  MOV     #DL11B,@#4
3140  010734  012777  000100  170560    MOV     #100,@RCSR1
3141  010742  012777  000100  170612    MOV     #100,@XCSR1
3142  010750  022737  000004  024142  DL11B:  CMP     #4,UNITNO               ;4 UNITS?
3143  010756  001133                    BNE     TAG2X                   ;NO, TEST FOR 3
3144  010760  012777  012024  170566    MOV     #RECV3, @RINT3          ;LOAD DL11 REC VECTOR FOR UNIT '3'
3145  010766  012777  000200  170562    MOV     #200,@RLVL3             ;BR LEVEL '4'
3146  010774  012777  011752  170612    MOV     #TRAN3,@XINT3           ;LOAD DL11 XMIT VECTOR FOR UNIT '3'
3147  011002  012777  000200  170606    MOV     #200,@XLVL3             ;BE LEVEL '4'
3148  011010  012777  011672  170366    MOV     #SERFK3,@FK3INT         ;LOAD FK VECTOR FOR UNIT '3'
3149  011016  012777  000200  170362    MOV     #200,@FK3LVL            ;BR LEVEL '4'
3150  011024  012702  032370            MOV     #VTBUFF+3000.,R2
3151  011030  010277  170422            MOV     R2,@VT3SAR              ;LOAD 'VT'3 STARTING ADDR. REG
3152  011034  004737  011610            JSR     PC,DISPMS
3153  011040  012702  032457            MOV     #VTBUFF+3055.,R2
3154  011044  010237  024416            MOV     R2,     BUF3R0          ;BUFFER POINTER FOR UNIT '3'
3155  011050  010237  024426            MOV     R2,     BUF3R1
3156  011054  012737  011076  000004    MOV     #DL11C,@#4
3157  011062  012777  000100  170436    MOV     #100,@RCSR3             ;ENABLE DL11 FOR UNIT '3' TO INTERRUPT
3158  011070  012777  000100  170470    MOV     #100,   @XCSR3
3159  011076  012777  000101  170354  DL11C:  MOV     #101,@VT3CSR            ;START VT
3160  011104  012777  000101  170266    MOV     #101,@FK3CSR            ;ENABLE FK INTERRUPT
3161  011112  012777  012012  170430  TAG1X:  MOV     #RECV2,@RINT2           ;LOAD DL11 REC VECTOR FOR UNIT '2'
3162  011120  012777  000200  170424    MOV     #200,@RLVL2             ;BR LEVEL '4'
3163  011126  012777  011736  170454    MOV     #TRAN2,@XINT2           ;LOAD DL11 XMIT VECTOR FOR UNIT '2'
3164  011134  012777  000200  170450    MOV     #200,@XLVL2             ;BR LEVEL '4'
3165  011142  012777  011656  170220    MOV     #SERFK2,@FK2INT         ;LOAD FK VECTOR FOR UNIT '2'
3166  011150  012777  000200  170214    MOV     #200,@FK2LVL            ;BR LEVEL '4'
3167  011156  012702  030420            MOV     #VTBUFF+2000.,R2
3168  011162  010277  170254            MOV     R2,@VT2SAR              ;LOAD 'VT'2 STARTING ADDR. REG
3169  011166  004737  011610            JSR     PC,DISPMS
3170  011172  012702  030507            MOV     #VTBUFF+2055.,R2
3171  011176  010237  024414            MOV     R2,BUF2R0               ;BUFFER POINTER FOR UNIT '2'
3172  011202  010237  024424            MOV     R2,BUF2R1
3173  011206  012737  011230  000004    MOV     #DL11D,@#4
3174  011214  012777  000100  170302    MOV     #100,   @RCSR2  ;ENABLE DL11 FOR UNIT '2' TO INTERRUPT
3175  011222  012777  000100  170334    MOV     #100,@XCSR2
3176  011230  012777  000101  170206  DL11D:  MOV     #101,@VT2CSR            ;START VT
3177  011236  012777  000101  170120    MOV     #101,@FK2CSR            ;ENABLE FK INTERRUPTS
3178  011244  000404                    BR      TAG3X
3179
3180  011246  022737  000003  024142  TAG2X:  CMP     #3,UNITNO               ;3 UNITS?
3181  011254  001716                    BEQ     TAG1X                   ;YES, SET UP UNIT 2
3182  011256  012737  000006  000004  TAG3X:  MOV     #6,@#4                  ;RESET THE TIMEOUT VECTOR
3183  011264  012737  000004  000006          MOV     #4,@#6
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3184  011272  012777  000101  170114          MOV     #101,@VTOCSR            ;START VT'S
3185  011300  012777  000101  170122          MOV     #101,@VT1CSR
3186  011306  012777  000101  170020          MOV     #101,@FK0CSR            ;ENABLE 'FK' INTERRUPTS
3187  011314  012777  000101  170026          MOV     #101,@FK1CSR
3188  011322  005077  167764                  CLR     @PSW                    ;SET PROC. PRIO. @0
3189
3190  011326  012700  024510          SERVCE: MOV     #VTBUFF+08.,R0
3191  011332  013702  024234                  MOV     CHRCT0,R2
3192  011336  104024                          BINDEC                          ;UPDATE THE CHARACTER COUNTER
3193  011340  012700  024526                  MOV     #VTBUFF+22.,R0
3194  011344  013702  024320                  MOV     RECTR0,R2
3195  011350  104024                          BINDEC                          ;UPDTAE THE RECV'D CHAR. COUNTER
3196  011352  012700  024544                  MOV     #VTBUFF+36.,R0
3197  011356  013702  024310                  MOV     TRANF0,R2
3198  011362  104024                          BINDEC                          ;UPDATE THE TRANSFER COUNTER
3199  011364  012700  024561                  MOV     #VTBUFF+49.,R0
3200  011370  013702  024340                  MOV     ERFLG0,R2
3201  011374  104024                          BINDEC                          ;UPDATE THE ERROR COUNTER
3202  011376  012700  026460                  MOV     #VTBUFF+1008.,R0
3203  011402  013702  024236                  MOV     CHRCT1,R2
3204  011406  104024                          BINDEC
3205  011410  012700  026476                  MOV     #VTBUFF+1022.,R0
3206  011414  013702  024322                  MOV     RECTR1,R2
3207  011420  104024                          BINDEC
3208  011422  012700  026514                  MOV     #VTBUFF+1036.,R0
3209  011426  013702  024312                  MOV     TRANF1,R2
3210  011432  104024                          BINDEC
3211  011434  012700  026531                  MOV     #VTBUFF+1049.,R0
3212  011440  013702  024342                  MOV     ERFLG1,R2
3213  011444  104024                          BINDEC
3214  011446  023727  024142  000003          CMP     UNITNO,#3               ;RUNNING '3' UNITS ?
3215  011454  002724                          BLT     SERVCE                  ;NO, RETURN TO SERVICE
3216  011456  012700  030430                  MOV     #VTBUFF+2008.,R0
3217  011462  013702  024240                  MOV     CHRCT2,R2
3218  011466  104024                          BINDEC                          ;UPDATE THE CHARACTER COUNTER
3219  011470  012700  030446                  MOV     #VTBUFF+2022.,R0
3220  011474  013702  024324                  MOV     RECTR2,R2
3221  011500  104024                          BINDEC                          ;UPDTAE THE RECV'D CHAR. COUNTER
3222  011502  012700  030464                  MOV     #VTBUFF+2036.,R0
3223  011506  013702  024314                  MOV     TRANF2,R2
3224  011512  104024                          BINDEC                          ;UPDATE THE TRANSFER COUNTER
3225  011514  012700  030501                  MOV     #VTBUFF+2049.,R0
3226  011520  013702  024344                  MOV     ERFLG2,R2
3227  011524  104024                          BINDEC                          ;UPDATE THE ERROR COUNTER
3228  011526  023727  024142  000004          CMP     UNITNO,#4               ;RUNNING '4' UNITS ?
3229  011534  002674                          BLT     SERVCE                  ;NO, RETURN TO SERVICE
3230  011536  012700  032400                  MOV     #VTBUFF+3008.,R0
3231  011542  013702  024242                  MOV     CHRCT3,R2
3232  011546  104024                          BINDEC
3233  011550  012700  032416                  MOV     #VTBUFF+3022.,R0
3234  011554  013702  024326                  MOV     RECTR3,R2
3235  011560  104024                          BINDEC
3236  011562  012700  032434                  MOV     #VTBUFF+3036.,R0
3237  011566  013702  024316                  MOV     TRANF3,R2
3238  011572  104024                          BINDEC
3239  011574  012700  032451                  MOV     #VTBUFF+3049.,R0
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3240  011600  013702  024346                MOV     ERFLG3,R2
3241  011604  104024                       BINDEC
3242  011606  000647                       BR      SERVCE
3243
3244                                  ;ENTERED HERE TO MOVE A MESSAGE INTO THE VT BUFFER
3245
3246  011610  012701  022164        DISPMS: MOV     #MES80,R1
3247  011614  111122                        MOVB    (R1),(R2)+
3248  011616  122721  000031                CMPB    #EOS,(R1)+
3249  011622  001374                        BNE     DISPMS+4
3250  011624  000207                        RTS     PC
3251                                  ;ENTERED HERE ON 'FK' INTERRUPTS FROM UNIT '0'
3252
3253  011626  004737  012036        SERFK0: JSR     PC,SETBF0               ;SET UP BUFFER POINTERS
3254  011632  004737  012444                JSR     PC,SERVFK               ;SERVICE 'FK' INTERRUPT
3255  011636  000137  012272                JMP     SAVBF0                  ;SAVE BUFFER POINTERS ON RETURN
3256
3257                                  ;ENTERED HERE ON 'FK' INTERRUPTS FROM UNIT '1'
3258
3259  011642  004737  012102        SERFK1: JSR     PC,SETBF1               ;SET UP BUFFER POINTERS
3260  011646  004737  012444                JSR     PC,SERVFK               ;SERVICE 'FK' INTERRUPT
3261  011652  000137  012316                JMP     SAVBF1                  ;SAVE BUFFER POINTERS ON RETURN
3262
3263                                  ;ENTERED HERE ON 'FK' INTERRUPTS FROM UNIT '2'
3264
3265  011656  004737  012152        SERFK2: JSR     PC,SETBF2               ;SET UP BUFFER POINTERS
3266  011662  004737  012444                JSR     PC,SERVFK               ;SERVICE 'FK' INTERRUPT
3267  011666  000137  012342                JMP     SAVBF2                  ;SAVE BUFFER POINTERS
3268
3269                                  ;ENTERED HERE ON 'FK' INTERRUPTS FROM UNIT '3'
3270
3271  011672  004737  012222        SERFK3: JSR     PC,SETBF3               ;SET UP BUFFER POINTERS
3272  011676  004737  012444                JSR     PC,SERVFK               ;SERVICE 'FK' INTERRUPT
3273  011702  000137  012366                JMP     SAVBF3                  ;SAVE BUFFER POINTERS
3274                                  ;ENTERED HERE ON DL11 TRANSMITTER INTERRUPTS FROM UNIT '0'
3275
3276  011706  004737  012036        TRAN0:  JSR     PC,SETBF0               ;SET UP BUFFER POINTERS
3277  011712  004737  013130                JSR     PC,TRNSMT
3278  011716  000137  012272                JMP     SAVBF0
3279
3280                                  ;ENTERED HERE ON DL11 TRANSMITTER INTERRUPTS FROM UNIT '1'
3281
3282  011722  004737  012102        TRAN1:  JSR     PC,SETBF1               ;SET UP BUFFER POINTERS
3283  011726  004737  013130                JSR     PC,TRNSMT
3284  011732  000137  012316                JMP     SAVBF1
3285
3286                                  ;ENTERED HERE ON DL11 TRANSMITTER INTERRUPTS FROM UNIT '2'
3287
3288  011736  004737  012152        TRAN2:  JSR     PC,SETBF2               ;SET UP BUFFER POINTERS
3289  011742  004737  013130                JSR     PC,TRNSMT               ;SERVICE TRANSMITTER INTERRUPT
3290  011746  000137  012342                JMP     SAVBF2
3291
3292                                  ;ENTERED HERE ON DL11 TRANSMITTER INTERRUPTS FROM UNIT '3'
3293
3294  011752  004737  012222        TRAN3:  JSR     PC,SETBF3               ;SET UP BUFFER POINTERS
3295  011756  004737  013130                JSR     PC,TRNSMT
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3296  011762  000137  012366                JMP     SAVBF3
3297
3298                                ;ENTERED HERE ON DL11 RECEIVER INTERRUPTS FROM UNIT '0'
3299
3300  011766  004737  012036        RECV0:  JSR     PC,SETBF0
3301  011772  004737  013362                JSR     PC,RECVIT
3302  011776  000535                        BR      SAVBF0
3303                                ;ENTERED HERE ON DL11 RECEIVER INTERRUPTS FROM UNIT '1'
3304
3305  012000  004737  012102        RECV1:  JSR     PC,SETBF1
3306  012004  004737  013362                JSR     PC,RECVIT
3307  012010  000542                        BR      SAVBF1
3308
3309                                ;ENTERED HERE ON DL11 RECEIVER INTERRUPTS FROM UNIT '2'
3310
3311  012012  004737  012152        RECV2:  JSR     PC,SETBF2               ;SET UP BUFFER POINTERS
3312  012016  004737  013362                JSR     PC,RECVIT               ;SERVICE RECEIVER INTERRUPT
3313  012022  000547                        BR      SAVBF2
3314
3315                                ;ENTERED HERE ON DL11 RECEIVER INTERRUPTS FROM UNIT '3'
3316
3317  012024  004737  012222        RECV3:  JSR     PC,SETBF3               ;SET UP BUFFER POINTERS
3318  012030  004737  013362                JSR     PC,RECVIT               ;SERVICE RECEIVER INTERRUPT
3319  012034  000554                        BR      SAVBF3
3320
3321                                ;SUBROUTINE ENTERED TO SET UP BUFFER POINTERS FOR UNIT '0'
3322
3323  012036  012637  024464        SETBF0: MOV     (SP)+,KSTOR1            ;SAVE THE RETURN ADDRESS
3324  012042  010046                        MOV     R0,-(SP)                ;SAVE THE WORKING REG.'S
3325  012044  010146                        MOV     R1,-(SP)
3326  012046  010246                        MOV     R2,-(SP)
3327  012050  010346                        MOV     R3,-(SP)
3328  012052  010446                        MOV     R4,-(SP)
3329  012054  013700  024410                MOV     BUF0R0,R0
3330  012060  013701  024420                MOV     BUF0R1,R1
3331  012064  005002                        CLR     R2                      ;R2 IS INDEX OFFSET FOR ADDRESSSING
3332  012066  005003                        CLR     R3                      ;R3 IS INDEX OFFSET FOR DEVICE ADDRESSING
3333  012070  012737  024567  024430        MOV     #VTBUFF+55.,START
3334  012076  000177  012362                JMP     @KSTOR1                 ;RETURN TO CALL
3335
3336                                ;SUBROUTINE ENTERED TO SET UP BUFFER POINTERS FOR UNIT '1'
3337
3338  012102  012637  024464        SETBF1: MOV     (SP)+,KSTOR1            ;SAVE THE RETURN ADDRESS
3339  012106  010046                        MOV     R0,-(SP)                ;SAVE THE WORKING REG.'S
3340  012110  010146                        MOV     R1,-(SP)
3341  012112  010246                        MOV     R2,-(SP)
3342  012114  010346                        MOV     R3,-(SP)
3343  012116  010446                        MOV     R4,-(SP)
3344  012120  013700  024412                MOV     BUF1R0,R0
3345  012124  013701  024422                MOV     BUF1R1,R1
3346  012130  012702  000002                MOV     #2,R2                   ;R2 IS INDEX OFFSET FOR ADDRESSSING
3347  012134  012703  000014                MOV     #12.,R3                 ;R3 IS INDEX OFFSET FOR DEVICE ADDRESSING
3348  012140  012737  026537  024430        MOV     #VTBUFF+1055.,START
3349  012146  000177  012312                JMP     @KSTOR1                 ;RETURN TO CALL
3350
3351                                ;SUBROUTINE ENTERED TO SET UP BUFFER POINTERS FOR UNIT '2'
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3352
3353  012152  012637  024464          SETBF2: MOV     (SP)+,KSTOR1            ;SAVE THE RETURN ADDRESS
3354  012156  010046                          MOV     R0,-(SP)                ;SAVE THE WORKING REG.'S
3355  012160  010146                          MOV     R1,-(SP)
3356  012162  010246                          MOV     R2,-(SP)
3357  012164  010346                          MOV     R3,-(SP)
3358  012166  010446                          MOV     R4,-(SP)
3359  012170  013700  024414                  MOV     BUF2R0,R0
3360  012174  013701  024424                  MOV     BUF2R1,R1
3361  012200  012702  000004                  MOV     #4,R2                   ;R2 IS INDEX OFFSET FOR ADDRESSING
3362  012204  012703  000030                  MOV     #24.,R3                 ;R3 IS INDEX OFFSET FOR DEVICE ADDR.
3363  012210  012737  030507  024430          MOV     #VTBUFF+2055.,START
3364  012216  000177  012242                  JMP     @KSTOR1                 ;RETURN TO CALL
3365
3366                          ;SUBROUTINE ENTERED TO SET UP BUFFER POINTERS FOR UNIT '3'
3367
3368  012222  012637  024464          SETBF3: MOV     (SP)+,KSTOR1            ;SAVE THE RETURN ADDRESS
3369  012226  010046                          MOV     R0,-(SP)                ;SAVE THE WORKING REG.'S
3370  012230  010146                          MOV     R1,-(SP)
3371  012232  010246                          MOV     R2,-(SP)
3372  012234  010346                          MOV     R3,-(SP)
3373  012236  010446                          MOV     R4,-(SP)
3374  012240  013700  024416                  MOV     BUF3R0,R0
3375  012244  013701  024426                  MOV     BUF3R1,R1
3376  012250  012702  000006                  MOV     #6,R2
3377  012254  012703  000044                  MOV     #36.,R3
3378  012260  012737  032457  024430          MOV     #VTBUFF+3055.,START
3379  012266  000177  012172                  JMP     @KSTOR1                 ;RETURN TO CALL
3380
3381                          ;SUBROUTINE ENTERED TO SAVE BUFFER POINTERS FOR UNIT '0'
3382
3383  012272  010037  024410          SAVBF0: MOV     R0,BUF0R0
3384  012276  010137  024420                  MOV     R1,BUF0R1
3385  012302  012604                          MOV     (SP)+,R4                ;RESTORE THE WORKING REG.'S
3386  012304  012603                          MOV     (SP)+,R3
3387  012306  012602                          MOV     (SP)+,R2
3388  012310  012601                          MOV     (SP)+,R1
3389  012312  012600                          MOV     (SP)+,R0
3390  012314  000002                          RTI
3391
3392                          ;SUBROUTINE ENTERED TO SAVE BUFFER POINTERS FOR UNIT '1'
3393
3394  012316  010037  024412          SAVBF1: MOV     R0,BUF1R0
3395  012322  010137  024422                  MOV     R1,BUF1R1
3396  012326  012604                          MOV     (SP)+,R4                ;RESTORE THE WORKING REG.'S
3397  012330  012603                          MOV     (SP)+,R3
3398  012332  012602                          MOV     (SP)+,R2
3399  012334  012601                          MOV     (SP)+,R1
3400  012336  012600                          MOV     (SP)+,R0
3401  012340  000002                          RTI
3402
3403                          ;SUBROUTINE ENTERED TO SAVE BUFFER POINTERS FOR UNIT '2'
3404
3405  012342  010037  024414          SAVBF2: MOV     R0,BUF2R0
3406  012346  010137  024424                  MOV     R1,BUF2R1
3407  012352  012604                          MOV     (SP)+,R4                ;RESTORE THE WORKING REG.'S
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3408  012354  012603                    MOV     (SP)+,R3
3409  012356  012602                    MOV     (SP)+,R2
3410  012360  012601                    MOV     (SP)+,R1
3411  012362  012600                    MOV     (SP)+,R0
3412  012364  000002                    RTI
3413
3414                              ;SUBROUTINE ENTERED TO SAVE BUFFER POINTERS FOR UNIT '3'
3415
3416  012366  010037  024416    SAVBF3: MOV     R0,BUF3R0
3417  012372  010137  024426            MOV     R1,BUF3R1
3418  012376  012604                    MOV     (SP)+,R4                ;RESTORE THE WORKING REG.'S
3419  012400  012603                    MOV     (SP)+,R3
3420  012402  012602                    MOV     (SP)+,R2
3421  012404  012601                    MOV     (SP)+,R1
3422  012406  012600                    MOV     (SP)+,R0
3423  012410  000002                    RTI
3424
3425                              ;SUBROUTINE ENTERED ON ENCOUNTERING SYSTEM ERRORS WHICH MOVES
3426                              ;THE CHARACTER IN THE PC INTO THE DISPLAY BUFFER.
3427
3428  012412  005262  024340    FLGERR: INC     ERFLG0(R2)              ;SET ERROR FLAG
3429  012416  112720  000362            MOVB    #BLINK,(R0)+            ;SET UP TO BLINK CHAR.
3430  012422  117620  000000            MOVB    @(SP),(R0)+             ;MOVE CHAR. INTO BUFFER
3431  012426  112720  000360            MOVB    #360,(R0)+              ;CLR PRESET FIELD
3432  012432  112710  000031            MOVB    #EOS,(R0)               ;TERMINATE W/ EOS.
3433  012436  062716  000002            ADD     #2,(SP)                 ;SET UP STACK TO EXIT
3434  012442  000207                    RTS     PC
3435
3436                              ;FK INTERRUPT SERVICE ROUTINE
3437
3438  012444  105773  001334    SERVFK: TSTB    @FKOCSR(R3)             ;ASCII FLAG SET?
3439  012450  100421                    BMI     SERVOO                  ;YES, SERVICE KEYBOARD
3440  012452  005762  024300            TST     AUTSW0(R2)              ;IS THE AUTO CHAR. SW. SET?
3441  012456  001012                    BNE     AUTOLL                  ;YES, GENERATE A CHARACTER
3442  012460  005762  024254            TST     PATERN(R2)              ;GENERATING WORST CASE PATTERN?
3443  012464  001011                    BNE     JMPWOR                  ;YES, OUTPUT NEXT CHAR.
3444  012466  005762  024244            TST     HOLDSO(R2)              ;INTERVAL TIMER, IS ERROR HOLD SET?
3445  012472  001402                    BEQ     LINKOD                  ;NO, CLR INTERVAL TIME FLAG
3446  012474  004737  013760            JSR     PC,TESTSW               ;YES, TST SW15 TO CONTINUE
3447  012500  000137  013106    LINKOD: JMP     SERVOD                  ;SW15 STILL SET, EXIT
3448  012504  000137  013304    AUTOLL: JMP     AUTOUT
3449  012510  000137  013350    JMPWOR: JMP     WORST1
3450
3451  012514  005773  001334    SERVOO: TST     @FKOCSR(R3)             ;ERROR FLAG SET?
3452  012520  100003                    BPL     SERVOA                  ;NO VALID CHAR.
3453  012522  004737  012412            JSR     PC,FLGERR               ;YES, ASCII ERRR FLAG SET
3454  012526  000113                    113                             ;DISPLAY A 'BLINKING K'
3455  012530  117304  001336    SERVOA: MOVB    @FKODAT(R3),R4          ;READ & SAVE CHAR.
3456  012534  122704  000003            CMPB    #3,R4                   ;CHAR='↑C'?
3457  012540  001051                    BNE     SERVAA                  ;NO, CONTINUE
3458  012542  005762  024400            TST     BUSY0(R2)               ;YES, DL'S BUSY?
3459  012546  001403                    BEQ     RELOAD                  ;NO, RE-START
3460  012550  005262  024330            INC     STOP0(R2)               ;YES, SET STOP SW.
3461  012554  000554                    BR      SERVOD                  ;EXIT
3462  012556  013700  024430    RELOAD: MOV     START,R0                ;RESET BUFFER POINTER
3463  012562  112710  000031            MOVB    #EOS,(R0)               ;SET UP FOR NEW INPUT
```

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3464  012566  005062  024370                CLR     XFERO(R2)
3465  012572  005062  024360                CLR     RESTRO(R2)
3466  012576  005062  024330                CLR     STOPO(R2)
3467  012602  005062  024224                CLR     STCODO(R2)
3468  012606  005062  024400                CLR     BUSYO(R2)
3469  012612  005062  024266                CLR     BLKERR(R2)
3470  012616  005062  024254                CLR     PATERN(R2)
3471  012622  005062  024300                CLR     AUTSWO(R2)
3472  012626  005062  024310                CLR     TRANFO(R2)
3473  012632  005062  024320                CLR     RECTRO(R2)
3474  012636  005062  024340                CLR     ERFLGO(R2)
3475  012642  005062  024244                CLR     HOLDSO(R2)
3476  012646  005062  024234                CLR     CHRCTO(R2)          ;CLR CHAR. CNTR.
3477  012652  005062  024204                CLR     TRNSWO(R2)
3478  012656  005062  024174                CLR     RECSWO(R2)
3479  012662  000511                        BR      SERVOD              ;EXIT
3480  012664  122704  000024        SERVAA: CMPB    #24,R4              ;CHAR='↑T' ?
3481  012670  001017                        BNE     SERVOB              ;NO, CONTINUE
3482  012672  005162  024370                COM     XFERO(R2)           ;YES, COMPLIMENT TRANSFER SW.
3483  012676  001503                        BEQ     SERVOD              ;STOP AUTO TRANSFER.
3484  012700  005762  024400                TST     BUSYO(R2)           ;CURRENTLY TRANSFERRING DATA?
3485  012704  001100                        BNE     SERVOD              ;YES, IGNORE SW.
3486  012706  005762  024360        SERVAB: TST     RESTRO(R2)          ;HAS A RESTART ADDR BEEN LOADED?
3487  012712  001403                        BEQ     .+10                ;NO, TERMINATE INPUT BUFFER
3488  012714  016200  024360                MOV     RESTRO(R2),R0       ;YES, RESET BUFFER POINTER
3489  012720  000423                        BR      SERVBB              ;SET UP TO START TRANSFER
3490  012722  112720  000014                MOVB    #EOT,(R0)+          ;TERMINATE MESSAGE
3491  012726  000420                        BR      SERVBB
3492
3493  012730  122704  000001        SERVOB: CMPB    #1,R4               ;CHAR. = TO '↑A'
3494  012734  001556                        BEQ     AUTOST              ;YES, AUTOMATICALLY GENERATE CHAR.'S
3495  012736  122704  000005                CMPB    #5,R4               ;CHAR. = TO '↑E'
3496  012742  001705                        BEQ     RELOAD              ;YES, RELOAD
3497  012744  122704  000027                CMPB    #27,R4              ;CHAR. = TO '↑W' ?
3498  012750  001574                        BEQ     WORST               ;YES, GENERATE WORST CASE PATTERN
3499  012752  005762  024400                TST     BUSYO(R2)           ;DL11 BUSY?
3500  012756  001053                        BNE     SERVOD              ;YES, IGNORE CHAR.
3501  012760  122704  000033                CMPB    #33,R4              ;REQUEST TRANSFER?
3502  012764  001024                        BNE     SERVOC              ;NO
3503  012766  000747                        BR      SERVAB
3504  012770  112710  000031        SERVBB: MOVB    #EOS,(R0)
3505  012774  010062  024360                MOV     R0,RESTRO(R2)       ;SAVE LAST ADDR. FOR AUTO RESTART
3506  013000  012762  000001  024400        MOV     #1,BUSYO(R2)        ;SET BUSY SW.
3507  013006  012762  000001  024204        MOV     #1,TRNSWO(R2)       ;SET TRANSFER, SOFTWARE SW.
3508  013014  013701  024430                MOV     START,R1            ;SET UP BUFFER POINTER TO TRANSMIT DATA.
3509  013020  105741                        TSTB    -(R1)               ;SET UP BUFFER POINTER
3510  013022  012762  000004  024214        MOV     #4,NULCTO(R2)
3511  013030  105072  001570        SERVBC: CLRB    @XBUFO(R2)          ;TRANSMIT THE START CODE
3512  013034  000424                        BR      SERVOD              ;EXIT
3513  013036  122704  000177        SERVOC: CMPB    #177,R4             ;CHAR. = 'RUBOUT'?
3514  013042  001010                        BNE     SERVCC              ;NO, SAVE IT
3515  013044  005762  024234                TST     CHRCTO(R2)          ;BUFFER EMPTY?
3516  013050  001416                        BEQ     SERVOD              ;YES, IGNORE IT
3517  013052  005362  024234                DEC     CHRCTO(R2)          ;NO, DECEMENT COUNTER
3518  013056  112740  000031                MOVB    #EOS,-(R0)          ;BACK UP BUFFER POINTER
3519  013062  000411                        BR      SERVOD              ;EXIT
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 3520  013064  026227  024234  000600  SERVCC: CMP     CHRCTO(R2),#384.        ;BUFFER FULL?
 3521  013072  103011                  BHIS    SERVDX                  ;YES, IGNORE CHAR.
 3522  013074  005262  024234                  INC     CHRCTO(R2)              ;INCREMENT CHAR. CNTR.
 3523  013100  110420                  MOVB    R4,(R0)+                ;NO, SAVE CHAR.
 3524  013102  112710  000031                  MOVB    #ESC,(R0)
 3525  013106  052773  000002  001334  SERVOD: BIS     #2,@#KDCSR(R3)          ;CLR INTERVAL TIMER FLAG
 3526  013114  000207                  RTS     PC                      ;EXIT
 3527  013116  005062  024254          SERVDX: CLR     PATERN(R2)              ;CLEAR WORST CASE PATTERN SW.
 3528  013122  005062  024300                  CLR     AUTSWO(R2)              ;CLEAR AUTO SW.
 3529  013126  000767                  BR      SERVOD
 3530
 3531                                  ;DL11 TRANSMITTER SERVICE ROUTINE
 3532
 3533  013130  005762  024350          TRNSMT: TST     INTRNO(R2)              ;LEGAL INTERRUPT?
 3534  013134  001003                  BNE     .+10                    ;YES, SERVICE IT.
 3535  013136  005262  024350                  INC     INTRNO(R2)              ;THIS IS THE INITIALIZE INTERRUPT.
 3536  013142  000207                  RTS     PC                      ;EXIT
 3537  013144  005762  024204                  TST     TRNSWO(R2)              ;TRANSFER SW. SET?
 3538  013150  001004                  BNE     TRANOA                  ;YES, LEGAL INTERRUPT
 3539  013152  004737  012412                  JSR     PC,FLGERR               ;NO, ILLEGAL TRANSMITTER INTERRUPT
 3540  013156  000124                  124                             ;DISPLAY A 'BLINKING T'.
 3541  013160  000207                  RTS     PC
 3542  013162  017737  166136  013270  TRANOA: MOV     @SWR,R3PRT              ;READ THE SWITCHES
 3543  013170  042737  177774  013270          BIC     #177774,R3PRT
 3544  013176  022737  000003  013270          CMP     #SWOO+SWO1,R3PRT        ;LOOPING DATA?
 3545  013204  001430                  BEQ     TRANOC+4                ;YES, EXIT
 3546  013206  005362  024214                  DEC     NULCTO(R2)
 3547  013212  003306                  BGT     SERVBC                  ;XMITTED 4 NULL CHARS?
 3548  013214  002406                  BLT     TRANOB
 3549  013216  112772  000377  001570          MOVB    #377,@XBUFO(R2)
 3550  013224  005062  024320                  CLR     RECTRO(R2)              ;RECV'D CHARACTER COUNTER
 3551  013230  000207                  RTS PC
 3552  013232  122721  000014          TRANOB: CMPB    #EOP,(R1)+              ;HAS LAST CHAR. BEEN TRANSMITTED?
 3553  013236  001011                  BNE     TRANOC                  ;NO, TRANSMIT NEXT CHAR.
 3554  013240  005062  024204                  CLR     TRNSWO(R2)              ;YES, CLR TRANSMIT SW.
 3555  013244  005062  024266                  CLR     BLKERR(R2)              ;CLEAR BLOCK ERROR SW.
 3556  013250  005262  024174                  INC     RECSWO(R2)              ;SET UP TO REC. DATA
 3557  013254  013701  024430                  MOV     START,R1                ;RESET POINTER TO COMPARE DATA
 3558  013260  000207                  RTS     PC                      ;EXIT
 3559  013262  111172  001570          TRANOC: MOVB    (R1),@XBUFO(R2)         ;TRANSMIT NEXT CHAR.
 3560  013266  000207                  RTS     PC
 3561  013270  000000                  R3PRT:  .WORD   0
 3562
 3563                                  ;ENTERED HERE TO INITALIZE THE AUTOMATIC CHARACTER GENERATOR
 3564
 3565  013272  012704  000041          AUTOST: MOV     #41,R4
 3566  013276  010462  024300                  MOV     R4,AUTSWO(R2)
 3567  013302  000670                  BR      SERVCC
 3568
 3569                                  ;ENTERED HERE TO GENERATE AND OUTPUT THE AUTOMATIC CHARACTERS
 3570
 3571  013304  005262  024300          AUTOUT: INC     AUTSWO(R2)              ;UPDATE THE CHARACTER
 3572  013310  042762  177600  024300          BIC     #177600,AUTSWO(R2)
 3573  013316  032762  000140  024300          BIT     #140,AUTSWO(R2)         ;IS CHARACTER LEGAL?
 3574  013324  001003                  BNE     .+10                    ;YES
 3575  013326  052762  000040  024300          BIS     #40,AUTSWO(R2)          ;NO, RESET IT
```

```
3576  013334  016204  024300                  MOV     AUTSWD(R2),R4
3577  013340  000651                          BR      SERVCC
3578
3579                                  ;ENTERED HERE TO INITIALIZE AND OUTPUT A WORST CASE CHARACTER
3580                                  ;PATTERN OF '125 & 252'.
3581
3582  013342  112762  000252  024254  WORST:  MOVB    #252,PATERN(R2)
3583  013350  105162  024254          WORST1: COMB    PATERN(R2)              ;COMPLIMENT PATTERN
3584  013354  116204  024254                  MOVB    PATERN(R2),R4
3585  013360  000641                          BR      SERVCC
3586
3587                                  ;DL11 RECEIVER SERVICE ROUTINE
3588
3589  013362  017204  001530          RECVIT: MOV     @RBUF0(R2),R4           ;READ DATA BUFFER
3590  013366  013705  024430                  MOV     START,R5
3591  013372  062705  001604                  ADD     #900.,R5                ;IS BUFFER LIMIT EXCEEDED?
3592  013376  020500                          CMP     R5,R0                   ;IS BUFFER LIMIT EXCEEDED?
3593  013400  003021                          BGT     RECVON                  ;NO, PROCESS CHARACTER
3594  013402  017737  165716  014020          MOV     @SWR,R3PXT              ;IF SW0 AND SW1 ARE SET -
3595  013410  042737  177774  014020          BIC     #177774,R3PXT           ;DO NOT EXIT- RESET THE BUFFER
3596  013416  022737  000003  014020          CMP     #SW00+SW01,R3PXT        ;AND CONTINUE.
3597  013424  001003                          BNE     1$
3598  013426  013700  024430                  MOV     START,R0
3599  013432  000404                          BR      RECVON
3600  013434  122704  000014          1$:     CMPB    #EOP,R4                 ;TRANSFER COMPLETE?
3601  013440  001522                          BEQ     RECVDD                  ;YES, SET UP TO EXIT
3602  013442  000207                          RTS     PC                      ;NO, IGNORE THE CHARACTER
3603  013444  035762  024174          RECVON: TST     RECSWD(R2)              ;REC. SW. SET?
3604  013450  001010                          BNE     RECVOA                  ;YES, LEGAL REC. INTERRUPT
3605  013452  032777  000001  165644          BIT     #SW00,@SWR              ;IS SW '0' SET?
3606  013460  001004                          BNE     RECVOA                  ;YES, HOST SENDING DATA
3607  013462  004737  012412          STERR:  JSR     PC,FLGERR               ;NO, ILLEGAL REC. INTR.
3608  013466  000122                          122                             ;DISPLAY A 'BLINKING R'.
3609  013470  000207                          RTS     PC                      ;EXIT
3610
3611  013472  005704          RECVOA: TST     R4                      ;REC. ERROR BIT SET?
3612  013474  100021                  BPL     RECVOB                  ;NO, VALID CHAR.
3613  013476  032704  040000          BIT     #40000,R4               ;OVERRUN ERROR?
3614  013502  001404                  BEQ     .+12                    ;NO
3615  013504  004737  012412          JSR     PC,FLGERR               ;YES, DATA OVERRUN ERROR
3616  013510  000117                  117                             ;DISPLAY A 'BLINKING O'
3617  013512  000412                  BR      RECVOB
3618  013514  032704  020000          BIT     #20000,R4               ;FRAMING ERROR?
3619  013520  001404                  BEQ     .+12                    ;NO
3620  013522  004737  012412          JSR     PC,FLGERR               ;YES, DISPLAY A 'BLINKING F'
3621  013526  000106                  106
3622  013530  000403                  BR      RECVOB
3623  013532  004737  012412          JSR     PC,FLGERR                       ;PARITY ERROR
3624  013536  000120                  120                             ;DISPLAY A BLINKING 'P'
3625  013540  017737  165560  014020  RECVOB: MOV     @SWR,R3PXT              ;READ THE SWITCHES
3626  013546  042737  177774  014020          BIC     #177774,R3PXT
3627  013554  022737  000003  014020          CMP     #SW00+SW01,R3PXT        ;LOOP DATA BACK REQUESTED
3628  013562  001524                          BEQ     RECVAC                  ;YES
3629  013564  105704                          TSTB    R4                      ;= NULL CHAR.?
3630  013566  001513                          BEQ     RECVOE                  ;YES, IGNORE IT
3631  013570  005762  024224                  TST     STCOD0(R2)              ;HAVE WE RECEIVED THE START CODE?
```

```
3632  013574  001014                    BNE     RECVBB          ;YES, SAVE DATA
3633  013576  122704  000377            CMPB    #377,R4         ;NO, IS THIS IT?
3634  013602  001107                    BNE     RECVAB          ;NO, CHECK 'SWO'
3635  013604  112720  000136            MOVB    #136,(R0)+      ;YES, DISPLAY ST. CODE AS '↑'
3636  013610  112720  000012            MOVB    #12,(R0)+       ;ST NEW LINE
3637  013614  112710  000031            MOVB    #EOS,(R0)       ;TERMINATE BUFFER.
3638  013620  005262  024224            INC     STCODO(R2)      ;SET SW.
3639  013624  000474                    BR      RECVOE          ;EXIT
3640
3641  013626  122704  000014  RECVBB:   CMPB    #EOP,R4         ;TRANSFER DONE?
3642  013632  001425                    BEQ     RECVDD          ;YES, SET UP TO EXIT
3643  013634  005262  024320            INC     RECTRO(R2)      ;KEEP TRACK OF NO. OF RECV'D CHAR.S'S
3644  013640  120421                    CMPB    R4,(R1)+        ;COMPARE REC. DATA TO TRANS. DATA
3645  013642  001415                    BEQ     RECVOC          ;DATA OK
3646  013644  005762  024266  RECVBC:   TST     BLKERR(R2)      ;HAS A BLOCK ERROR BEEN DETECTED?
3647  013650  001002                    BNE     1$              ;YES, DON'T UPDATE ERROR COUNTER
3648  013652  005262  024340            INC     ERFLGO(R2)      ;DATA ERROR SET SOFT SWITCH
3649  013656  005262  024266  1$:       INC     BLKERR(R2)
3650  013662  112720  000374            MOVB    #374,(R0)+      ;DISPLAY CHAR IN "BOLD-UNDERLINE"
3651  013666  110420                    MOVB    R4,(R0)+
3652  013670  112720  000360            MOVB    #360,(R0)+      ;CLR FIELD PRESET
3653  013674  000401                    BR      .+4
3654  013676  110420  RECVOC:  MOVB    R4,(R0)+        ;DISPLAY REC. CHAR.
3655  013700  112710  000031            MOVB    #EOS,(R0)
3656  013704  000207                    RTS     PC              ;EXIT
3657  013706  005262  024310  RECVOD:   INC     TRANFO(R2)      ;TRANSFER COUNTER
3658  013712  005062  024400            CLR     BUSYO(R2)
3659  013716  005062  024174            CLR     RECSWO(R2)      ;CLR. REC. SOFTWARE SW.
3660  013722  005062  024224            CLR     STCODO(R2)      ;CLR ST. CODE SW.
3661  013726  005762  024370            TST     XFERO(R2)       ;IS AUTO TRANSFER SW. SET?
3662  013732  001431                    BEQ     RECVOE          ;NO, NORMAL TRANSFER EXIT
3663  013734  005762  024330            TST     STOPO(R2)       ;YES, STOP SW. SET?
3664  013740  001402                    BEQ     .+6             ;NO, START NEXT TRANSFER
3665  013742  000137  012556            JMP     RELOAD          ;YES, RESTART
3666  013746  016200  024360            MOV     RESTRO(R2),R0   ;NO, RESET BUFFER POINTER
3667  013752  005762  024340            TST     ERFLGO(R2)      ;ERROR FLAG SET?
3668  013756  001412                    BEQ     RECVDD          ;NO, START NEXT TRANSFER
3669  013760  005777  165340  TESTSW:   TST     @SWR            ;YES, IS SW15 SET?
3670  013764  100411                    BMI     RECVEE          ;YES, INHIBIT FURTHER TRANSFERS
3671  013766  005762  024244            TST     HOLDSO(R2)      ;HAS SW15 BEEN SET AND NOW RESET?
3672  013772  001404                    BEQ     RECVDD          ;NO, IT HASN'T BEEN SET
3673  013774  005062  024340            CLR     ERFLGO(R2)      ;YES, RESET THE ERROR COUNTER TO '0'
3674  014000  005062  024244            CLR     HOLDSO(R2)
3675  014004  000137  012770  RECVDD:   JMP     SERVBB          ;SET UP NEXT TRANSFER
3676  014010  012762  000001  024244  RECVEE:  MOV     #1,HOLDSO(R2)   ;SET TO HOLD XFER
3677  014016  000207          RECVOE:   RTS     PC
3678  014020  000000          R3PXT:    .WORD   0
3679
3680
3681  014022  032777  000001  165274  RECVAB:  BIT     #SW00,@SWR      ;IS SW '0' SET?
3682  014030  001322                    BNE     RECVOC          ;YES, JUST DISPLAY CHARACTER.
3683  014032  000704                    BR      RECVBC          ;NO, POST AS ILLEGAL CHAR.
3684
3685                          ;ENTERED HERE IF BOTH 'SW00 & SW01' ARE SET
3686
3687  014034  005262  024320  RECVAC:  INC     RECTRO(R2)      ;UPDATE RECEIVE COUNT
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 3688  014040  005262  024310                 INC     TRANFO(R2)              ;UPDATE TRANSMIT COUNT
 3689  014044  005262  024204                 INC     TRNSWO(R2)              ;SET THE TRANSMITTER SWITCH
 3690  014050  110472  001570                 MOVB    R4,@XBUFO(R2)           ;TRANSMIT CHARACTER BACK
 3691  014054  042704  177400                 BIC     #177400,R4              ;SET UP TO DISPLAY OCTAL REPRESENTATION
 3692                                                                          ;OF THE CHARACTER
 3693  014060  012737  000003  024474         MOV     #3,KSTOR5
 3694  014066  012737  000376  015166         MOV     #376,MASK
 3695  014074  012703  000006                 MOV     #6,R3
 3696  014100  000401                         BR      .+4
 3697  014102  006104                 MOVE1:  ROL     R4
 3698  014104  006104                         ROL     R4
 3699  014106  006104                         ROL     R4
 3700  014110  005337  024474                 DEC     KSTOR5
 3701  014114  002010                         BGE     MOVE2
 3702  014116  110402                         MOVB    R4,R2
 3703  014120  143702  015166                 BICB    MASK,R2
 3704  014124  152702  000060                 BISB    #60,R2
 3705  014130  110220                         MOVB    R2,(R0)+                ;PUT CHARACTER IN DISPLAY BUFFER
 3706  014132  112710  000031                 MOVB    #EOS,(R0)               ;TERMINATE BUFFER
 3707  014136  012737  000370  015166 MOVE2:  MOV     #370,MASK
 3708  014144  005303                         DEC     R3                      ;DONE
 3709  014146  001355                         BNE     MOVE1                   ;NO
 3710  014150  112720  000040                 MOVB    #40,(R0)+               ;YES, PLACE 'SPACE' CODE IN BUFFER
 3711  014154  112710  000031                 MOVB    #EOS,(R0)
 3712  014160  000207                         RTS     PC                      ;RETURN
 3713                                 ;*************************************************************************
 3714                                 ;ROUTINE TO LOOP THRU A SINGLE LOGIC SUBTEST.  ENTERED FROM THE 'MONITOR'
 3715                                 ;VIA SELECTING TEST '?'.  UPON ENTERING THIS SUBROUTINE ANOTHER 'HALT' IS EN-
 3716                                 ;COUNTERED.  LOAD THE ADDRESS OF THE SUBTEST TO BE EXECUTED IN THE DATA
 3717                                 ;SWITCHES AND PRESS CONTINUE.
 3718                                 ;NOTE THAT 'SW11' MUST BE '0' (DOWN) TO RUN THIS TEST.
 3719                                 ;*************************************************************************
 3720
 3721  014162  005737  024160 TESTX:  TST     TTYSWH                  ;TTY AVAILABLE?
 3722  014166  001406                 BEQ     TSTA                    ;NO, HALT FOR TEST ADDR.
 3723  014170  104012                 PRINT
 3724  014172  021641                 MES8                            ;TEXT 'TEST ADDR.? '
 3725  014174  104015                 ASEMBL                          ;YES, GET ADDR. FROM TTY.
 3726  014176  010337  024464         MOV     R3,KSTOR1               ;SAVE ADDRESS
 3727  014202  000404                 BR      TSTB                    ;EXECUTE TEST
 3728  014204  000000         TSTA:   HALT                            ;GET TEST ADDRESS
 3729  014206  017737  165112  024464 MOV     @SWR,KSTOR1             ;SAVE ADDRESS
 3730
 3731  014214  023727  024464  006174 TSTB:   CMP     KSTOR1,#SETUPF  ;'FK' OR 'VT' LOGIC TEST?
 3732  014222  101003                 BHI     .+10                    ;SET UP FOR 'FK'
 3733  014224  004737  003026         JSR     PC,SETUPV               ;SET UP FOR 'VT'
 3734  014230  000402                 BR      .+6
 3735  014232  004737  006174         JSR     PC,SETUPF
 3736  014236  062737  000002  024464 ADD     #2,KSTOR1               ;ADD '2' TO POINT TO INSTRUCTION AFTER SCOPE
 3737  014244  017737  010214  024146 MOV     @KSTOR1,TSTNUM          ;LOAD TEST NO.
 3738  014252  062737  000002  024464 ADD     #2,KSTOR1
 3739  014260  005037  020400 XLOOP:  CLR     SCOPEF                  ;KEEP COUNT AT ZERO
 3740  014264  012737  014260  020402 MOV     #XLOOP,RETURN           ;LOAD SCOPE LOOP RETURN POINTER
 3741  014272  000177  010166         JMP     @KSTOR1                 ;JUMP TO TEST
 3742                                 ;*************************************************************************
 3743                                 ;SUBROUTINE TO ISSUE N SPACES
```

```
                                        ;N IS ONE PLUS VALUE CONTAINED IN SPACEX
                                        ;SPACEX IS CLEARED WITHIN THE SUBROUTINE, SO THAT A CALL ON
                                        ;SPACE WITHOUT LOADING SPACEX ISSUES ONLY ONE SPACE
                                        ;*************************************************************************
014276  105777  165016          XSPACE: TSTB    @TPS            ;WAIT FOR TTY READY
014302  100375                          BPL     .-4
014304  012777  000240  165010          MOV     #240,@TPB       ;OUTPUT A SPACE
014312  005337  014326                  DEC     SPACEX          ;DECREMENT COUNT
014316  003367                          BGT     XSPACE          ;LOOP IF NOT DONE
014320  005037  014326                  CLR     SPACEX          ;RESET COUNT TO ZERO
014324  000002                          RTI                     ;RETURN
014326  000000                  SPACEX: 0
                                        ;*************************************************************************
                                        ;SUBROUTINE TO TEST FOR THE KEYBOARD FLAG BEING SET
                                        ;*************************************************************************

014330  005737  024160          TKSFLG: TST     TTYSWH          ;USING THE 'TTY' ?
014334  001404                          BEQ     .+12            ;NO, EXIT
014336  105777  164752                  TSTB    @TKS            ;FLAG SET?
014342  100001                          BPL     .+4             ;NO, EXIT
014344  104013                          TTYIN                   ;YES,INQUIRE
014346  000002                          RTI
                                        ;*************************************************************************
                                        ;KEYBOARD SERVICE ROUTINE
                                        ;*************************************************************************

014350  012704  014600          XTTYIN: MOV     #INBUF,R4       ;SETUP CHARACTER BUFFER
014354  005037  024152                  CLR     CHRCNT          ;CLEAR CHARACTER COUNTER
014360  005037  014602                  CLR     INBUF+2
014364  105777  164724          INPUTA: TSTB    @TKS            ;CHARACTER READY?
014370  100375                          BPL     INPUTA          ;NO, WAIT IT OUT
014372  017701  164720                  MOV     @TKB,R1         ;SAVE CHARACTER
014376  042701  000200                  BIC     #200,R1         ;STRIPE PARITY BIT
014402  120127  000060                  CMPB    R1,#60          ;IS IT A SPECIAL CHARACTER
014406  100420                          BMI     SPCHR1          ;YES, TEST IT
014410  122701  000137                  CMPB    #137,R1
014414  100415                          BMI     SPCHR1
014416  010124          INPUTB: MOV     R1,(R4)+        ;SAVE CHARACTER
014420  005237  024152                  INC     CHRCNT          ;INCREMENT THE CHARACTER COUNT.
014424  022737  000016  024152          CMP     #14.,CHRCNT
014432  100450                          BMI     SPCHR5          ;TYPE '?' IF TOO MANT CHAR.
014434  105777  164660          OUTPTA: TSTB    @TPS            ;ECHO CHARACTER
014440  100375                          BPL     OUTPTA
014442  110177  164654                  MOVB    R1,@TPB
014446  000746                          BR      INPUTA          ;WAIT FOR NEXT CHARACTER

                                        ;SUBROUTINE TO TEST FOR SPECIAL CHARACTERS :'↑C','+','CR',',' OR 'RUBOUT'
014450  122701  000003          SPCHR1: CMPB    #3,R1           ;CHAR.='↑C'
014454  001002                          BNE     .+6             ;NO,NOT '↑C'
014456  000137  002526                  JMP     MONITR          ;YES, EXIT TO MONITOR
014462  122701  000001                  CMPB    #1,R1           ;CHAR. ='↑A'?
014466  001005                          BNE     .+14            ;NOT '↑A'
014470  022626                          POP2SP                  ;YES, RESTORE STACK
014472  104012                          PRINT
014474  023005                          CNTRLA                  ;TEXT '↑A'
014476  000177  007432                  JMP     @AVECTR
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3800  014502  122701  000177          CMPB    #177,R1         ;CHAR. = 'RUBOUT'
3801  014506  001011                  BNE     SPCHR3          ;IGNORE CHAR. & EXIT
3802  014510  005737  024152          TST     CHRCNT          ;IS RUBOUT LEGAL?
3803  014514  001723                  BEQ     INPUTA          ;NO, IGNORE IT
3804  014516  005337  024152          DEC     CHRCNT
3805  014522  012701  000134          MOV     #134,R1         ;TYPE '\' TO INDICATE RUBOUT
3806  014526  005744                  TST     -(R4)           ;POP OFF LAST CHARACTER
3807  014530  000741                  BR      OUTPTA          ;WAIT FOR NEXT CHARACTER
3808  014532  122701  000054  SPCHR3: CMPB    #54,R1          ;TEST FOR ','
3809  014536  001727                  BEQ     INPUTB          ;LEGAL CHAR., SAVE IT
3810  014540  122701  000015  SPCHR4: CMPB    #15,R1          ;=TO 'CARRIAGE RETURN' TO TERMINATE?
3811  014544  001003                  BNE     SPCHR5          ;NO, CONTINUE
3812  014546  104012                  PRINT                   ;YES, TYPE 'CR-LF'
3813  014550  023011                  CRLF
3814  014552  000002  EXTTY:  RTI                             ;EXIT
3815  014554  122701  000040  SPCHR5: CMPB    #40,R1          ;TEST FOR SPACE
3816  014560  001725                  BEQ     OUTPTA          ;ECHO BUT DON'T SAVE
3817  014562  105701                  TSTB    R1              ;TEST FOR A NULL CHAR.
3818  014564  001002                  BNE     .+6             ;NO, EHCO IT
3819  014566  000137  002526          JMP     MONITR          ;ILLEGAL CHAR. RETURN TO MONITR
3820  014572  104012                  PRINT                   ;OTHERWISE TYPE '?'
3821  014574  023013                  QMARK
3822  014576  000664                  BR XTTYIN               ;WAIT FOR NEW ENTRY
3823  014600  000000  INBUF:  0                               ;CHARACTER STORAGE BUFFER
3824          014632                  .=.+30
3825                  ;*****************************************************************
3826                  ;THIS ROUTINE CHECKS THE 'SWAP SW.' AND IF FOUND SET, SETS UP
3827                  ;THE OPPSITE UNIT TO BE TESTED.
3828                  ;*****************************************************************
3829
3830  014632  005037  024166  TSWAP:  CLR     DONESW
3831  014636  005737  024170          TST     SWAPEM          ;SWAP SW. SET?
3832  014642  001001                  BNE     .+4             ;YES, SWITCH UNITS
3833  014644  000207                  RTS     PC              ;NO, EXIT
3834  014646  005077  164636          CLR     @VTCSR          ;CLR GO BIT
3835  014652  005237  024140          INC     UNITFG          ;SELECT OPPOSITE UNIT
3836  014656  004737  016320          JSR     PC,STUNIT       ;SET IT UP
3837  014662  005737  024140          TST     UNITFG          ;BACK TO '0'
3838  014666  001414                  BEQ     SWPEXT          ;YES, CONTINUE TO NEXT TEST
3839  014670  005726                  POP1SP                  ;CLEAN UP STACK
3840  014672  104012                  PRINT
3841  014674  023735                  MES44                   ;TEXT 'RUNNING UNIT 'X'
3842  014676  112737  000260  014750          MOVB    #260,   MRUNN1
3843  014704  153737  024140  014750          BISB    UNITFG, MRUNN1
3844  014712  104012                  PRINT
3845  014714  014750                  MRUNN1
3846  014716  000002                  RTI                     ;RE-RUN TEST W/ UNIT 'X'
3847  014720  104012  SWPEXT: PRINT
3848  014722  023715                  MES43                   ;TEXT 'RUNNING UNIT '0'
3849  014724  005737  024244          TST     HOLDSO
3850  014730  001406                  BEQ     .+16
3851  014732  032777  010000  164364          BIT     #SW12,@SWR
3852  014740  001002                  BNE     .+6
3853  014742  005726                  POP1SP
3854  014744  000002                  RTI
3855  014746  000207                  RTS     PC
```

```
3856  014750  000  015  012  MRUNN1: .BYTE   0,15,12,100
3857  014753  100
3858
3859                        ;*************************************************************************
3860                        ;MESSAGE PRINT ROUTINE, ENTERED VIA EMT DISPATCH HANDLER.
3861                        ;ROUTINE PICKS UP CONTENTS OF THE 'PC' AND USES THIS AS
3862                        ;THE ADDRESS OF MESSAGE TO BE TYPED.
3863                        ;*************************************************************************
3864
3865  014754  004737  017062        TYPMES: JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
3866  014760  104002                  SAVREG                  ;SAVE REGISTERS ON STACK
3867  014762  017602  000000          MOV     @(SP),R2        ;GET THE MESSAGE ADDRESS FROM START
3868  014766  062716  000002          ADD     #2,(SP)         ;SET UP STACK TO EXIT
3869  014772  105777  164322  TYPERA: TSTB    @TPS
3870  014776  100375                  BPL     TYPERA          ;WAIT FOR TTY DONE
3871  015000  122712  000100          CMPB    #100,(R2)       ;TEST FOR '@'
3872  015004  001003                  BNE     TYPER1          ;BRANCH IF NO EQUAL
3873  015006  104003                  GETREG                  ;RESTORE REGISTERS FROM STACK.
3874  015010  104022                  NULL                    ;TRANSMIT 'NULL' CHARACTER
3875  015012  000002                  RTI                     ;OTHERWISE EXIT
3876  015014  122712  000045  TYPER1: CMPB    #45,(R2)        ;TEST FOR '%'
3877  015020  001403                  BEQ     TYPECL          ;IF = TYPE 'CR-LF'
3878  015022  112277  164274  TYPER2: MOVB    (R2)+,@TPB      ;OUTPUT CHAR.
3879  015026  000761                  BR      TYPERA
3880  015030  012777  000015  164264 TYPECL: MOV     #15,@TPB        ;TYPE 'CR'
3881  015036  105777  164256          TSTB    @TPS
3882  015042  100375                  BPL     .-4
3883  015044  012777  000012  164250        MOV     #12,@TPB
3884  015052  105722                  TSTB    (R2)+           ;INCREMENT BUFFER
3885  015054  000746                  BR      TYPERA
3886                        ;*************************************************************************
3887                        ;SUBROUTINE TO TYPEOUT A '6' DIGIT OCTAL NO. THE 'PC' CONTAINS
3888                        ;THE ADDRESS OF 'WORD' TO BE TYPED
3889                        ;*************************************************************************
3890
3891  015056  004737  017062  OCTPRT: JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
3892  015062  104002                  SAVREG                  ;SAVE REGISTERS ON STACK
3893  015064  017601  000000          MOV     @(SP),R1        ;THE ADDRESS OF WORD TO BE TYPED
3894  015070  062716  000002          ADD     #2,(SP)         ;SET UP STACK TO EXIT
3895  015074  012737  000006  024472        MOV     #6,KSTOR4
3896  015102  012737  000376  015166        MOV     #376,MASK       ;MASK FOR FIRST BIT
3897  015110  000401                  BR      .+4
3898  015112  006111          MOVEIT: ROL     (R1)
3899  015114  006111                  ROL     (R1)
3900  015116  006111                  ROL     (R1)
3901  015120  111102                  MOVB    (R1),R2
3902  015122  143702  015166          BICB    MASK,R2
3903  015126  052702  000260          BIS     #260,R2
3904  015132  132777  000200  164160        BITB    #200,@TPS
3905  015140  100374                  BPL     .-6
3906  015142  110277  164154          MOVB    R2,@TPB         ;PRINT CHAR.
3907  015146  012737  000370  015166        MOV     #370,MASK       ;MASK FOR NEXT '5' DIGITS
3908  015154  005337  024472          DEC     KSTOR4
3909  015160  001354                  BNE     MOVEIT
3910  015162  104003                  GETREG                  ;RESTORE REGISTERS FROM STACK.
3911  015164  000002                  RTI
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015166  000376                  MASK:   376
                                ;*****************************************************************
                                ;THIS SUBROUTINE IS USED TO CREATE THE 'VT' CHARACTER SET IN NUMERICAL ORDER
                                ;ALL LINES ARE SET UP TO BE TERMINATED WITH EITHER 'VISIBLE END OF LINE'
                                ;OR 'VISIBLE END OF SCREEN'. THIS SUBROUTINE WILL RETURN TO THE SUBROUTINE
                                ;'CALL+2' AFTER CREATING '1' VT CHARACTER CODE AND INSERTING IT INTO
                                ;THE 'VT' DISPLAY BUFFER. IF THIS WAS THE LAST CHARACTER OF THE LINE, THE
                                ;SUBROUTINE RETURNS TO THE 'CALL+4',AND IF IT WAS THE LAST CHARACTER OF THE
                                ;BUFFER IT RETURNS TO 'CALL+6'.
                                ;*****************************************************************

015170  005737  024156          INTCHR: TST     INTSWH                  ;INITIALIZE SUBROUTINE?
015174  001014                          BNE     LDCHAR                  ;NO,LOAD CHAR.
015176  012700  024500                  MOV     #VTBUFF,R0              ;SET UP BUFFER ADDR.
015202  012701  000040                  MOV     #40,R1                  ;CHAR. CODES START W/40 (SPACE).
015206  012702  177701                  MOV     #-63.,R2                ;LOAD '63' CHAR.'S/LINE
015212  012703  177760                  MOV     #-16.,R3                ;LOAD '16' LINES OF CHAR.'S
015216  012704  015520                  MOV     #TERMTB,R4              ;LINE TERMINATOR TABLE (EOL,EOP)
015222  005237  024156                  INC     INTSWH
015226  005202                  LDCHAR: INC     R2                      ;INCREMENT CHAR. CNTR.
015230  001013                          BNE     LDCHR1                  ;NOT END OF LINE
015232  012702  177701          LDCHR0: MOV     #-63.,R2                 ;RESET CHAR. CNTR.
015236  112420                          MOVB    (R4)+,(R0)+              ;LOAD LINE TERMINATOR (EOL,EOP,EOS
015240  062716  000002                  ADD     #2,(SP)
015244  005203                          INC     R3                      ;INCREMENT LINE NO. CNTR.
015246  001401                          BEQ     .+4                     ;EOS?
015250  000207                          RTS     PC                      ;NO, EOL-RETURN TO 'CALL+4'
015252  062716  000002                  ADD     #2,(SP)                 ;YES, RETURN TO 'CALL+6'
015256  000207                          RTS     PC
015260  005737  001622          LDCHR1: TST     FCSET1
015264  001405                          BEQ     .+14
015266  112720  000040                  MOVB    #40,(R0)+
015272  005037  001622                  CLR     FCSET1
015276  000401                          BR      1$
015300  110120                          MOVB    R1,(R0)+                ;MOVE CHAR. TO BUFFER
015302  005201                  1$:             INC     R1                 ;INCREMENT CHAR. VALUE
015304  022701  000335          LDCHEB: CMP     #335,R1                 ;CHAR. VALUE OVERFLO?
015310  001003                          BNE     .+10                     ;NO
015312  012701  000040                  MOV     #40,R1                  ;YES, RESET CHAR. VALUE
015316  000745                          BR      LDCHR0                  ;RESET LINE COUNTER
015320  005037  001622                  CLR     FCSET1
015324  005737  001620                  TST     FCSET                   ;FORIEGN CHARACTER SET
015330  001043                          BNE     2$                      ;YES-IGNOR THIS SECTION
015332  020127  000177                  CMP     R1,#177                 ;COUNT ABOVE 177?
015336  003440                          BLE     2$                      ;NO,IGNOR THIS SECTION
015340  120127  000203                  CMPB    R1,#203                 ;IF NO FORIEGN CHARACTER SET
015344  001435                          BEQ     2$                      ;THEN THERE ARE SOME CODES
015346  120127  000207                  CMPB    R1,#207                 ;THAT WE DON'T WANT TO PRINT
015352  001432                          BEQ     2$                      ;THIS IS THE INTELLIGENTS SECTION
015354  120127  000211                  CMPB    R1,#211
015360  001427                          BEQ     2$
015362  120127  000216                  CMPB    R1,#216
015366  001424                          BEQ     2$
015370  120127  000210                  CMPB    R1,#210
015374  001421                          BEQ     2$
015376  120127  000237                  CMPB    R1,#237
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3968  015402  001416                        BEQ     2$
3969  015404  120127  000213                CMPB    R1,#213
3970  015410  001413                        BEQ     2$
3971  015412  120127  000215                CMPB    R1,#215
3972  015416  001410                        BEQ     2$
3973  015420  120127  000217                CMPB    R1,#217
3974  015424  001405                        BEQ     2$
3975  015426  120127  000255                CMPB    R1,#255
3976  015432  001402                        BEQ     2$
3977  015434  005137  001622                COM     FCSET1
3978  015440  120127  000212    2$:         CMPB    R1,#VISEOL          ;CHAR.=VISIBLE END OF LINE?
3979  015444  001407                        BEQ     LDCHR2              ;YES, SKIP IT
3980  015446  120127  000214                CMPB    R1,#VISEOP          ;CHAR.=VISIBLE END OF PARAGRAPH?
3981  015452  001404                        BEQ     LDCHR2              ;YES, SKIP IT
3982  015454  120127  000231                CMPB    R1,#VISEOS          ;CHAR.=VISIBLE END OF SCREEN?
3983  015460  001401                        BEQ     .+4                 ;NO,
3984  015462  000207                        RTS     PC
3985  015464  005201            LDCHR2:     INC     R1                  ;YES, SKIP IT
3986  015466  005037  001622                CLR     FCSET1
3987  015472  000137  015304                JMP     LDCHEB              ;RETURN TO 'CALL+2'
3988
3989                                ;*************************************************************************
3990                                ;SUBROUTINE TO SET UP A WAIT LOOP TO WAIT FOR VERTICAL SYNC (17 MSEC.).
3991                                ;*************************************************************************
3992
3993  015476  004737  017062        XWAITS: JSR     PC,TTYENB           ;ENABLE TTY INTERRUPTS
3994  015502  012737  170000  024446        MOV     #-10000,TEMP2
3995  015510  005237  024446                INC     TEMP2
3996  015514  001375                        BNE     .-4
3997  015516  000002                        RTI
3998
3999                                ;FOLLOWING IS A '16' BYTE BUFFER USED TO TERMINATE EACH LINE OF THE 'VT' BUFFER.
4000
4001  015520      212               TERMTB: .BYTE   VISEOL
4002  015521      214                       .BYTE   VISEOP
4003  015522      212                       .BYTE   VISEOL
4004  015523      214                       .BYTE   VISEOP
4005  015524      212                       .BYTE   VISEOL
4006  015525      214                       .BYTE   VISEOP
4007  015526      212                       .BYTE   VISEOL
4008  015527      214                       .BYTE   VISEOP
4009  015530      212                       .BYTE   VISEOL
4010  015531      214                       .BYTE   VISEOP
4011  015532      212                       .BYTE   VISEOL
4012  015533      214                       .BYTE   VISEOP
4013  015534      212                       .BYTE   VISEOL
4014  015535      214                       .BYTE   VISEOP
4015  015536      212                       .BYTE   VISEOL
4016  015537      231                       .BYTE   VISEOS
4017                                        .EVEN
4018
4019                                ;*************************************************************************
4020                                ;SUBROUTINE TO SET UP AN APPROXIMATE '3' SECOND DELAY. THE ROUTINE ALSO
4021                                ;CONTINUOUSLY MONITORS DATA 'SW14' AND IF FOUND SET CAUSES AN INDEFINITE DELAY.
4022                                ;*************************************************************************
4023
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 4024  015540  012737  175000  024446  XDELAY: MOV     #175000,TEMP2           ;SET UP SHORT DELAY
 4025  015546  000402                  BR      .+6
 4026  015550  005037  024446          XDLAYL: CLR     TEMP2                   ;SET UP LONG DELAY
 4027  015554  004737  017062                  JSR     PC,TTYENB               ;ENABLE TTY INTERRUPTS
 4028  015560  012737  177777  024444          MOV     #-1,TEMP1
 4029  015566  005737  024432          XDLAY1: TST     DISPSW                  ;DISPLAYING MESSAGE?
 4030  015572  001010                  BNE     XDLAY3                  ;YES INHIBIT HOLD
 4031  015574  032777  040000  163522          BIT     #SW14,@SWR              ;TEST DATA SW14
 4032  015602  001374                  BNE     .-6                     ;IF SET, WAIT FOR CLEAR.
 4033  015604  032777  004000  163512          BIT     #SW11,@SWR              ;IS SW. '11' SET?
 4034  015612  001006                  BNE     XDLAY2                  ;YES, INIBIT DELAY
 4035  015614  005237  024446          XDLAY3: INC     TEMP2
 4036  015620  001362                  BNE     XDLAY1
 4037  015622  005237  024444                  INC     TEMP1
 4038  015626  001357                  BNE     XDLAY1
 4039  015630  000002                  XDLAY2: RTI
 4040                                  ;*************************************************************************
 4041                                  ;SUBROUTINE TO LOAD '64' CHAR.'S INTO 'VT' BUFFER.
 4042                                  ;*************************************************************************
 4043
 4044  015632  104002                  XLDLNE: SAVREG                          ;SAVE REG.'S
 4045  015634  012701  177700                  MOV     #-64.,R1                ;LOAD '64' CHAR. BYTES
 4046  015640  013702  024464                  MOV     KSTOR1,R2               ;FROM THIS ADDR. UP.
 4047  015644  112220                  XLDLNA: MOVB    (R2)+,(R0)+             ;'R0' IS POINTER TO A 'VT' BUFFER ADDR.
 4048  015646  005201                  INC     R1                      ;FINISHED?
 4049  015650  001375                  BNE     XLDLNA                  ;NO, LOAD NEXT CHAR.
 4050  015652  104003                  GETREG                          ;YES, RESTORE REG.'S
 4051  015654  000002                  RTI
 4052
 4053                                  ;*************************************************************************
 4054                                  ;SUBROUTINE TO LOAD THE 'VT' BUFFER W/ 'VISIBLE EOS' CHARACTER.
 4055                                  ;*************************************************************************
 4056
 4057  015656  104002                  XEOSBF: SAVREG                          ;SAVE REG.'S
 4058  015660  012700  024500                  MOV     #VTBUFF,R0              ;SET UP BUFFER ADDR. POINTER
 4059  015664  012701  004374                  MOV     #2300.,R1               ;LOAD '515' DATA WORDS
 4060  015670  112720  000031                  MOVB    #EOS,(R0)+
 4061  015674  005301                  DEC     R1
 4062  015676  001374                  BNE     .-6
 4063  015700  012700  024500                  MOV     #VTBUFF,R0              ;RE-SET POINTER
 4064  015704  005077  163574                  CLR     @VTCAR                  ;CLR CURSOR ADDR. REG.
 4065  015710  010077  163572                  MOV     R0,@VTSAR               ;LOAD STARTING ADDR.
 4066  015714  012777  000001  163566          MOV     #1,@VTCSR               ;ST. DISPLAY
 4067  015722  104003                  GETREG
 4068  015724  000002                  RTI
 4069
 4070                                  ;*************************************************************************
 4071                                  ;SUBROUTINE ENTERED AT THE END OF EVERY DISPLAY TEST TO CHECK STATUS
 4072                                  ;OF THE DATA SWITCHES
 4073                                  ;*************************************************************************
 4074
 4075  015726  005237  024166  XTHEND: INC     DONESW
 4076  015732  104020          XENDT:  DELAYL                          ;ISSUE DELAY
 4077  015734  004737  017062                  JSR     PC,TTYENB               ;ENABLE TTY INTERRUPTS
 4078  015740  005737  024154                  TST     RUNSWH                  ;RUNING ALL TESTS?
 4079  015744  001015                  BNE     RUNEM                   ;YES, DO IT
```

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4080  015746  032777  010000  163350          BIT     #SW12,@SWR              ;MANUAL ADVANCE SW. SET?
4081  015754  001011                          BNE     RUNEM                   ;YES,
4082  015756  013737  024166  024244          MOV     DONESW,HOLDSO           ;SAVE SW.
4083  015764  004737  014632                  JSR     PC,TSWAP                ;TEST FOR SWAP SW.
4084  015770  005737  024244                  TST     HOLDSO                  ;WAS SW. SET TO LOOP TEST?
4085  015774  001354                          BNE     XTHEND                  ;YES, LOOP IT.
4086  015776  000002                          RTI                             ;NORMAL EXIT
4087  016000  104020                  RUNEM:  DELAYL
4088  016002  004737  014632                  JSR     PC,TSWAP                ;TEST SWAP SW.
4089  016006  062716  000002          RUNEXT: ADD     #2,(SP)                 ;ADVANCE TO NEXT TEST
4090  016012  000002                          RTI
4091
4092                                  ;*************************************************************************
4093                                  ;POWER FAIL HANDLER
4094                                  ;*************************************************************************
4095
4096  016014  010046                  PWRFAL: MOV     R0,-(SP)                ;SAVE REGISTERS ON STACK
4097  016016  010146                          MOV     R1,-(SP)
4098  016020  010246                          MOV     R2,-(SP)
4099  016022  010346                          MOV     R3,-(SP)
4100  016024  010446                          MOV     R4,-(SP)
4101  016026  010546                          MOV     R5,-(SP)
4102  016030  013746  000024                  MOV     24,-(SP)
4103  016034  010637  024444                  MOV     SP,TEMP1                ;SAVE STACK POINTER
4104  016040  012737  016050  000024          MOV     #PWRUP,@#24             ;POWER UP ROUTINE TO LOCATION 24
4105  016046  000000                          HALT                            ;HALT
4106  016050  012777  000340  163234  PWRUP:  MOV     #340,@PSW               ;LOCK OUT INTERRUPTS
4107  016056  013706  024444                  MOV     TEMP1,SP                ;POWER DOWN ROUTINE TO LOCATION 24
4108  016062  012637  000024                  MOV     (SP)+,@#24
4109  016066  012605                          MOV     (SP)+,R5                ;RESTORE REGISTERS
4110  016070  012604                          MOV     (SP)+,R4
4111  016072  012603                          MOV     (SP)+,R3
4112  016074  012602                          MOV     (SP)+,R2
4113  016076  012601                          MOV     (SP)+,R1
4114  016100  012600                          MOV     (SP)+,R0
4115  016102  000005                          RESET
4116  016104  005001                          CLR     R1                      ;POWER UP DELAY
4117  016106  005201                          INC     R1
4118  016110  001376                          BNE     .-2
4119  016112  104000                          DISPLAY
4120  016114  023043                          MES21
4121  016116  000177  002260                  JMP     @RETURN
4122
4123                                  ;*************************************************************************
4124                                  ;SUBROUTINE TO SAVE 'R1-R5' ON STACK
4125                                  ;*************************************************************************
4126
4127  016122  012637  024454          XSAVRG: MOV     (SP)+,SAVEPC
4128  016126  012637  024456                  MOV     (SP)+,SAVPSW
4129  016132  012637  024460                  MOV     (SP)+,SAV2PC
4130  016136  012637  024462                  MOV     (SP)+,SAV2SW
4131  016142  010146                          MOV     R1,-(SP)
4132  016144  010246                          MOV     R2,-(SP)
4133  016146  010346                          MOV     R3,-(SP)
4134  016150  010446                          MOV     R4,-(SP)
4135  016152  010546                          MOV     R5,-(SP)
```

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 4136  016154  013746  024462                 MOV     SAV2SW,-(SP)
 4137  016160  013746  024460                 MOV     SAV2PC,-(SP)
 4138  016164  013746  024456                 MOV     SAVPSW,-(SP)
 4139  016170  013746  024454                 MOV     SAVEPC,-(SP)
 4140  016174  000002                         RTI
 4141                          ;*****************************************************************************
 4142                          ;SUBROUTINE TO RESTORE 'R1-R5' FROM THE STACK
 4143                          ;*****************************************************************************
 4144
 4145  016176  012637  024454  XGETRG: MOV     (SP)+,SAVEPC
 4146  016202  012637  024456         MOV     (SP)+,SAVPSW
 4147  016206  012637  024460         MOV     (SP)+,SAV2PC
 4148  016212  012637  024462         MOV     (SP)+,SAV2SW
 4149  016216  012605                 MOV     (SP)+,R5
 4150  016220  012604                 MOV     (SP)+,R4
 4151  016222  012603                 MOV     (SP)+,R3
 4152  016224  012602                 MOV     (SP)+,R2
 4153  016226  012601                 MOV     (SP)+,R1
 4154  016230  013746  024462         MOV     SAV2SW,-(SP)
 4155  016234  013746  024460         MOV     SAV2PC,-(SP)
 4156  016240  013746  024456         MOV     SAVPSW,-(SP)
 4157  016244  013746  024454         MOV     SAVEPC,-(SP)
 4158  016250  000002                 RTI
 4159
 4160                          ;*****************************************************************************
 4161                          ;SUBROUTINE TO PRE-LOAD THE 'VT' DATA BUFFER WITH DATA FROM THE 'PC'.
 4162                          ;*****************************************************************************
 4163
 4164  016252  005077  163232  XPRELD: CLR     @VTCSR          ;STOP 'VT'
 4165  016256  012701  001000         MOV     #512.,R1        ;SET UP '512' WORDS
 4166  016262  011602                 MOV     (SP),R2         ;GET ADDR. OF DATA FROM STACK
 4167  016264  062716  000002         ADD     #2,(SP)         ;SET UP STACK TO EXIT
 4168  016270  012700  024500         MOV     #VTBUFF,R0      ;SET UP BUFFER ADDR. POINTER
 4169  016274  011220                 MOV     (R2),(R0)+      ;MOVE DATA TO BUFFER.
 4170  016276  005301                 DEC     R1              ;DONE?
 4171  016300  001375                 BNE     .-4             ;NO, MOVE NEXT WORD
 4172  016302  112710  014431         MOVB    #14431,(R0)     ;YES, TERMINATE BUFFER W/ 'EOS'
 4173  016306  012700  024500         MOV     #VTBUFF,R0      ;RE-SET BUFFER ADDR. POINTER
 4174  016312  010077  163170         MOV     R0,@VTSAR       ;LOAD 'STARTING ADDR. REG.
 4175  016316  000002                 RTI                     ;EXIT
 4176
 4177                          ;*****************************************************************************
 4178                          ;SUBROUTINE TO SET UP THE 'FK' AND THE 'VT' DEVICE ADDRESSES
 4179                          ;*****************************************************************************
 4180
 4181  016320  123737  024140  024142  STUNIT: CMPB    UNITFG,UNITNO           ;TESTED ALL UNITS?
 4182  016326  001414                         BEQ     SETUT0                  ;YES, RE-SELECT UNIT '0'
 4183  016330  022737  000001  024140         CMP     #1,UNITFG               ;RUNNING UNIT #1?
 4184  016336  001417                         BEQ     SETUT1                  ;YES
 4185  016340  022737  000002  024140         CMP     #2,UNITFG               ;RUNNING UNIT #2
 4186  016346  001420                         BEQ     SETUT2
 4187  016350  022737  000003  024140         CMP     #3,UNITFG               ;RUNNING UNIT #3
 4188  016356  001421                         BEQ     SETUT3
 4189  016360  005037  024140         SETUT0: CLR     UNITFG
 4190  016364  012700  001330                 MOV     #FKOLDB,R0              ;NO, LOAD UNIT '0'
 4191  016370  012701  001410                 MOV     #VTOCAR,R1
```

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 4192  016374  000416                        BR      LDUNIT
 4193  016376  012700  001344        SETUT1: MOV     #FK1LDB,R0
 4194  016402  012701  001424                MOV     #VT1CAR,R1
 4195  016406  000411                        BR      LDUNIT
 4196  016410  012700  001360        SETUT2: MOV     #FK2LDB,R0
 4197  016414  012701  001440                MOV     #VT2CAR,R1
 4198  016420  000404                        BR      LDUNIT
 4199  016422  012700  001374        SETUT3: MOV     #FK3LDB,R0
 4200  016426  012701  001454                MOV     #VT3CAR,R1
 4201  016432  012702  001470        LDUNIT: MOV     #FKLDB,R2
 4202  016436  012703  001504                MOV     #VTCAR,R3
 4203  016442  012022                SETFKA: MOV     (R0)+,(R2)+
 4204  016444  012123                        MOV     (R1)+,(R3)+
 4205  016446  022702  001504                CMP     #FKLVL+2,R2
 4206  016452  001373                        BNE     SETFKA
 4207  016454  000207                        RTS     PC
 4208                          ;*************************************************************************
 4209                          ;SUBROUTINE ENTERED ON AN ILLEGAL TRAP. THE ROTUINE REPORTS WHERE IT
 4210                          ;TRAPPED 'FR0M' AND WHERE IT TRAPPED 'TO'. IF NO TTY IS AVAILABLE
 4211                          ;A 'HALT' IS EXECUTED. HERE THE USER CAN EXAMINE THE 'FROMPC'
 4212                          ;LOCATION AND THE 'TOPC' LOCATION TO TRACK DOWN THE ERROR.
 4213                          ;*************************************************************************
 4214
 4215  016456  000005        ERTRAP: RESET                   ;CLEAR ALL FLAGS
 4216  016460  104022                NULL
 4217  016462  000240                NOP
 4218  016464  011637  024162        MOV     (SP),TOPC       ;SAVE LOCATION WHERE IT TRAPPED 'TO'
 4219  016470  022626                POP2SP
 4220  016472  011637  024164        MOV     (SP),FROMPC     ;SAVE WHERE IT TRAPPED FROM
 4221  016476  162737  000004  024162 SUB     #4,TOPC
 4222  016504  162737  000002  024164 SUB     #2,FROMPC
 4223  016512  005737  024160        TST     TTYSWH          ;IS TTY AVAILABLE?
 4224  016516  001001                BNE     .+4             ;YES
 4225  016520  000000                HALT                    ;NO, HALT
 4226  016522  104012                PRINT
 4227  016524  022133                MES5A                   ;TEXT 'ILLEGAL TRAP'
 4228  016526  104014                PRTOCT
 4229  016530  024162                TOPC                    ;TYPE 'PC TRAPPED TOO
 4230  016532  104012                PRINT
 4231  016534  022155                MES6C                   ;TEXT 'FROM'
 4232  016536  104014                PRTOCT
 4233  016540  024164                FROMPC                  ;WHERE IT TRAPPED FROM
 4234  016542  000137  002526        JMP     MONITR          ;RETURN TO THE MONITOR
 4235
 4236                          ;*************************************************************************
 4237                          ;SUBROUTINE TO PRINT THE DECIMAL VALUE IN R2
 4238                          ;*************************************************************************
 4239
 4240  016546  005077  162540 XBINDEC: CLR    @PSW            ;ENABLE INTERRUPTS
 4241  016552  042702  160000        BIC     #160000,R2
 4242  016556  012737  177774  016652 MOV     #-4,R3PBT
 4243  016564  012704  016642        MOV     #DECPNT,R4
 4244  016570  012701  177777 TYPT1: MOV     #-1,R1
 4245  016574  005201         TYPT2: INC     R1
 4246  016576  161402                SUB     (R4),R2
 4247  016600  100375                BPL     TYPT2
```

```
 4248  016602  062402                        ADD     (R4)+,R2
 4249  016604  004737  016620                JSR     PC,DECOUT
 4250  016610  005237  016652                INC     R3PBT
 4251  016614  001365                        BNE     TYPT1
 4252  016616  000002                        RTI
 4253  016620  005701                DECOUT: TST     R1
 4254  016622  001003                        BNE     DEC1
 4255  016624  112720  000060                MOVB    #60,(R0)+
 4256  016630  000207                        RTS     PC
 4257  016632  152701  000060        DEC1:   BISB    #60,R1
 4258  016636  110120                        MOVB    R1,(R0)+
 4259  016640  000207                        RTS     PC
 4260
 4261  016642  001750                DECPNT: 1000.
 4262  016644  000144                        100.
 4263  016646  000012                        10.
 4264  016650  000001                        1.
 4265  016652  000000                R3PBT:  .WORD   0
 4266
 4267                                ;*****************************************************************************
 4268                                ;SUBROUTINE TO SET UP 'FK' VECTOR ADDR. & INTR ENABLE
 4269                                ;*****************************************************************************
 4270
 4271  016654  017677  000000  162616 LDFKVT: MOV     @(SP),@FKINT    ;LOAD INTR SERVICE ADDR
 4272  016662  062716  000002                ADD     #2,(SP)
 4273  016666  012777  000200  162606        MOV     #200,@FKLVL
 4274  016674  052777  000101  162572        BIS     #101,@FKCSR
 4275  016702  005077  162404                CLR     @PSW            ;ENABLE INTERRUPTS
 4276  016706  000207                        RTS     PC
 4277                                ;*****************************************************************************
 4278                                ;SUBROUTINE TO RESET 'FK' VECTOR ADDRESSES TO HALT ON INTERRUPTS
 4279                                ;*****************************************************************************
 4280  016710  012777  000340  162374 CLRFKV: MOV     #340,@PSW
 4281  016716  012777  000012  162550        MOV     #12,@FKCSR
 4282  016724  013777  001502  162546        MOV     FKLVL,@FKINT
 4283  016732  005077  162544                CLR     @FKLVL
 4284  016736  000207                        RTS     PC
 4285
 4286                                ;*****************************************************************************
 4287                                ;SUBROUTINE TO LOAD 'VT' VECTOR ADDR. & INTR ENABLE
 4288                                ;*****************************************************************************
 4289
 4290  016740  017677  000000  162546 LDVTVT: MOV     @(SP),@VTINT    ;LOAD INTR SERVICE ADDR.
 4291  016746  062716  000002                ADD     #2,(SP)
 4292  016752  012777  000240  162536        MOV     #240,@VTLVL
 4293  016760  052777  000101  162522        BIS     #101,@VTCSR     ;SET 'GO' & INTR 'ENABLE'
 4294  016766  005077  162320                CLR     @PSW
 4295  016772  000207                        RTS     PC
 4296
 4297                                ;*****************************************************************************
 4298                                ;SUBROUTINE TO RESET 'VT' VECTOR ADDRESSES TO HALT ON INTERRUPTS
 4299                                ;*****************************************************************************
 4300
 4301  016774  012777  000340  162310 CLRVTV: MOV     #340,@PSW
 4302  017002  042777  000101  162500        BIC     #101,@VTCSR
 4303  017010  013777  001516  162476        MOV     VTLVL,@VTINT
```

```
 4304  017016  005077  162474          CLR     @VTLVL
 4305  017022  000207                  RTS     PC
 4306
 4307                          ;*****************************************************************
 4308                          ;SUBROUTINE TO LOAD THE 'FIELD' CONTROL WITH THE '4' MODES AND SET UP
 4309                          ;'VT' BUFFER.
 4310                          ;*****************************************************************
 4311
 4312  017024  112720  000362  XSTLNE: MOVB   #BLINK,(R0)+          ;LOAD 'BLINK'
 4313  017030  104010                  LDLINE                      ;LOAD LINE OF 'BLINKING' CHAR'S
 4314  017032  112720  000364          MOVB   #BOLD,(R0)+
 4315  017036  104010                  LDLINE                      ;LOAD LINE OF 'BOLD' CHAR.'S
 4316  017040  112720  000361          MOVB   #BLANK,(R0)+
 4317  017044  104010                  LDLINE                      ;LOAD LINE OF 'BLANK' CHAR.'S
 4318  017046  112720  000370          MOVB   #UNLINE,(R0)+
 4319  017052  104010                  LDLINE                      ;LOAD LINE OF 'UNDERLINED' CHAR.'S
 4320  017054  112720  000360          MOVB   #CLRFLD,(R0)+
 4321  017060  000002                  RTI
 4322                          ;*****************************************************************
 4323                          ;SUBROUTINE TO TEST IF A TTY IS AVAILABLE, AND IF SO, ENABLE
 4324                          ;KEYBOARD INTERRUPTS.
 4325                          ;*****************************************************************
 4326
 4327  017062  005737  024160  TTYENB: TST    TTYSWH              ;TTY AVAILABLE?
 4328  017066  001405                  BEQ    .+14                ;NO, EXIT
 4329  017070  012777  000100  162216  MOV    #100,@TKS           ;YES, ENABLE TTY INTERRUPTS
 4330  017076  005077  162210          CLR    @PSW
 4331  017102  000207                  RTS    PC
 4332
 4333                          ;*****************************************************************
 4334                          ;SUBROUTINE TO WAIT FOR AND ASSEMBLE CHARACTERS INPUT
 4335                          ;FROM THE KEYBOARD INTO OCTAL NUMBERS.
 4336                          ;*****************************************************************
 4337
 4338  017104  104013  XASEMB: TTYIN                              ;GET CHAR.'S FROM KEYBOARD
 4339  017106  012701  014600          MOV    #INBUF,R1           ;SET UP CHAR. BUFFER POINTER
 4340  017112  004737  017200          JSR    PC,STRIPN           ;STRIPE NO.
 4341  017116  010403  XASEM1: MOV    R4,R3                       ;RETURNS HERE IF ONLY '1' NO.
 4342  017120  022703  000701          CMP    #701,R3
 4343  017124  001407                  BEQ    WHY
 4344  017126  022703  154765          CMP    #154765,R3
 4345  017132  001401                  BEQ    .+4
 4346  017134  000002                  RTI
 4347  017136  104012                  PRINT
 4348  017140  022710                  MES19
 4349  017142  000402                  BR     XASEXT
 4350  017144  104012  WHY:    PRINT
 4351  017146  022661                  MES18
 4352  017150  000137  002526  XASEXT: JMP    MONITR
 4353
 4354  017154  005721  WORD2:  TST    (R1)+               ;ADVANCE POINTER PAST COMMA
 4355  017156  006204                  ASR    R4
 4356  017160  006204                  ASR    R4
 4357  017162  006204                  ASR    R4
 4358  017164  005337  024152          DEC    CHRCNT              ;DEC. CHAR. CNTR.
 4359  017170  001752                  BEQ    XASEM1              ;COMMA LAST CHAR.?
```

```
 4360  017172  010403                        MOV     R4,R3           ;NO, SAVE 1ST NO.
 4361  017174  062716  000002                ADD     #2,(SP)         ;SET UP STACK TO EXIT
 4362  017200  005004                STRIPN: CLR     R4
 4363  017202  005737  024152                TST     CHRCNT          ;WAS ANY DATA INPUTTED?
 4364  017206  001001                        BNE     .+4             ;YES, PROCESS IT
 4365  017210  000207                        RTS     PC              ;NO, RETURN
 4366  017212  022711  000054                CMP     #54,(R1)        ;CHAR. = COMMA?
 4367  017216  001756                        BEQ     WORD2           ;YES, SAVE 1ST NO.
 4368  017220  042711  177770                BIC     #177770,(R1)    ;NO, STRIPE NO. TO OCTAL
 4369  017224  062104                        ADD     (R1)+,R4
 4370  017226  005337  024152                DEC     CHRCNT          ;FINISHED?
 4371  017232  003001                        BGT     .+4             ;NO
 4372  017234  000207                        RTS     PC              ;YES, EXIT
 4373  017236  006304                        ASL     R4
 4374  017240  006304                        ASL     R4
 4375  017242  006304                        ASL     R4
 4376  017244  000756                        BR      STRIPN+2
 4377                          ;*************************************************************************
 4378                          ;VT MESSAGE ROUTINE, ENTERED VIA EMT DISPATCH HANDLER.
 4379                          ;ROUTINE PICKS UP CONTENTS OF THE 'PC' AND USES THIS AS
 4380                          ;THE ADDRESS OF MESSAGE TO BE DISPLAYED.
 4381                          ;*************************************************************************
 4382
 4383  017246  004737  017062  VTMES:  JSR     PC,TTYENB       ;ENABLE TTY INTERRUPTS
 4384  017252  005077  162232          CLR     @VTCSR          ;CLR 'GO'
 4385  017256  104005                  EOSBUF                  ;PRE-LOAD BUFFER
 4386  017260  017637  000000  024472  MOV     @(SP),KSTOR4    ;GET THE MESSAGE ADDRESS FROM STACK
 4387  017266  011637  024134          MOV     (SP),AVECTR     ;GET ADDRESS OF CALL
 4388  017272  162737  000002  024134  SUB     #2,AVECTR       ;SAVE AS '↑A' RE-START ADDR.
 4389  017300  062716  000002          ADD     #2,(SP)         ;SET UP STACK TO EXIT
 4390  017304  104002                  SAVREG                  ;SAVE REG'S
 4391  017306  013702  024472          MOV     KSTOR4,R2
 4392  017312  122712  000100  VTERA:  CMPB    #100,(R2)       ;TEST FOR '@'
 4393  017316  001007                  BNE     VTER1           ;BRANCH IF NO EQUAL
 4394  017320  104003                  GETREG                  ;RESTORE REG'S
 4395  017322  005237  024432          INC     DISPSW          ;SET DISPLAY SW.
 4396  017326  104020                  DELAYL
 4397  017330  005037  024432          CLR     DISPSW          ;CLR DISPLAY SW.
 4398  017334  000002                  RTI                     ;OTHERWISE EXIT
 4399  017336  122712  000045  VTER1:  CMPB    #45,(R2)        ;TEST FOR '%'
 4400  017342  001402                  BEQ     VTCRLF          ;IF = TYPE 'CR-LF'
 4401  017344  112220          VTER2:  MOVB    (R2)+,(R0)+     ;SAVE CHAR. IN BUFFER
 4402  017346  000761                  BR      VTERA
 4403  017350  112720  000012  VTCRLF: MOVB    #12,(R0)+       ;SAVE 'EOL' IN BUFFER
 4404  017354  105722                  TSTB    (R2)+           ;INCREMENT BUFFER
 4405  017356  000755                  BR      VTERA
 4406
 4407                          ;*************************************************************************
 4408                          ;SUBROUTINE TO TRANSMIT A 'NULL' CHAR. TO THE PRINTER.
 4409                          ;*************************************************************************
 4410
 4411  017360  005037  014326  XNULL:  CLR     SPACEX
 4412  017364  105237  014326  1$:     INCB    SPACEX
 4413  017370  100375                  BPL     1$
 4414  017372  012737  000002  014326  MOV     #2,SPACEX
 4415  017400  004737  017432          JSR     PC,TSTTPS
```

```
 4416  017404  005077  161712          XNULL1: CLR     @TPB            ;TRANSMIT A NULL CHAR.
 4417  017410  004737  017432                  JSR     PC,TSTTPS
 4418  017414  005337  014326                  DEC     SPACEX
 4419  017420  001371                          BNE     XNULL1
 4420  017422  105237  014326          2$:     INCB    SPACEX
 4421  017426  100375                          BPL     2$
 4422  017430  000002                          RTI
 4423
 4424  017432  105777  161662          TSTTPS: TSTB    @TPS
 4425  017436  100375                          BPL     .-4
 4426  017440  000207                          RTS     PC
 4427                                  ;*************************************************************************
 4428                                  ;ENTERED WITH SYSTEM TRAP 'TRAP' CALL (ERROR) FROM THE 'FK' LOGIC TEST
 4429                                  ;THIS ROUTINE SETS UP REG'S 'R0-R5' WITH DATA
 4430                                  ;FROM THE 'FK' LOGIC TO BE EXAMINED ON A 'HALT' IF AN 'FK' LOGIC ERROR IS
 4431                                  ;DETECTED AND 'NO' TELEPRINTER IS AVAILABLE.
 4432                                  ;*************************************************************************
 4433
 4434  017442  005737  024160          FKERR:  TST     TTYSWH          ;TTY AVAILABLE?
 4435  017446  001065                          BNE     TYPFKR          ;YES, TYPE FK ERRORS
 4436  017450  052777  000200  162032          BIS     #AUDIO,@VTCSR   ;ISSUE 'AUDIO BEEP' ON ERROR
 4437  017456  005777  161642                  TST     @SWR            ;TEST IF 'SW15' IS SET
 4438  017462  100014                          BPL     CKHALT          ;NO, INHIBIT ERROR HALT.
 4439  017464  013700  024146                  MOV     TSTNUM,R0       ;SAVE 'TEST NO.' IN 'R0'
 4440  017470  013701  020400                  MOV     SCOPEF,R1       ;SAVE PASS COUNT
 4441  017474  005201                          INC     R1
 4442  017476  011602                          MOV     (SP),R2         ;SAVE 'ERROR PC' IN 'R2'
 4443  017500  162702  000002                  SUB     #2,R2
 4444  017504  017703  161764                  MOV     @FKCSR,R3       ;SAVE 'FK CSR' IN 'R3'
 4445  017510  017704  161762                  MOV     @FKDATA,R4      ;SAVE 'FK DATA' IN 'R4'
 4446  017514  005777  161604          CKHALT: TST     @SWR            ;CHECK IF SW15 IS SET
 4447  017520  100001                          BPL     .+4             ;NO
 4448  017522  000000                          HALT                    ;YES, HALT
 4449  017524  000002                          RTI
 4450
 4451                                  ;*************************************************************************
 4452                                  ;ENTERED WITH SYSTEM TRAP 'TRAP' CALL (ERROR) FROM THE 'VT' LOGIC TEST
 4453                                  ;THIS ROUTINE SETS UP REG'S 'R0-R5' WITH DATA FROM THE 'VT' LOGIC TEST
 4454                                  ;TO BE EXAIMNED ON A 'HALT' IF A 'VT' ERROR IS DETECTED AN 'NO' TELEPRINTER
 4455                                  ;IS AVAILABLE.
 4456                                  ;*************************************************************************
 4457
 4458  017526  005737  024160          VTERR:  TST     TTYSWH          ;TTY AVAILABLE?
 4459  017532  001051                          BNE     TYPVTR          ;YES, TYPE 'VT' ERRORS
 4460  017534  005777  161564                  TST     @SWR            ;TEST IF SW15 IS SET
 4461  017540  100367                          BPL     CKHALT+4        ;NO, INHIBIT ERROR HALT
 4462  017542  104002                          SAVREG                  ;SAVE REGISTERS
 4463  017544  010003                          MOV     R0,R3           ;SAVE SHIFT COUNT
 4464  017546  010104                          MOV     R1,R4           ;SAVE EXPECTED DATA
 4465  017550  013700  024146                  MOV     TSTNUM,R0       ;SAVE FAILING TEST NO.
 4466  017554  013701  020400                  MOV     SCOPEF,R1       ;SAVE PASS COUNTER
 4467  017560  005201                          INC     R1
 4468  017562  011602                          MOV     (SP),R2         ;SAVE 'PC'
 4469  017564  162702  000002                  SUB     #2,R2
 4470  017570  005737  024436                  TST     SHFTSW          ;RUNNING SHIFT TEST?
 4471  017574  001005                          BNE     VTERR1          ;YES
```

```
 4472  017576  017703  161706                MOV     @VTCSR,R3       ;NO, SAVE CONTENTS OF 'CSR'
 4473  017602  017704  161704                MOV     @VTMAR,R4       ;SAVE CONTENTS OF THE 'MAR'
 4474  017606  000402                        BR      VTERR2
 4475  017610  017705  161676        VTERR1: MOV     @VTMAR,R5       ;SAVE CONTENTS OF 'MAR'
 4476  017614  000000                VTERR2: HALT                    ;EXAMINE REG.'S
 4477  017616  104003                        GETREG                  ;RESTORE REG.'S
 4478  017620  000002                        RTI                     ;EXIT
 4479
 4480                                ;*************************************************************************
 4481                                ;ENTERED WITH SYSTEM TRAP 'TRAP' CALL (ERROR) FROM THE 'FK' LOGIC TEST
 4482                                ;THIS ROUTINE IS USED TO PRINT OUT THE CONTENTS OF THE 'FK' REGISTERS
 4483                                ;WHEN A LOGIC ERROR IS DETECTED
 4484                                ;*************************************************************************
 4485
 4486  017622  012737  022374  020162 TYPFKR: MOV     #MES13,ERRMES   ;SET UP TO PRINT LOGIC ERROR HEADER
 4487  017630  012737  000003  024444         MOV     #3,TEMP1        ;SET UP TO PRINT 'FK' REG'S
 4488  017636  012701  001474                MOV     #FKCSR,R1
 4489  017642  011637  024470                MOV     (SP),KSTOR3     ;PC OF FAILING ROUTINE
 4490  017646  004737  020114                JSR     PC,PRTERR       ;PRINT ERROR DATA
 4491  017652  000137  017514                JMP     CKHALT          ;EXIT
 4492
 4493                                ;*************************************************************************
 4494                                ;ENTERED WITH SYSTEM TRAP 'TRAP' CALL (ERROR) FROM THE 'VT' LOGIC TEST
 4495                                ;THIS ROUTINE IS USED TO PRINT OUT THE CONTENTS OF THE 'VT' REGISTERS
 4496                                ;WHEN A LOGIC ERROR IS DETECTED
 4497                                ;*************************************************************************
 4498
 4499  017656  104002                TYPVTR: SAVREG                  ;SAVE REGISTERS ON STACK
 4500  017660  005737  024436                TST     SHFTSW          ;DOING SHIFT TEST?
 4501  017664  001422                        BEQ     VTNORM          ;NO, REPORT AS NORMAL ERROR
 4502  017666  005737  024452                TST     MESPT1          ;TYPED HEADER?
 4503  017672  001004                        BNE     .+12            ;YES
 4504  017674  005237  024452                INC     MESPT1
 4505  017700  005037  024450                CLR     MESPRT
 4506  017704  012737  022575  020162        MOV     #MES17,ERRMES   ;YES, SET UP SHIFT HEADER
 4507  017712  010037  024476                MOV     R0,KSTOR6       ;SAVE SHIFT COUNT
 4508  017716  010137  024474                MOV     R1,KSTOR5       ;SAVE EXPT'D DATA
 4509  017722  012737  000001  024444        MOV     #1,TEMP1        ;PRINT '1' DATA WORD
 4510  017730  000413                        BR      VTDUMP
 4511  017732  042777  000100  161550 VTNORM: BIC     #100,@VTCSR     ;CLR 'VT' INTR ENABLE
 4512  017740  012737  022532  020162        MOV     #MES16,ERRMES   ;SET UP TO PRINT LOGIC ERROR HEADER
 4513  017746  012737  000002  024444        MOV     #2,TEMP1        ;SET UP TO PRINT 'VT' REG'S
 4514  017754  012701  001510                MOV     #VTCSR,R1
 4515  017760  011637  024470        VTDUMP: MOV     (SP),KSTOR3     ;PC OF FAILING ROUTINE
 4516  017764  004737  020114                JSR     PC,PRTERR       ;PRINT ERROR DATA
 4517  017770  032777  020000  161326        BIT     #SW13,@SWR      ;IS PRINT INHIBIT SW. SET?
 4518  017776  001043                        BNE     EXTVTR          ;YES, EXIT
 4519  020000  005737  024436                TST     SHFTSW          ;DOING SHIFT TEST?
 4520  020004  001414                        BEQ     GETMAR          ;NO, GET AND TYPE 'MAR'
 4521  020006  013737  024476  024470        MOV     KSTOR6,KSTOR3   ;YES, SET UP TO TYPE SHIFT COUNT.
 4522  020014  004737  020232                JSR     PC,XPRTA        ;TYPE SHIFT COUNT
 4523  020020  104012                        PRINT                   ;PRINT IF DATA IS SHIFTED IN OR OUT
 4524  020022  000000                SHFMES: 0
 4525  020024  013737  024474  024470        MOV     KSTOR5,KSTOR3   ;SET UP TO TYPE EXPT'D DATA
 4526  020032  004737  020232                JSR     PC,XPRTA        ;TYPE EXPT'D DATA
 4527  020036  032777  000007  161260 GETMAR: BIT     #7,@SWR         ;ARE THE 'MAR' SELECT BITS SET?
```

```
4528  020044  001412                          BEQ     TYPMAR          ;NO, PRINT MAR AS IS
4529  020046  042777  000017  161434          BIC     #17,@VTCSR      ;YES, RESELECT THE 'MAR'
4530  020054  017702  161244                  MOV     @SWR,R2         ;GET 'MAR' ADDR. FROM SW'S
4531  020060  042702  177770                  BIC     #177770,R2
4532  020064  006302                          ASL     R2
4533  020066  050277  161416                  BIS     R2,@VTCSR       ;SET UP SELECTED 'MAR' REG.
4534  020072  017737  161414  024470  TYPMAR: MOV     @VTMAR,KSTOR3
4535  020100  004737  020232                  JSR     PC,XPRTA
4536  020104  104022                          NULL                    ;TRANSMIT 'NULL' CHARACTER
4537  020106  104003                  EXTVTR: GETREG                  ;RESTORE REGISTERS FROM STACK.
4538  020110  000137  017514                  JMP     CKHALT          ;EXIT
4539
4540                                  ;*********************************************************************
4541                                  ;SUBROUTINE TO PRINT OUT ERROR INFORMATION ON 'FK' & 'VT' LOGIC
4542                                  ;ERRORS.
4543                                  ;*********************************************************************
4544
4545  020114  005737  020456          PRTERR: TST     XORFLG
4546  020120  001402                          BEQ     .+6
4547  020122  005237  020264                  INC     XORHLT
4548  020126  032777  020000  161170          BIT     #20000,@SWR     ;TEST SW-13 FOR INHIBIT PRINT OUT
4549  020134  001044                          BNE     EXTPRT          ;INHIBIT,CHECK FOR HALT
4550  020136  162737  000002  024470          SUB     #2,KSTOR3
4551  020144  042777  000100  161322          BIC     #100,@FKCSR     ;CLR 'FK' INTR. ENABLE
4552  020152  005737  024450                  TST     MESPRT          ;HEADER BEEN TYPED?
4553  020156  001004                          BNE     .+12            ;YES,
4554  020160  104012                          PRINT
4555  020162  000000                  ERRMES: 0                       ;PRINT LOGIC ERROR HEADER
4556  020164  005237  024450                  INC     MESPRT          ;SET PRINT INHIBIT SW.
4557  020170  104012                          PRINT
4558  020172  023011                          CRLF
4559  020174  104014                          PRTOCT
4560  020176  024146                          TSTNUM                  ;PRINT FAILING TEST NO.
4561  020200  104016                          SPACE
4562  020202  013737  020400  024446          MOV     SCOPEF,TEMP2
4563  020210  005237  024446                  INC     TEMP2
4564  020214  104014                          PRTOCT
4565  020216  024446                          TEMP2                   ;PRINT THE FAILING PASS NO.
4566  020220  104016                          SPACE
4567  020222  000403                          BR      XPRTA
4568  020224  012102                  XPRT:   MOV     (R1)+,R2
4569  020226  011237  024470                  MOV     (R2),KSTOR3
4570  020232  104014                  XPRTA:  PRTOCT
4571  020234  024470                          KSTOR3
4572  020236  104016                          SPACE
4573  020240  005337  024444                  DEC     TEMP1
4574  020244  003367                          BGT     XPRT
4575  020246  005737  020264          EXTPRT: TST     XORHLT
4576  020252  001403                          BEQ     1$
4577  020254  104012                          PRINT
4578  020256  023756                          MXORH
4579  020260  000000                          HALT
4580
4581  020262  000207                  1$:     RTS     PC
4582  020264  000000                  XORHLT: 000000
4583                                  ;*********************************************************************
```

```
                                        ;SCOPE AND/OR ITERATION LOOP FOR EACH LOGIC TEST
                                        ;*********************************************************************
020266  104017                  SCOPEC: TSTTKS                  ;CHECK FOR KEYBOARD FLAG
020270  032777  040000  161026          BIT     #40000,@SWR     ;TEST SW-14 FOR SCOPE
020276  001015                          BNE     SCOPEB          ;YES, SCOPE
020300  005737  020456                  TST     XORFLG          ;SEE IF RUNNING WITH XOR
020304  001037                          BNE     XORT
020306  032777  004000  161010  SCOP1:  BIT     #4000,@SWR      ;NO-TEST SW-11 FOR ITERATION
020314  001013                          BNE     SCOPEG          ;INHIBIT ITERATION
020316  023737  020400  020376          CMP     SCOPEF,ICOUNT   ;COMPARE CURRENT COUNT TO MAX NUMBER
020324  100007                          BPL     SCOPEG          ;EXIT-DONE
020326  005237  020400                  INC     SCOPEF          ;INCREMENT COUNT
020332  022606                  SCOPEB: CMP     (6)+,SP         ;REPOSITION STACK
020334  012677  160752                  MOV     (6)+,@PSW       ;RESTORE PREVIOUS PROCESSOR STATUS
020340  000177  000036                  JMP     @RETURN         ;REPEAT TEST
020344  005037  020400          SCOPEG: CLR     SCOPEF          ;CLEAR COUNT
020350  011601                          MOV     @SP,R1          ;SAVE TEST NO.
020352  011137  024146                  MOV     (R1),TSTNUM
020356  062716  000002                  ADD     #2,(SP)
020362  011637  020402                  MOV     @SP,RETURN      ;SAVE SCOPE RETURN POINTER
020366  052777  000200  161114          BIS     #AUDIO,@VTCSR   ;ISSUE 'AUDIO BEEP' ON END OF TEST
020374  000002                          RTI                     ;RETURN INLINE-NEXT TEST
020376  000200                  ICOUNT: 200                     ;ITERATION COUNT
020400  000000                  SCOPEF: 0                       ;COUNT LOCATION FOR ITERATION LOOP
020402  006246                  RETURN: FKT1
                                        ;*****BEGINNING OF XOR TESTING
020404  013746  000004          XORT:   MOV     @#4,    -(6)    ;SAVE CONTENTS OF LOCATION 4
020410  012737  020430  000004          MOV     #XORERR,@#4     ;SET UP FOR XOR TIMEOUT
020416  005737  177060                  TST     @#177060        ;IF XOR TIMES OUT IT DETECTED AN ERROR
020422  012637  000004                  MOV     (6)+,@#4        ;NO TIMEOUT-RESTORE LOCATION 4
020426  000727                          BR      SCOP1           ;RETURN TO TEST
020430  022626                  XORERR: CMP     (6)+,(6)+       ;CLEAR STACK
020432  012637  000004                  MOV     (6)+,@#4        ;RESTORE LOCATION 4
020436  032777  000001  160660          BIT     #1,     @SWR    ;RING BELL ON ERROR?
020444  001402                          BEQ     1$              ;IF NO, SKIP AHEAD
020446  104012                          PRINT                   ;SEND BELL
020450  023754                          MBELL
020452  000177  177724          1$:     JMP     @RETURN
020456  000000                  XORFLG: 000000

                                        ;*********************************************************************
                                        ;KEYBOARD CHARACTER TABLE
                                        ;*********************************************************************
                                                                ;START, TOP UN-SHIFTED
020460      133                 CHRTAB: .BYTE   '[
020461      061                         .BYTE   '1
020462      062                         .BYTE   '2
020463      063                         .BYTE   '3
020464      064                         .BYTE   '4
020465      065                         .BYTE   '5
020466      066                         .BYTE   '6
020467      067                         .BYTE   '7
020470      070                         .BYTE   '8
020471      071                         .BYTE   '9
```

```
 4640  020472  060                    .BYTE   '0
 4641  020473  055                    .BYTE   '-
 4642  020474  137                    .BYTE   '←
 4643  020475  135                    .BYTE   ']
 4644
 4645                                ;2ND ROW LOWER CASE
 4646
 4647  020476  011                    .BYTE   11              ;TAB
 4648  020477  033                    .BYTE   33              ;ALTMODE
 4649  020500  161                    .BYTE   161             ;Q
 4650  020501  167                    .BYTE   167             ;W
 4651  020502  145                    .BYTE   145             ;E
 4652  020503  162                    .BYTE   162             ;R
 4653  020504  164                    .BYTE   164             ;T
 4654  020505  171                    .BYTE   171             ;Y
 4655  020506  165                    .BYTE   165             ;U
 4656  020507  151                    .BYTE   151             ;I
 4657  020510  157                    .BYTE   157             ;O
 4658  020511  160                    .BYTE   160             ;P
 4659  020512  100                    .BYTE   '@
 4660  020513  012                    .BYTE   12              ;'LF'
 4661  020514  015                    .BYTE   15              ;'CR'
 4662
 4663                                ;3RD ROW LOWER CASE
 4664
 4665  020515  136                    .BYTE   '↑
 4666  020516  141                    .BYTE   141             ;A
 4667  020517  163                    .BYTE   163             ;S
 4668  020520  144                    .BYTE   144             ;D
 4669  020521  146                    .BYTE   146             ;F
 4670  020522  147                    .BYTE   147             ;G
 4671  020523  150                    .BYTE   150             ;H
 4672  020524  152                    .BYTE   152             ;J
 4673  020525  153                    .BYTE   153             ;K
 4674  020526  154                    .BYTE   154             ;L
 4675  020527  073                    .BYTE   ';
 4676  020530  072                    .BYTE   ':
 4677  020531  177                    .BYTE   177             ;RUBOUT
 4678
 4679                                ;4TH ROW LOWER CASE
 4680
 4681  020532  172                    .BYTE   172             ;Z
 4682  020533  170                    .BYTE   170             ;X
 4683  020534  143                    .BYTE   143             ;C
 4684  020535  166                    .BYTE   166             ;V
 4685  020536  142                    .BYTE   142             ;B
 4686  020537  156                    .BYTE   156             ;N
 4687  020540  155                    .BYTE   155             ;M
 4688  020541  054                    .BYTE   ',
 4689  020542  056                    .BYTE   '.
 4690  020543  057                    .BYTE   '/
 4691  020544  134                    .BYTE   '\
 4692  020545  040                    .BYTE   40                      ;TERMINATE W/ SPACE
 4693
 4694                                ;START OF 'SHIFTED' PASS
 4695
```

```
 4696  020546  173                UPCASE: .BYTE   173             ;LEFT BRACE
 4697  020547  041                        .BYTE   '!
 4698  020550  042                        .BYTE   '"
 4699  020551  043                        .BYTE   '#
 4700  020552  044                        .BYTE   '$
 4701  020553  045                        .BYTE   '%
 4702  020554  046                        .BYTE   '&
 4703  020555  047                        .BYTE   ''
 4704  020556  050                        .BYTE   '(
 4705  020557  051                        .BYTE   ')
 4706  020560  060                        .BYTE   '0
 4707  020561  075                        .BYTE   '=
 4708  020562  137                        .BYTE   '←
 4709  020563  175                        .BYTE   175             ;RIGHT BRACE
 4710
 4711                             ;2ND ROW 'SHIFTED'
 4712
 4713  020564  011                        .BYTE   11
 4714  020565  033                        .BYTE   33              ;ALTMODE
 4715  020566  121                        .BYTE   'Q
 4716  020567  127                        .BYTE   'W
 4717  020570  105                        .BYTE   'E
 4718  020571  122                        .BYTE   'R
 4719  020572  124                        .BYTE   'T
 4720  020573  131                        .BYTE   'Y
 4721  020574  125                        .BYTE   'U
 4722  020575  111                        .BYTE   'I
 4723  020576  117                        .BYTE   'O
 4724  020577  120                        .BYTE   'P
 4725  020600  140                        .BYTE   140
 4726  020601  012                        .BYTE   12              ;'LF
 4727  020602  015                        .BYTE   15              ;'CR'
 4728
 4729                             ;3RD ROW 'SHIFTED'
 4730
 4731  020603  176                        .BYTE   176             ;'↑'
 4732  020604  101                        .BYTE   'A
 4733  020605  123                        .BYTE   'S
 4734  020606  104                        .BYTE   'D
 4735  020607  106                        .BYTE   'F
 4736  020610  107                        .BYTE   'G
 4737  020611  110                        .BYTE   'H
 4738  020612  112                        .BYTE   'J
 4739  020613  113                        .BYTE   'K
 4740  020614  114                        .BYTE   'L
 4741  020615  053                        .BYTE   '+
 4742  020616  052                        .BYTE   '*
 4743  020617  177                        .BYTE   177             ;RUBOUT
 4744
 4745                             ;4TH ROW 'SHIFTED'
 4746
 4747  020620  132                        .BYTE   'Z
 4748  020621  130                        .BYTE   'X
 4749  020622  103                        .BYTE   'C
 4750  020623  126                        .BYTE   'V
 4751  020624  102                        .BYTE   'B
```

```
 4752  020625  116                    .BYTE   'N
 4753  020626  115                    .BYTE   'M
 4754  020627  074                    .BYTE   '<
 4755  020630  076                    .BYTE   '>
 4756  020631  077                    .BYTE   '?
 4757  020632  174                    .BYTE   174
 4758  020633  040                    .BYTE   40                      ;TERMINATE W/ SPACE
 4759
 4760                                 ;START OF 'CONTROL' PASS
 4761
 4762  020634  033                    CONTRL: .BYTE   33              ;'↑['
 4763  020635  061                            .BYTE   '1
 4764  020636  062                            .BYTE   '2
 4765  020637  063                            .BYTE   '3
 4766  020640  064                            .BYTE   '4
 4767  020641  065                            .BYTE   '5
 4768  020642  066                            .BYTE   '6
 4769  020643  067                            .BYTE   '7
 4770  020644  070                            .BYTE   '8
 4771  020645  071                            .BYTE   '9
 4772  020646  060                            .BYTE   '0
 4773  020647  015                    CNTRIT: .BYTE   15
 4774  020650  037                            .BYTE   37              ;'↑←'
 4775  020651  035                            .BYTE   35              ;'↑'RIGHT BRACKET
 4776
 4777
 4778
 4779  020652  011                    ;2ND ROW 'CONTROL'
                                              .BYTE   11
 4780  020653  033                            .BYTE   33              ;ALTMODE
 4781  020654  021                            .BYTE   21              ;'↑Q'
 4782  020655  027                            .BYTE   27              ;'↑W'
 4783  020656  005                            .BYTE   05              ;'↑E'
 4784  020657  022                            .BYTE   22              ;'↑R'
 4785  020660  024                            .BYTE   24              ;'↑T'
 4786  020661  031                            .BYTE   31              ;'↑Y'
 4787  020662  025                            .BYTE   25              ;'↑U
 4788  020663  011                            .BYTE   11              ;'↑I'
 4789  020664  017                            .BYTE   17              ;'↑O'
 4790  020665  020                            .BYTE   20              ;'↑P'
 4791  020666  000                            .BYTE   00              ;'↑@'
 4792  020667  012                            .BYTE   12              ;'LF
 4793  020670  015                            .BYTE   15              ;'CR'
 4794
 4795                                 ;3RD ROW 'CONTROL'
 4796
 4797  020671  036                            .BYTE   36              ;'↑↑'
 4798  020672  001                            .BYTE   01              ;'↑A'
 4799  020673  023                            .BYTE   23              ;'↑S'
 4800  020674  004                            .BYTE   04              ;'↑D'
 4801  020675  006                            .BYTE   06              ;'↑F'
 4802  020676  007                            .BYTE   07              ;'↑G'
 4803  020677  010                            .BYTE   10              ;↑↑H'
 4804  020700  012                            .BYTE   12              ;'↑J'
 4805  020701  013                            .BYTE   13              ;'↑K'
 4806  020702  014                            .BYTE   14              ;'↑L'
 4807  020703  073                            .BYTE   73              ;'.'
```

```
 4808  020704  072                    .BYTE   72              ;':'
 4809  020705  177                    .BYTE   177             ;'↑'RUBOUT
 4810
 4811                                ;4TH ROW 'CONTROL'
 4812
 4813  020706  032                    .BYTE   32              ;'↑Z'
 4814  020707  030                    .BYTE   30              ;'↑X'
 4815  020710  003                    .BYTE   03              ;'↑C'
 4816  020711  026                    .BYTE   26              ;'↑V'
 4817  020712  002                    .BYTE   02              ;'↑B'
 4818  020713  016                    .BYTE   16              ;'↑N'
 4819  020714  015                    .BYTE   15              ;'↑M'
 4820  020715  054                    .BYTE   ','
 4821  020716  056                    .BYTE   '.
 4822  020717  057                    .BYTE   '/
 4823  020720  034                    .BYTE   34
 4824  020721  040                CHREND: .BYTE   40          ;SPACE,  'DONE'
 4825                                .EVEN
 4826                                ;*************************************************************************
 4827                                ;'VT' SHIFT DATA TABLE USED BY THE 'VT' LOGIC SHIFT TEST
 4828                                ;THIS BUFFER IS SHIFTED IN 2 PASSES (64 TIMES IN ALL) TO TEST THE
 4829                                ;SHIFT REGISTER INPUT & OUTPUT LOGIC. AFTER EACH NPR TRANSFER IS MADE
 4830                                ;THE DATA FROM THIS TABLE IS COMPARED TO THE CONTENTS OF THE MAINTENANCE
 4831                                ;ADDRESS REGISTER. THE SHIFTS ARE COMMENTED IN OCTAL AND REPORTED IN
 4832                                ;OCTAL. THE LOW BYTE OF EACH SHIFT IS A CONTROL FIELD CHARACTER AND
 4833                                ;THE HIGH BYTE IS VALID DATA CHARACTER.
 4834                                ;*************************************************************************
 4835
 4836  020722  360                SHFTBF: .BYTE   360
 4837  020723  040                        .BYTE   40          ;SHIFT '1' OR '41'
 4838  020724  361                        .BYTE   361
 4839  020725  041                        .BYTE   41          ;SHIFT '2' OR '42'
 4840  020726  362                        .BYTE   362
 4841  020727  042                        .BYTE   42          ;SHIFT '3' OR '43'
 4842  020730  364                        .BYTE   364
 4843  020731  043                        .BYTE   43          ;SHIFT '4' OR '44'
 4844  020732  370                        .BYTE   370
 4845  020733  044                        .BYTE   44          ;SHIFT '5' OR '45'
 4846  020734  363                        .BYTE   363
 4847  020735  045                        .BYTE   45          ;SHIFT '6' OR '46'
 4848  020736  365                        .BYTE   365
 4849  020737  046                        .BYTE   46          ;SHIFT '7' OR '47'
 4850  020740  367                        .BYTE   367
 4851  020741  047                        .BYTE   47          ;SHIFT '10' OR '50'
 4852  020742  371                        .BYTE   371
 4853  020743  050                        .BYTE   50          ;SHIFT '11' OR '51'
 4854  020744  373                        .BYTE   373
 4855  020745  061                        .BYTE   61          ;SHIFT '12' OF '52'
 4856  020746  375                        .BYTE   375
 4857  020747  072                        .BYTE   72          ;SHIFT '13' OR '53'
 4858  020750  377                        .BYTE   377
 4859  020751  107                        .BYTE   107         ;SHIFT '14' OR '54'
 4860  020752  366                        .BYTE   366
 4861  020753  106                        .BYTE   106         ;SHIFT '15' OR '55'
 4862  020754  372                        .BYTE   372
 4863  020755  170                        .BYTE   170         ;SHIFT '16' OR '56'
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 4864  020756  374                                .BYTE   374
 4865  020757  123                                .BYTE   123          ;SHIFT '17' OR '57'
 4866  020760  376                                .BYTE   376
 4867  020761  137                                .BYTE   137          ;SHIFT '20' OR '60'
 4868  020762  360                                .BYTE   360
 4869  020763  177                                .BYTE   177          ;SHIFT '21' OR '61'
 4870  020764  360                                .BYTE   360
 4871  020765  200                                .BYTE   200          ;SHIFT '22' OR '62'
 4872  020766  376                                .BYTE   376
 4873  020767  237                                .BYTE   237          ;SHIFT '23' OR '63'
 4874  020770  374                                .BYTE   374
 4875  020771  277                                .BYTE   277          ;SHIFT '24' OR '64'
 4876  020772  372                                .BYTE   372
 4877  020773  253                                .BYTE   253          ;SHIFT '25' OR '65'
 4878  020774  366                                .BYTE   366
 4879  020775  235                                .BYTE   235          ;SHIFT '26' OR '66'
 4880  020776  360                                .BYTE   360
 4881  020777  040                                .BYTE   40           ;SHIFT '27' OR '67'
 4882  021000  361                                .BYTE   361
 4883  021001  041                                .BYTE   41           ;SHIFT '30' OR '70'
 4884  021002  363                                .BYTE   363
 4885  021003  043                                .BYTE   43           ;SHIFT '31' OR '71'
 4886  021004  362                                .BYTE   362
 4887  021005  045                                .BYTE   45           ;SHIFT '32' OR '72'
 4888  021006  364                                .BYTE   364
 4889  021007  047                                .BYTE   47           ;SHIFT '33' OR '73'
 4890  021010  366                                .BYTE   366
 4891  021011  050                                .BYTE   50           ;SHIFT '34' OR '74'
 4892  021012  365                                .BYTE   365
 4893  021013  070                                .BYTE   70           ;SHIFT '35' OR '75'
 4894  021014  367                                .BYTE   367
 4895  021015  071                                .BYTE   71           ;SHIFT '36' OR '76'
 4896  021016  370                                .BYTE   370
 4897  021017  072                                .BYTE   72           ;SHIFT '37' OR '77'
 4898  021020  360                     SHFEND:    .BYTE   360
 4899  021021  031                                .BYTE   31           ;SHIFT '40' OR '100'
 4900
 4901                                  ;*****************************************************************
 4902                                  ;MESSAGES
 4903                                  ;*****************************************************************
 4904  021022     000                             .BYTE
 4905  021023     045  053045  031124  TITLE:     .ASCII  '%%VT20 DIAGNOSTIC TEST 4/25/75, MAINDEC-11-DBVTA-C-PB @'
 4906  021030  020060  044504  043501
 4907  021036  047516  052123  041511
 4908  021044  052040  051505  020124
 4909  021052  027464  032462  033457
 4910  021060  026065  046440  044501
 4911  021066  042116  041505  030455
 4912  021074  026461  041104  052126
 4913  021102  026501  026503  041120
 4914  021110  040040
 4915
 4916  021112  043042  020113  053523  MES1:     .ASCII  '"FK SWITCH & LIGHT TEST", READY FOR INPUT%@'
 4917  021120  052111  044103  023040
 4918  021126  046040  043511  052110
 4919  021134  052040  051505  021124
```

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 4920  021142  020054  042522  042101
 4921  021150  020131  047506  020122
 4922  021156  047111  052520  022524
 4923  021164     100
 4924  021165     045  051101  020105  MES1A:  .ASCII ;%ARE DEFAULT ADDRESSES & VECTORS OK (Y OR N) ? @;
 4925  021172  042504  040506  046125
 4926  021200  020124  042101  051104
 4927  021206  051505  042523  020123
 4928  021214  020046  042526  052103
 4929  021222  051117  020123  045517
 4930  021230  024040  020131  051117
 4931  021236  047040  020051  020077
 4932  021244     100
 4933
 4934  021245     045  043042  020113  MES2:   .ASCII  '%"FK LOGIC TEST"%%@'
 4935  021252  047514  044507  020103
 4936  021260  042524  052123  022442
 4937  021266  040045
 4938  021270  052045  051505  020124  MES3:   .ASCII  ;%TEST NO. (0-22) ....%@;
 4939  021276  047516  020056  030050
 4940  021304  031055  024462  027040
 4941  021312  027056  022456     100
 4942
 4943  021317     042  045506  041440  MES4:   .ASCII  ;"FK CHARACTER TEST",INPUT 'LOWER CASE' CHARACTERS.%@;
 4944  021324  040510  040522  052103
 4945  021332  051105  052040  051505
 4946  021340  021124  044454  050116
 4947  021346  052125  023440  047514
 4948  021354  042527  020122  040503
 4949  021362  042523  020047  044103
 4950  021370  051101  041501  042524
 4951  021376  051522  022456     100
 4952
 4953  021403     045  052524  042502  MES5:   .ASCII  ;%TUBE '0', '1' ,'2','3', OR '4'? @;
 4954  021410  023440  023460  020054
 4955  021416  030447  020047  023454
 4956  021424  023462  023454  023463
 4957  021432  020054  051117  023440
 4958  021440  023464  020077     100
 4959
 4960  021445     045  047506  044522  MFCP:   .ASCII  /%FORIEGN CHARACTER SET ('Y' OR 'N' ?)@/
 4961  021452  043505  020116  044103
 4962  021460  051101  041501  042524
 4963  021466  020122  042523  020124
 4964  021474  023450  023531  047440
 4965  021502  020122  047047  020047
 4966  021510  024477     100
 4967  021513     045  047111  052520  MES6:   .ASCII  ;%INPUT CHAR., TEST 1.@;
 4968  021520  020124  044103  051101
 4969  021526  026056  052040  051505
 4970  021534  020124  027061     100
 4971  021541     045  047111  052520  MES6A:  .ASCII  ;%INPUT CHAR., TEST 2.@;
 4972  021546  020124  044103  051101
 4973  021554  026056  052040  051505
 4974  021562  020124  027062     100
 4975  021567     045  047111  052520  MES6B:  .ASCII  ;%INPUT CHAR., TEST 3.@;
```

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 4976  021574  020124  044103  051101
 4977  021602  026056  052040  051505
 4978  021610  020124  027063     100
 4979
 4980  021615     045  052042  051505  MES7:   .ASCII  :%"TEST COMPLETE"   @;
 4981  021622  020124  047503  050115
 4982  021630  042514  042524  020042
 4983  021636  020040     100
 4984
 4985
 4986  021641     124  051505  020124  MES8:   .ASCII  ;TEST ADDR.? @;
 4987  021646  042101  051104  037456
 4988  021654  040040
 4989
 4990  021656  053042  031124  020060  MES9:   .ASCII  ;"VT20 SYSTEM EXERCISER TEST". ;
 4991  021664  054523  052123  046505
 4992  021672  042440  042530  041522
 4993  021700  051511  051105  052040
 4994  021706  051505  021124  020056
 4995  021714     012                          .BYTE   12
 4996  021715     012                          .BYTE   12
 4997  021716  047516  042524  020072  .ASCII  ;NOTE: THE HOST DIAGNOSTIC, EITHER FOR THE PDP-8 OR 11 MUST BE;
 4998  021724  044124  020105  047510
 4999  021732  052123  042040  040511
 5000  021740  047107  051517  044524
 5001  021746  026103  042440  052111
 5002  021754  042510  020122  047506
 5003  021762  020122  044124  020105
 5004  021770  042120  026520  020070
 5005  021776  051117  030440  020061
 5006  022004  052515  052123  041040
 5007  022012     105
 5008  022013     012                          .BYTE   12
 5009  022014  047514  042101  042105          .ASCII  ;LOADED INTO THE HOST COMPUTER BEFORE RUNNING THIS TEST.;
 5010  022022  044440  052116  020117
 5011  022030  044124  020105  047510
 5012  022036  052123  041440  046517
 5013  022044  052520  042524  020122
 5014  022052  042502  047506  042522
 5015  022060  051040  047125  044516
 5016  022066  043516  052040  044510
 5017  022074  020123  042524  052123
 5018  022102     056
 5019  022103     031                          .BYTE   31
 5020
 5021  022104  053042  020124  042117  MES10:  .ASCII  ;"VT ODD ADDRESS TEST".@;
 5022  022112  020104  042101  051104
 5023  022120  051505  020123  042524
 5024  022126  052123  027042     100
 5025
 5026
 5027  022133     045  046111  042514  MESSA:  .ASCII  ;%ILLEGAL TRAP TO @;
 5028  022140  040507  020114  051124
 5029  022146  050101  052040  020117
 5030  022154     100
 5031
```

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 5032  022155     040  051106  046517  MES6C:  .ASCII  ; FROM @;
 5033  022162  040040
 5034  022164  044103  051101  027123  MES8C:  .ASCII  ;CHARS.: 0000  RECV'D: 0000  XFERS.: 0000  ;
 5035  022172  020072  030060  030060
 5036  022200  020040  042522  053103
 5037  022206  042047  020072  030060
 5038  022214  030060  020040  043130
 5039  022222  051105  027123  020072
 5040  022230  030060  030060  020040
 5041  022236  051105  051522  035056          .ASCII  ;ERRS.: 0000;
 5042  022244  030040  030060     060
 5043  022251     012                          .BYTE   12
 5044  022252     012                          .BYTE   12
 5045  022253     031                          .BYTE   31
 5046
 5047                                          .EVEN
 5048  022254     000                          .BYTE
 5049  022255     124  044510  020123  MES11:  .ASCII  ;THIS MESSAGE IS BEING LOADED FROM AN ODD STARTING ;
 5050  022262  042515  051523  043501
 5051  022270  020105  051511  041040
 5052  022276  044505  043516  046040
 5053  022304  040517  042504  020104
 5054  022312  051106  046517  040440
 5055  022320  020116  042117  020104
 5056  022326  052123  051101  044524
 5057  022334  043516     040
 5058  022337     101  042104  042522          .ASCII  ;ADDRESS. HOW  DOES IT LOOK??;
 5059  022344  051523  020056  047510
 5060  022352  020127  042040  042517
 5061  022360  020123  052111  046040
 5062  022366  047517  037513     077
 5063  022373     031                          .BYTE   31
 5064  022374  052045  052123  047040  MES13:  .ASCII  ;%TST NO  PASS    MA    CSR    DATA@;
 5065  022402  020117  050040  051501
 5066  022410  020123  020040  046440
 5067  022416  020101  020040  041440
 5068  022424  051123  020040  020040
 5069  022432  040504  040524     100
 5070  022437     042  045506  051040  MES14:  .ASCII  ;"FK REPEATIBILITY TEST", READY FOR INPUT.%@;
 5071  022444  050105  040505  044524
 5072  022452  044502  044514  054524
 5073  022460  052040  051505  021124
 5074  022466  020054  042522  042101
 5075  022474  020131  047506  020122
 5076  022502  047111  052520  027124
 5077  022510  040045
 5078  022512  041445  040510  027122  MES15:  .ASCII  ;%CHAR.-CODE(S) @;
 5079  022520  041440  042117  024105
 5080  022526  024523  040040
 5081
 5082  022532  022445  051524  020124  MES16:  .ASCII  ;%%TST NO  PASS    MA    CSR    MAR@;
 5083  022540  047516  020040  040520
 5084  022546  051523  020040  020040
 5085  022554  040515  020040  020040
 5086  022562  051503  020122  020040
 5087  022570  046440  051101     100
```

```
5088
5089  022575     045  052045  052123  MES17:  .ASCII  ;%%TST NO  PASS    MA   SHIFT  IN/OUT  EXPT'D RECV'D@;
5090  022602  047040  020117  050040
5091  022610  051501  020123  020040
5092  022616  046440  020101  020040
5093  022624  044123  043111  020124
5094  022632  044440  027516  052517
5095  022640  020124  042440  050130
5096  022646  023524  020104  042522
5097  022654  053103  042047     100
5098  022661     045  042502  040503  MES18:  .ASCII  ;%BECAUSE I LOVE YOU!!%@;
5099  022666  051525  020105  020111
5100  022674  047514  042526  054440
5101  022702  052517  020441  040045
5102  022710  044445  020106  047516  MES19:  .ASCII  ;%IF NOT WITH THE ONE YOU LOVE,;
5103  022716  020124  044527  044124
5104  022724  052040  042510  047440
5105  022732  042516  054440  052517
5106  022740  046040  053117  026105
5107  022746  046040  053117  020105          .ASCII  ; LOVE THE ONE YOUR WITH.%@;
5108  022754  044124  020105  047117
5109  022762  020105  047531  051125
5110  022770  053440  052111  027110
5111  022776  040045
5112
5113  023000  041536  027045     100  CNTRLC: .ASCII  '↑C%.@'
5114  023005     136  022501     100  CNTRLA: .ASCII  '↑A%@'
5115
5116  023011     045     100          CRLF:   .ASCII  '%@'
5117
5118
5119  023013     077  020040     100  QMARK:  .ASCII  '?  @'
5120
5121
5122  023017     045  053042  031124  MES20:  .ASCII  ;%"VT20 LOGIC TEST"%@;
5123  023024  020060  047514  044507
5124  023032  020103  042524  052123
5125  023040  022442     100
5126
5127  023043     045  051045  041505  MES21:  .ASCII  '%%RECOVERED FROM POWER FAILURE @'
5128  023050  053117  051105  042105
5129  023056  043040  047522  020115
5130  023064  047520  042527  020122
5131  023072  040506  046111  051125
5132  023100  020105     100
5133
5134  023103     111  050116  052125  MES22:  .ASCII  ;INPUT THE 'UPPER CASE' CHARACTERS.%@;
5135  023110  052040  042510  023440
5136  023116  050125  042520  020122
5137  023124  040503  042523  020047
5138  023132  044103  051101  041501
5139  023140  042524  051522  022456
5140  023146     100
5141
5142  023147     111  050116  052125  MES23:  .ASCII  ;INPUT THE 'CONTROL' CHARACTERS.%@;
5143  023154  052040  042510  023440
```

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 5144  023162  047503  052116  047522
 5145  023170  023514  041440  040510
 5146  023176  040522  052103  051105
 5147  023204  027123  040045
 5148  023210  053042  020124  044103  MES24:  .ASCII                    ;"VT CHARACTER DISPLAY TEST"@;
 5149  023216  051101  041501  042524
 5150  023224  020122  044504  050123
 5151  023232  040514  020131  042524
 5152  023240  052123  040042
 5153  023244  053042  020124  044506  MES25:  .ASCII                    ;"VT FIELD CONTROL TEST"@;
 5154  023252  046105  020104  047503
 5155  023260  052116  047522  020114
 5156  023266  042524  052123  040042
 5157  023274  053042  020124  051503  MES26:  .ASCII                    ;"VT CSR PRESET TEST"@;
 5158  023302  020122  051120  051505
 5159  023310  052105  052040  051505
 5160  023316  021124     100
 5161  023321     042  052126  046040  MES27:  .ASCII                    ;"VT LINE FEED TEST"@;
 5162  023326  047111  020105  042506
 5163  023334  042105  052040  051505
 5164  023342  021124     100
 5165  023345     042  052126  042440  MES30:  .ASCII                    ;"VT END OF SCREEN TEST"@;
 5166  023352  042116  047440  020106
 5167  023360  041523  042522  047105
 5168  023366  052040  051505  021124
 5169  023374     100
 5170  023375     042  052126  041040  MES31:  .ASCII                    ;"VT BLANK CONTROL TEST"@;
 5171  023402  040514  045516  041440
 5172  023410  047117  051124  046117
 5173  023416  052040  051505  021124
 5174  023424     100
 5175  023425     042  052126  040440  MES33:  .ASCII                    ;"VT ALIGNMENT TEST"@;
 5176  023432  044514  047107  042515
 5177  023440  052116  052040  051505
 5178  023446  021124     100
 5179  023451     042  052126  043040  MES34:  .ASCII                    ;"VT FOCUS TEST"@;
 5180  023456  041517  051525  052040
 5181  023464  051505  021124     100
 5182  023471     042  052126  053440  MES35:  .ASCII                    ;"VT WORST CASE TEST"@;
 5183  023476  051117  052123  041440
 5184  023504  051501  020105  042524
 5185  023512  052123  040042
 5186  023516  053042  020124  052503  MES36:  .ASCII                    ;"VT CURSOR MOVEMENT TEST"@;
 5187  023524  051522  051117  046440
 5188  023532  053117  046505  047105
 5189  023540  020124  042524  052123
 5190  023546  040042
 5191
 5192  023550  020040  047111  020040  MES37:  .ASCII          ;  IN    @;
 5193  023556  020040     100
 5194
 5195  023561     040  052517  020124  MES38:  .ASCII          ; OUT    @;
 5196  023566  020040  040040
 5197
 5198  023572  041042  046117  020104  MES39:  .ASCII  ;"BOLD PRESET TEST"@;
 5199  023600  051120  051505  052105
```

```
5200  023606  052040  051505  021124
5201  023614     100
5202
5203  023615     042  046102  047111  MES40:  .ASCII  ;"BLINK PRESET TEST"@;
5204  023622  020113  051120  051505
5205  023630  052105  052040  051505
5206  023636  021124     100
5207
5208  023641     042  046102  047101  MES41:  .ASCII  ;"BLANK PRESET TEST"@;
5209  023646  020113  051120  051505
5210  023654  052105  052040  051505
5211  023662  021124     100
5212
5213  023665     042  047125  042504  MES42:  .ASCII  ;"UNDERLINE PRESET TEST"@;
5214  023672  046122  047111  020105
5215  023700  051120  051505  052105
5216  023706  052040  051505  021124
5217  023714     100
5218  023715     045  052522  047116  MES43:  .ASCII  ;%RUNNING TUBE 0@;
5219  023722  047111  020107  052524
5220  023730  042502  030040     100
5221
5222  023735     045  052522  047116  MES44:  .ASCII  ;%RUNNING TUBE @;
5223  023742  047111  020107  052524
5224  023750  042502  040040
5225
5226  023754  040007                  MBELL:  .ASCII  <7>/@/
5227  023756  050045  047522  051107  MXORH:  .ASCII  /%PROGRAM RUN IS ABORTED@/
5228  023764  046501  051040  047125
5229  023772  044440  020123  041101
5230  024000  051117  042524  040104
5231  024006  047045  046525  042502  MED1:   .ASCII  /%NUMBER OF TUBES? @/
5232  024014  020122  043117  052040
5233  024022  041125  051505  020077
5234  024030     100
5235          024032                  .EVEN
5236  024032  053045  020124     100  MUTP:   .ASCII  /%VT @/
5237  024037     045  045506     040  MFKP:   .ASCII  /%FK /
5238  024043     040  042526  052103  MAUFK:  .ASCII  / VECTOR AND ADDRESS FOR TUBE @/
5239  024050  051117  040440  042116
5240  024056  040440  042104  042522
5241  024064  051523  043040  051117
5242  024072  052040  041125  020105
5243  024100     100
5244  024101     045  042040  030514  MDLVA:  .ASCII  /% DL11 VECTOR FOR TUBE @/
5245  024106  020061  042526  052103
5246  024114  051117  043040  051117
5247  024122  052040  041125  020105
5248  024130     100
5249          024132                  .EVEN
5250                                  ;ADDRESS AND CONSTANTS TABLE
5251
5252  024132  000000                  PIMP:   0
5253  024134  001726                  AVECTR: INITB                   ;CNTR 'A' VECTOR ADDRESS
5254  024136  001000                  STACK:  1000                    ;'SP' INITIALIZATION ADDRESS
5255  024140  000000                  UNITFG: 0                       ;SOFTWARE SW., SET IF BOTH UNITS AVAIL.
```

```
5256  024142  000000          UNITNO: 0               ;CONTAINS NO. OF UNITS AVAILABLE
5257  024144  000000          MEMSIZ: 0               ;CONTAINS HIGHEST 'K' OF MEM. ADDR.
5258  024146  000000          TSTNUM: 0               ;CONTAINS CURRENT LOGIC TEST NO.
5259  024150  000000          FIELDSW:0               ;FIELD CONTROL SOFTWARE SW.
5260  024152  000000          CHRCNT: 0               ;'VT' BUFFER CHARACTER COUNTER
5261  024154  000000          RUNSWH: 0               ;'RUN ALL' SOFTWARE SW.
5262  024156  000000          INTSWH: 0               ;SOFTWARE SW.
5263  024160  000000          TTYSWH: 0               ;SOFTWARE SW., SET IF TTY AVAIBLE
5264  024162  000000          TOPC:   0
5265  024164  000000          FROMPC: 0
5266  024166  000000          DONESW: 0
5267  024170  000000          SWAPEM: 0
5268  024172  000000          MTRSWH: 0               ;SOFTWARE SW.
5269  024174  000000          RECSW0: 0               ;SET IF RECEIVING OR EXPECTING DATA
5270  024176  000000          RECSW1: 0
5271  024200  000000          RECSW2: 0
5272  024202  000000          RECSW3: 0
5273  024204  000000          TRNSW0: 0               ;SET IF TRANSMITTING DATA
5274  024206  000000          TRNSW1: 0
5275  024210  000000          TRNSW2: 0
5276  024212  000000          TRNSW3: 0
5277  024214  000000          NULCT0: 0
5278  024216  000000          NULCT1: 0
5279  024220  000000          NULCT2: 0
5280  024222  000000          NULCT3: 0
5281  024224  000000          STCOD0: 0               ;SET IF START CODE (377) WAS RECV'D
5282  024226  000000          STCOD1: 0
5283  024230  000000          STCOD2: 0
5284  024232  000000          STCOD3: 0
5285  024234  000000          CHRCT0: 0               ;CONTAINS NO. OF CHAR.'S ON SCREEN
5286  024236  000000          CHRCT1: 0
5287  024240  000000          CHRCT2: 0
5288  024242  000000          CHRCT3: 0
5289  024244  000000          HOLDS0: 0               ;SET ON ERROR DETECTION, CLR'D VIA SW15
5290  024246  000000          HOLDS1: 0
5291  024250  000000          HOLDS2: 0
5292  024252  000000          HOLDS3: 0
5293  024254  000000          PATERN: 0
5294          024266                  .=.+10
5295  024266  000000          BLKERR: 0
5296          024300                  .=.+10
5297  024300  000000          AUTSW0: 0
5298  024302  000000          AUTSW1: 0
5299  024304  000000          AUTSW2: 0
5300  024306  000000          AUTSW3: 0
5301  024310  000000          TRANF0: 0
5302  024312  000000          TRANF1: 0
5303  024314  000000          TRANF2: 0
5304  024316  000000          TRANF3: 0
5305  024320  000000          RECTR0: 0
5306  024322  000000          RECTR1: 0
5307  024324  000000          RECTR2: 0
5308  024326  000000          RECTR3: 0
5309  024330  000000          STOP0:  0               ;SET TO STOP CONTINOUS TRANSFER
5310  024332  000000          STOP1:  0
5311  024334  000000          STOP2:  0
```

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 5312  024336  000000          STOP3:  0
 5313  024340  000000          ERFLG0: 0
 5314  024342  000000          ERFLG1: 0
 5315  024344  000000          ERFLG2: 0
 5316  024346  000000          ERFLG3: 0
 5317  024350  000000          INTRN0: 0                ;SET ON DL11 TRANS. INITIALIZATION
 5318  024352  000000          INTRN1: 0
 5319  024354  000000          INTRN2: 0
 5320  024356  000000          INTRN3: 0
 5321  024360  000000          RESTR0: 0                ;CONTAINS 1ST FREE LOCATION AFTER
 5322  024362  000000          RESTR1: 0                ;THE USER DATA
 5323  024364  000000          RESTR2: 0
 5324  024366  000000          RESTR3: 0
 5325  024370  000000          XFER0:  0
 5326  024372  000000          XFER1:  0
 5327  024374  000000          XFER2:  0
 5328  024376  000000          XFER3:  0
 5329  024400  000000          BUSY0:  0                ;SET IF DOING CONTINOUS TRANSFERS
 5330  024402  000000          BUSY1:  0
 5331  024404  000000          BUSY2:  0
 5332  024406  000000          BUSY3:  0
 5333  024410  000000          BUF0R0: 0
 5334  024412  000000          BUF1R0: 0
 5335  024414  000000          BUF2R0: 0
 5336  024416  000000          BUF3R0: 0
 5337  024420  000000          BUF0R1: 0
 5338  024422  000000          BUF1R1: 0
 5339  024424  000000          BUF2R1: 0
 5340  024426  000000          BUF3R1: 0
 5341  024430  000000          START:  0
 5342  024432  000000          DISPSW: 0
 5343  024434  000000          SELECT: 0
 5344  024436  000000          SHFTSW: 0
 5345  024440  000000          SHFPRT: 0
 5346  024442  000000          SAVOLD: 0                ;TEMPORARY STORAGE
 5347  024444  000000          TEMP1:  0                ;TEMPORARY STORAGE
 5348  024446  000000          TEMP2:  0                ;TEMPORARY STORAGE
 5349  024450  000000          MESPRT: 0                ;SOFTWARE PRINT INHIBIT SW.
 5350  024452  000000          MESPT1: 0
 5351  024454  000000          SAVEPC: 0                ;TEMPORARY STORAGE OF 'PC'
 5352  024456  000000          SAVPSW: 0                ;TEMPORARY STORAGE OF 'PSW'
 5353  024460  000000          SAV2PC: 0
 5354  024462  000000          SAV2SW: 0
 5355  024464  000000          KSTOR1: 0                ;PERMANENT STORAGE
 5356  024466  000000          KSTOR2: 0                ;PERMANENT STORAGE
 5357  024470  000000          KSTOR3: 0                ;PERMANENT STORAGE
 5358  024472  000000          KSTOR4: 0                ;PERMANENT STORAGE
 5359  024474  000000          KSTOR5: 0
 5360  024476  000000          KSTOR6: 0
 5361
 5362                          ;HERE STARTS A '1200' WORD 'VT' BUFFER USED FOR ALL
 5363                          ;VT DISPLAY TESTS.  DATA TO BE DISPLAYED IS ASSEMBLED
 5364                          ;IN EACH INDIVIDUAL TEST AND STORED HERE.
 5365
 5366  024500      031         VTBUFF: .BYTE   EOS
 5367  024501      031                 .BYTE   EOS
```

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 5368
 5369
 5370          000001                          .END
```

```
ASEMBL= 104015          1271#   1562    1567    1570    1582    1599    1616    1629    1672    3011    3725
AUDIO = 000200          1460#   3042    4436    4605
AUTOLL  012504          3441    3448#
AUTOST  013272          3494    3565#
AUTOUT  013304          3448    3571#
AUTSW0  024300          3440    3471*   3528*   3566*   3571*   3572*   3573    3575*   3576    5297#
AUTSW1  024302          5298#
AUTSW2  024304          5299#
AUTSW3  024306          5300#
AVECTR  024134          1658*   2967*   2975*   3022*   3087*   3799    4387*   4388*   5253#
BINDEC= 104024          1278#   3192    3195    3198    3201    3204    3207    3210    3213    3218    3221    3224    3227
                        3232    3235    3238    3241
BLANK = 000361          1458#   2439    2444    4316
BLINK = 000362          1459#   3429    4312
BLKERR  024266          3469*   3555*   3646    3649*   5295#
BOLD  = 000364          1457#   4314
BUFOR0  024410          3130*   3329    3383*   5333#
BUFOR1  024420          3131*   3330    3384*   5337#
BUF1R0  024412          3133*   3344    3394*   5334#
BUF1R1  024422          3134*   3345    3395*   5338#
BUF2R0  024414          3171*   3359    3405*   5335#
BUF2R1  024424          3172*   3360    3406*   5339#
BUF3R0  024416          3154*   3374    3416*   5336#
BUF3R1  024426          3155*   3375    3417*   5340#
BUSY0   024400          3458    3468*   3484    3499    3506*   3658*   5329#
BUSY1   024402          5330#
BUSY2   024404          5331#
BUSY3   024406          5332#
CAR   = 000010          1478#   1840    1853    1866    1879    1890
CHKFK0  007646          2933    2939#
CHKFK1  007704          2943    2945    2947    2948#
CHKFK2  007730          2952    2955#   2990    2993
CHKFK4  010004          2962    2964    2969#
CHRCNT  024152          3771*   3782*   3783    3802    3804*   4358*   4363    4370*   5260#
CHRCT0  024234          3191    3476*   3515    3517*   3520    3522*   5285#
CHRCT1  024236          3203    5286#
CHRCT2  024240          3217    5287#
CHRCT3  024242          3231    5288#
CHREND  020721          2981    4824#
CHRERR  010100          2950    2988#
CHRTAB  020460          2927    4630#
CKHALT  017514          4438    4446#   4461    4491    4538
CLRFKV  016710          1659    2672    2689    2705    2721    2735    2984    4280#
CLRFLD= 000360          1464#   4320
CLRVTV  016774          1660    2149    2171    2195    4301#
CNTRIT  020647          2977    4773#
CNTRLA  023005          3798    5114#
CNTRLC  023000          1671    5113#
CONTRL  020634          2971    4762#
CORSIZ  001702          1500    1504#
CRLF    023011          3813    4558    5116#
CSR   = 000000          1474#
DAR   = 000002          1475#   1974    1994    2013
DECOUT  016620          4249    4253#
DECPNT  016642          4243    4261#
DEC1    016632          4254    4257#
```

```
DELAY = 104004          1262#   2281    2375    2392    2417    2442    2445    2517
DELAYL= 104020          1274#   2352    3102    3103    4076    4087    4396
DISPLA= 104000          1258#   2276    2298    2325    2328    2332    2336    2340    2363    2408    2434    2458    2474
                        2489    2507    2534    2556    2796    2815    2834    2854    2869    2925    2965    2973    3020
                        4119
DISPMS  011610          3124    3128    3152    3169    3246#   3249
DISPSW  024432          4029    4395*   4397*   5342#
DL11A   010726          3135    3139#
DL11B   010750          3139    3142#
DL11C   011076          3156    3159#
DL11D   011230          3173    3176#
DONESW  024166          1664*   3830*   4075*   4082    5266#
EMTOK   001220          1291    1293#
EMTSRV  001200          1244    1287#
EMTTAB  001240          1295    1301#
ENDCUR  006132          2519    2524#
ENDEOS  005654          2419    2423#
ENDTST= 104006          1264#   2204    2285    2344    2395    2423    2448    2524    2856    2906    2986
EOL   = 000012          1461#
EOP   = 000014          1462#   3490    3552    3600    3641
EOS   = 000031          1463#   3248    3432    3463    3504    3518    3524    3637    3655    3706    3711    4060    5366
                        5367
EOSBUF= 104005          1263#   2278    2300    2327    2365    3104    4385
ERFLG0  024340          3200    3428*   3474*   3648*   3667    3673*   5313#
ERFLG1  024342          3212    5314#
ERFLG2  024344          3226    5315#
ERFLG3  024346          3240    5316#
ERRMES  020162          4486*   4506*   4512*   4555#
ERROR = 104400          1257#   1780    1791    1802    1814    1826    1832    1843    1856    1870    1882    1893    1909
                        1922    1934    1949    1965    1977    1997    2016    2040    2043    2057    2073    2089    2103
                        2117    2132    2147    2152    2168    2193    2260    2569    2581    2593    2604    2616    2630
                        2645    2657    2669    2688    2704    2720    2738    2742    2751    2755    2766    2777    2781
                        2807    2826    2845
ERTRAP  016456          1239    4215#
EXITF0  007544          2887    2896    2901#
EXITF1  007564          2885    2905#
EXITSF  005160          2245    2264#
EXREPT  010334          3033    3054#
EXTCHR  010036          2940    2970    2972    2977#
EXTPRT  020246          4549    4575#
EXTTY   014552          3814#
EXTVTR  020106          4518    4537#
FCSET   001620          1469#   1512*   1564*   3953
FCSET1  001622          1470#   3941    3944*   3952*   3977*   3986*
FIELDS  024150          2928*   2944    2951    2953*   2989    2991*   3023*   3043    3045*   3048    3050*   5259#
FKCHAR  007576          1727    2924#   2967    2975    2987
FKCSR   001474          1406#   2548    2882    2903*   2905*   2939    2980*   3032    3054*   4274*   4281*   4444    4488
                        4551*
FKCSR4=%000004          1221#   2548*   2567    2576*   2577    2582*   2589*   2590*   2591    2594*   2600*   2602    2614
                        2617*   2625*   2628    2631*   2638*   2639    2641*   2642*   2643    2651*   2652    2655    2683*
                        2699*   2715*   2748*   2749    2752*   2753    2762*   2764    2767*   2774*   2775    2779    2782*
                        2783*   2795*   2805    2808*   2824    2827*   2833*   2843    2846*   2847*
FKDATA  001476          1407#   2763    2778    2884    2941    3034    4445
FKERR   017442          1246    2551    4434#
FKFUN   007416          1725    2868#   2907
FKINT   001500          1408#   1524*   1535*   1583*   1600*   1687    1688*   1689    1691*   2679*   2695*   2711*   4271*
```

```
                    4282*
FKLDA   001472      1405*   2889    2901*
FKLDB   001470      1404*   2895    2902*   4201
FKLOGI  006236      1723    2541    2556#   2859
FKLVL   001502      1409#   2680*   2696*   2712*   4205    4273*   4282    4283*
FKREPT  010126      1729    3007#   3022
FKRPTA  010144      3008    3013#
FKRPTB  010160      3012    3017#   3019
FKT1    006246      2552    2564#   4609
FKT10   006504      2650#
FKT11   006532      2663#
FKT12   006566      2678#
FKT13   006640      2694#
FKT14   006714      2710#
FKT15   006770      2727#
FKT16   007040      2739    2747#
FKT17   007072      2761#
FKT2    006262      2568    2575#
FKT20   007120      2773#
FKT21   007166      2791#
FKT22   007254      2814#
FKT23   007320      2832#
FKT24   007372      2793    2853#
FKT3    006314      2588#
FKT4    006342      2599#
FKT5    006362      2610#
FKT6    006412      2623#
FKT7    006446      2637#
FKOCSR  001334      1336#   3186*   3438    3451    3525*
FKODAT  001336      1337#   3455
FKOINT  001340      1338#   3118*
FKOLDA  001332      1335#
FKOLDB  001330      1334#   1522    1575    4190
FKOLVL  001342      1339#   3119*
FK1CSR  001350      1345#   3187*
FK1DAT  001352      1346#
FK1INT  001354      1347#   3120*
FK1LDA  001346      1344#
FK1LDB  001344      1343#   4193
FK1LVL  001356      1348#   3121*
FK2CSR  001364      1354#   3177*
FK2DAT  001366      1355#
FK2INT  001370      1356#   3165*
FK2LDA  001362      1353#
FK2LDB  001360      1352#   4196
FK2LVL  001372      1357#   3166*
FK3CSR  001400      1363#   3160*
FK3DAT  001402      1364#
FK3INT  001404      1365#   3148*
FK3LDA  001376      1362#
FK3LDB  001374      1361#   4199
FK3LVL  001406      1366#   3149*
FLGERR  012412      3428#   3453    3539    3607    3615    3620    3623
FREPT0  010234      3027    3032#
FREPT1  010260      3036    3040#
FREPT2  010330      3044    3047    3049    3052#
```

DBVTAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
FROMPC  024164          4220*  4222*  4233   5265#
GETMAR  020036          4520   4527#
GETREG= 104003          1261#  3873   3910   4050   4067   4394   4477   4537
HOLDS0  024244          1663*  3444   3475*  3671   3674*  3676*  3849   4082*  4084   5289#
HOLDS1  024246          5290#
HOLDS2  024250          5291#
HOLDS3  024252          5292#
ICOUNT  020376          1752*  2084*  2140*  2550*  2786*  4594   4607#
INBUF   014600          3770   3772*  3823#  4339
INITAC  002232          1575#
INITB   001726          1508#  1658   5253
INITBA  002136          1253   1553#  1626
INITC   002150          1509   1556#
INITCB  002436          1519   1572   1574   1625#
INITD   002456          1555   1631#
INITSF  004752          2087   2099   2115   2128   2214#  2239
INITTY  001624          1251   1490#
INPUTA  014364          3773#  3774   3788   3803
INPUTB  014416          3781#  3809
INTCHR  015170          2282   2309   2349   3923#
INTRN0  024350          3533   3535*  5317#
INTRN1  024352          5318#
INTRN2  024354          5319#
INTRN3  024356          5320#
INTSWH  024156          2279*  2302*  2348*  3923   3930*  5262#
JMPWOR  012510          3443   3449#
KSTOR1  024464          2301*  2313*  2931*  2957   2979*  3323*  3334   3338*  3349   3353*  3364   3368*  3379
                        3726*  3729*  3731   3736*  3737   3738*  3741   4046   5355#
KSTOR2  024466          5356#
KSTOR3  024470          2303*  2314*  4489*  4515*  4521*  4525*  4534*  4550*  4569*  4571   5357#
KSTOR4  024472          3895*  3908*  4386*  4391   5358#
KSTOR5  024474          3693*  3700*  4508*  4525   5359#
KSTOR6  024476          4507*  4521   5360#
LDCHAR  015226          3924   3931#
LDCHEB  015304          3948#  3987
LDCHR0  015232          3933#  3951
LDCHR1  015260          3932   3941#
LDCHR2  015464          3979   3981   3985#
LDFKVT  016654          2665   2729   2874   2932   3026   4271#
LDLINE= 104010          1266#  4313   4315   4317   4319
LDUNIT  016432          4192   4195   4198   4201#
LDVTVT  016740          2143   2161   2182   4290#
LINKOD  012500          3445   3447#
LOOP12  003510          1889#  1897
LOOP16  003704          1944#  1951
LOOP24  004102          2011#  2019
MASK    015166          3694*  3703   3707*  3896*  3902   3907*  3912#
MAUFK   024043          1596   5238#
MBELL   023754          4621   5226#
MDLVA   024101          1613   5244#
MED1    024006          1566   5231#
MEMSIZ  024144          1505*  5257#
MESPRT  024450          1750*  2549*  4505*  4552   4556*  5349#
MESPT1  024452          1751*  4502   4504*  5350#
MES1    021112          2870   4916#
MES1A   021165          1569   4924#
```

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MES10   022104          2535    5021#
MES11   022255          2537    5049#
MES13   022374          4486    5064#
MES14   022437          3021    5070#
MES15   022512          3010    5078#
MES16   022532          4512    5082#
MES17   022575          4506    5089#
MES18   022661          4351    5098#
MES19   022710          4348    5102#
MES2    021245          2557    4934#
MES20   023017          1765    5122#
MES21   023043          4120    5127#
MES22   023103          2966    5134#
MES23   023147          2974    5142#
MES24   023210          2277    5148#
MES25   023244          2299    5153#
MES26   023274          2326    5157#
MES27   023321          2364    5161#
MES3    021270          1641    4938#
MES30   023345          2409    5165#
MES31   023375          2435    5170#
MES33   023425          2459    5175#
MES34   023451          2475    5179#
MES35   023471          2490    5182#
MES36   023516          2508    5186#
MES37   023550          2085    2113    5192#
MES38   023561          2097    2126    5195#
MES39   023572          2329    5198#
MES4    021317          2926    4943#
MES40   023615          2333    5203#
MES41   023641          2337    5208#
MES42   023665          2341    5213#
MES43   023715          3848    5218#
MES44   023735          3841    5222#
MES5    021403          1628    4953#
MES5A   022133          4227    5027#
MES6    021513          2797    4967#
MES6A   021541          2816    4971#
MES6B   021567          2835    4975#
MES6C   022155          4231    5032#
MES7    021615          2203    2855    4980#
MES8    021641          3724    4986#
MES80   022164          3246    5034#
MES9    021656          3088    3089    3092    3094    4990#
MFCP    021445          1561    4960#
MFKP    024037          1579    5237#
MONITR  002526          1639    1649#   1680    3793    3819    4234    4352
MOVBLK  005716          2443#   2447
MOVEIT  015112          3898#   3909
MOVE1   014102          3697#   3709
MOVE2   014136          3701    3707#
MRUNN1  014750          1577*   1581    1586*   1591*   1598    1603*   1610*   1615    1621*   3842*   3843*   3845    3856#
MTRSWH  024172          1556    1661*   5268#
MUTP    024032          1594    5236#
MXORH   023756          4578    5227#
NOP   = 000240          1228#
```

```
NOTTY   001634          1252    1492#
NULCTO  024214          3510*   3546*   5277#
NULCT1  024216          5278#
NULCT2  024220          5279#
NULCT3  024222          5280#
NULL    = 104022        1276#   1650    1766    3874    4216    4536
OCTPRT  015056          1313    3891#
OUTPTA  014434          3785#   3786    3807    3816
PATERN  024254          3442    3470*   3527*   3582*   3583*   3584    5293#
PC      =%000007        1217#   1528*   1539*   1585*   1602*   1637*   1657*   1659*   1660*   1692*   1760*   1767*   2087*
                        2088*   2099*   2102*   2115*   2116*   2128*   2131*   2143*   2149*   2161*   2171*   2182*   2195*
                        2220*   2239*   2259*   2265*   2282*   2304*   2309*   2316*   2331*   2335*   2339*   2343*   2349*
                        2353*   2554*   2558*   2665*   2672*   2689*   2705*   2721*   2729*   2735*   2874*   2932*   2984*
                        3025*   3026*   3124*   3128*   3152*   3169*   3250*   3253*   3254*   3259*   3260*   3265*   3266*
                        3271*   3272*   3276*   3277*   3282*   3283*   3288*   3289*   3294*   3295*   3300*   3301*   3305*
                        3306*   3311*   3312*   3317*   3318*   3434*   3446*   3453*   3526*   3536*   3539*   3541*   3551*
                        3558*   3560*   3602*   3607*   3609*   3615*   3620*   3623*   3656*   3677*   3712*   3733*   3735*
                        3833*   3836*   3855*   3865*   3891*   3938*   3940*   3984*   3993*   4027*   4077*   4083*   4088*
                        4207*   4249*   4256*   4259*   4276*   4284*   4295*   4305*   4331*   4340*   4365*   4372*   4383*
                        4415*   4417*   4426*   4490*   4516*   4522*   4526*   4535*   4581*
PIMP    024132          1631*   1653    5252#
POP1SP= 005726          1224#   3839    3853
POP2SP= 022626          1227#   2671    2687    2703    2719    2734    2985    3796    4219
PRELOA= 104011          1267#   2410    2436    2460    2476    2491    2509
PRINT = 104012          1268#   1558    1560    1565    1569    1578    1580    1593    1595    1597    1612    1614    1627
                        1640    1670    1678    1764    2202    3009    3723    3797    3812    3820    3840    3844    3847
                        4226    4230    4347    4350    4523    4554    4557    4577    4620
PRTERR  020114          4490    4516    4545#
PRTOCT= 104014          1270#   4228    4232    4559    4564    4570
PSW     001312          1325#   1493*   1755*   2163*   2682*   2698*   2714*   3105*   3188*   4106*   4240*   4275*   4280*
                        4294*   4301*   4330*   4598*
PUSH1S= 005746          1225#
PUSH2S= 024646          1226#
PWRFAL  016014          1241    4096#
PWRUP   016050          4104    4106#
QMARK   023013          1679    3821    5119#
RBUF0   001530          1424#   3589
RBUF1   001532          1425#
RBUF2   001534          1426#
RBUF3   001536          1427#
RCSR0   001520          1420#   3137*
RCSR1   001522          1421#   3140*
RCSR2   001524          1422#   3174*
RCSR3   001526          1423#   3157*
RECSW0  024174          3106    3478*   3556*   3603    3659*   5269#
RECSW1  024176          5270#
RECSW2  024200          5271#
RECSW3  024202          5272#
RECTR0  024320          3194    3473*   3550*   3643*   3687*   5305#
RECTR1  024322          3206    5306#
RECTR2  024324          3220    5307#
RECTR3  024326          3234    5308#
RECVAB  014022          3634    3681#
RECVAC  014034          3628    3687#
RECVBB  013626          3632    3641#
RECVBC  013644          3646#   3683
```

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RECVDD  014004          3668    3672    3675#
RECVEE  014010          3670    3676#
RECVIT  013362          3301    3306    3312    3318    3589#
RECVON  013444          3593    3599    3603#
RECVO   011766          3110    3300#
RECVOA  013472          3604    3606    3611#
RECVOB  013540          3612    3617    3622    3625#
RECVOC  013676          3645    3654#   3682
RECVOD  013706          3601    3642    3657#
RECVOE  014016          3630    3639    3662    3677#
RECV1   012000          3112    3305#
RECV2   012012          3161    3311#
RECV3   012024          3144    3317#
RELOAD  012556          3459    3462#   3496    3665
REPORT  005126          2247    2255#
REPTER  010264          3039    3042#
REPTOK  010312          3038    3041    3048#
RESCNT  005472          2367#   2374
RESTRO  024360          3465*   3486    3488    3505*   3666    5321#
RESTR1  024362          5322#
RESTR2  024364          5323#
RESTR3  024366          5324#
RETURN  020402          1754*   2275*   2297*   2324*   2362*   2407*   2433*   2457*   2473*   2488*   2506*   2533*   2552*
                        2794*   2868*   2924*   3019*   3085*   3740*   4121    4599    4604*   4609#   4622
RINTO   001540          1428#   1543    1609    3110*
RINT1   001544          1430#   3112*
RINT2   001550          1432#   3161*
RINT3   001554          1434#   3144*
RLVLO   001542          1429#   3111*
RLVL1   001546          1431#   3113*
RLVL2   001552          1433#   3162*
RLVL3   001556          1435#   3145*
RUNEM   016000          4079    4081    4087#
RUNEXT  016006          4089#
RUNSWH  024154          1662*   1742*   4078    5261#
R0      =%000000        1210#   1521*   1529*   1533*   1540*   1542*   1551*   1576*   1587*   1590*   1604*   1607*   1622*
                        2101*   2130*   2164*   2165*   2179*   2187    2188    2218*   2227*   2235    2240*   2242    2255
                        2261    2313    2367*   2369*   2384*   2385    2387*   2388    2389*   2414*   2415*   2420*   2421*
                        2439*   2443*   2444*   2513*   2514    2515*   2520*   2521    2522*   2577*   2578*   2579    2611*
                        2612*   2624*   2626*   2664*   2667*   2681*   2684*   2697*   2700*   2713*   2716*   2799*   2903*
                        2818*   2822*   2837*   2841*   2871*   2891    2892*   2894*   2901    2954*   2960*   2992*   3046*
                        3051*   3053*   3106*   3107*   3108    3122*   3123    3126    3129*   3130    3131    3190*   3193*
                        3196*   3199*   3202*   3205*   3208*   3211*   3216*   3219*   3222*   3225*   3230*   3233*   3236*
                        3239*   3324    3329*   3339    3344*   3354    3359*   3369    3374*   3383    3389*   3394    3400*
                        3405    3411*   3416    3422*   3429*   3430*   3431*   3432*   3462*   3463*   3488*   3490*   3504*
                        3505    3518*   3523*   3524*   3592    3598*   3635*   3636*   3637*   3650*   3651*   3652*   3654*
                        3655*   3666*   3705*   3706*   3710*   3711*   3925*   3934*   3943*   3946*   4047*   4058*   4060*
                        4063*   4065    4096    4114*   4168*   4169*   4172*   4173*   4174    4190*   4193*   4196*   4199*
                        4203    4255*   4258*   4312*   4314*   4316*   4318*   4320*   4401*   4403*   4439*   4463    4465*
                        4507
R1      =%000001        1211#   1501*   1502    1504*   1505    1681    1682*   1685*   1690*   1777*   1778*   1788*   1789*
                        1798*   1799*   1800    1828*   1829*   1830    2178*   2190*   2232*   2233*   2234*   2246*   2248
                        2250*   2252*   2253    2366*   2372*   2373    2413*   2418*   2440*   2446*   2512*   2518*   2728*
                        2731*   2736    2740    2800*   2801*   2819*   2820*   2838*   2839*   2872*   2897    2898*   2900*
                        2902    2927*   2948    2949    2963    2971    2977    2981    3034*   3037    3040    3053    3246*
                        3247    3248    3325    3330*   3340    3345*   3355    3360*   3370    3375*   3384    3388*   3395
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                    3399*  3406   3410*  3417   3421*  3508*  3509   3552   3557*  3559   3644   3775*  3776*
                    3777   3779   3781   3787   3791   3794   3800   3805*  3808   3810   3815   3817   3893*
                    3898*  3899*  3900*  3901   3926*  3946   3947*  3948   3950*  3955   3957   3959   3961
                    3963   3965   3967   3969   3971   3973   3975   3978   3980   3982   3985*  4045*  4048*
                    4059*  4061*  4097   4113*  4116*  4117*  4131   4153*  4165*  4170*  4191*  4194*  4197*
                    4200*  4204   4244*  4245*  4253   4257*  4258   4339*  4354   4366   4368*  4369   4440*
                    4441*  4464   4466*  4467*  4488*  4508   4514*  4568   4601*  4602
R2      =%000002    1212#  1543*  1608*  2100   2129   2184*  2185*  2217*  2232   2873*  2881*  2886   2888*
                    2941*  2949   2955   2959*  2960   3123*  3125*  3127   3132*  3133   3134   3150*  3151
                    3153*  3154   3155   3167*  3168   3170*  3171   3172   3191*  3194*  3197*  3200*  3203*
                    3206*  3209*  3212*  3217*  3220*  3223*  3226*  3231*  3234*  3237*  3240*  3247*  3326
                    3331*  3341   3346*  3356   3361*  3371   3376*  3387*  3398*  3409*  3420*  3428*  3440
                    3442   3444   3458   3460*  3464*  3465*  3466*  3467*  3468*  3469*  3470*  3471*  3472*
                    3473*  3474*  3475*  3476*  3477*  3478*  3482*  3484   3486   3488   3499   3505*  3506*
                    3507*  3510*  3511*  3515   3517*  3520   3522*  3527*  3528*  3533   3535*  3537   3546*
                    3549*  3550*  3554*  3555*  3556*  3559*  3566*  3571*  3572*  3573   3575*  3576   3582*
                    3583*  3584   3589   3603   3631   3638*  3643*  3646   3648*  3649*  3657*  3658*  3659*
                    3660*  3661   3663   3666   3667   3671   3673*  3674*  3676*  3687*  3688*  3689*  3690*
                    3702*  3703*  3704*  3705   3867*  3871   3876   3878   3884   3901*  3902*  3903*  3906
                    3927*  3931*  3933*  4046*  4047   4098   4112*  4132   4152*  4166*  4169   4201*  4203*
                    4205   4241*  4246*  4248*  4391*  4392   4399   4401   4404   4442*  4443*  4468*  4469*
                    4530*  4531*  4532*  4533   4568*  4569
R3      =%000003    1213#  1546*  1563*  1564   1568   1571   1573   1583   1600   1630   1668*  1673*  1674*
                    1675   1677   1888*  1889   1891   1896*  1943*  1945   1947   1950*  2010*  2011   2014
                    2018*  2215*  2229   2230   2368*  2370*  3014*  3017*  3037   3327   3332*  3342   3347*
                    3357   3362*  3372   3377*  3386*  3397*  3408*  3419*  3438   3451   3455   3525*  3695*
                    3708*  3726   3928*  3936*  4099   4111*  4133   4151*  4202*  4204*  4341*  4342   4344
                    4360*  4444*  4463*  4472*
R3PBT   016652      4242*  4250*  4265#
R3PRT   013270      3542*  3543*  3544   3561#
R3PXT   014020      3594*  3595*  3596   3625*  3626*  3627   3678#
R4      =%000004    1214#  1527*  1538*  1683   1684*  2383*  2390*  2889*  2892   2893*  2894   2895*  2898
                    2899*  2900   3016*  3018*  3040   3328   3343   3358   3373   3385*  3396*  3407*  3418*
                    3455*  3456   3480   3493   3495   3497   3501   3513   3523   3565*  3566   3576*  3584*
                    3589*  3600   3611   3613   3618   3629   3633   3641   3644   3651   3654   3690   3691*
                    3697*  3698*  3699*  3702   3770*  3781*  3806   3929*  3934   4100   4110*  4134   4150*
                    4243*  4246   4248   4341   4355*  4356*  4357*  4360   4362*  4369*  4373*  4374*  4375*
                    4445*  4464*  4473*
R5      =%000005    1215#  1522*  1532*  1544*  1575*  1589*  1609*  2382*  2393*  3024*  3035   3052*  3590*
                    3591*  3592   4101   4109*  4135   4149*  4475*
SAR     = 000012    1479#  1904   1917   1929   1944   1958   1962
SAVBF0  012272      3255   3278   3302   3383#
SAVBF1  012316      3261   3284   3307   3394#
SAVBF2  012342      3267   3290   3313   3405#
SAVBF3  012366      3273   3296   3319   3416#
SAVEPC  024454      4127*  4139   4145*  4157   5351#
SAVOLD  024442      2891*  2893   2897*  2899   5346#
SAVPSW  024456      4128*  4138   4146*  4156   5352#
SAVREG= 104002      1260#  3866   3892   4044   4057   4390   4462   4499
SAV2PC  024460      4129*  4137   4147*  4155   5353#
SAV2SW  024462      4130*  4136   4148*  4154   5354#
SCOPE = 104001      1259#  1786   1796   1809   1821   1838   1851   1864   1876   1887   1902   1915   1927
                    1941   1956   1971   1984   1991   2003   2009   2025   2033   2050   2067   2082   2111
                    2139   2159   2177   2201   2575   2588   2599   2610   2623   2637   2650   2663   2679
                    2694   2710   2727   2747   2761   2773   2784   2791   2814   2832   2853
SCOPEB  020332      4589   4597#
```

```
SCOPEC  020266  1302  4587#
SCOPEF  020400  1759*  3739*  4440  4466  4562  4594  4596*  4600*  4608#
SCOPEG  020344  4593  4595  4600#
SCOPI  020306  4592#  4615
SELECT  024434  2086*  2098*  2114*  2127*  2228  5343#
SERFK0  011626  3118  3253#
SERFK1  011642  3120  3259#
SERFK2  011656  3165  3265#
SERFK3  011672  3148  3271#
SERVAA  012664  3457  3480#
SERVAB  012706  3486#  3503
SERVBB  012770  3489  3491  3504#  3675
SERVBC  013030  3511#  3547
SERVCC  013064  3514  3520#  3567  3577  3585
SERVCE  011326  3190#  3215  3229  3242
SERVDX  013116  3521  3527#
SERVFK  012444  3254  3260  3266  3272  3438#
SERVOA  012530  3452  3455#
SERVOB  012730  3481  3493#
SERVOC  013036  3502  3513#
SERVOD  013106  3447  3461  3479  3483  3485  3500  3512  3516  3519  3525#  3529
SERVOO  012514  3439  3451#
SETBF0  012036  3253  3276  3300  3323#
SETBF1  012102  3259  3282  3305  3338#
SETBF2  012152  3265  3288  3311  3353#
SETBF3  012222  3271  3294  3317  3368#
SETED  002700  1528  1539  1585  1602  1681#
SETFKA  016442  4203#  4206
SETLNE=  104007  1265#  2312
SETUPF  006174  2548#  2558  3731  3735
SETUPV  003026  1748#  1767  3733
SETUT0  016360  4182  4189#
SETUT1  016376  4184  4193#
SETUT2  016410  4186  4196#
SETUT3  016422  4188  4199#
SHFBAD  005074  2238  2246#
SHFCUR  006106  2517#  2523
SHFEND  021020  2068  4898#
SHFEOL  005536  2385#  2391
SHFLST  005032  2235#
SHFMES  020022  2085*  2097*  2113*  2126*  4524#
SHFPRT  024440  1758*  5345#
SHFTBF  020722  2034  2036  2051  2053  2179  2180  2214  2215  2217  4836#
SHFTSW  024436  1757*  2141*  2219*  4470  4500  4519  5344#
SHF32  005046  2239#  2262
SHF64  005060  2236  2242#
SHIFT  005004  2088  2102  2116  2131  2227#  2241  2254  2263
SP  =%000006  1216#  1287*  1288*  1289*  1290  1293*  1294*  1295*  1296*  1297  1494*  1651*  2148*
              2169*  2194*  2264*  3323  3324*  3325*  3326*  3327*  3328*  3338  3339*  3340*  3341*
              3342*  3343*  3353  3354*  3355*  3356*  3357*  3358*  3368  3369*  3370*  3371*  3372*
              3373*  3385  3386  3387  3388  3389  3396  3397  3398  3399  3400  3407  3408
              3409  3410  3411  3418  3419  3420  3421  3422  3430  3433*  3867  3868*  3893
              3894*  3935*  3939*  4089*  4096*  4097*  4098*  4099*  4100*  4101*  4102*  4103  4107*
              4108  4109  4110  4111  4112  4113  4114  4127  4128  4129  4130  4131*  4132*
              4133*  4134*  4135*  4136*  4137*  4138*  4139*  4145  4146  4147  4148  4149  4150
              4151  4152  4153  4154*  4155*  4156*  4157*  4166  4167*  4218  4220  4271  4272*
```

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                    4290    4291*   4361*   4386    4387    4389*   4442    4468    4489    4515    4597    4601    4603*
                    4604
SPACE = 104016      1272*   4561    4566    4572
SPACEX  014326      3752*   3754*   3756*   4411*   4412*   4414*   4418*   4420*
SPCHR1  014450      3778    3780    3791*
SPCHR3  014532      3801    3808*
SPCHR4  014540      3810*
SPCHR5  014554      3784    3811    3815*
SRHEOL  005526      2383*   2394
SRHEOS  005634      2417*   2422
SRIDE = 000004      1476*   2037    2054    2070    2086
SRIDO = 000014      1480*   2114
SRODE = 000006      1477*   2098
SRODO = 000016      1481*   2127
SRRVFK  007450      2875    2881*
SRVFOB  007522      2890    2895*
STACK   024136      1494    1651    2148    2169    2194    5254*
START   024430      3108    3333*   3348*   3363*   3378*   3462    3508    3557    3590    3598    5341*
STCOD0  024224      3467*   3631    3638*   3660*   5281*
STCOD1  024226      5282*
STCOD2  024230      5283*
STCOD3  024232      5284*
STERR   013462      3607*
STOP0   024330      3460*   3466*   3663    5309*
STOP1   024332      5310*
STOP2   024334      5311*
STOP3   024336      5312*
STRIPN  017200      4340    4362*   4375
STUNIT  016320      1637    1657    3836    4181*
SWAPEM  024170      1632*   1636*   1652*   1656*   3831    5267*
SWPEXT  014720      3838    3847*
SWR     001324      1330*   1512    1515    1517    1524    1527    1535    1538    1546    1554    1668    2257    2792
                    2942    2946    3014    3016    3542    3594    3605    3625    3669    3681    3729    3851    4031
                    4033    4080    4437    4446    4460    4517    4527    4530    4548    4588    4592    4618
SWR0    001326      1331*
SW00  = 000001      1206*   3544    3596    3605    3627    3681
SW01  = 000002      1205*   3544    3596    3627
SW02  = 000004      1204*
SW03  = 000010      1203*
SW04  = 000020      1202*
SW05  = 000040      1201*
SW06  = 000100      1200*
SW07  = 000200      1199*
SW08  = 000400      1198*
SW09  = 001000      1197*
SW10  = 002000      1196*
SW11  = 004000      1195*   4033
SW12  = 010000      1194*   2257    3851    4080
SW13  = 020000      1193*   4517
SW14  = 040000      1192*   2942    4031
SW15  = 100000      1191*
SYSIT1  010462      3105*
SYSTST  010344      1731    3085*   3087
TAGA    006560      2666    2671*
TAGAB   006630      2679    2687*
TAGAH   007274      2819*   2823
```

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TAGB    006704          2695    2703#
TAGC    006760          2711    2719#
TAGFA   007010          2730    2734#
TAGFH   007210          2794    2795#
TAGH    007230          2800#   2804
TAGI    007344          2838#   2842
TAGVA   004544          2144    2148#
TAGVB   004410          2090    2104#
TAGVC   004502          2118    2133#
TAGVD   004624          2162    2168#
TAGVE   004672          2184#   2191
TAGVF   004716          2183    2193#
TAG1X   011112          3161#   3181
TAG2X   011246          3143    3180#
TAG3X   011256          3178    3182#
TEMP1   024444          2929*   2961    2968*   4028*   4037*   4103*   4107    4487*   4509*   4513*   4573*   5347#
TEMP2   024446          2930*   2969    2976*   3994*   3995*   4024*   4026*   4035*   4562*   4563*   4565    5348#
TERMTB  015520          3929    4001#
TESTSW  013760          3446    3669#
TESTX   014162          1733    3721#
TEST00  002750          1677    1697#
TEST01  002752          1699#
TEST02  002754          1701#
TEST03  002756          1703#
TEST04  002760          1705#
TEST05  002762          1707#
TEST06  002764          1709#
TEST07  002766          1711#
TEST10  002770          1713#
TEST11  002772          1715#
TEST12  002774          1717#
TEST13  002776          1719#
TEST14  003000          1721#
TEST15  003002          1723#
TEST16  003004          1725#
TEST17  003006          1727#
TEST20  003010          1729#
TEST21  003012          1731#
TEST22  003014          1733#
THEND = 104023          1277#   2305    2464    2480    2495    2539
TITLE   021023          1559    4905#
TKB     001316          1327#   3775
TKS     001314          1326#   3763    3773    4329*
TKSFLG  014330          1316    3761#
TOPC    024162          4218*   4221*   4229    5264#
TPB     001322          1329#   3751*   3787*   3878*   3880*   3883*   3906*   4416*
TPS     001320          1328#   3749    3785    3869    3881    3904    4424
TRANF0  024310          3197    3472*   3657*   3688*   5301#
TRANF1  024312          3209    5302#
TRANF2  024314          3223    5303#
TRANF3  024316          3237    5304#
TRAN0   011706          3114    3276#
TRAN0A  013162          3538    3542#
TRAN0B  013232          3548    3552#
TRAN0C  013262          3545    3553    3559#
TRAN1   011722          3116    3282#
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TRAN2   011736          3163    3288#
TRAN3   011752          3146    3294#
TRNSMT  013130          3277    3283    3289    3295    3533#
TRNSWO  024204          3477*   3507*   3537    3554*   3689*   5273#
TRNSW1  024206          5274#
TRNSW2  024210          5275#
TRNSW3  024212          5276#
TSTA    014204          3722    3728#
TSTB    014214          3727    3731#
TSTNUM  024146          1756*   2553*   3737*   4439    4465    4560    4602*   5258#
TSTSHF  005102          2243    2248#
TSTTKS= 104017          1273#   4587
TSTTPS  017432          4415    4417    4424#
TSWAP   014632          3830#   4083    4088
TTYENB  017062          3025    3865    3891    3993    4027    4077    4327#   4383
TTYIN = 104013          1269#   3765    4338
TTYMTR  002644          1666    1670#
TTYMT1  002652          1669    1673#
TTYSWH  024160          1490*   1492*   1508    1625    1638    1665    1762    3007    3721    3761    4223    4327    4434
                        4458    5263#
TYPECL  015030          3877    3880#
TYPERA  014772          3869#   3870    3879    3885
TYPER1  015014          3872    3876#
TYPER2  015022          3878#
TYPFKR  017622          4435    4486#
TYPMAR  020072          4528    4534#
TYPMES  014754          1311    3865#
TYPT1   016570          4244#   4251
TYPT2   016574          4245#   4247
TYPVTR  017656          4459    4499#
UNITFG  024140          1554*   1630*   1631    1633    1635*   1655*   3835*   3837    3843    4181    4183    4185    4187
                        4189*   5255#
UNITNO  024142          1515*   1516*   1521    1533    1542    1568*   1576    1590    1607    3090    3098    3142    3180
                        3214    3228    4181    5256#
UNLINE= 000370          1456#   4318
UPCASE  020546          2963    4696#
VISEOL= 000212          1465#   2367    2385    2389    3978    4001    4003    4005    4007    4009    4011    4013    4015
VISEOP= 000214          1466#   3980    4002    4004    4006    4008    4010    4012    4014
VISEOS= 000231          1467#   2415    2421    2515    2522    3982    4016
VTALIN  005740          1711    2457#   2466
VTBLAN  005660          1709    2433#   2449
VTBUFF  024500          1903    1916    1928    1942    1957    2301    2384    2414    2513    3122    3125    3129    3132
                        3150    3153    3167    3170    3190    3193    3196    3199    3202    3205    3208    3211    3215
                        3219    3222    3225    3230    3233    3236    3239    3333    3348    3363    3378    3925    4058
                        4063    4168    4173    5366#
VTCAR   001504          1411#   1839*   1845*   1852*   1858*   1865*   1867*   1877*   1889*   1895*   2036*   2053*   2514*
                        2521*   4064*   4202
VTCHAR  005166          1699    2206    2275#   2286
VTCRLF  017350          4400    4403#
VTCSR   001510          1413#   1748    1840*   1844*   1853*   1857*   2058    2330*   2334*   2338*   2342*   2416*   2441*
                        2463*   2479*   2494*   2516*   2536*   2538*   2798*   2817*   2836*   2988*   3042*   3834*   4066*
                        [illegible] 4293*   4302*   4384*   4436*   4472    4511*   4514    4529*   4533*   4605*
VTCSR4=%000004          1222#   1748*   1775*   1777    1797*   1798    1803*   1810*   1812    1815*   1822*   1827*   1866*
                        1879*   1890*   1894*   1904*   1917*   1929*   1944*   1958*   1962*   1974*   1978*   1994*   1998*
                        2013*   2017*   2037*   2038    2041    2044*   2054*   2062*   2070*   2071    2074*   2150    2228*
VTCURS  006042          1717    2506#   2525
```

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VTDUMP  017760          4510    4515#
VTEOL   005454          1705    2346    2362#   2396
VTEOS   005574          1707    2407#   2424
VTERA   017312          4392#   4402    4405
VTERR   017526          1753    4458#
VTERR1  017610          4471    4475#
VTERR2  017614          4474    4476#
VTER1   017336          4393    4399#
VTER2   017344          4401#
VTFOCU  005766          1713    2473#   2481
VTINT   001514          1415#   4290*   4303*
VTLOGI  003122          1697    1743    1762#   2858
VTLVL   001516          1416#   4292*   4303    4304*
VTMAR   001512          1414#   1749    4473    4475    4534
VTMAR5=%000005          1223#   1749*   1788    1824    1828    1841    1854    1868    1880    1891    1907    1920    1932
                        1947    1963    1975    1995    2014    2055    2237    2244    2253
VTMD1A  005274          2304    2309#   2315
VTMD2A  005342          2330#
VTMD2B  005434          2331    2335    2339    2343    2348#
VTMES   017246          1301    4383#
VTMOD1  005226          1701    2297#   2306
VTMOD2  005322          1703    2307    2324#   2345
VTNORM  017732          4501    4511#
VTODD   006136          1719    2533#   2540
VTREST  003136          1767#   2207
VTRUN   003016          1721    1742#
VTSAR   001506          1412#   1903*   1905*   1916*   1918*   1928*   1930*   1942*   1945*   1957*   1959*   1972*   1992*
                        2011*   2034*   2051*   2068*   2142*   2160*   2180*   2187*   2214*   2230*   2537*   4065*   4174*
VTWORS  006014          1715    2488#   2496
VTOCAR  001410          1370#   1532    1589    4191
VTOCSR  001414          1372#   3100*   3184*
VTOINT  001420          1374#
VTOLVL  001422          1375#
VTOMAR  001416          1373#
VTOSAR  001412          1371#   3088*   3126*
VTI     003142          1754    1773#
VTICAR  001424          1379#   4194
VTICSR  001430          1381#   3101*   3185*
VTIINT  001434          1383#
VTILVL  001436          1384#
VTIMAR  001432          1382#
VTISAR  001426          1380#   3089*   3127*
VTIO    003422          1864#
VTI1    003452          1876#
VTI2    003500          1887#
VTI3    003540          1902#
VTI4    003576          1915#
VTI5    003634          1927#
VTI6    003666          1941#
VTI7    003730          1956#
VT2     003166          1786#
VT2CAR  001440          1388#   4197
VT2CSR  001444          1390#   3095*   3176*
VT2INT  001450          1392#
VT2LVL  001452          1393#
VT2MAR  001446          1391#
```

DBVTAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
VT2SAR  001442          1389#   3094*   3168*
VT20    003772          1971#
VT21    004024          1984#
VT22    004032          1991#
VT23    004064          2003#
VT24    004072          2009#
VT25    004130          2025#
VT26    004136          2033#
VT27    004206          2050#
VT3     003206          1796#
VT3CAR  001454          1397#   4200
VT3CSR  001460          1399#   3093*   3159*
VT3INT  001464          1401#
VT3LVL  001466          1402#
VT3MAR  001462          1400#
VT3SAR  001456          1398#   3092*   3151*
VT30    004260          2067#
VT31    004312          2082#
VT32    004412          2111#
VT33    004504          2139#
VT34    004564          2159#
VT35    004640          2177#
VT36    004730          2201#
VT4     003236          1809#
VT5     003262          1821#
VT6     003322          1838#
VT7     003362          1851#
WAITSY= 104021          1275#   1811    1823    1906    1919    1931    1946    1961    1973    1993    2012    2035    2052
                        2069    2145    2146    2181    2189    2216    2231
WHY     017144          4343    4350#
WORD2   017154          4354#   4367
WORST   013342          3498    3582#
WORST1  013350          3449    3583#
X     = 000025          1229#   2575    2576#   2588    2589#   2599    2600#   2610    2611#   2623    2624#   2637    2638#
                        2650    2651#   2663    2664#   2678    2679#   2694    2695#   2710    2711#   2727    2728#   2747
                        2748#   2761    2762#   2773    2774#   2791    2792#   2814    2815#   2832    2833#   2853    2854#
XASEMB  017104          1314    4338#
XASEM1  017116          4341#   4359
XASEXT  017150          4349    4352#
XBINDE  016546          1321    4240#
XBUF0   001570          1441#   3511*   3549*   3559*   3690*
XBUF1   001572          1442#
XBUF2   001574          1443#
XBUF3   001576          1444#
XCSR0   001560          1437#   3138*
XCSR1   001562          1438#   3141*
XCSR2   001564          1439#   3175*
XCSR3   001566          1440#   3158*
XDELAY  015540          1305    4024#
XDLAYL  015550          1317    4026#
XDLAY1  015566          4029#   4036    4038
XDLAY2  015630          4034    4039#
XDLAY3  015614          4030    4035#
XENDT   015732          1307    4076#
XEOSBF  015656          1306    4057#
XFER0   024370          3464*   3482*   3661    5325#
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XINT1   001604          1447#   3116*
XINT2   001610          1449#   3163*
XINT3   001614          1451#   3146*
XLDLNA  015644          4047#   4049
XLDLNE  015632          1309    4044#
XLOOP   014260          3739#   3740
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XLVL1   001606          1448#   3117*
XLVL2   001612          1450#   3164*
XLVL3   001616          1452#   3147*
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XNULL1  017404          4416#   4419
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XORHLT  020264          4547*   4575    4582#
XORT    020404          4591    4611#
XPRELD  016252          1310    4164#
XPRT    020224          4568#   4574
XPRTA   020232          4522    4526    4535    4567    4570#
XSAVRG  016122          1303    4127#
XSPACE  014276          1315    3749#   3753
XSTLNE  017024          1308    4312#
XTHEND  015726          1320    4075#   4085
XTTYIN  014350          1249    1312    3770#   3822
XWAITS  015476          1318    3993#
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                        1942#   1956    1957#   1971    1972#   1984    1985#   1991    1992#   2003    2004#   2009    2010#
                        2025    2026#   2033    2034#   2050    2051#   2067    2068#   2082    2083#   2111    2112#   2139
                        2140#   2159    2160#   2177    2178#   2201    2202#
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                        2167    2186    2192    2205    2249    2251    2256    2258    2280    2284    2310    2351    2371
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ASR     4355  4356  4357
BEQ     1572  1574  1584  1601  1626  1639  1763  1779  1790  1801  1813  1825  1831  1842  1855
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BGT     1676  3547  3593  3753  4371  4574
BHI     3732
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BIC     1294  1516  1563  1673  1778  1789  1799  1829  2233  2252  2578  2641  2892  2893  2898
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BICB    3703  3902
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BISB    3704  3843  4257
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        4618
BITB    3904
BLE     3956
BLOS    2737
BLT     3215  3229  3548
BMI     1518  2151  2750  2776  2806  2844  3439  3670  3778  3780  3784
BNE     1291  1509  1530  1541  1552  1557  1588  1605  1623  1634  1654  1666  1686  1897  1951
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BPL     2765  2780  2825  2883  2940  2947  3033  3452  3612  3750  3764  3774  3786  3870  3882
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BR      1491  1503  1555  1669  1680  2090  2118  2167  2192  2205  2206  2241  2247  2251  2263
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CLR     1492  1632  1635  1652  1655  1662  1663  1664  1750  1751  1757  1758  1759  1803  1815
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TRAP        1257
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TSTB        2388  2749  2764  2805  2824  2882  2939  2948  3032  3438  3509  3629  3749  3763  3773
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WAIT        2876  2934  3028
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.BYTE       2411  2412  2437  2438  2461  2462  2477  2478  2492  2493  2510  2511  3856  4001  4002
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                4757    4758    4762    4763    4764    4765    4766    4767    4768    4769    4770    4771    4772    4773    4774
                4775    4779    4780    4781    4782    4783    4784    4785    4786    4787    4788    4789    4790    4791    4792
                4793    4797    4798    4799    4800    4801    4802    4803    4804    4805    4806    4807    4808    4809    4813
                4814    4815    4816    4817    4818    4819    4820    4821    4822    4823    4824    4836    4837    4838    4839
                4840    4841    4842    4843    4844    4845    4846    4847    4848    4849    4850    4851    4852    4853    4854
                4855    4856    4857    4858    4859    4860    4861    4862    4863    4864    4865    4966    4867    4868    4869
                4870    4871    4872    4873    4874    4875    4876    4877    4878    4879    4880    4881    4882    4883    4884
                4885    4886    4887    4888    4889    4890    4891    4892    4893    4894    4895    4896    4897    4898    4899
                4904    4995    4996    5008    5019    5043    5044    5045    5048    5063    5366    5367
.ENABL          1181
.END            5370
.EVEN           4017    4825    5047    5235    5249
.LIST           1181    1254    1787    1797    1810    1822    1839    1852    1865    1877    1888    1903    1916    1928    1942
                1957    1972    1985    1992    2004    2010    2026    2034    2051    2068    2083    2112    2140    2160    2178
                2202    2576    2589    2600    2611    2624    2638    2651    2664    2679    2695    2711    2728    2748    2762
                2774    2792    2815    2833    2854
.MACRO          1254    1255
.NLIST          1181    1254    1787    1797    1810    1822    1839    1852    1865    1877    1888    1903    1916    1928    1942
                1957    1972    1985    1992    2004    2010    2026    2034    2051    2068    2083    2112    2140    2160    2178
                2202    2576    2589    2600    2611    2624    2638    2651    2664    2679    2695    2711    2728    2748    2762
                2774    2792    2815    2833    2854
.REM               1
.REPT           1234
.TITLE          1192
.WORD           3561    3678    4265


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DBVTAC,DBVTAC.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DBVTAC.P11
 RUN-TIME:  16 34 7 SECONDS
 RUN-TIME RATIO: 169/59=2.8
 CORE USED:  14K  (28 PAGES)
```

Spooler runtime 19 Seconds, 82 KCS, 531 disk reads, 5 disk writes, 119 pages

[redacted]