VT20/DL11

PDP-11/VT20 HOST DIAGNOSTIC

MD-11-DZVTE-B

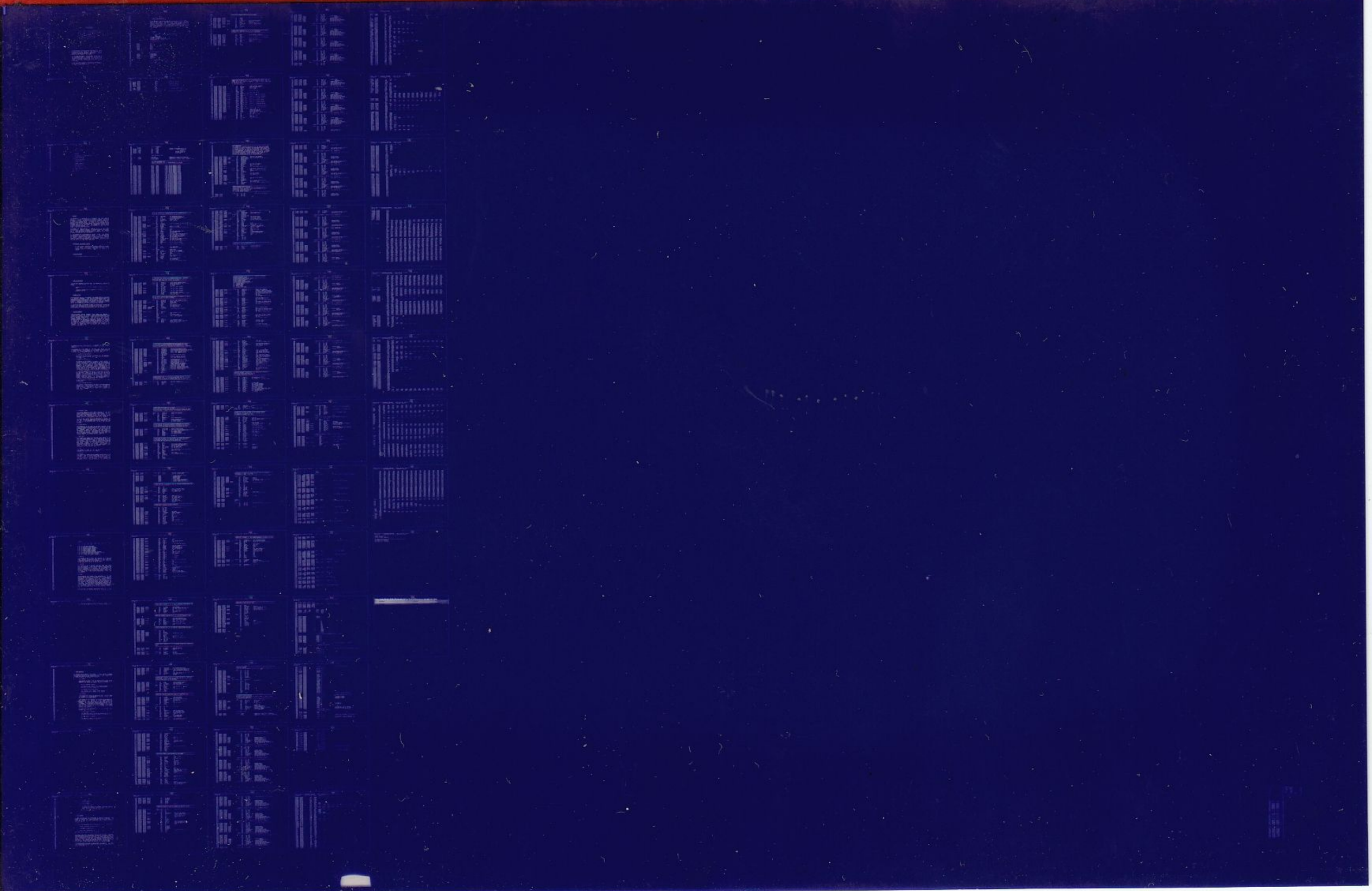
EP-DZVTE-B-DL-A

OCT 1976

FICHE 1 OF 1

digital

Made in U.S.A.



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.REM    %
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IDENTIFICATION
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PRODUCT CODE: MAINDEC-11-DZVTE-B-D
PRODUCT NAME: VT20 HOST COMPUTER PROGRAM
DATE CREATED: OCTOBER 17, 1974
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: EARL L. BOUSE

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1. ABSTRACT

THIS PROGRAM IS A COMBINATION DL11 DIAGNOSTIC AND DATA HANDLING ROUTINE. IT IS USED IN CONJUNCTION WITH MAINDEC-11-DBVTA (VT20 SYSTEM DIAGNOSTIC), TEST 21. THE PROGRAM IS COMPLETELY OPERATOR INTERACTIVE BY MEANS OF A CONSOLE DEVICE. THIS DEVICE IS ALWAYS ACTIVE AND WILL RESPOND TO ANY OPERATOR INPUTS. BY MEANS OF THE CONSOLE DEVICE, SPECIFIED LINES CAN BE HELD FROM TRANSMITTING, RECEIVER BUFFERS CAN BE EXAMINED, DATA CAN BE ORIGINATED AND TRANSMITTED, SYSTEM STATUS MONITORED AND ACTIVE DL11'S LISTED. THE PROGRAM ALSO HAS A PROVISION TO BOOT (TRANSFER) PROGRAMS I.E. VT20 DIAGNOSTIC, FROM THE HOST READER TO ANY SPECIFIED VT20 SYSTEM.

THE PROGRAM HAS BEEN WRITTEN TO EXERCISE UP TO 16 DL11 LINES SIMULTANEOUSLY. HOWEVER, BECAUSE OF SOFTWARE OVERHEAD LIMITATIONS, ONLY 10 LINES CAN BE RUN SUCCESSFULLY AT 9600 BAUD. ANY INCREASE OVER 10 LINES MAY RESULT IN OVERRUN ERRORS. THEREFORE, VT20'S SHOULD BE TESTED IN GROUPS OF FIVE (TEN LINES).

ALL LINE NUMBERS ARE TO BE ENTERED AS DECIMAL VALUES. THE PROGRAM WILL RESPOND TO ALL ILLEGAL INPUTS BY TYPING '?'. THIS INDICATES THAT THE PREVIOUSLY INPUTTED CHARACTER WAS IGNORED. USE (CR) TO TERMINATE ALL INPUTS. RUBOUT MAY BE USED TO DELETE PREVIOUSLY INPUTTED CHARACTERS WHEN ENTERING ADDRESSES AND LINE NUMBERS. THE RUBOUT WILL HAVE NO EFFECT IN THE SEND MODE SINCE THE PREVIOUSLY INPUTTED CHARACTER WILL HAVE ALREADY BEEN TRANSMITTED.

2. REQUIREMENTS (EQUIPMENT & MEMORY)

A. ANY PDP-11 FAMILY COMPUTER WITH A CONSOLE DEVICE AND AT LEAST 4K OF MEMORY. THIS IS THE MINIMUM CONFIGURATION TO SUPPORT TESTING OF TWO VT20 SYSTEMS. THEREAFTER, AT LEAST 1K OF ADDIONAL MEMORY IS REQUIRED FOR EACH VT20 SYSTEM TO BE TESTED.

3. LOADING PROCEDURE

A. USE STANDARD PROCEDURE FOR LOADING BINARY TAPES.

4. STARTING PROCEDURE

LOAD AND START PROGRAM AT LOCATION 200. THE PROGRAM WILL RESPOND BY TYPING THE PROGRAM HEADER AND THEN ASK FOR THE FIRST DL11 LINE ADDRESS.

1. RESPOND WITH (CR) IF A DEFAULT ADDRESS OF 175610 IS TO BE USED.

2. OTHERWISE, RESPOND WITH THE ADDRESS OF THE FIRST DL11 LINE ADDRESS TO BE USED.

5. PROGRAM ACTION

AFTER RECEIVING THE DL11 LINE ADDRESS, THE PROGRAM TESTS ALL AVAILABLE DL11 RECEIVER ADDRESSES. THESE AND THEIR CORRESPONDING TRANSMITTER ADDRESSES ARE THEN LOADED INTO AN ACTIVE DEVICE BUFFER AREA. ANY ERRORS ENCOUNTERED WHILE MAPPING THESE DEVICES WILL RESULT IN AN ERROR PRINTOUT. THESE ARE CONSIDERED 'FATAL ERRORS' AND MUST BE CORRECTED BEFORE THE PROGRAM WILL CONTINUE. AFTER THE DL11 ADDRESSES HAVE BEEN SET UP, THE PROGRAM PRINTS A DOT AND ENTERS A MONITOR MODE.

IN THE MONITOR MODE, THE PROGRAM IS READY TO AUTOMATICALLY RECEIVE AND TRANSMIT DATA RECEIVED FROM ANY INITIALIZED VT20 SYSTEM. ALSO IN THE MONITOR MODE, THE PROGRAM RUNS BACKGROUND JOBS OF PRINTING ERRORS, KEEPING ACCOUNT OF SYSTEM STATUS AND EXECUTING OPERATOR REQUESTS.

6. MONITOR COMMANDS

THERE ARE SEVERAL MONITOR COMMANDS WHICH ENABLE THE OPERATOR TO CONTROL AND COMMAND THE PROGRAM. THESE COMMANDS ARE ESSENTIALLY DIAGNOSTIC TOOLS WHICH CAN BE USED TO DEBUG RECEIVER/TRANSMITTER LINES AND TO MONITOR SYSTEM STATUS. THERE ARE TWO TYPES OF COMMANDS: MONITOR RESPONSE COMMANDS I.E. ↑A,↑C,↑D,↑E & ↑L, AND LINE NO. DEPENDENT COMMANDS, I.E. ↑B,↑H,↑M,↑R & ↑S. ON RECEIPT OF A MONITOR RESPONSE COMMAND, THE PROGRAM WILL IMMEDIATELY EXECUTE THE COMMAND. ON RECEIPT OF A LINE DEPENDENT COMMAND THE PROGRAM WILL WAIT FOR A LINE NUMBER AND A CARRIAGE RETURN (CR) BEFORE EXECUTING THE COMMAND. THE FORM OF THIS TYPE OF COMMAND IS "COMMAND & LINE NO. (CR)". IN SOME CASES, THE COMMAND WILL ALLOW FOR MULTIPLE LINE NUMBERS TO BE ACCEPTED. IN THESE CASES THE LINE NUMBERS ARE TO BE SEPERATED BY COMMAS AND TERMINATED BY (CR).

AN EXAMPLE WOULD BE: "↑H0,4,6,7(CR)". ON RECEIPT OF THIS COMMAND, LINES 0,4,6 & 7 WOULD BE HELD FROM TRANSMITTING (REFER TO THE ↑H COMMAND).

THE OMMISSION OF A LINE NUMBER I.E. (CR) ONLY, WILL RESULT IN LINE '0' BEING SERVICED. IN ALL CASES, THE LINE NUMBERS MAY BE INPUTTED IN ANY ORDER. ALL CONTROL CHARACTERS I.E. ↑A,↑B ETC. ARE OBTAINED BY TYPING THE 'CNTRL & CHARACTER SPECIFIED' KEYS SIMULTANEOUSLY.

A. ↑A (ABSOLUTE SYSTEM RESTART)

ONE RECEIPT OF THIS COMMAND, THE PROGRAM WILL BE RESTARTED. THIS WILL ENABLE FOR A NEW SET OF DL11 DEVICES ADDRESSES TO BE ENTERED.

B. ↑B (BOOT)

THE PURPOSE OF THIS COMMAND IS TO SELECT A BOOT ROUTINE TO TRANSFER PROGRAMS FROM THE READER OF THE HOST COMPUTER TO SELECTED VT20 SYSTEMS. UPON RECEIPT OF THE (↑B), THE PROGRAM WILL WAIT FOR THE LINE OR LINES NUMBERS OVER WHICH THE PROGRAM IS TO BE TRANSFERED. AFTER RECEIVING THE LINE NUMBER(S), THE PROGRAM WILL REQUEST THE READER DEVICE & VECTOR ADDRESSES. THIS QUESTION WILL ONLY BE ASKED ON THE INITIAL USE OF THE BOOT ROUTINE, BUT THESE ADDRESSES CAN BE CHANGED BY TYPING A (↑E). THEN ON THE NEXT OCCURANCE OF THE (↑B) COMMAND, A NEW READER DEVICE ADDRESS WILL BE REQUESTED.

IN ORDER FOR PROGRAMS TO BE BOOTED TO A SELECTED VT20 SYSTEM, THE BOOTSTRAP LOADER IN THE PDP-11/05 OF THE VT20 MUST BE MODIFIED. THIS WILL ENABLE THE PDP-11 TO ACCEPT THE BOOTED PROGRAM. TO DO THIS, SIMPLY REPLACE THE PC11 OR TTY 'CSR' ADDRESS IN LOCATION '37776' WITH A DL11 'CSR' ADDRESS OF EITHER '175610 OR 175620'. IF THE ABSOLUTE LOADER ISN'T RESIDENT, THIS WILL HAVE TO BE THE FIRST PROGRAM BOOTED OVER. THIS WOULD THEN BE FOLLOWED BY THE VT20 DIAGNOSTIC.

THE BOOT ROUTINE IS CAPABLE OF BOOTING UP TO '16' DL LINES SIMULTANEOUSLY.

C. ↑C (CLEAR SOFTWARE SWITCHES)

THIS COMMAND CAN BE EXECUTED AT ANYTIME TO TERMINATE OPERATOR REQUESTS I.E. SEND, HOLD, BOOT MODES ETC., AND RESET THE SYSTEM STATUS TO A KNOWN STATE. THE (↑C) WILL NOT EFFECT THE STATE OF ACTIVE RECEIVERS AND TRANSMITTERS. HOWEVER, ALL LINES THAT WERE BEING HELD, WILL BE RELEASED AND RE-ACTIVATED.

D. ↑D (DIAGNOSTIC MODE)

THIS COMMAND ENABLES ALL DATA BEING RECEIVED BY THE HOST PROGRAM, REGARDLESS OF LINE NUMBER, TO BE PRINTED. THIS IS A DOUBLE FUNCTION COMMAND WHICH ON THE FIRST RECEIPT OF (↑D) WILL ENABLE THE DIAGNOSTIC MODE. THIS WILL RESULT IN THE MESSAGE "DIAGNOSTIC MODE ENABLE" TO BE TYPED. ON THE SECOND RECEIPT OF A '↑D', THE DIAGNOSTIC MODE WILL BE DISABLED.

THE USE OF THIS COMMAND SHOULD BE RESTRICTED TO RUNNING ONE LINE AND THEN ONLY IF THERE ARE NO ERRORS BEING REPORTED BY THAT LINE. IT IS RECOMMENDED THAT THE (↑P) FEATURE BE USED IN LIEU OF THE DIAGNOSTIC MODE IF MULTIPLE LINES ARE BEING EXERCISED.

E. ↑E (ESCAPE RESTART)

THIS COMMAND IS TO BE USED IF MULTIPLE RECEIVER AND/OR TRANSMITTER ERRORS ARE BEING REPORTED AND THE USE OF (↑C) HAS NO APARENT EFFECT. ON RECEIPT OF A (↑E), ALL SYSTEM SOFTWARE AND HARDWARE FLAGS ARE RESET. THIS WILL RESULT IN TERMINATING THE OPERATION OF ANY LINES WHICH WERE ACTIVE UPON THE RECEIPT OF THE (↑E). HENCEFORTH, ALL VT20 SYSTEMS WILL HAVE TO BE REINITIALIZED. THIS COMMAND WILL ALSO RESET THE MONITOR TRANSFER AND ERRORS COUNTERS. THESE ARE THE COUNTS DISPLAYED WHEN LISTING MONITOR STATUS (REFER TO ↑M).

F. ↑H (HOLD MODE)

THIS COMMAND WILL ENABLE FOR A SELECTED LINES' BUFFER TO BE HELD FROM BEING TRANSMITTED. THE COMMAND MAY BE USED SOLEY TO HOLD LINE TRANSMISSION OR USED IN CONJUNCTION WITH THE (↑S) FEATURE. THIS WILL ENABLE A USER TO CREATE A BUFFER WHICH CAN BE RELEASED, ON COMMAND, IN A BURST AT TRANSMITTER BAUD RATE. REFER TO THE MONITOR COMMAND (↑S) FOR INSTRUCTIONS ON CREATING THIS BUFFER. THIS COMMAND WILL FACILITATE HOLDING UP TO '16' DL LINES SIMULTANEOUSLY IN ANY ORDER. THE LINES CAN THEN BE RELEASED (REFER TO ↑R) INDIVIDUALLY OR SIMULTANEOUSLY USING (↑C).

G. ↑L (LIST)

THIS COMMAND IS USED TO LIST THE ACTIVE DL11 RECEIVER ADDRESSES THAT WERE MAPPED BY THE PROGRAM.

H. ↑M (MONITOR)

THIS COMMAND WILL ENABLE FOR THE CURRENT SYSTEM STATUS TO BE MONITORED. THE (↑M) OPTION CAN BE USED IN ONE OF TWO WAYS: (1) TYPE "↑M(CR)" TO PRINT THE STATUS OF ALL DL11 LINES. (2) TYPE "↑M & LINE NO., LINE NO....(CR)" TO PRINT THE STATUS OF SPECIFIED LINE(S). THE FOLLOWING IS AN EXAMPLE AND EXPLAINATION OF THE MONITOR PRINTOUT. REFER TO SECTION

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  292                                   7.(ERRORS) FOR A FURTHER EXPLANATION OF THE ERROR DATA.
```

EXAMPLE:

LINE	IN	OUT	OR	PAR.	FRAM	REC	TRAN	ST.	HELD
A	B	C	D	E	F	G	H	I	J

A= NO. OF LINE BEING MONITORED
B= NO. OF BLOCKS OF DATA RECEIVED
C= NO. OF BLOCKS OF DATA TRANSMITTED
D= NO. OF OVERRUN ERRORS INCURRED
E= NO. OF PARITY ERRORS INCURRED
F= NO. OF FRAMING ERRORS INCURRED
G= NO. ILLEGAL RECEIVER INTERRUPTS INCURRED.
H= NO. OF ILLEGAL TRANSMITTER INTERRUPTS INCURRED.
I= NO. OF ILLEGAL START CODES INCURRED.
J= TO '1' IF LINE IS CURRENTLY BEING HELD.

I. ↑P (PRINT)

THIS COMMAND IS USED TO PRINT THE CONTENTS OF A SELECTED LINES' BUFFER. IT SHOULD BE NOTED THAT THE START CODE (377) IS DETECTED AND PRINTED AS AN UP-ARROW (↑). UPON COMPLETION OF PRINTING A BUFFER OR IF THE BUFFER IS EMPTY, A DOT WILL BE PRINTED INDICATING A RETURN TO THE MONITOR.

J. ↑R (RELEASE)

THIS COMMAND IS USED TO RELEASE LINES THAT WERE HELD USING THE (↑H) FEATURE. LINES MAY BE RELEASED IN ANY ORDER AND EITHER INDIVIDUALLY OR COLLECTIVELY. THE (↑M) COMMAND CAN BE USED TO DETERMINE IF A SELECTED LINE IS BEING HELD. ANY ATTEMPT TO RELEASE AN ACTIVE LINE WHICH WASN'T BEING HELD, MAY RESULT IN AN 'ILLEGAL TRANSMITTER INTERRUPT' ERROR. THE (↑R) COMMAND WILL FACILITATE RELEASING UP TO 16 LINES SIMULTANEOUSLY.

K. ↑S (SEND)

THIS COMMAND IS USED TO SEND DATA, ORGINATED ON THE HOST CONSOLE DEVICE, TO SELECTED TRANSMITTER LINE(S). IN THIS MODE, AS EACH CHARACTER IS RECEIVED IT IS SIMULTANEOUSLY TRANSFERED. AN ALTERNATE TO THIS SINGLE CHARACTER TRANSMISSION IS TO BUFFER THE DATA AND THEN RELEASE IT IN A BURST AT THE TRANSMITTER BAUD RATE. THIS IS DONE USING THE (↑H) FEATURE TO HOLD SELECTED LINE(S) AND THEN ENTERING THE (↑S) MODE. ALL DATA THEN WILL BE BUFFERED INSTEAD OF BEING TRANSMITTED. WHEN THE DESIRED BUFFER HAS BEEN CREATED, EXIT THE (↑S) MODE BY TYPING (ALT). THE PROGRAM WILL RESPOND BY A DOT, INDICATING A RETURN TO THE MONITOR. THE DATA BUFFER(S) CAN THEN BE PRINTED (REFER TO ↑P) AND/OR RELEASED (REFER TO ↑R).

WHEN USING THE (↑S) FEATURE, SW00 MUST BE SET TO A '1' (UP) ON THE VT20 SYSTEM RECEIVING THE DATA. OTHERWISE, THE DATA

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   349                          WILL LOOK AND BE HANDLED AS DATA, OR RECEIVER  ERRORS.   THIS
   350                          SWITCH SHOULD BE RESET (DOWN) WHEN NOT USING THE SEND MODE.
```

7. ERROR REPORTER
****

THE PROGRAM HANDLES ERRORS IN TWO PHASES (1) FATAL ERRORS (INCURRED WHILE MAPPING THE ACTIVE DL11 DEVICES) AND (2) NON-FATAL SYSTEM ERRORS (INCURRED WHILE RECEIVING AND TRANSFERRING DATA). FATAL ERRORS MUST BE CORRECTED BEFORE THE PROGRAM WILL CONTINUE.

A. FATAL ERRORS

THESE ERRORS CAN RESULT FROM THE USER ENTERING ILLEGAL DEVICE ADDRESSES OR SIMPLY BY HAVING BAD DL11'S PRESENT. FATAL ERRORS OF THIS NATURE WILL RESULT IN ONE OF TWO TYPEOUTS:

1. "NO DL11 ADDRESSES PRESENT"

   THIS PRINTOUT WILL RESULT IF THE ADDRESS ENTERED BY THE USER DIDN'T RETURN A 'SLAVE SYNC' WHEN ADDRESSED.

2. "NO RESPONSE FROM DEVICE NNNNNN"

   THIS PRINTOUT WILL RESULT AFTER MAPPING IF A DL TRANSMITTER FAILS TO INTERRUPT WHEN ENABLED.

B. SYSTEM ERRORS

SYSTEM ERRORS ARE HANDLED AS BACKGROUND JOBS. WHEN AN ERROR IS INCURRED IT IS CATEGORIZED BY GIVING IT A UNIQUE NUMBER AND PUSHED INTO AN ERROR BUFFER.

THESE ERRORS ARE THEN PRINTED (IN THE ORDER OF INCURRENCE) BY THE MONITOR. A MAXIMUM OF SIX(6) ERRORS PER/LINE, REGUARDLESS OF TYPE, ARE SAVED IN THE ERROR BUFFER AND PRINTED. THE SYSTEM DOES, HOWEVER, KEEP A RUNNING COUNT OF ALL ERRORS. THIS INFORMATION CAN BE ACCESSED BY USE OF THE (↑M) COMMAND. THESE ERROR COUNTERS ARE RESET ONLY ON SYSTEM START UP AND BY THE (↑E) & (↑A) COMMANDS. EACH ERROR PRINTOUT WILL CONSIST OF THE LINE NUMBER AND A MESSAGE DESCRIBING THE ERROR TYPE.

FOLLOWING IS A LIST AND DESCRIPTION OF THE POSSIBLE ERROR MESSAGES THAT MAY OCCUR:

1. "ILLEGAL RECVR. INTERRUPT"

   THIS ERROR WILL RESULT IF THE LINE TRANSMITTER IS ACTIVE OR BEING HELD AND A RECEIVER INTERRUPT IS SERVICED.

2. "ILLEGAL TRANS. INTERRUPT"

   THIS ERROR WILL RESULT IS THE LINE RECEIVER IS ACTIVE AND A TRANSMITTER INTERRUPT IS SERVICED.

407 3. "OVERRUN ERROR"

4. "FRAMING ERROR"

5. "PARITY ERROR"

6. "ILLEGAL START CODE"

   THIS ERROR IS A RESULT OF THE FIRST CHARACTER RECEIVED, OTHER THAN A NULL CODE, NOT BEING '377'. (REFER TO DATA FORMAT SECTION FOR A FURTHER EXPLAINATION.)

7. "ILLEGAL READER INTERRUPT"

8. DATA FORMAT

ALL DATA RECEIVED FROM THE VT20 SYSTEMS IS ESPECIALLY FORMATTED. THIS FORMAT IS CHECKED AND TRANSMITTED EXACTLY AS IT WAS RECEIVED. THE FORMAT OF THIS DATA IS: 4 NULL CHARACTERS (000), A START CODE(377), DATA (UP TO 384 CHARACTERS ORIGINATED BY USER), AND A EOP (END OF PARAGRAPH CODE-14).

NOTE - THE DATA ORIGINATED FROM A VT20 MAY BE IN ONE OF THREE FORMATS:

A. RANDOM, GENERATED FROM THE KEYBOARD

B. INCREMENTAL, GENERATED BY ↑A

C. WORST CASE, GENERATED BY ↑W

REFER TO MAINDEC-11-DBVTA WRITEUP FOR DETAILS.

WHEN DATA IS RECEIVED, THE PROGRAM VERIFIES THAT THE FIRST CHARACTER, OTHER THAN NULLS), IS A START CODE. ON RECEIPT OF THE START CODE, THE RECEIVER SERVICE ROUTINE IS INITIALIZED. ALL DATA FROM THIS POINT, UNTIL THE RECEIPT OF AN EOP CODE, IS STORED IN THE APPROPRIATE LINES' BUFFER. ON RECEIPT OF THE EOP, THE RECEIVER SERVICE ROUTINE IS TERMINATED. THE TRANSMITTER SERVICE ROUTINE IS THEN INITIALIZED. THUS, NO DL11 TRANSMITTER AND RECEIVER ARE ACTIVE SIMULTANEOUSLY. THE RECEIVED DATA IS THEN TRANSMITTED, EXACTLY AS IT WAS RECEIVED.

IT SHOULD BE NOTED THAT WHEN A LINES' BUFFER IS PRINTED, THE START CODE CHARACTER IS DETECTED AND PRINTED AS AN UP-ARROW (↑). THIS ALSO HOLDS TRUE ON THE VT20 END, WHERE THE START CODE IS DISPLAYED AS AN (↑) ON THE SCREEN.

9. DISPLAY REGISTER OPTION
    ****

IF THIS PROGRAM IS BEING RUN ON A PDP-11/45 THE ACTIVITY OF THE DL11 LINES MAY BE VISUALLY MONITORED. THIS IS DONE BY SETTING THE DATA DISPLAY SELECT SWITCH, ON THE /45 CONSOLE, TO THE "DISPLAY REGISTER" POSITION. THEN EVERY TIME A DL11 TRANSMITTER BECOMES ACTIVE, IT'S CORRESPONDING LINE NUMBER WILL BE REFLECTED BY LIGHTING A LIGHT IN THE DATA LIGHT REGISTER. IT CAN BE NOTED, THAT IF A SELECTED LINE IS HELD, THE LIGHT REFLECTING THAT LINE WILL BE LIT IF THAT LINE IS READY TO BE RELEASED.

10. LISTING
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```
                        %
                        .TITLE PDP-11/VT20 HOST DIAGNOSTIC PROGRAM
                        .ABS
                        .ENABLE AMA
                ;MAINDEC-11-DZVTE-B-D
                ;COPYRIGHT OCTOBER 17, 1974
                ;DIGITAL EQUIPMENT CORP. MAYNARD, MASS. 01754
                ;PROGRAMMER: EARL L. BOUSE

                ;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

                ;INSTRUCTION DEFINITION

005726          POP1SP=05726
022626          POP2SP=22626
024646          PUSH2SP=24646
000240          NOP=240
001100          STACK=1100
000014          EOP=14

                ;LOAD TRAP CATCHER INTO LOC 0-1000

000000                  .=0
                .REPT   200
                        .+2
                        4                       ;LOAD TRAP WITH 'IOT' TRAP VECTOR
                .ENDR
```

```
                    000020
                    010750                          .=20
000020  010750                                      MAPVEC                  ;MAPPER TRAP ROUTINE
000022  000340                                      340
000024  006336                                      PWRFAL                  ;POWER FAIL HANDLER
000026  000340                                      340
000030  006442                                      EMTSRV                  ;EMT SERVICE ROUTINE
000032  000340                                      340
                    000060                          .=60
000060  002502                                      KEYSRV                  ;TTY KEYBOARD SERVICE ROUTINE
000062  000200                                      200
                    000200                          .=200
000200  000137  001314                              JMP     START           ;PROGRAM STARTING ADDRESS
```

```
                                ;REGISTER ADDRESSES
            001200                      .=1200
001200  177776          PSW:    177776          ;ADDRESS OF PROCESSOR STATUS REG.
001202  177560          TKS:    177560          ;ADDRESS OF KEYBOARD STATUS REG.
001204  177562          TKB:    177562          ;   "    "    "       BUFFER   "
001206  177564          TPS:    177564          ;   "    "  PRINTER STATUS REG.
001210  177566          TPB:    177566          ;   "    "  PRINTER BUFFER REG.
001212  177570          SWR:    177570          ;   "    "  SWITCH REG.

                                ;TRAP EQUIVALENCE TABLE:

            104000              PRINT=EMT                   ;SUBROUTINE TO PRINT ASCII MESSAGES.
            104001              PRTOCT=PRINT+1              ;SUBROUTINE TO PRINT A 6 DIGIT OCTAL NO
            104002              BINDEC=PRTOCT+1             ;SUBROUTINE TO CONVERT OCTAL TO BINARY & PRINT IT

                                ;*************************************************************************
                                ;DL11 DEVICE ADDRESS LIST
                                ;TABLE IS TERMINATED WITH '-1' AFTER MAPPING '16' DEVICES
                                ;*************************************************************************

001214  175610          RXCR0:  175610          ;LINE 0 DEVICE ADDRESS (RXCSR)
001216  175620          RXCR1:  175620          ;LINE 1 DEVICE ADDRESS (RXCSR)
001220  175630          RXCR2:  175630          ;LINE 2 DEVICE ADDRESS (RXCSR)
001222  175640          RXCR3:  175640          ;LINE 3 DEVICE ADDRESS (RXCSR)
001224  175650          RXCR4:  175650          ;LINE 4 DEVICE ADDRESS (RXCSR)
001226  175660          RXCR5:  175660          ;LINE 5 DEVICE ADDRESS (RXCSR)
001230  175670          RXCR6:  175670          ;LINE 6 DEVICE ADDRESS (RXCSR)
001232  175700          RXCR7:  175700          ;LINE 7 DEVICE ADDRESS (RXCSR)
001234  175710          RXCR10: 175710          ;LINE 10 DEVICE ADDRESS (RXCSR)
001236  175720          RXCR11: 175720          ;LINE 11 DEVICE ADDRESS (RXCSR)
001240  175730          RXCR12: 175730          ;LINE 12 DEVICE ADDRESS (RXCSR)
001242  175740          RXCR13: 175740          ;LINE 13 DEVICE ADDRESS (RXCSR)
001244  175750          RXCR14: 175750          ;LINE 14 DEVICE ADDRESS (RXCSR)
001246  175760          RXCR15: 175760          ;LINE 15 DEVICE ADDRESS (RXCSR)
001250  175770          RXCR16: 175770          ;LINE 16 DEVICE ADDRESS (RXCSR)
001252  176000          RXCR17: 176000          ;LINE 17 DEVICE ADDRESS (RXCSR)
001254  176010          RXCR20: 176010          ;LINE 20 DEVICE ADDRESS (RXCSR)
001256  176020          RXCR21: 176020          ;LINE 21 DEVICE ADDRESS (RXCSR)
001260  176030          RXCR22: 176030          ;LINE 22 DEVICE ADDRESS (RXCSR)
001262  176040          RXCR23: 176040          ;LINE 23 DEVICE ADDRESS (RXCSR)
001264  176050          RXCR24: 176050          ;LINE 24 DEVICE ADDRESS (RXCSR)
001266  176060          RXCR25: 176060          ;LINE 25 DEVICE ADDRESS (RXCSR)
001270  176070          RXCR26: 176070          ;LINE 26 DEVICE ADDRESS (RXCSR)
001272  176100          RXCR27: 176100          ;LINE 27 DEVICE ADDRESS (RXCSR)
001274  176110          RXCR30: 176110          ;LINE 30 DEVICE ADDRESS (RXCSR)
001276  176120          RXCR31: 176120          ;LINE 31 DEVICE ADDRESS (RXCSR)
001300  176130          RXCR32: 176130          ;LINE 32 DEVICE ADDRESS (RXCSR)
001302  176140          RXCR33: 176140          ;LINE 33 DEVICE ADDRESS (RXCSR)
001304  176150          RXCR34: 176150          ;LINE 34 DEVICE ADDRESS (RXCSR)
001306  176160          RXCR35: 176160          ;LINE 35 DEVICE ADDRESS (RXCSR)
001310  176170          RXCR36: 176170          ;LINE 36 DEVICE ADDRESS (RXCSR)
001312  177777          RXEND:  177777          ;LINE XX DEVICE ADDRESS (RXCSR)
```

```
                                        ;*****************************************************************************
                                        ;SET UP AN 'ACTIVE' DL11 ADDRESS BUFFER FOR ALL EXISTING DL11'S
                                        ;*****************************************************************************

001314  012777  000340  177656  START:  MOV     #340,@PSW       ;SET PROCESSOR PRIORITY '@7:
001322  012706  001100                  MOV     #STACK,SP       ;INITIALIZE STACK POINTER
001326  005077  177650                  CLR     @TKS            ;CLR KEYBOARB INTERRRUPT ENABLE
001332  004737  010712                  JSR     PC,OVRLAY       ;OVERLAY TRAP AREA.
001336  012737  001354  000004          MOV     #CORSIZ,@#4     ;RESET TIMEOUT
001344  012701  020000                  MOV     #20000,R1       ;TEST CORE SIZE
001350  005721                          TST     (R1)+
001352  000776                          BR      .-2
001354  162701  001000          CORSIZ: SUB     #1000,R1        ;SAVE THIS ADDRESS AS ERROR BUFFER LIMIT
001360  010137  012144                  MOV     R1,MEMSIZ
001364  012737  000006  000004          MOV     #6,@#4
001372  012737  000004  000006          MOV     #4,@#6          ;RESET '6' TO TRAP
001400  012700  012206                  MOV     #RCSR0,R0       ;SETUP TO CLR BUFFER & STORAGE AREA
001404  005020                          CLR     (R0)+
001406  023700  012144                  CMP     MEMSIZ,R0       ;DONE?
001412  001374                          BNE     .-6             ;NO
001414  005737  012142                  TST     MONFLG          ;HAS THE HEADER BEEN TYPED?
001420  001004                          BNE     START1          ;YES, SKIP RE-TYPING IT
001422  005237  012142                  INC     MONFLG          ;NO, SET FLAG
001426  104000  011111                  PRINT,  TITLE           ;TEXT 'DL11 DATA HANDLING ROUTINE'
001432  104000  011403          START1: PRINT   ,MFIAD          ;ASK FOR FIRST DL11 ADDRESS
001436  004737  004050                  JSR     PC,GETLN1       ;GET & DECODE THE LINE ADDRESS
001442  005737  013206                  TST     DEVADR          ;WAS AN ADDRESS INPUTTED?
001446  001003                          BNE     START2          ;YES, SET IT UP.
001450  012737  175610  013206          MOV     #175610,DEVADR  ;NO, USE DEFAULT 175610 AS FIRST
001456  013701  013206          START2: MOV     DEVADR,R1       ;GET READY TO ASSEMBLE
001462  012704  001214                  MOV     #RXCR0,R4       ;SET UP POINTER TO SAVE ACTIVE DL'S
001466  005037  012626                  CLR     HERE
001472  012737  001522  000004          MOV     #MAPNE,@#4      ;SET UP TIME-OUT ADDRESS
001500  005037  000006                  CLR     @#6
001504  005711          START3: TST     (R1)            ;TEST IF ADDRESS IS PRESENT
001506  000240                          NOP
001510  000240                          NOP
001512  005237  012626                  INC     HERE            ;YES, KEEP TRACK
001516  010124                          MOV     R1,(R4)+        ;SAVE ADDRESS IN TABLE
001520  000401                          BR      .+4
001522  022626          MAPNE:  POP2SP                  ;RESET STACK
001524  062701  000010                  ADD     #10,R1          ;SET UP NEXT DL ADDRESS
001530  022701  176200                  CMP     #176200,R1      ;TESTED ALL DL AADDRESSES?
001534  003404                          BLE     3$              ;YES
001536  022737  000020  012626          CMP     #16.,HERE       ;MAPPED '16' ACTIVE DL'S?
001544  001357                          BNE     START3          ;NO
001546  012714  177777          3$:     MOV     #-1,(R4)        ;YES, TERMINATE TABLE
001552  012737  000006  000004          MOV     #6,@#4          ;RESET TRAP
001560  012737  000004  000006          MOV     #4,@#6
001566  005737  012626                  TST     HERE            ;ANY DEVICES PRESENT
001572  001003                          BNE     LDADRS          ;YES, CONTINUE
001574  104000                          PRINT                   ;NO, REPORT ERROR
001576  011222                          MES1                    ;TEXT 'NO DL11 ADDRESSES PRESENT'.
001600  000645                          BR      START
```

```
                                ;*************************************************************************
                                ;AT THIS POINT THE 'ACTIVE' DL11 ADDRESSES BEEN FOUND.  THIS NEXT
                                ;SUBROUTINE FORMS THE ENTIRE TRANSMITTER AND RECEIVER ADDRESSES FOR THESE
                                ;DL11'S AND SAVES THEM IN AN 'ACTIVE' DL11 BUFFER.
                                ;*************************************************************************

001602  012700  012206    LDADRS: MOV     #RCSR0,R0       ;SETUP BUFFER ADDRESS POINTER
001606  012701  001214            MOV     #RXCR0,R1       ;SETUP ACTIVE DEVICE TABLE POINTER
001612  032711  0000C1    NXADRS: BIT     #1,(R1)         ;IS DEVICE PRESENT?
001616  001015                    BNE     FINVEC          ;NO, DONE
001620  011120                    MOV     (R1),(R0)+      ;LOAD THE 'RCSR' ADDRESS
001622  011110                    MOV     (R1),(R0)
001624  052720  000002            BIS     #2,(R0)+        ;LOAD THE 'RBUF' ADDRESS
001630  011110                    MOV     (R1),(R0)
001632  052720  000004            BIS     #4,(R0)+        ;LOAD THE 'XCSR' ADDRESS
001636  012110                    MOV     (R1)+,(R0)
001640  052720  000006            BIS     #6,(R0)+        ;LOAD THE 'XBUF' ADDRESS
001644  062700  000010            ADD     #10,R0          ;MOVE POINTER TO NEXT 'RCSR' ADDRESS
001650  000760                    BR      NXADRS          ;FORM NEXT GROUP

                                ;*************************************************************************
                                ;NOW AN 'ACTIVE' DEVICE TABLE HAS BEEN SETUP, AN INTERRUPT IS FORCED
                                ;FOR EACH DL11 AND IT'S VECTOR IS MAPPED.
                                ;*************************************************************************

001652  012700  012212    FINVEC: MOV     #XCSR0,R0       ;SET UP 'XCSR' ADDRESS POINTER
001656  012701  012224            MOV     #XLVL0,R1       ;SETUP 'XMITTER' BR LEVEL POINTER
001662  013737  012626  013324    MOV     HERE,TEMP       ;SETUP CNTR.
001670  005737  013324    FOUNDV: TST     TEMP            ;DONE MAPPING?
001674  001444                    BEQ     LDVECT          ;YES
001676  005337  013324            DEC     TEMP            ;NO, DECREMENT CNTR
001702  005077  177272            CLR     @PSW            ;SET PROC. PRIORITY @0
001706  052737  000001  013352    BIS     #1,FMAP         ;SET MAPPING FLAG
001714  042770  000100  000000    BIC     #100,@(R0)
001722  052770  000100  000000    BIS     #100,@(R0)      ;CAUSE TRANSMITTER INTERRUPT
001730  000240                    NOP
001732  000240                    NOP
001734  012777  000340  177236    MOV     #340,@PSW
001742  005711                    TST     (R1)            ;DID INTERRUPT OCCUR?
001744  001010                    BNE     TSTVA           ;YES,
001746  104000                    PRINT                   ;NO, REPORT ERROR
001750  011257                    MES2                    ;TEXT 'NO DEVICE PRESENT FOR THIS LINE"
001752  011037  013326            MOV     (R0),KSTOR1     ;PRINT 'RCSR' ADDRESS
001756  104001                    PRTOCT
001760  013326                    KSTOR1
001762  000137  001314            JMP     START
001766  042770  000100  000000  TSTVA:  BIC     #100,@(R0)      ;CLR INTERRUPT ENABLE
001774  062700  000020            ADD     #20,R0          ;SETUP OFFSET TO ADDR. NEXT GROUP
002000  062701  000026            ADD     #26,R1          ;SETUP NEXT BR LEVEL POINTER
002004  000731                    BR      FOUNDV          ;MAP NEXT VECTOR
```

```
                                ;*************************************************************************
                                ;AT THIS POINT ALL VECTOR ADDRESSES HAVE BEEN MAPPED AND LOADED.
                                ;THE FOLLOWING SUBROUTINE LOADS THE VECTOR ADDRESSES WITH THEIR
                                ;RESPECTIVE SERVICE ROUTINE ADDRESSES AND ENABLES THE DL11 INTERRUPTS.
                                ;*************************************************************************

002006  012700  012216          LDVECT: MOV     #RVTR0,R0       ;SETUP VECTOR ADDRESS POINTER
002012  012701  006510                  MOV     #RECV00,R1      ;SETUP RECEIVER SERVICE ROUTINE POINTER
002016  012702  007612                  MOV     #XFER00,R2      ;SETUP TRANSMITTER SERVICE ROUTINE POINTER
002022  012703  012206                  MOV     #RCSR0,R3       ;SETUP 'RCSR' ADDRESS POINTER
002026  012704  012212                  MOV     #XCSR0,R4       ;SETUP 'XCSR' ADDRESS POINTER
002032  012705  006664                  MOV     #RECV03,R5
002036  162705  006620                  SUB     #RECV02,R5      ;GET SERVICE ROUTINE OFFSET
002042  013737  012626  013324          MOV     HERE,TEMP
002050  005737  013324          LDNXTV: TST     TEMP            ;SETUP ALL SERVICE ROUTINES?
002054  001436                  BEQ     SERVCE          ;YES, START SERVICE ROUTINE
002056  005337  013324          DEC     TEMP
002062  010130                  MOV     R1,@(R0)+       ;LOAD RECEIVER SERVICE ADDRESS.
002064  012730  000240          MOV     #240,@(R0)+     ;SET BR LEVEL @5
002070  010230                  MOV     R2,@(R0)+       ;LOAD TRANSMITTER SERVICE ADDRESS
002072  012770  000240  000000  MOV     #240,@(R0)      ;SET BR LEVEL @5
002100  052773  000100  000000  BIS     #100,@(R3)      ;ENABLE RECEIVER INTERRUPTS
002106  052774  000100  000000  BIS     #100,@(R4)      ;ENABLE TRANSMITTER INTERRUPTS
002114  062703  000020          ADD     #20,R3          ;SETUP NEXT 'RCSR' ADDRESS
002120  062704  000020          ADD     #20,R4          ;SETUP NEXT 'XCSR' ADDRESS
002124  062700  000012          ADD     #12,R0          ;SETUP NEXT RECEIVER VECTOR ADDR.
002130  060501                  ADD     R5,R1           ;SETUP NEXT RECEIVER SERVICE ADDR.
002132  060502                  ADD     R5,R2           ;SETUP NEXT TRANSMITTER SERVICE ADDR.
002134  000745                  BR      LDNXTV          ;LOAD NEXT VECTOR ADDRESS
002136  012701  012630          MOV     #INTRAN,R1
002142  005021          2$:     CLR     (R1)+
002144  022701  012672          CMP     #HLDLD,R1
002150  001374                  BNE     2$


                                ;*************************************************************************
                                ;PROGRAM ENTERED HERE TO INITIALIZE ALL SOFTWARE SWITCHES (BOTH FOR
                                ;USER OPTIONS I.E. '↑S, ↑P, ETC. AND PROGRAM SWITCHES. THIS IS ENTER-
                                ;ED EITHER FROM THE MONITOR ON PROGRAM LOADS OR BY TYPING A '↑E'.
                                ;*************************************************************************

002152  012777  000340  177020  SERVCE: MOV     #340,@PSW       ;SET PROC. PRIORITY @7
002160  012701  013354          MOV     #RECSWH,R1      ;SET UP TO CLEAR ALL SOFTWARE SW'S.
002164  005021          1$:     CLR     (R1)+
002166  023701  012144          CMP     MEMSIZ,R1       ;DONE?
002172  001374                  BNE     1$              ;NO
```

```
                                ;*************************************************************************
                                ;RESTART ENTRY POINT WHEN '↑C' IS TYPED.
                                ;ENTRY HERE ONLY CLEARS USERS SOFTWARE SWITCHES AND RESETS THE ERROR
                                ;BUFFER POINTERS TO INHIBIT PRINTING FOR PREVIOUSLY BUFFERED ERRORS.
                                ;*************************************************************************

002174  012706  001100          RESTRT: MOV     #STACK,SP       ;RESET STACK POINTER
002200  012701  012672          2$:     MOV     #HLDLO,R1       ;CLEAR '↑C' SOFTWARE SW.'S
002204  005021                  3$:     CLR     (R1)+
002206  022701  013354                  CMP     #RECSWH,R1      ;DONE?
002212  001374                          BNE     3$
002214  012700  014146                  MOV     #ERRBUF,R0      ;SETUP ERROR BUFFER
002220  010005                          MOV     R0,R5
002222  052777  000100  176752          BIS     #100,@TKS       ;ENABLE KEYBOARD INTERRUPTS
002230  104000  012135                  PRINT,  DOT             ;TO INDICATE READY
002234  005077  176740                  CLR     @PSW            ;SET PROC. PRIORITY @0

                                ;*************************************************************************
                                ;PROGRAM RUNS IN THE FOLLOWING SUBROUTINE BREAKING OUT TO SERVICE
                                ;DL11 & KEYBOARD INTERRUPTS AND RUNNING A BACKGROUND JOB OF LOOKING
                                ;FOR AND PRINTING ANY ERRORS ENCOUNTER BY THE SERVICE ROUTINES.
                                ;*************************************************************************

002240  013777  013164  176744  TSTERR: MOV     ACTIVE,@SWR     ;DISPLAY SYSTEM STATUS
002246  022700  014754                  CMP     #ERRBUF+390.,R0 ;TEST THAT THE ERROR BUFFER ISN'T EXCEEDED
002252  101403                          BLOS    1$              ;IF IT DOES, RESET BUFFER POINTER
002254  005737  013342                  TST     ERRFLG          ;ANY ERRORS PENDING?
002260  001004                          BNE     SRVERR          ;YES, SERVICE ERROR
002262  012705  014146          1$:     MOV     #ERRBUF,R5      ;NO, RE-SET BUFFER POINTERS
002266  010500                          MOV     R5,R0
002270  000763                          BR      TSTERR          ;RE-SERVICE

                                ;*************************************************************************
                                ;ENTERED HERE TO REPORT THE SYSTEM ERRORS. ALL ERRORS ARE BUFFERED
                                ;IN THE SERVICE ROUTINES I.E. RECEIVER, READER AND TRANSMITTER.
                                ;THESE ERRORS ARE THEN REPORTED AS BACKGROUND JOBS.
                                ;*************************************************************************

002272  005337  013342          SRVERR: DEC     ERRFLG
002276  100412                          BMI     1$              ;COUNT SHOULD NEVER GO NEGATIVE
002300  005737  013336                  TST     RMODE           ;DATA REPORT MODE REQUESTED?
002304  001043                          BNE     DATA            ;YES, GO TO DATA REPORT ROUTINE
002306  112537  013330                  MOVB    (R5)+,KSTOR2    ;GET THE ERROR CODE
002312  112537  013326                  MOVB    (R5)+,KSTOR1    ;GET FAILING UNIT NO.
002316  005337  013342                  DEC     ERRFLG
002322  100003                          BPL     2$              ;CHECK ERROR COUNT NEVER GOES NEGATIVE
002324  005037  013342          1$:     CLR     ERRFLG          ;RESET IF IT DOES
002330  000743                          BR      TSTERR
002332  104000  011312          2$:     PRINT,  MES3            ;TEXT 'LINE'
002336  104002  013326                  BINDEC, KSTOR1          ;PRINT FAILING UNIT NO.
002342  013704  013330                  MOV     KSTOR2,R4       ;PICK UP OFFSET TO PRINT ERROR TYPE
002346  042704  177770                  BIC     #177770,R4
002352  006304                          ASL     R4
002354  022704  000007                  CMP     #7,R4
002360  001727                          BEQ     TSTERR
002362  016437  002376  002372        MOV     ERRTBL(R4),ERRMES+2
```

```
                                ERRMES: PRINT,  HALT            ;MODIFIED TO PRINT ERROR MESSAGE
002374  000721                          BR      TSTERR          ;LOOK FOR FUTHER ERRORS

                                ERRTBL: CODE00                  ;= ILLEGAL RECEIVER INTERRUPT
                                        CODE01                  ;= OVERRUN ERROR
                                        CODE02                  ;= FRAMING ERROR
                                        CODE03                  ;= PARITY ERROR
                                        CODE04                  ;= ILLEGAL START CODE RECEIVED
                                        CODE05                  ;= ILLEGAL READER INTERRUPT
                                        CODE06                  ;= ILLEGAL TRANSMITTER INTERRUPT

                                ;*************************************************************************
                                ;ENTERED HERE WHEN IN DIAGNOSTIC MODE  TO TYPE DATA RECEIVED FROM THE VT20
                                ;*************************************************************************

002414  105777  176566          DATA:   TSTB    @TPS
002420  100375                          BPL     .-4
002422  122715  000377                  CMPB    #377,(R5)       ;CHAR. = TO START CODE?
002426  001010                          BNE     PRTAS1          ;NO, CHECK FOR 'LF' CODE
002430  112777  000336  176552          MOVB    #336,@TPB       ;YES, CHANGE CODE TO '↑'.
002436  005037  013340          PRTAS0: CLR     PRTCNT          ;CLR PRINT COUNT.
002442  104000  012133                  PRINT,  CRLF
002446  000413                          BR      EXIT

002450  122715  000012          PRTAS1: CMPB    #12,(R5)        ;CHAR. = TO 'LF'
002454  001770                          BEQ     PRTAS0          ;YES, PRINT 'CR-LF'
002456  111577  176526                  MOVB    (R5),@TPB       ;NO, PRINT CHAR. AS IS.
002462  005237  013340                  INC     PRTCNT          ;INC. PRINT COUNT
002466  022737  000100  013340          CMP     #64.,PRTCNT     ;LINE FULL?
002474  001760                          BEQ     PRTAS0          ;YES, PRINT CRLF.
002476  105725                  EXIT:   TSTB    (R5)+           ;INC. BUFFER POINTER.
002500  000657                          BR      TSTERR          ;RETURN

                                ;*************************************************************************
                                ;ENTERED HERE TO SERVICE KEYBOARD INTERRUPTS
                                ;*************************************************************************

002502  010146                  KEYSRV: MOV     R1,-(SP)        ;SAVE WORKING REG.'S
002504  010246                          MOV     R2,-(SP)
002506  010346                          MOV     R3,-(SP)
002510  010446                          MOV     R4,-(SP)
002512  117701  176466                  MOVB    @TKB,R1         ;GET CHAR.
002516  042701  177600                  BIC     #177600,R1      ;STRIPE OFF PARITY BIT
002522  010137  013170                  MOV     R1,SCHAR        ;SAVE THE CHAR.
002526  022701  000015                  CMP     #15,R1          ;CHAR. = TO 'CR'?
002532  001003                          BNE     4$              ;NO
002534  004737  005042                  JSR     PC,TYPEIT       ;YES, ECHO IT
002540  000520                          BR      EXITKS          ;EXIT
002542  022701  000012          4$:     CMP     #12,R1          ;CHAR. = TO 'LF'?
002546  001504                          BEQ     GETLN           ;YES
002550  020127  000033                  CMP     R1,#33          ;CHAR. PRINTABLE?
002554  002101                          BGE     GETLN           ;YES
002556  012701  000136                  MOV     #136,R1         ;NO, PRINT AS A CONTROL CHAR.
002562  004737  005042                  JSR     PC,TYPEIT
002566  013701  013170                  MOV     SCHAR,R1
002572  052701  000100                  BIS     #100,R1         ;MAKE CHAR. PRINTABLE
```

```
 846  002576  004737  005042                 JSR     PC,TYPEIT
 847  002602  122701  000101                 CMPB    #101,R1         ;CHAR. = TO '↑A'?
 848  002606  001002                         BNE     .+6             ;NO
 849  002610  000137  001314                 JMP     START           ;YES, RESTART PROGRAM
 850  002614  122701  000103                 CMPB    #103,R1         ;CHAR. = TO '↑C' ?
 851  002620  001524                         BEQ     CONC
 852  002622  122701  000105                 CMPB    #105,R1         ;↑E FOR ESCAPE AND RESTART
 853  002626  001002                         BNE     .+6
 854  002630  000137  002152                 JMP     SERVCE          ;YES, DO A COMPLETE RESTART
 855  002634  005737  013154                 TST     SYSSWH          ;SYSTEM ACTIVE?
 856  002640  001042                         BNE     QMARK           ;YES, IGNORE REQUEST
 857  002642  005237  013154                 INC     SYSSWH          ;NO, SET REQUEST SW.
 858  002646  122701  000102                 CMPB    #102,R1         ;CHAR. = TO '↑B'?
 859  002652  001002                         BNE     .+6             ;NO
 860  002654  000137  004452                 JMP     BOOT            ;YES, BOOT TAPE TO VT20.
 861  002660  122701  000104                 CMPB    #104,R1         ;CHAR. = '↑D' ?
 862  002664  001466                         BEQ     COND            ;YES, DIAGNOSTIC MODE
 863  002666  122701  000110                 CMPB    #110,R1         ;↑H (HOLD)?
 864  002672  001450                         BEQ     CONH
 865  002674  122701  000122                 CMPB    #122,R1         ;↑R (RELEASE)?
 866  002700  001517                         BEQ     CONR
 867  002702  122701  000123                 CMPB    #123,R1         ;↑S (SEND)?
 868  002706  001571                         BEQ     CONS
 869  002710  122701  000114                 CMPB    #114,R1         ;↑L (LIST ACTIVE RECEIVERS)
 870  002714  001002                         BNE     1$              ;NO
 871  002716  000137  004134                 JMP     CONL            ;YES
 872  002722  122701  000115         1$:     CMPB    #115,R1         ;↑M (MONITOR SYSTEM STATUS)
 873  002726  001002                         BNE     2$              ;NO
 874  002730  000137  004216                 JMP     CONM            ;YES
 875  002734  122701  000120         2$:     CMPB    #120,R1         ;↑P (PRINT)?
 876  002740  001531                         BEQ     CONP
 877  002742  005337  013154                 DEC     SYSSWH          ;CLR SYSTEM SWITCH ON ILLEGAL ENTRY
 878  002746  112701  000077         QMARK:  MOVB    #77,R1          ;ILLEGAL CHAR.
 879  002752  004737  005042                 JSR     PC,TYPEIT       ;TYPE '?'.
 880  002756  000411                         BR      EXITKS          ;IGNORE IT
 881  002760  005737  013202         GETLN:  TST     CONSFL          ;ARE WE IN SEND MODE?
 882  002764  001161                         BNE     SENDLN          ;YES, GO TO SEND ROUTINE
 883  002766  000137  003520                 JMP     GETLN2          ;NO TO LINE NO. INPUT ROUTINE
 884
 885  002772  005037  013154         PRTDOT: CLR     SYSSWH
 886  002776  104000  012135                 PRINT,  DOT
 887  003002  012604                 EXITKS: MOV     (SP)+,R4        ;RESTORE THE WORKING REG.'S
 888  003004  012603                         MOV     (SP)+,R3
 889  003006  012602                         MOV     (SP)+,R2
 890  003010  012601                         MOV     (SP)+,R1
 891  003012  000002                         RTI                     ;EXIT
```

```
                                ;*****************************************************************************
                                ;ENTERED HERE ON RECEIPT A '↑H' TO HOLD A SPECIFIED TRANSMISSION LINE.
                                ;*****************************************************************************

003014  004737  003730          CONH:   JSR     PC,FORMIT       ;FORM OFFSETS
003020  005263  012672                  INC     HLDLO(R3)       ;SET HOLD SWITCH FOR THIS LINE
003024  005337  013102                  DEC     BCDCTR          ;ANY MORE LINES TO BE HELD?
003030  001403                          BEQ     CONH1           ;NO
003032  004737  003734                  JSR     PC,FORMON       ;YES, FORM OFFSET FOR LINE
003036  000770                          BR      CONH+4          ;HOLD NEXT LINE
003040  000754                  CONH1:  BR      PRTDOT          ;EXIT

                                ;*****************************************************************************
                                ;SUBROUTINE ENTERED ON RECEIPT OF A '↑D' TO ENTER DIAGNOSTIC MODE
                                ;*****************************************************************************

003042  005137  013336          COND:   COM     RMODE           ;SET/CLEAR DIAGNOSTIC SW.
003046  001403                          BEQ     1$              ;RESET POINTERS IF CLEARED
003050  104000  011567                  PRINT,  MES9            ;TEXT 'DIAG. MODE ENABLED'
003054  000405                          BR      2$              ;EXIT
003056  012700  014146          1$:     MOV     #ERRBUF,R0      ;RESET BUFFER POINTERS
003062  010005                          MOV     R0,R5
003064  005037  013342                  CLR     ERRFLG          ;CLEAR THE ERROR COUNTER
003070  000740                  2$:     BR      PRTDOT          ;EXIT

                                ;*****************************************************************************
                                ;ENTERED ON RECEIPT OF A '↑C' TO CLEAR ALL USER SOFTWARE SWITCHES.
                                ;*****************************************************************************

003072  005002                  CONC:   CLR     R2
003074  005003                          CLR     R3
003076  005037  013102                  CLR     BCDCTR
003102  004737  003152          CONC1:  JSR     PC,RELESE       ;RELEASE HELD LINES
003106  062702  000020                  ADD     #16.,R2
003112  062703  000002                  ADD     #2,R3
003116  022703  000040                  CMP     #32.,R3         ;RELEASED ALL LINES?
003122  001367                          BNE     CONC1           ;NO
003124  012604                          MOV     (SP)+,R4        ;RESTORE THE WORKING REG.'S
003126  012603                          MOV     (SP)+,R3
003130  012602                          MOV     (SP)+,R2
003132  012601                          MOV     (SP)+,R1
003134  000137  002174                  JMP     RESTRT

                                ;*****************************************************************************
                                ;ENTERED HERE ON RECEIPT OF A '↑R' TO RELEASE A SPECIFIED TRANSMISSION
                                ;LINE.
                                ;*****************************************************************************

003140  004737  003730          CONR:   JSR     PC,FORMIT       ;FORM THE OFFSETS
003144  004737  003152                  JSR     PC,RELESE       ;RELEASE HELD LINES
003150  000710                          BR      PRTDOT          ;EXIT

003152  005763  012672          RELESE: TST     HLDLO(R3)       ;ACTIVE?
003156  001413                          BEQ     CONR2           ;NO, EXIT
003160  005063  012672          CONR1:  CLR     HLDLO(R3)       ;CLR HOLD SW FOR THIS LINE
003164  005063  012734                  CLR     SENDSW(R3)      ;CLEAR THE SEND SW.
```

```
  948  003170  005263  013422                    INC     TRNSWH(R3)          ;SET TRANSMITTER SWITCH
  949  003174  056337  012146  013164            BIS     UNITNO(R3),ACTIVE ;SET ACTIVE WHEN TRANSMITTING
  950  003202  005072  012214                    CLR     @XBUFO(R2)          ;START TRANSMISSION OPERATION
  951  003206  005337  013102            CONR2:  DEC     BCDCTR              ;ANY MORE LINES TO BE RELEASED?
  952  003212  003403                            BLE     CONR3               ;NO
  953  003214  004737  003734                    JSR     PC,FORMON           ;YES, FORM OFFSET FOR NEXT LINE
  954  003220  000754                            BR      RELESE              ;RELEASE NEXT LINE
  955  003222  000207            CONR3:  RTS     PC                  ;RETURN
  956
  957                        ;*************************************************************************
  958                        ;ENTERED HERE ON RECEIPT OF A '↑P' TO PRINT THE DATA IN A SPECIFIED
  959                        ;LINES BUFFER. THIS CAN EITHER BE DATA RECEIVED FROM A SLAVE VT20
  960                        ;OR DATA ENTERED WHILE IN THE SEND MODE.
  961                        ;*************************************************************************
  962
  963  003224  005077  175750            CONP:   CLR     @PSW                ;ENABLE FURTHER INTERRUPTS
  964  003230  005037  013336                    CLR     RMODE               ;CLR DIAGNOSTIC MODE
  965  003234  004737  003730                    JSR     PC,FORMIT           ;FORM THE OFFSETS
  966  003240  010437  003246            CONP1:  MOV     R4,CONP2+2          ;SET UP BUFFER TO BE PRINTED
  967  003244  104000  000000            CONP2:  PRINT,  HALT
  968  003250  005337  013102                    DEC     BCDCTR              ;DONE PRINTING ALL REQUESTS
  969  003254  003405                            BLE     CONP3               ;YES
  970  003256  004737  003734                    JSR     PC,FORMON           ;NO, FORM NEXT OFFSET
  971  003262  104000  012133                    PRINT,  CRLF
  972  003266  000764                            BR      CONP1
  973  003270  000640            CONP3:  BR      PRTDOT              ;EXIT
  974
  975                        ;*************************************************************************
  976                        ;SUBROUTINE TO SETUP TO SEND DATA FROM KB TO SPECIFIED LINE
  977                        ;*************************************************************************
  978
  979  003272  004737  003730            CONS:   JSR     PC,FORMIT           ;FORM THE OFFSETS
  980  003276  005237  013202                    INC     CONSFL              ;SET SOFTWARE SW.
  981  003302  010463  013464            CONS1:  MOV     R4,SAVR4(R3)        ;SET UP THE BUFFER POINTER
  982  003306  005263  012734                    INC     SENDSW(R3)          ;SET SEND SW.
  983  003312  005337  013102                    DEC     BCDCTR              ;ANY MORE LINES TO BE SETUP?
  984  003316  003403                            BLE     CONS2               ;NO
  985  003320  004737  003734                    JSR     PC,FORMON           ;YES, SET THEM UP
  986  003324  000766                            BR      CONS1
  987  003326  000625            CONS2:  BR      EXITKS              ;EXIT
  988
  989  003330  004737  005042            SENDLN: JSR     PC,TYPEIT           ;ECHO CHAR.
  990  003334  005001                            CLR     R1
  991  003336  005002                            CLR     R2
  992  003340  005003                            CLR     R3
  993  003342  005763  012734            CONSO:  TST     SENDSW(R3)          ;SEND TO THIS LINE?
  994  003346  001424                            BEQ     TAGC                ;NO, CHECK NEXT LINE
  995  003350  016304  013464                    MOV     SAVR4(R3),R4        ;SET UP BUFFER POINTER
  996  003354  122737  000033  013170            CMPB    #33,SCHAR           ;TERMINATE SEND MODE?
  997  003362  001427                            BEQ     TAGA                ;YES
  998  003364  005763  012672                    TST     HLDLO(R3)           ;IS IT BEING HELD?
  999  003370  001003                            BNE     SENDBF              ;YES-BUFFER DATA
 1000  003372  113772  013170  012214            MOVB    SCHAR,@XBUFO(R2) ;SEND CHARACTER
 1001
 1002  003400  113724  013170            SENDBF: MOVB    SCHAR,(R4)+         ;SAVE CHARACTER IN BUFFER
 1003  003404  112714  000014                    MOVB    #EOP,(R4)           ;TERIMATE THE BUFFER
```

```
1004  003410  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER
1005  003414  062701  000500                  ADD     #500,R1
1006  003420  062702  000020          TAGC:   ADD     #16.,R2
1007  003424  062703  000002                  ADD     #2,R3
1008  003430  022703  000040                  CMP     #32.,R3         ;DONE ALL LINES?
1009  003434  001342                          BNE     CONSO           ;NO
1010  003436  000137  003002                  JMP     EXITKS          ;YES, EXIT
1011  003442  005037  013202          TAGA:   CLR     CONSFL
1012  003446  112714  000014                  MOVB    #EOP,(R4)       ;TERMINATE BUFFER
1013  003452  005763  012734          TAGB:   TST     SENDSW(R3)      ;SENDING ON THIS LINE?
1014  003456  001407                          BEQ     TAGD            ;NO
1015  003460  005063  012734                  CLR     SENDSW(R3)
1016  003464  012704  015036                  MOV     #BUFFER+4,R4
1017  003470  060104                          ADD     R1,R4
1018  003472  010463  013464                  MOV     R4,SAVR4(R3)    ;SET UP BUFFER POINTER
1019  003476  062701  000764          TAGD:   ADD     #500.,R1
1020  003502  062703  000002                  ADD     #2,R3
1021  003506  022703  000040                  CMP     #32.,R3
1022  003512  001357                          BNE     TAGB
1023  003514  000137  002772                  JMP     PRTDOT          ;EXIT
1024
1025                                  ;*****************************************************************
1026                                  ;SUBROUTINE ENTERED TO FORM ADDRESS OR LINE NUMBER
1027                                  ;*****************************************************************
1028
1029  003520  022701  000177  GETLN2: CMP     #177,R1         ;CHAR. = RUBOUT?
1030  003524  001446                  BEQ     RUBOUT          ;YES
1031  003526  005737  013166          TST     RUBSWH          ;IS RUBOUT SW. SET?
1032  003532  001402                  BEQ     1$              ;NO
1033  003534  104000  012140          PRINT,  SLASH           ;YES, PRINT'/'
1034  003540  005037  013166  1$:     CLR     RUBSWH          ;CLR SW.
1035  003544  004737  005042          JSR     PC,TYPEIT       ;ECHO CHAR.
1036  003550  120127  000054          CMPB    R1,#54          ;CHAR. = TO ','?
1037  003554  001410                  BEQ     3$              ;YES, SAVE IT
1038  003556  120127  000060          CMPB    R1,#60          ;LEGAL NO.?
1039  003562  002403                  BLT     2$              ;NO
1040  003564  120127  000071          CMPB    R1,#71
1041  003570  003402                  BLE     3$              ;YES
1042  003572  000137  002746  2$:     JMP     QMARK           ;NO, TYPE '?'
1043  003576  110177  007354  3$:     MOVB    R1,@TTYPTR      ;SAVE CHAR. IN TTY BUFFER
1044  003602  005237  013156          INC     TTYPTR          ;UPDATE POINTER
1045  003606  105077  007344          CLRB    @TTYPTR         ;TERMINATE BUFFER WITH NULL
1046  003612  042701  177770          BIC     #177770,R1      ;STRIP
1047  003616  006337  013206          ASL     DEVADR          ;LEFT JUSTIFY '3' PLACES
1048  003622  006337  013206          ASL     DEVADR
1049  003626  006337  013206          ASL     DEVADR
1050  003632  060137  013206          ADD     R1,DEVADR       ;THEN ADD NEW DIGIT
1051  003636  000137  003002          JMP     EXITKS          ;EXIT
1052
1053  003642  005737  013166  RUBOUT: TST     RUBSWH          ;IS THE RUBOUT SW. SET?
1054  003646  001002                  BNE     1$              ;YES
1055  003650  104000  012140          PRINT,  SLASH
1056  003654  005237  013166  1$:     INC     RUBSWH          ;SET SW.
1057  003660  005337  013156          DEC     TTYPTR          ;BACK UP BUFFER POINTER
1058  003664  117701  007266          MOVB    @TTYPTR,R1      ;PICK UP PREVIOUS CHAR.
1059  003670  105077  007262          CLRB    @TTYPTR         ;TERMINATE BUFFER
```

```
1060  003674  004737  005042                  JSR     PC,TYPEIT       ;ECHO CHAR.
1061  003700  013701  013206                  MOV     DEVADR,R1
1062  003704  042701  177770                  BIC     #177770,R1
1063  003710  006237  013206                  ASR     DEVADR
1064  003714  006237  013206                  ASR     DEVADR
1065  003720  006237  013206                  ASR     DEVADR
1066  003724  000137  003002                  JMP     EXITKS          ;EXIT
1067
1068                                  ;*****************************************************************
1069                                  ;SUBROUTINE ENTERED TO FORM THE ADDRESS AND REGISTER OFFSETS
1070                                  ;*****************************************************************
1071
1072  003730  004737  004050          FORMIT: JSR     PC,GETLN1       ;FORM LINE NO.
1073  003734  005001                  FORMON: CLR     R1
1074  003736  005002                          CLR     R2
1075  003740  005003                          CLR     R3
1076  003742  017704  007136                  MOV     @BCDPTR,R4      ;PICK UP LINE NUMBER
1077  003746  062737  000002  013104          ADD     #2,BCDPTR       ;UPDATE POINTER FOR NEXT ENTRY
1078  003754  005704                          TST     R4              ;IS THE LINE NO. '0'?
1079  003756  001420                          BEQ     1$              ;YES, NO WORK NEEDED
1080  003760  022704  000017                  CMP     #15.,R4         ;LEGAL LINE NO?
1081  003764  002005                          BGE     2$              ;YES
1082  003766  012701  000077                  MOV     #77,R1
1083  003772  004737  005042                  JSR     PC,TYPEIT
1084  003776  000754                          BR      FORMIT
1085  004000  062701  000764          2$:     ADD     #500.,R1        ;FORM THE BUFFER OFFSET
1086  004004  062702  000020                  ADD     #16.,R2         ;FORM THE REGISTER OFFSET
1087  004010  062703  000002                  ADD     #2.,R3          ;FORM THE ADDRESS OFFSET
1088  004014  005304                          DEC     R4              ;DONE?
1089  004016  001370                          BNE     2$              ;NO
1090  004020  010137  013200          1$:     MOV     R1,BUFOFF
1091  004024  010237  013176                  MOV     R2,REGOFF
1092  004030  010337  013174                  MOV     R3,ADDOFF
1093  004034  012704  015032                  MOV     #BUFFER,R4
1094  004040  060104                          ADD     R1,R4           ;ADD BUFFER OFFSET
1095  004042  005024                          CLR     (R4)+
1096  004044  005024                          CLR     (R4)+
1097  004046  000207                          RTS     PC              ;RETURN
```

```
1098                                    ;*************************************************************************
1099                                    ;SUBROUTINE TO ENABLE FORMING OF A LINE NUMBER
1100                                    ;*************************************************************************
1101
1102  004050  005037  013206   GETLN1: CLR     DEVADR          ;SET UP TO GET LINE NUMBER
1103  004054  005037  013170            CLR     SCHAR
1104  004060  005037  014770            CLR     TTYBUF
1105  004064  012737  014770  013156    MOV     #TTYBUF,TTYPTR  ;SET UP BUFFER POINTER
1106  004072  052777  000100  175102    BIS     #100,@TKS       ;ENABLE TTY INTERRUPTS
1107  004100  005077  175074            CLR     @PSW            ;GET LINE NO.
1108  004104  013777  013164  175100 1$: MOV     ACTIVE,@SWR     ;DISPLAY SYSTEM STATUS
1109  004112  023727  013170  000015    CMP     SCHAR,#15       ;EXIT ON CARRIAGE RETURN
1110  004120  001371                    BNE     1$
1111  004122  004737  006072            JSR     PC,BCDBIN       ;CONVERT LINE NO. TO OCTAL
1112  004126  104000  012133            PRINT   ,CRLF
1113  004132  000207                    RTS     PC
1114
1115                                    ;*************************************************************************
1116                                    ;ENTERED HERE ON RECEIPT OF A '↑L' TO LIST THE ACTIVE DL11 RECEIVER
1117                                    ;ADDRESSES THAT WERE MAPPED AND SET UP BY THE PROGRAM.
1118                                    ;*************************************************************************
1119
1120  004134  005077  175040   CONL:   CLR     @PSW            ;ALLOW FURTHER INTERRUPTS
1121  004140  104000  011445            PRINT,  MES7            ;TEXT "LIST OF ACTIVE DL11 RECEIVERS"
1122  004144  005037  013160            CLR     CNTR
1123  004150  012702  001214            MOV     #RXCRO,R2       ;SET UP POINTER TO PICK UP ADDRESSES
1124  004154  104000  012133 1$:       PRINT,  CRLF
1125  004160  104002  013160            BINDEC, CNTR            ;PRINT THE LINE NO.
1126  004164  012237  013324            MOV     (R2)+,TEMP      ;PICK UP THE DL11 ADDRESS
1127  004170  104001  013324            PRTOCT, TEMP            ;PRINT IT
1128  004174  005237  013160            INC     CNTR            ;UPDATE THE LINE NUMBER
1129  004200  032712  000001            BIT     #1,(R2) ;DONE?
1130  004204  001763                    BEQ     1$              ;NO
1131  004206  005037  013154            CLR     SYSSWH
1132  004212  000137  002772            JMP     PRTDOT          ;EXIT
```

```
1133                                    ;*************************************************************************
1134                                    ;ENTERED HERE ON RECEIPT OF A '↑M' TO MONITOR SYSTEM STATUS. THE '↑M'
1135                                    ;OPTION CAN BE USED IN ONE OF TWO WAYS: (1) TYPE '↑M (CR)' TO PRINT THE
1136                                    ;STATUS OF ALL DL11 LINES. (2) TYPE '↑M & LINE NO.' TO PRINT THE STATUS
1137                                    ;OF SPECIFIED LINE(S).
1138                                    ;*************************************************************************
1139
1140  004216  005077  174756           CONM:   CLR     @PSW            ;ENABLE FURTHER INTERRUPTS
1141  004222  004737  003730                   JSR     PC,FORMIT       ;FORM THE LINE NUMBER
1142  004226  013702  012626                   MOV     HERE,R2         ;PICK UP THE NO. OF ACTIVE DL'S
1143  004232  104000  011504                   PRINT,  MES8            ;PRINT HEADER
1144  004236  010337  013172           1$:     MOV     R3,LINNO
1145  004242  006237  013172                   ASR     LINNO           ;SET UP THE LINE NO.
1146  004246  104000  012133           2$:     PRINT,  CRLF
1147  004252  104002  013172                   BINDEC, LINNO           ;PRINT THE LINE NO.
1148  004256  016337  013526  013324           MOV     RECNTR(R3),TEMP
1149  004264  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF BLOCKS RECEIVED
1150  004270  016337  013570  013324           MOV     XFERCT(R3),TEMP
1151  004276  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF BLOCKS TRANSFERED
1152  004302  016337  013674  013324           MOV     OR(R3),TEMP
1153  004310  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF OVERRUN ERRORS
1154  004314  016337  014000  013324           MOV     PAR(R3),TEMP
1155  004322  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF PARITY ERRORS
1156  004326  016337  013736  013324           MOV     FRM(R3),TEMP
1157  004334  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF FRAMING ERRORS
1158  004340  016337  013632  013324           MOV     REC(R3),TEMP
1159  004346  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF RECEIVER ERRORS
1160  004352  016337  014104  013324           MOV     TRN(R3),TEMP
1161  004360  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF TRANSMITTER ERRORS
1162  004364  016337  014042  013324           MOV     ST(R3),TEMP
1163  004372  104002  013324                   BINDEC, TEMP            ;PRINT NO. OF START CODE ERRORS
1164  004376  016337  012672  013324           MOV     HLDLO(R3),TEMP
1165  004404  104002  013324                   BINDEC, TEMP            ;PRINT STATUS IF HELD
1166  004410  005237  013172                   INC     LINNO           ;UPDATE THE LINE NO.
1167  004414  062703  000002                   ADD     #2,R3           ;UPDATE THE OFFSET NO.
1168  004420  105737  014770                   TSTB    TTYBUF          ;WAS A SPECIFIED LINE REQUESTED?
1169  004424  001002                           BNE     3$              ;YES, EXIT
1170  004426  005302                           DEC     R2              ;NO, DONE ALL LINES?
1171  004430  001306                           BNE     2$              ;NO
1172  004432  005337  013102           3$:     DEC     BCDCTR          ;DONE ALL LINES?
1173  004436  003403                           BLE     4$              ;YES, EXIT
1174  004440  004737  003734                   JSR     PC,FORMON       ;NO SET UP NEXT LINE
1175  004444  000674                           BR      1$
1176  004446  000137  002772           4$:     JMP     PRTDOT
```

```
1177                                    ;*************************************************************************
1178                                    ;BOOT SUBROUTINE
1179                                    ;THIS SUBROUTINE IS ENTERED ON RECEIPT OF A '↑B' FROM THE KEYBOARD.
1180                                    ;ITS PURPOSE IS TO BOOT (TRANSFER) THE VT20 PROGRAM FROM THE READER
1181                                    ;OF THE HOST COMPUTER TO A SELECTED VT20 SYSTEMS.  WHEN ENTERED, THE
1182                                    ;THE PROGRAM WILL WAIT FOR THE LINE OR LINES OVER WHICH THE PROGRAM
1183                                    ;IS TO BE TRANSFERED. THE PROGRAM WILL THEN CHECK TO SEE IF A READER
1184                                    ;DEVICE ADDRESS HAS BEEN PREVIOUSLY SETUP. IF IT HASN'T, THE PROGRAM
1185                                    ;WILL REQUEST THE DEVICE & VECTOR ADDRESSES. AFTER COMPLETION OF
1186                                    ;LOADING, THE PROGRAM WILL RETURN TO THE MONITOR.
1187                                    ;*************************************************************************
1188
1189  004452  004737  003730           BOOT:   JSR     PC,FORMIT       ;WAIT FOR LINE NUMBERS
1190  004456  013737  013102  013334           MOV     BCDCTR,KSTOR4   ;SAVE NO. OF LINE SET UP
1191  004464  012737  013262  013212           MOV     #BOOTLN,BOOTP1  ;SET UP POINTERS TO SAVE LINE NO.'S
1192  004472  012737  013220  013214           MOV     #BOOTOF,BOOTP2
1193  004500  010277  006506           BOOT1:  MOV     R2,@BOOTP1
1194  004504  010377  006504                   MOV     R3,@BOOTP2
1195  004510  062737  000002  013212           ADD     #2,BOOTP1
1196  004516  062737  000002  013214           ADD     #2,BOOTP2
1197  004524  005263  012776                   INC     BOOTSW(R3)      ;SET BOOT SOFTWARE SW.
1198  004530  005337  013102                   DEC     BCDCTR          ;SET UP ALL LINES?
1199  004534  001403                           BEQ     BOOT2           ;YES,
1200  004536  004737  003734                   JSR     PC,FORMON       ;NO, FORM OFFSETS FOR NEXT LINE
1201  004542  000756                           BR      BOOT1
1202  004544  005737  013416           BOOT2:  TST     RCSR            ;HAS READER ADDRESS BEEN SETUP?
1203  004550  001027                           BNE     BOOT4           ;YES
1204  004552  104000  011614           BOOT3:  PRINT,  MES11           ;REQUEST READER DEVICE ADDRESS
1205  004556  004737  004050                   JSR     PC,GETLN1       ;GET IT
1206  004562  013701  013206                   MOV     DEVADR,R1
1207  004566  005701                           TST     R1              ;WAS ONE ENTERED?
1208  004570  001770                           BEQ     BOOT3           ;NO, MAKE HIM DO IT
1209  004572  010137  013416                   MOV     R1,RCSR         ;YES, SET IT UP
1210  004576  062701  000002                   ADD     #2,R1
1211  004602  010137  013420                   MOV     R1,RDBR
1212  004606  104000  011645                   PRINT,  MES13           ;ASK FOR VECTOR ADDRESS
1213  004612  004737  004050                   JSR     PC,GETLN1       ;GET IT
1214  004616  013701  013206                   MOV     DEVADR,R1
1215  004622  012721  004646                   MOV     #READER,(R1)+   ;SET UP READER SERVICE ROUTINE
1216  004626  005011                           CLR     (R1)            ;SET PRIORITY @0
1217  004630  012777  000101  006560  BOOT4:  MOV     #101,@RCSR      ;SET GO & INTERRUPT ENABLE FOR READER
1218  004636  005037  013154                   CLR     SYSSWH
1219  004642  000137  003002                   JMP     EXITKS          ;EXIT
1220
1221                                    ;*************************************************************************
1222                                    ;READER INTERRUPT SERVICE ROUTINE
1223                                    ;THIS ROUTINE READS '1' CHARACTER FROM THE PAPERTAPE READER AND
1224                                    ;TRANSMITS IT TO THE SPECIFIED LINE OR LINES ENTERED BY (↑B).
1225                                    ;READER ERROR CODES ARE AS FOLLOWS:
1226                                    ;05 = ILLEGAL READER INTERRUPT
1227                                    ;*************************************************************************
1228
1229  004646  010146                   READER: MOV     R1,-(SP)                ;SAVE WORKING REGISTERS
1230  004650  010246                           MOV     R2,-(SP)
1231  004652  010346                           MOV     R3,-(SP)
1232  004654  010446                           MOV     R4,-(SP)
```

```
1233  004656  013704  013334                MOV     KSTOR4,R4       ;SET UP NO. OF LINES TO BE SERVICED
1234  004662  005037  013216                CLR     BOOTAD
1235  004666  017737  006524  013152        MOV     @RCSR,RSTAT     ;SAVE READER STATUS
1236  004674  017737  006520  013150        MOV     @RDBR,RCHAR     ;READ & SAVE CHAR.
1237  004702  013701  013216  READIT:      MOV     BOOTAD,R1
1238  004706  016102  013262                MOV     BOOTLN(R1),R2
1239  004712  016103  013220                MOV     BOOTOF(R1),R3   ;SET UP BOOT OFFSET
1240  004716  005763  012776                TST     BOOTSW(R3)      ;IS BOOT SW. SET?
1241  004722  001010                        BNE     READ1           ;YES, LEGAL INTERRUPT
1242  004724  062737  000002  013342        ADD     #2,ERRFLG       ;NO, SET ERROR FLAG
1243  004732  112720  000005                MOVB    #05,(R0)+       ;CODE FOR ILLEGAL READER INTERRUPT
1244  004736  110310                        MOVB    R3,(R0)
1245  004740  106220                        ASRB    (R0)+
1246  004742  000417                        BR      READ2           ;EXIT
1247  004744  005737  013152  READ1:       TST     RSTAT           ;END OF TAPE FLAG SET?
1248  004750  100414                        BMI     READ2           ;YES, EXIT
1249  004752  113772  013150  012214        MOVB    RCHAR,@XBUF0(R2) ;TRANSMIT THE CHARACTER
1250  004760  062737  000002  013216        ADD     #2,BOOTAD       ;SET UP TO ADDRESS NEXT LINE
1251  004766  005304                        DEC     R4              ;DONE ALL LINES?
1252  004770  001344                        BNE     READIT          ;NO
1253  004772  012777  000101  006416        MOV     #101,@RCSR      ;START NEXT READ
1254  005000  000413                        BR      READ3           ;EXIT
1255  005002  005077  006410  READ2:       CLR     @RCSR           ;DISABLE READER INTERRUPT
1256  005006  005063  012776                CLR     BOOTSW(R3)      ;CLEAR THE SOFTWARE SW.
1257  005012  062737  000002  013216        ADD     #2,BOOTAD       ;SET UP TO SERVICE NEXT LINE
1258  005020  005304                        DEC     R4              ;DONE
1259  005022  001327                        BNE     READIT          ;NO
1260  005024  104000  012135                PRINT,  DOT
1261  005030  012604  READ3:               MOV     (SP)+,R4
1262  005032  012603                        MOV     (SP)+,R3
1263  005034  012602                        MOV     (SP)+,R2
1264  005036  012601                        MOV     (SP)+,R1
1265  005040  000002                        RTI                     ;EXIT
1266
1267                  ;*************************************************************************
1268                  ;SUBROUTINE TO TYPE THE CHARACTER IN 'R1'
1269                  ;*************************************************************************
1270
1271  005042  013777  013164  174142  TYPEIT: MOV     ACTIVE,@SWR     ;DISPLAY SYSTEM STATUS
1272  005050  105777  174132                TSTB    @TPS            ;WAIT FOR PRINTER
1273  005054  100372                        BPL     TYPEIT
1274  005056  110177  174126                MOVB    R1,@TPB         ;OUTPUT CHAR.
1275  005062  000207                        RTS     PC
```

```
                                        ;*************************************************************************
                                        ;SUBROUTINE ENTERED TO SERVICE ALL DL11 RECEIVER INTERRUPTS.
                                        ;R0=ERROR ADDRESS POINTER
                                        ;R1=DATA BUFFER ADDRESS OFFSET (BUFFERS ARE 512 BYTES APART)
                                        ;R2=DEVICE REGISTER ADDRESS OFFSET
                                        ;R3=UNIT ADDRESS OFFSET
                                        ;R4=DATA BUFFER ADDRESS POINTER
                                        ;RECEIVER ERROR CODES ARE AS FOLLOWS:
                                        ;00 = ILLEGAL RECEIVER INTERRUPT
                                        ;01 = OVERRUN ERROR
                                        ;02 = FRAMING ERROR
                                        ;03 = PARITY ERROR
                                        ;04 = ILLEGAL START CODE
                                        ;*************************************************************************

005064  017237  012210  013204  RECVER: MOV     @RBUF0(R2),SAVCHR       ;READ & SAVE CHARACTER
005072  005763  013422                   TST     TRNSWH(R3)              ;CURRENTLY TRANSMITTING DATA?
005076  001410                           BEQ     RECVR1                  ;NO, SERVICE AS LEGAL INTERRUPT
005100  005263  013632                   INC     REC(R3)                 ;KEEP TRACK OF RECEIVER ERRORS
005104  022763  000005  013040           CMP     #5,ERRCTR(R3)           ;HAS UNIT EXCEEDED ERROR LIMIT?
005112  002553                           BLT     RECEXT                  ;YES, EXIT
005114  105020                           CLRB    (R0)+                   ;YES, POST AS ILLEGAL RECVR. INTERRUPT
005116  000542                           BR      RECERR                  ;REPORT ERROR

005120  005737  013204          RECVR1: TST     SAVCHR                  ;RECEIVER ERROR FLAG SET?
005124  100043                           BPL     RECVR2                  ;NO, VALID CHAR.
005126  032737  040000  013204           BIT     #40000,SAVCHR           ;YES, IS IT AN OVERRUN ERROR?
005134  001411                           BEQ     FRAMER                  ;NO
005136  005263  013674                   INC     OR(R3)                  ;KEEP TRACK OF OVERRUN ERRORS
005142  022763  000005  013040           CMP     #5,ERRCTR(R3)           ;HAS UNIT EXCEEDED ERROR LIMIT?
005150  002534                           BLT     RECEXT                  ;YES, EXIT
005152  112720  000001                   MOVB    #01,(R0)+               ;YES, POST AS OVERRUN ERROR
005156  000522                           BR      RECERR

005160  032737  020000  013204  FRAMER: BIT     #20000,SAVCHR           ;IS IT A FRAMING ERROR?
005166  001411                           BEQ     PARITY                  ;NO
005170  005263  013736                   INC     FRM(R3)                 ;KEEP TRACK OF FRAMINING ERRORS
005174  022763  000005  013040           CMP     #5,ERRCTR(R3)           ;HAS UNIT EXCEEDED ERROR LIMIT?
005202  002517                           BLT     RECEXT                  ;YES, EXIT
005204  112720  000002                   MOVB    #02,(R0)+               ;YES, POST AS FRAMING ERROR
005210  000505                           BR      RECERR

005212  005263  014000          PARITY: INC     PAR(R3)                 ;KEEP TRACK OF PARITY ERRORS
005216  022763  000005  013040           CMP     #5,ERRCTR(R3)           ;HAS UNIT EXCEEDED ERROR LIMIT?
005224  002506                           BLT     RECEXT                  ;YES, EXIT
005226  112720  000003                   MOVB    #03,(R0)+               ;POST AS PARITY ERROR
005232  000474                           BR      RECERR

005234  005763  013354          RECVR2: TST     RECSWH(R3)              ;CURRENTLY RECEIVING DATA?
005240  001033                           BNE     RECVR4                  ;YES, SAVE CHAR.
005242  105737  013204                   TSTB    SAVCHR                  ;NO, NULL CHAR.?
005246  001475                           BEQ     RECEXT
005250  122737  000377  013204           CMPB    #377,SAVCHR             ;= TO START CODE CHAR.?
005256  001411                           BEQ     RECVR3                  ;YES, SET UP TO RECEIVE DATA
005260  005263  014042                   INC     ST(R3)
005264  022763  000005  013040           CMP     #5,ERRCTR(R3)           ;HAS UNIT EXCEEDED ERROR LIMIT?
```

```
1332  005272  002463                          BLT     RECEXT          ;YES, EXIT
1333  005274  112720  000004                  MOVB    #04,(R0)+       ;NO, POST AS ILLEGAL START CODE
1334  005300  000451                          BR      RECERR
1335  005302  005263  013354          RECVR3: INC     RECSWH(R3)      ;SET RECEIVER SOFTWARE SW.
1336  005306  046337  012146  013164          BIC     UNITNO(R3),ACTIVE ;KEEP TRACK OF SYSTEM STATUS
1337  005314  012704  015032                  MOV     #BUFFER,R4      ;SET UP BUFFER POINTER
1338  005320  060104                          ADD     R1,R4           ;ADD OFFSET
1339  005322  005024                          CLR     (R4)+
1340  005324  005024                          CLR     (R4)+
1341  005326  000404                          BR      RECR4A
1342  005330  122737  000377  013204  RECVR4: CMPB    #377,SAVCHR     ;CHAR. = TO START CODE?
1343  005336  001761                          BEQ     RECVR3          ;YES, RE-SET RECEIVER
1344  005340  113714  013204          RECR4A: MOVB    SAVCHR,(R4)     ;SAVE CHARACTER IN BUFFER
1345  005344  005737  013336                  TST     RMODE           ;RUNNING DATA REPORT MODE?
1346  005350  001403                          BEQ     RECVR5          ;NO
1347  005352  005237  013342                  INC     ERRFLG          ;YES, FORCE DATA TYPEOUT
1348  005356  111420                          MOVB    (R4),(R0)+      ;SAVE CHAR. IN ERROR BUFFER
1349  005360  122724  000014          RECVR5: CMPB    #EOP,(R4)+      ;CHAR. = END OF PARAGRAPH?
1350  005364  001026                          BNE     RECEXT          ;NO, EXIT
1351  005366  005063  013354                  CLR     RECSWH(R3)      ;YES, CLEAR RECEIVER SW.
1352  005372  005263  013526                  INC     RECNTR(R3)      ;COUNT NO. OF BLOCKS RECEIVED
1353  005376  005263  013422                  INC     TRNSWH(R3)      ;SET UP TO TRANSMIT
1354  005402  056337  012146  013164          BIS     UNITNO(R3),ACTIVE ;KEEP TRACK OF SYSTEM STATUS
1355  005410  012704  015032                  MOV     #BUFFER,R4      ;SET UP BUFFER POINTER
1356  005414  060104                          ADD     R1,R4           ;ADD OFFSET
1357  005416  111472  012214                  MOVB    (R4),@XBUF0(R2) ;START UP TRANSMITTER
1358  005422  000407                          BR      RECEXT          ;EXIT
1359  005424  005263  013040          RECERR: INC     ERRCTR(R3)      ;KEEP TRACK OF NO. OF ERRORS
1360  005430  062737  000002  013342          ADD     #2,ERRFLG
1361  005436  110310                          MOVB    R3,(R0)         ;GET FAILING UNIT NO.
1362  005440  106220                          ASRB    (R0)+           ;SET IT UP TO BE PRINTED
1363  005442  000207          RECEXT: RTS     PC                      ;RETURN
1364
1365                          ;*****************************************************************
1366                          ;SUBROUTINE ENTERED TO SERVICE ALL DL11 TRANSMITTER INTERRUPTS
1367                          ;TRANSMITTER ERROR CODES ARE AS FOLLOWS:
1368                          ;06 = ILLEGAL TRANSMITTER INTERRUPT
1369                          ;*****************************************************************
1370
1371  005444  005763  012630  TRNMIT: TST     INTRAN(R3)      ;INITIALIZATION INTERRUPT?
1372  005450  001003                  BNE     .+10            ;NO, SERVICE IT.
1373  005452  005263  012630          INC     INTRAN(R3)      ;YES, IGNORE 1ST TRANSFER INTERRUPT.
1374  005456  000434                  BR      EXTRAN
1375  005460  005763  012672          TST     HLDLO(R3)
1376  005464  001031                  BNE     EXTRAN
1377  005466  005763  012734          TST     SENDSW(R3)      ;IN SEND MODE?
1378  005472  001026                  BNE     EXTRAN          ;YES, IGNORE INTERRUPT
1379  005474  005763  012776          TST     BOOTSW(R3)      ;BOOTING OVER PROGRAMS?
1380  005500  001023                  BNE     EXTRAN          ;YES, IGNORE INTERRUPT
1381  005502  005763  013422          TST     TRNSWH(R3)      ;TRANSMITTER SW. SET?
1382  005506  001003                  BNE     TRANOK          ;YES, LEGAL INTERRUPT
1383  005510  112720  000006          MOVB    #06,(R0)+       ;POST AS ILLEGAL TRANSMITTER INTERRUPT
1384  005514  000743                  BR      RECERR          ;EXIT VIA RECEIVER ERROR REPORTER
1385  005516  122724  000014  TRANOK: CMPB    #EOP,(R4)+      ;LAST TRANSFER MADE?
1386  005522  001010                  BNE     NXTCHR          ;NO, TRANSMIT NEXT CHAR.
1387  005524  005063  013422          CLR     TRNSWH(R3)      ;YES, CLR SW.
```

```
1388  005530  005263  013570                  INC     XFERCT(R3)          ;COUNT NO. OF BLOCKS TRANSFERED
1389  005534  046337  012146  013164          BIC     UNITNO(R3),ACTIVE
1390  005542  000402                          BR      EXTRAN              ;EXIT
1391  005544  111472  012214          NXTCHR: MOVB    (R4),@XBUFO(R2) ;TRANSMIT NEXT CHAR.
1392  005550  000207                  EXTRAN: RTS     PC
1393
1394                                  ;*************************************************************************
1395                                  ;MESSAGE PRINT ROUTINE, ENTERED VIA EMT DISPATCH HANDLER.
1396                                  ;ROUTINE PICKS UP CONTENTS OF THE 'PC' AND USES THIS AS
1397                                  ;THE ADDRESS OF MESSAGE TO BE TYPED.
1398                                  ;*************************************************************************
1399
1400  005552  005077  173422          TYPMES: CLR     @PSW
1401  005556  010237  013162                  MOV     R2,TYPSV2           ;SAVE R2
1402  005562  017602  000000                  MOV     @(SP),R2            ;GET THE MESSAGE ADDRESS FROM START
1403  005566  062716  000002                  ADD     #2,(SP)             ;SET UP STACK TO EXIT
1404  005572  010146                          MOV     R1,-(SP)            ;SAVE R1
1405  005574  005037  013340                  CLR     PRTCNT
1406  005600  112201                  TYPERA: MOVB    (R2)+,R1            ;PICK UP CHAR.
1407  005602  105701                          TSTB    R1                  ;TEST FOR NULL CHARACTER
1408  005604  001444                          BEQ     TYPEXT              ;IF SO, EXIT
1409  005606  122701  000012                  CMPB    #12,R1              ;TEST FOR LINE FEED
1410  005612  001421                          BEQ     TYPECL
1411  005614  122701  000377                  CMPB    #377,R1             ;TEST FOR START CODE
1412  005620  001431                          BEQ     TYPERB
1413  005622  122701  000014                  CMPB    #EOP,R1             ;TEST FOR 'END OF PARAGRAPH'
1414  005626  001433                          BEQ     TYPEXT
1415  005630  122701  000045                  CMPB    #45,R1              ;TEST FOR '%'
1416  005634  001410                          BEQ     TYPECL              ;IF = TYPE 'CR-LF'
1417  005636  004737  005042                  JSR     PC,TYPEIT           ;OUTPUT CHAR.
1418  005642  005237  013340                  INC     PRTCNT
1419  005646  022737  000100  013340          CMP     #64.,PRTCNT         ;LINE FULL?
1420  005654  003351                          BGT     TYPERA              ;NO, CHECK NEXT CHAR.
1421  005656  005037  013340          TYPECL: CLR     PRTCNT
1422  005662  012701  000015                  MOV     #15,R1
1423  005666  004737  005042                  JSR     PC,TYPEIT           ;TYPE 'CR'
1424  005672  012701  000012                  MOV     #12,R1
1425  005676  004737  005042                  JSR     PC,TYPEIT           ;TYPE 'LF'
1426  005702  000736                          BR      TYPERA
1427
1428  005704  012701  000336          TYPERB: MOV     #336,R1
1429  005710  004737  005042                  JSR     PC,TYPEIT           ;PRINT '↑'
1430  005714  000760                          BR      TYPECL              ;TYPE 'CR/LF'
1431
1432  005716  013702  013162          TYPEXT: MOV     TYPSV2,R2           ;RESTORE R2
1433  005722  012601                          MOV     (SP)+,R1            ;RESTORE R1
1434  005724  000002                          RTI                         ;RETURN
```

```
1435
1436                                    ;*************************************************************************
1437                                    ;SUBROUTINE TO TYPEOUT A '6' DIGIT OCTAL NO. THE 'PC' CONTAINS
1438                                    ;THE ADDRESS OF 'WORD' TO BE TYPED
1439                                    ;*************************************************************************
1440
1441  005726  005077  173246           OCTPRT: CLR     @PSW
1442  005732  010137  006052                   MOV     R1,OCTSV1       ;SAVE R1
1443  005736  010237  006054                   MOV     R2,OCTSV2       ;SAVE R2
1444  005742  017601  000000                   MOV     @(SP),R1        ;THE ADDRESS OF WORD TO BE TYPED
1445  005746  062716  000002                   ADD     #2,(SP)         ;SET UP STACK TO EXIT
1446  005752  012737  000006  013332           MOV     #6,KSTOR3
1447  005760  012737  000376  006056           MOV     #376,MASK       ;MASK FOR FIRST BIT
1448  005766  000401                           BR      .+4
1449  005770  006111                  MOVEIT:  ROL     (R1)
1450  005772  006111                           ROL     (R1)
1451  005774  006111                           ROL     (R1)
1452  005776  111102                           MOVB    (R1),R2
1453  006000  143702  006056                   BICB    MASK,R2
1454  006004  052702  000260                   BIS     #260,R2
1455  006010  132777  000200  173170           BITB    #200,@TPS
1456  006016  100374                           BPL     .-6
1457  006020  110277  173164                   MOVB    R2,@TPB         ;PRINT CHAR.
1458  006024  012737  000370  006056           MOV     #370,MASK       ;MASK FOR NEXT '5' DIGITS
1459  006032  005337  013332                   DEC     KSTOR3
1460  006036  001354                           BNE     MOVEIT
1461  006040  013701  006052                   MOV     OCTSV1,R1       ;RESTORE R1
1462  006044  013702  006054                   MOV     OCTSV2,R2
1463  006050  000002                           RTI
1464
1465  006052  000000                  OCTSV1:  0
1466  006054  000000                  OCTSV2:  0
1467  006056  000376                  MASK:    376
1468
1469  006060  012604                  RSTORE:  MOV     (SP)+,R4        ;RESTORE WORKING REG.'S FROM STACK
1470  006062  012603                           MOV     (SP)+,R3
1471  006064  012602                           MOV     (SP)+,R2
1472  006066  012601                           MOV     (SP)+,R1
1473  006070  000002                           RTI                     ;RETURN
```

```
1474                            ;*************************************************************************
1475                            ;SUBROUTINE TO CONVERT 'N' 'BCD' WORDS SEPERATED VIA COMMA'S TO OCTAL
1476                            ;*************************************************************************
1477
1478  006072  012704  014770   BCDBIN: MOV     #TTYBUF,R4      ;PICK UP BUFFER POINTER
1479  006076  012737  013106  013104   MOV     #BCDBUF,BCDPTR  ;SET UP BUFFER POINTER
1480  006104  005037  013102           CLR     BCDCTR          ;COUNT NO. OF ENTRIES IN BUFFER
1481  006110  005001           BCDBN0: CLR     R1
1482  006112  105714           BCDBN1: TSTB    (R4)            ;END OF DATA?
1483  006114  001431                   BEQ     BCDEND          ;YES, EXIT
1484  006116  112403                   MOVB    (R4)+,R3        ;SAVE IT
1485  006120  022703  000054           CMP     #54,R3          ;CHAR. = TO ','?
1486  006124  001003                   BNE     BCDBN2          ;NO
1487  006126  004737  006160           JSR     PC,BCDBN3       ;YES, SAVE CURRENT WORD
1488  006132  000766                   BR      BCDBN0          ;CONVERT NEXT WORD
1489  006134  042703  000360   BCDBN2: BIC     #360,R3         ;STIPE NO. TO BCD
1490  006140  010102                   MOV     R1,R2           ;SAVE CURRENT TOTAL
1491  006142  006301                   ASL     R1              ;NX2
1492  006144  006301                   ASL     R1              ;NX4
1493  006146  006301                   ASL     R1              ;NX8
1494  006150  060201                   ADD     R2,R1           ;NX9
1495  006152  060201                   ADD     R2,R1           ;NX10
1496  006154  060301                   ADD     R3,R1           ;N+NEW NO.
1497  006156  000755                   BR      BCDBN1
1498
1499  006160  010177  004720   BCDBN3: MOV     R1,@BCDPTR      ;SAVE WORD
1500  006164  062737  000002  013104   ADD     #2,BCDPTR       ;UPDATE POINTER
1501  006172  005237  013102           INC     BCDCTR          ;COUNT NO. OF ENTRIES IN BUFFER
1502  006176  000207                   RTS     PC              ;RETURN
1503
1504  006200  004737  006160   BCDEND: JSR     PC,BCDBN3       ;SAVE WORD
1505  006204  012737  013106  013104   MOV     #BCDBUF,BCDPTR
1506  006212  000207                   RTS     PC              ;EXIT
```

```
1507                                    ;*************************************************************************
1508                                    ;SUBROUTINE TO PRINT DECIMAL VALUE
1509                                    ;*************************************************************************
1510
1511  006214  005077  172760   XBINDEC:CLR     @PSW
1512  006220  010237  006054           MOV     R2,OCTSV2       ;SAVE R2
1513  006224  017602  000000           MOV     @(SP),R2        ;PICK UP ADDRES OF VALUE
1514  006230  011202                   MOV     (R2),R2         ;MOVE VALUE TO R2
1515  006232  042702  160000           BIC     #160000,R2      ;CAN ONLY PRINT A '4' DIGIT NO.
1516  006236  062716  000002           ADD     #2,(SP)         ;SET UP STACK TO EXIT
1517  006242  010146                   MOV     R1,-(SP)
1518  006244  010446                   MOV     R4,-(SP)
1519  006246  012704  006324           MOV     #DECPTR,R4
1520  006252  012701  177777   TYPT1:  MOV     #-1,R1
1521  006256  005201           TYPT2:  INC     R1
1522  006260  161402                   SUB     (R4),R2
1523  006262  100375                   BPL     TYPT2
1524  006264  062402                   ADD     (R4)+,R2
1525  006266  052701  000260   DEC1:   BIS     #260,R1
1526  006272  004737  005042           JSR     PC,TYPEIT
1527  006276  005714                   TST     (R4)            ;DONE?
1528  006300  001364                   BNE     TYPT1           ;NO
1529  006302  012701  000240           MOV     #240,R1         ;YES, TYPE SPACE
1530  006306  004737  005042           JSR     PC,TYPEIT
1531  006312  013702  006054           MOV     OCTSV2,R2       ;RESTORE R2
1532  006316  012604                   MOV     (SP)+,R4
1533  006320  012601                   MOV     (SP)+,R1
1534  006322  000002                   RTI
1535
1536  006324  001750   DECPTR: 1000.
1537  006326  000144           100.
1538  006330  000012           10.
1539  006332  000001           1.
1540  006334  000000           0
```

```
1541                                    ;*****************************************************************
1542                                    ;POWER FAIL HANDLER
1543                                    ;*****************************************************************
1544
1545  006336  010046                    PWRFAL: MOV     R0,-(SP)
1546  006340  010146                            MOV     R1,-(SP)
1547  006342  010246                            MOV     R2,-(SP)
1548  006344  010346                            MOV     R3,-(SP)
1549  006346  010446                            MOV     R4,-(SP)
1550  006350  010546                            MOV     R5,-(SP)
1551  006352  013746  000024                    MOV     24,-(SP)
1552  006356  010637  013324                    MOV     SP,TEMP
1553  006362  012737  006372  000024            MOV     #PWRUP,@#24
1554  006370  000000                            HALT
1555  006372  012777  000340  172600  PWRUP:   MOV     #340,@PSW
1556  006400  005001                            CLR     R1              ;POWER UP DELAY
1557  006402  005201                            INC     R1
1558  006404  001376                            BNE     .-2
1559  006406  013706  013324                    MOV     TEMP,SP
1560  006412  012637  000024                    MOV     (SP)+,@#24
1561  006416  012605                            MOV     (SP)+,R5
1562  006420  012604                            MOV     (SP)+,R4
1563  006422  012603                            MOV     (SP)+,R3
1564  006424  012602                            MOV     (SP)+,R2
1565  006426  012601                            MOV     (SP)+,R1
1566  006430  012600                            MOV     (SP)+,R0
1567  006432  104000                            PRINT
1568  006434  011320                            MES4
1569  006436  000137  002006                    JMP     LDVECT
1570
1571                                    ;*****************************************************************
1572                                    ;EMT DISPATCH SERVICE ROUTINE
1573                                    ;ARGUMENT OF EMT IS EXTRACTED AND USED AS OFFSET TO OBTAIN POINTER
1574                                    ;TO THE SELECTED SUBROUTINE.
1575                                    ;*****************************************************************
1576
1577  006442  011646                    EMTSRV: MOV     (SP),-(SP)      ;GET PC FOR TO RETURN
1578  006444  162716  000002                    SUB     #2,(SP)         ;PC OF EMT
1579  006450  017616  000000                    MOV     @(SP),(SP)      ;GET EMT
1580  006454  005716                            TST     (SP)            ;IS EMT VALID?
1581  006456  001001                            BNE     EMTOK
1582  006460  000000                            HALT                    ;INVALID EMT
1583  006462  006316                    EMTOK:  ASL     (SP)            ;MULTIPLY EMT ARG BY '2'
1584  006464  042716  177001                    BIC     #177001,(SP)    ;CLEAR UNWANTED BITS
1585  006470  062716  006502                    ADD     #EMTTAB,(SP)    ;POINTER TO SUBROUTINE ADDRESS
1586  006474  017616  000000                    MOV     @(SP),(SP)      ;SUBROUTINE ADDRESS
1587  006500  000136                            JMP     @(SP)+          ;GO TO SUBROUTINE
1588
1589                                    ;EMT DISPATCH TABLE
1590
1591  006502  005552                    EMTTAB: TYPMES                  ;SUBROUTINE TO PRINT ASCII MESSAGES.
1592  006504  005726                            OCTPRT                  ;SUBROUTINE TO PRINT A '6' DIGIT OCTAL NO.
1593  006506  006214                            XBINDEC                 ;SUBROUTINE TO CONVERT OCTAL TO BINARY & PRNT IT
```

```
1594
1595
1596  006510  010146                ;SUBROUTINE ENTERED TO SERVICE LINE 0 RECEIVER INTERRUPTS.
1597
1598  006510  010146          RECV00: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1599  006512  010246                  MOV     R2,-(SP)
1600  006514  010346                  MOV     R3,-(SP)
1601  006516  010446                  MOV     R4,-(SP)
1602  006520  012701  000000          MOV     #0,R1           ;BUFFER OFFSET IS '0'
1603  006524  012702  000000          MOV     #0,R2           ;REGISTER OFFSET IS '0'
1604  006530  012703  000000          MOV     #0,R3           ;ADDRESS OFFSET IS '0'
1605  006534  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1606  006540  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1607  006544  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1608  006550  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S FROM STACK
1609
1610                                  ;SUBROUTINE ENTERED TO SERVICE LINE 1 RECEIVER INTERRUPTS
1611
1612  006554  010146          RECV01: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1613  006556  010246                  MOV     R2,-(SP)
1614  006560  010346                  MOV     R3,-(SP)
1615  006562  010446                  MOV     R4,-(SP)
1616  006564  012701  000764          MOV     #500.,R1        ;BUFFER OFFSET
1617  006570  012702  000020          MOV     #16.,R2         ;REGISTER OFFSET
1618  006574  012703  000002          MOV     #2,R3           ;ADDRESS OFFSET
1619  006600  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1620  006604  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1621  006610  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1622  006614  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1623
1624                                  ;SUBROUTINE ENTERED TO SERVICE LINE 2 RECEIVER INTERRUPTS
1625
1626  006620  010146          RECV02: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1627  006622  010246                  MOV     R2,-(SP)
1628  006624  010346                  MOV     R3,-(SP)
1629  006626  010446                  MOV     R4,-(SP)
1630  006630  012701  001750          MOV     #1000.,R1       ;BUFFER OFFSET
1631  006634  012702  000040          MOV     #32.,R2         ;REGISTER OFFSET
1632  006640  012703  000004          MOV     #4,R3           ;ADDRESS OFFSET
1633  006644  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1634  006650  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1635  006654  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1636  006660  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1637                                  ;SUBROUTINE ENTERED TO SERVICE LINE 3 RECEIVER INTERRUPTS
1638
1639  006664  010146          RECV03: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1640  006666  010246                  MOV     R2,-(SP)
1641  006670  010346                  MOV     R3,-(SP)
1642  006672  010446                  MOV     R4,-(SP)
1643  006674  012701  002734          MOV     #1500.,R1       ;BUFFER OFFSET
1644  006700  012702  000060          MOV     #48.,R2         ;REGISTER OFFSET
1645  006704  012703  000006          MOV     #6,R3           ;ADDRESS OFFSET
1646  006710  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1647  006714  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1648  006720  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1649  006724  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
                                      ;SUBROUTINE ENTERED TO SERVICE LINE 4 RECEIVER INTERRUPTS
```

```
 1650  006730  010146                 RECV04: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1651  006732  010246                         MOV     R2,-(SP)
 1652  006734  010346                         MOV     R3,-(SP)
 1653  006736  010446                         MOV     R4,-(SP)
 1654  006740  012701  003720                 MOV     #2000.,R1       ;BUFFER OFFSET
 1655  006744  012702  000100                 MOV     #64.,R2         ;REGISTER OFFSET
 1656  006750  012703  000010                 MOV     #8.,R3          ;ADDRESS OFFSET
 1657  006754  016304  013464                 MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
 1658  006760  004737  005064                 JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
 1659  006764  010463  013464                 MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1660  006770  000137  006060                 JMP     RSTORE          ;RESTORE WORKING REG.'S
 1661
 1662                                 ;SUBROUTINE ENTERED TO SERVICE LINE 5 RECEIVER INTERRUPTS
 1663
 1664  006774  010146                 RECV05: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1665  006776  010246                         MOV     R2,-(SP)
 1666  007000  010346                         MOV     R3,-(SP)
 1667  007002  010446                         MOV     R4,-(SP)
 1668  007004  012701  004704                 MOV     #2500.,R1       ;BUFFER OFFSET
 1669  007010  012702  000120                 MOV     #80.,R2         ;REGISTER OFFSET
 1670  007014  012703  000012                 MOV     #10.,R3         ;ADDRESS OFFSET
 1671  007020  016304  013464                 MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
 1672  007024  004737  005064                 JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
 1673  007030  010463  013464                 MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1674  007034  000137  006060                 JMP     RSTORE          ;RESTORE WORKING REG.'S
 1675
 1676                                 ;SUBROUTINE ENTERED TO SERVICE LINE 6 RECEIVER INTERRUPTS
 1677
 1678  007040  010146                 RECV06: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1679  007042  010246                         MOV     R2,-(SP)
 1680  007044  010346                         MOV     R3,-(SP)
 1681  007046  010446                         MOV     R4,-(SP)
 1682  007050  012701  005670                 MOV     #3000.,R1       ;BUFFER OFFSET
 1683  007054  012702  000140                 MOV     #96.,R2         ;REGISTER OFFSET
 1684  007060  012703  000014                 MOV     #12.,R3         ;ADDRESS OFFSET
 1685  007064  016304  013464                 MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
 1686  007070  004737  005064                 JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
 1687  007074  010463  013464                 MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1688  007100  000137  006060                 JMP     RSTORE          ;RESTORE WORKING REG.'S
 1689                                 ;SUBROUTINE ENTERED TO SERVICE LINE 7 RECEIVER INTERRUPTS
 1690
 1691  007104  010146                 RECV07: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1692  007106  010246                         MOV     R2,-(SP)
 1693  007110  010346                         MOV     R3,-(SP)
 1694  007112  010446                         MOV     R4,-(SP)
 1695  007114  012701  006654                 MOV     #3500.,R1       ;BUFFER OFFSET
 1696  007120  012702  000160                 MOV     #112.,R2                ;REGISTER OFFSET
 1697  007124  012703  000016                 MOV     #14.,R3         ;ADDRESS OFFSET
 1698  007130  016304  013464                 MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
 1699  007134  004737  005064                 JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
 1700  007140  010463  013464                 MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1701  007144  000137  006060                 JMP     RSTORE          ;RESTORE WORKING REG.'S
 1702                                 ;SUBROUTINE ENTERED TO SERVICE LINE 8 RECEIVER INTERRUPTS
 1703
 1704  007150  010146                 RECV08: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1705  007152  010246                         MOV     R2,-(SP)
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1706  007154  010346                  MOV     R3,-(SP)
1707  007156  010446                  MOV     R4,-(SP)
1708  007160  012701  007640          MOV     #4000.,R1       ;BUFFER OFFSET
1709  007164  012702  000200          MOV     #128.,R2                ;REGISTER OFFSET
1710  007170  012703  000020          MOV     #16.,R3         ;ADDRESS OFFSET
1711  007174  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1712  007200  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1713  007204  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1714  007210  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1715
1716                                ;SUBROUTINE ENTERED TO SERVICE LINE 9 RECEIVER INTERRUPTS
1717
1718  007214  010146          RECV09: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1719  007216  010246                  MOV     R2,-(SP)
1720  007220  010346                  MOV     R3,-(SP)
1721  007222  010446                  MOV     R4,-(SP)
1722  007224  012701  010624          MOV     #4500.,R1       ;BUFFER OFFSET
1723  007230  012702  000220          MOV     #144.,R2                ;REGISTER OFFSET
1724  007234  012703  000022          MOV     #18.,R3         ;ADDRESS OFFSET
1725  007240  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1726  007244  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1727  007250  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1728  007254  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1729                                ;SUBROUTINE ENTERED TO SERVICE LINE 10 RECEIVER INTERRUPTS
1730
1731  007260  010146          RECV10: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1732  007262  010246                  MOV     R2,-(SP)
1733  007264  010346                  MOV     R3,-(SP)
1734  007266  010446                  MOV     R4,-(SP)
1735  007270  012701  011610          MOV     #5000.,R1       ;BUFFER OFFSET
1736  007274  012702  000240          MOV     #160.,R2                ;REGISTER OFFSET
1737  007300  012703  000024          MOV     #20.,R3         ;ADDRESS OFFSET
1738  007304  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1739  007310  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1740  007314  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1741  007320  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1742
1743                                ;SUBROUTINE ENTERED TO SERVICE LINE 11 RECEIVER INTERRUPTS
1744
1745  007324  010146          RECV11: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1746  007326  010246                  MOV     R2,-(SP)
1747  007330  010346                  MOV     R3,-(SP)
1748  007332  010446                  MOV     R4,-(SP)
1749  007334  012701  012574          MOV     #5500.,R1       ;BUFFER OFFSET
1750  007340  012702  000260          MOV     #176.,R2                ;REGISTER OFFSET
1751  007344  012703  000026          MOV     #22.,R3         ;ADDRESS OFFSET
1752  007350  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1753  007354  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1754  007360  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1755  007364  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1756                                ;SUBROUTINE ENTERED TO SERVICE LINE 12 RECEIVER INTERRUPTS
1757
1758  007370  010146          RECV12: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1759  007372  010246                  MOV     R2,-(SP)
1760  007374  010346                  MOV     R3,-(SP)
1761  007376  010446                  MOV     R4,-(SP)
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1762  007400  012701  013560          MOV     #6000.,R1       ;BUFFER OFFSET
1763  007404  012702  000300          MOV     #192.,R2                ;REGISTER OFFSET
1764  007410  012703  000030          MOV     #24.,R3         ;ADDRESS OFFSET
1765  007414  016304  013464          MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1766  007420  004737  005064          JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1767  007424  010463  013464          MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1768  007430  000137  006060          JMP     RSTORE          ;RESTORE WORKING REG.'S
1769
1770                                ;SUBROUTINE ENTERED TO SERVICE LINE 13 RECEIVER INTERRUPTS
1771
1772  007434  010146                RECV13: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1773  007436  010246                        MOV     R2,-(SP)
1774  007440  010346                        MOV     R3,-(SP)
1775  007442  010446                        MOV     R4,-(SP)
1776  007444  012701  014544                MOV     #6500.,R1       ;BUFFER OFFSET
1777  007450  012702  000320                MOV     #208.,R2                ;REGISTER OFFSET
1778  007454  012703  000032                MOV     #26.,R3         ;ADDRESS OFFSET
1779  007460  016304  013464                MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1780  007464  004737  005064                JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1781  007470  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1782  007474  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1783                                ;SUBROUTINE ENTERED TO SERVICE LINE 14 RECEIVER INTERRUPTS
1784
1785  007500  010146                RECV14: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1786  007502  010246                        MOV     R2,-(SP)
1787  007504  010346                        MOV     R3,-(SP)
1788  007506  010446                        MOV     R4,-(SP)
1789  007510  012701  015530                MOV     #7000.,R1       ;BUFFER OFFSET
1790  007514  012702  000340                MOV     #224.,R2                ;REGISTER OFFSET
1791  007520  012703  000034                MOV     #28.,R3         ;ADDRESS OFFSET
1792  007524  016304  013464                MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1793  007530  004737  005064                JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1794  007534  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1795  007540  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1796  007544  000002                        RTI                     ;EXIT
1797                                ;SUBROUTINE ENTERED TO SERVICE LINE 15 RECEIVER INTERRUPTS
1798
1799  007546  010146                RECV15: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1800  007550  010246                        MOV     R2,-(SP)
1801  007552  010346                        MOV     R3,-(SP)
1802  007554  010446                        MOV     R4,-(SP)
1803  007556  012701  016514                MOV     #7500.,R1       ;BUFFER OFFSET
1804  007562  012702  000360                MOV     #240.,R2                ;REGISTER OFFSET
1805  007566  012703  000036                MOV     #30.,R3         ;ADDRESS OFFSET
1806  007572  016304  013464                MOV     SAVR4(R3),R4    ;SETUP BUFFER POINTER
1807  007576  004737  005064                JSR     PC,RECVER       ;SERVICE RECEIVER INTERRUPT
1808  007602  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1809  007606  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1810                                ;SUBROUTINE ENTERED TO SERVICE LINE 0  TRANSMITTER
1811
1812  007612  010146                XFER00: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1813  007614  010246                        MOV     R2,-(SP)
1814  007616  010346                        MOV     R3,-(SP)
1815  007620  010446                        MOV     R4,-(SP)
1816  007622  012701  000000                MOV     #0,R1           ;BUFFER OFFSET IS '0'
1817  007626  012702  000000                MOV     #0,R2           ;REGISTER OFFSET IS '0'
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1818  007632  012703  000000                MOV     #0,R3           ;ADDRESS OFFSET IS '0'
1819  007636  016304  013464                MOV     SAVR4(R3),R4
1820  007642  004737  005444                JSR     PC,TRNMIT
1821  007646  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1822  007652  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1823
1824                                    ;SUBROUTINE ENTERED TO SERVICE LINE 1 TRANSMITTER
1825
1826  007656  010146                XFER01: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1827  007660  010246                        MOV     R2,-(SP)
1828  007662  010346                        MOV     R3,-(SP)
1829  007664  010446                        MOV     R4,-(SP)
1830  007666  012701  000764                MOV     #500.,R1        ;BUFFER OFFSET
1831  007672  012702  000020                MOV     #16.,R2         ;REGISTER OFFSET
1832  007676  012703  000002                MOV     #2,R3           ;ADDRESS OFFSET
1833  007702  016304  013464                MOV     SAVR4(R3),R4
1834  007706  004737  005444                JSR     PC,TRNMIT
1835  007712  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1836  007716  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1837                                    ;SUBROUTINE ENTERED TO SERVICE LINE 2 TRANSMITTER
1838
1839  007722  010146                XFER02: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1840  007724  010246                        MOV     R2,-(SP)
1841  007726  010346                        MOV     R3,-(SP)
1842  007730  010446                        MOV     R4,-(SP)
1843  007732  012701  001750                MOV     #1000.,R1       ;BUFFER OFFSET
1844  007736  012702  000040                MOV     #32.,R2         ;REGISTER OFFSET
1845  007742  012703  000004                MOV     #4,R3           ;ADDRESS OFFSET
1846  007746  016304  013464                MOV     SAVR4(R3),R4
1847  007752  004737  005444                JSR     PC,TRNMIT
1848  007756  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1849  007762  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1850
1851                                    ;SUBROUTINE ENTERED TO SERVICE LINE 3 TRANSMITTER
1852
1853  007766  010146                XFER03: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1854  007770  010246                        MOV     R2,-(SP)
1855  007772  010346                        MOV     R3,-(SP)
1856  007774  010446                        MOV     R4,-(SP)
1857  007776  012701  002734                MOV     #1500.,R1       ;BUFFER OFFSET
1858  010002  012702  000060                MOV     #48.,R2         ;REGISTER OFFSET
1859  010006  012703  000006                MOV     #6,R3           ;ADDRESS OFFSET
1860  010012  016304  013464                MOV     SAVR4(R3),R4
1861  010016  004737  005444                JSR     PC,TRNMIT
1862  010022  010463  013464                MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1863  010026  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
1864                                    ;SUBROUTINE ENTERED TO SERVICE LINE 4 TRANSMITTER
1865
1866  010032  010146                XFER04: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1867  010034  010246                        MOV     R2,-(SP)
1868  010036  010346                        MOV     R3,-(SP)
1869  010040  010446                        MOV     R4,-(SP)
1870  010042  012701  003720                MOV     #2000.,R1       ;BUFFER OFFSET
1871  010046  012702  000100                MOV     #64.,R2         ;REGISTER OFFSET
1872  010052  012703  000010                MOV     #8.,R3          ;ADDRESS OFFSET
1873  010056  016304  013464                MOV     SAVR4(R3),R4
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1874  010062  004737  005444                  JSR     PC,TRNMIT
1875  010066  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1876  010072  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
1877
1878                                  ;SUBROUTINE ENTERED TO SERVICE LINE 5 TRANSMITTER
1879
1880  010076  010146                  XFER05: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1881  010100  010246                          MOV     R2,-(SP)
1882  010102  010346                          MOV     R3,-(SP)
1883  010104  010446                          MOV     R4,-(SP)
1884  010106  012701  004704                  MOV     #2500.,R1       ;BUFFER OFFSET
1885  010112  012702  000120                  MOV     #80.,R2         ;REGISTER OFFSET
1886  010116  012703  000012                  MOV     #10.,R3         ;ADDRESS OFFSET
1887  010122  016304  013464                  MOV     SAVR4(R3),R4
1888  010126  004737  005444                  JSR     PC,TRNMIT
1889  010132  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1890  010136  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
1891
1892                                  ;SUBROUTINE ENTERED TO SERVICE LINE 6 TRANSMITTER
1893  010142  010146                  XFER06: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1894  010144  010246                          MOV     R2,-(SP)
1895  010146  010346                          MOV     R3,-(SP)
1896  010150  010446                          MOV     R4,-(SP)
1897  010152  012701  005670                  MOV     #3000.,R1       ;BUFFER OFFSET
1898  010156  012702  000140                  MOV     #96.,R2         ;REGISTER OFFSET
1899  010162  012703  000014                  MOV     #12.,R3         ;ADDRESS OFFSET
1900  010166  016304  013464                  MOV     SAVR4(R3),R4
1901  010172  004737  005444                  JSR     PC,TRNMIT
1902  010176  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1903  010202  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
1904
1905                                  ;SUBROUTINE ENTERED TO SERVICE LINE 7 TRANSMITTER
1906
1907  010206  010146                  XFER07: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1908  010210  010246                          MOV     R2,-(SP)
1909  010212  010346                          MOV     R3,-(SP)
1910  010214  010446                          MOV     R4,-(SP)
1911  010216  012701  006654                  MOV     #3500.,R1       ;BUFFER OFFSET
1912  010222  012702  000160                  MOV     #112.,R2        ;REGISTER OFFSET
1913  010226  012703  000016                  MOV     #14.,R3         ;ADDRESS OFFSET
1914  010232  016304  013464                  MOV     SAVR4(R3),R4
1915  010236  004737  005444                  JSR     PC,TRNMIT
1916  010242  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
1917  010246  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
1918                                  ;SUBROUTINE ENTERED TO SERVICE LINE 8 TRANSMITTER
1919
1920  010252  010146                  XFER08: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
1921  010254  010246                          MOV     R2,-(SP)
1922  010256  010346                          MOV     R3,-(SP)
1923  010260  010446                          MOV     R4,-(SP)
1924  010262  012701  007640                  MOV     #4000.,R1       ;BUFFER OFFSET
1925  010266  012702  000200                  MOV     #128.,R2                ;REGISTER OFFSET
1926  010272  012703  000020                  MOV     #16.,R3         ;ADDRESS OFFSET
1927  010276  016304  013464                  MOV     SAVR4(R3),R4
1928  010302  004737  005444                  JSR     PC,TRNMIT
1929  010306  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
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 1930  010312  000137  006060                JMP     RSTORE          ;RESTORE WORKING REG.'S
 1931
 1932
 1933
 1934  010316  010146                  XFER09: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1935  010320  010246                          MOV     R2,-(SP)
 1936  010322  010346                          MOV     R3,-(SP)
 1937  010324  010446                          MOV     R4,-(SP)
 1938  010326  012701  010624                  MOV     #4500.,R1       ;BUFFER OFFSET
 1939  010332  012702  000220                  MOV     #144.,R2                ;REGISTER OFFSET
 1940  010336  012703  000022                  MOV     #18.,R3         ;ADDRESS OFFSET
 1941  010342  016304  013464                  MOV     SAVR4(R3),R4
 1942  010346  004737  005444                  JSR     PC,TRNMIT
 1943  010352  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1944  010356  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
 1945                                  ;SUBROUTINE ENTERED TO SERVICE LINE 10 TRANSMITTER
 1946
 1947  010362  010146                  XFER10: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1948  010364  010246                          MOV     R2,-(SP)
 1949  010366  010346                          MOV     R3,-(SP)
 1950  010370  010446                          MOV     R4,-(SP)
 1951  010372  012701  011610                  MOV     #5000.,R1       ;BUFFER OFFSET
 1952  010376  012702  000240                  MOV     #160.,R2                ;REGISTER OFFSET
 1953  010402  012703  000024                  MOV     #20.,R3         ;ADDRESS OFFSET
 1954  010406  016304  013464                  MOV     SAVR4(R3),R4
 1955  010412  004737  005444                  JSR     PC,TRNMIT
 1956  010416  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1957  010422  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
 1958
 1959                                  ;SUBROUTINE ENTERED TO SERVICE LINE 11 TRANSMITTER
 1960
 1961  010426  010146                  XFER11: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1962  010430  010246                          MOV     R2,-(SP)
 1963  010432  010346                          MOV     R3,-(SP)
 1964  010434  010446                          MOV     R4,-(SP)
 1965  010436  012701  012574                  MOV     #5500.,R1       ;BUFFER OFFSET
 1966  010442  012702  000260                  MOV     #176.,R2                ;REGISTER OFFSET
 1967  010446  012703  000026                  MOV     #22.,R3         ;ADDRESS OFFSET
 1968  010452  016304  013464                  MOV     SAVR4(R3),R4
 1969  010456  004737  005444                  JSR     PC,TRNMIT
 1970  010462  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1971  010466  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
 1972                                  ;SUBROUTINE ENTERED TO SERVICE LINE 12 TRANSMITTER
 1973
 1974  010472  010146                  XFER12: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1975  010474  010246                          MOV     R2,-(SP)
 1976  010476  010346                          MOV     R3,-(SP)
 1977  010500  010446                          MOV     R4,-(SP)
 1978  010502  012701  013560                  MOV     #6000.,R1       ;BUFFER OFFSET
 1979  010506  012702  000300                  MOV     #192.,R2                ;REGISTER OFFSET
 1980  010512  012703  000030                  MOV     #24.,R3 ;ADDRESS OFFSET
 1981  010516  016304  013464                  MOV     SAVR4(R3),R4
 1982  010522  004737  005444                  JSR     PC,TRNMIT
 1983  010526  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1984  010532  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
 1985
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 1986
 1987
 1988  010536  010146                  XFER13: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 1989  010540  010246                          MOV     R2,-(SP)
 1990  010542  010346                          MOV     R3,-(SP)
 1991  010544  010446                          MOV     R4,-(SP)
 1992  010546  012701  014544                  MOV     #6500.,R1       ;BUFFER OFFSET
 1993  010552  012702  000320                  MOV     #208.,R2                ;REGISTER OFFSET
 1994  010556  012703  000032                  MOV     #26.,R3         ;ADDRESS OFFSET
 1995  010562  016304  013464                  MOV     SAVR4(R3),R4
 1996  010566  004737  005444                  JSR     PC,TRNMIT
 1997  010572  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 1998  010576  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
 1999                                  ;SUBROUTINE ENTERED TO SERVICE LINE 14 TRANSMITTER
 2000
 2001  010602  010146                  XFER14: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 2002  010604  010246                          MOV     R2,-(SP)
 2003  010606  010346                          MOV     R3,-(SP)
 2004  010610  010446                          MOV     R4,-(SP)
 2005  010612  012701  015530                  MOV     #7000.,R1       ;BUFFER OFFSET
 2006  010616  012702  000340                  MOV     #224.,R2                ;REGISTER OFFSET
 2007  010622  012703  000034                  MOV     #28.,R3         ;ADDRESS OFFSET
 2008  010626  016304  013464                  MOV     SAVR4(R3),R4
 2009  010632  004737  005444                  JSR     PC,TRNMIT
 2010  010636  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 2011  010642  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
 2012
 2013                                  ;SUBROUTINE ENTERED TO SERVICE LINE 15 TRANSMITTER
 2014
 2015  010646  010146                  XFER15: MOV     R1,-(SP)        ;SAVE WORKING REG.'S ON THE STACK
 2016  010650  010246                          MOV     R2,-(SP)
 2017  010652  010346                          MOV     R3,-(SP)
 2018  010654  010446                          MOV     R4,-(SP)
 2019  010656  012701  016514                  MOV     #7500.,R1       ;BUFFER OFFSET
 2020  010662  012702  000360                  MOV     #240.,R2                ;REGISTER OFFSET
 2021  010666  012703  000036                  MOV     #30.,R3         ;ADDRESS OFFSET
 2022  010672  016304  013464                  MOV     SAVR4(R3),R4
 2023  010676  004737  005444                  JSR     PC,TRNMIT
 2024  010702  010463  013464                  MOV     R4,SAVR4(R3)    ;SAVE BUFFER POINTER ON RETURN
 2025  010706  000137  006060                  JMP     RSTORE          ;RESTORE WORKING REG.'S
```

```
2026
2027  010712  012701  000210          ;OVERLAY VECTOR AREA
2028  010716  012702  000212  OVRLAY: MOV     #210,%1         ;GET DL11-E VECTOR BASE ADDRESS
2029  010722  012703  000004          MOV     #212,%2
2030  010726  010221                  MOV     #4,%3
2031  010730  010321          OVRLYA: MOV     %2,(1)+         ;LOAD VECTOR WITH IOT ERROR TRAP
2032  010732  062702  000004          MOV     %3,(1)+
2033  010736  020127  001000          ADD     #4,%2
2034  010742  001401                  CMP     %1,#1000        ;ALL VECTORS BEEN LOADED
2035  010744  000770                  BEQ     OVRLYB
2036  010746  000207                  BR      OVRLYA
2037                          OVRLYB: RTS     7               ;EXIT
2038
2039                          ;MAPVEC - MAP VECTOR OR REPORT ERROR DEPENDING ON FMAP FLAG
2040  010750  011637  013346  MAPVEC: MOV     (SP),TOPC
2041  010754  022626                  POP2SP
2042  010756  011637  013350          MOV     (SP),FROMPC
2043  010762  005737  013352          TST     FMAP            ;MAPPING?
2044  010766  001427                  BEQ     ERTRAP          ;NO, REPORT ERROR
2045  010770  162737  000002  013346  SUB     #2,TOPC         ;SETUP TO LOAD TRAN'S ADDRESSES
2046  010776  013711  013346          MOV     TOPC,(R1)       ;STORE BR ADDRESS
2047  011002  162737  000002  013346  SUB     #2,TOPC
2048  011010  013741  013346          MOV     TOPC,-(R1)      ;STORE VECTOR
2049  011014  162737  000002  013346  SUB     #2,TOPC         ;SET UP TO LOAD RECEIVER ADDRESSES
2050  011022  013741  013346          MOV     TOPC,-(R1)      ;STORE BR ADDRESS
2051  011026  162737  000002  013346  SUB     #2,TOPC
2052  011034  013741  013346          MOV     TOPC,-(R1)
2053  011040  005037  013352          CLR     FMAP
2054  011044  000002                  RTI
2055
2056                          ;ERROR TRAP HANDLER, ENTERED ON ILLEGAL TRAPS
2057
2058  011046  104000          ERTRAP: PRINT
2059  011050  011361                  MES5                    ;TEXT 'ILLEGAL TRAP TO'
2060  011052  162737  000004  013346  SUB     #4,TOPC
2061  011060  104001                  PRTOCT
2062  011062  013346                  TOPC                    ; TYPE 'PC' TRAPPED TOO
2063  011064  104000                  PRINT
2064  011066  011436                  MES6                    ;TEXT 'FROM'
2065  011070  162737  000002  013350  SUB     #2,FROMPC
2066  011076  104001                  PRTOCT
2067  011100  013350                  FROMPC                  ;TYPE WHERE IT TRAPPED FROM
2068  011102  000000                  HALT                    ;WAIT FOR FIX
2069  011104  000137  001314          JMP     START           ;RE-START TEST
2070
```

```
 2071  011110     000                          .BYTE
 2072                                          ;MESSAGES
 2073
 2074  011111     045  050045  050104  TITLE:  .ASCII          ;%%PDP-11/VT20 HOST DIAGNOSTIC PROGRAM%;
 2075  011116  030455  027461  052126
 2076  011124  030062  044040  051517
 2077  011132  020124  044504  043501
 2078  011140  047516  052123  041511
 2079  011146  050040  047522  051107
 2080  011154  046501     045
 2081  011157     115  044501  042116          .ASCII          ;MAINDEC-11-DZVTE-B-PB;
 2082  011164  041505  030455  026461
 2083  011172  055104  052126  026505
 2084  011200  026502  041120
 2085  011204  020040  030440  027460          .ASCIZ          ;   10/17/74.%;
 2086  011212  033461  033457  027064
 2087  011220  000045
 2088
 2089  011222  047045  020117  046104  MES1:   .ASCIZ          ;%NO DL11 ADDRESSES PRESENT??;
 2090  011230  030461  040440  042104
 2091  011236  042522  051523  051505
 2092  011244  050040  042522  042523
 2093  011252  052116  037477     000
 2094
 2095  011257     045  047516  051040  MES2:   .ASCIZ          ;%NO RESPONSE FROM DEVICE  ;
 2096  011264  051505  047520  051516
 2097  011272  020105  051106  046517
 2098  011300  042040  053105  041511
 2099  011306  020105  000040
 2100
 2101  011312  044514  042516  000040  MES3:   .ASCIZ          ;LINE ;
 2102  011320  022446  042522  047503  MES4:   .ASCIZ          ;%%RECOVERED FROM POWER FAILURE.%;
 2103  011326  042526  042522  020104
 2104  011334  051106  046517  050040
 2105  011342  053517  051105  043040
 2106  011350  044501  052514  042522
 2107  011356  022456     000
 2108
 2109  011361     045  046111  042514  MES5:   .ASCIZ          ;%ILLEGAL TRAP TO ;
 2110  011366  040507  020114  051124
 2111  011374  050101  052040  020117
 2112  011402     000
 2113
 2114
 2115  011403     045  044506  051522  MFIAD:  .ASCIZ          ;%FIRST DL11 LINE ADDRESS? ;
 2116  011410  020124  046104  030461
 2117  011416  046040  047111  020105
 2118  011424  042101  051104  051505
 2119  011432  037523  000040
 2120
 2121  011436  043040  047522  020115  MES6:   .ASCIZ          ; FROM ;
 2122  011444     000
 2123
 2124  011445     045  044514  052123  MES7:   .ASCIZ  ;%LIST OF ACTIVE DL11 RECEIVERS;
 2125  011452  047440  020106  041501
 2126  011460  044524  042526  042040
```

```
2127  011466  030514  020061  042522
2128  011474  042503  053111  051105
2129  011502  000123
2130
2131  011504  046045  047111  020105  MES8:   .ASCIZ  ;%LINE IN   OUT  OR.  PAR. FRAM REC. TRAN ST.  HELD;
2132  011512  047111  020040  047440
2133  011520  052125  020040  051117
2134  011526  020056  050040  051101
2135  011534  020056  051106  046501
2136  011542  051040  041505  020056
2137  011550  051124  047101  051440
2138  011556  027124  020040  042510
2139  011564  042114     000
2140
2141
2142  011567     040  044504  043501  MES9:   .ASCIZ                ; DIAG. MODE ENABLED.;
2143  011574  020056  047515  042504
2144  011602  042440  040516  046102
2145  011610  042105  000056
2146  011614  051045  040505  042504  MES11:  .ASCIZ                ;%READER DEVICE ADDRESS? ;
2147  011622  020122  042504  044526
2148  011630  042503  040440  042104
2149  011636  042522  051523  020077
2150  011644     000
2151  011645     126  041505  047524  MES13:  .ASCIZ  ;VECTOR ADDRESS? ;
2152  011652  020122  042101  051104
2153  011660  051505  037523  000040
2154  011666  044440  046114  043505  CODE00: .ASCIZ  ; ILLEGAL RECVR. INTERRUPT.%.;
2155  011674  046101  051040  041505
2156  011702  051126  020056  047111
2157  011710  042524  051122  050125
2158  011716  027124  027045     000
2159
2160  011723     040  053117  051105  CODE01: .ASCIZ  ; OVERRUN ERROR.%.;
2161  011730  052522  020116  051105
2162  011736  047522  027122  027045
2163  011744     000
2164
2165  011745     040  051106  046501  CODE02: .ASCIZ  ; FRAMING ERROR.%.;
2166  011752  047111  020107  051105
2167  011760  047522  027122  027045
2168  011766     000
2169
2170  011767     040  040520  044522  CODE03: .ASCIZ  ; PARITY ERROR.%.;
2171  011774  054524  042440  051122
2172  012002  051117  022456  000056
2173
2174  012010  044440  046114  043505  CODE04: .ASCIZ  ; ILLEGAL START CODE.%.;
2175  012016  046101  051440  040524
2176  012024  052122  041440  042117
2177  012032  027105  027045     000
2178
2179  012037     040  046111  042514  CODE05: .ASCIZ  ; ILLEGAL READER INTERRUPT.%.;
2180  012044  040507  020114  042522
2181  012052  042101  051105  044440
2182  012060  052116  051105  052522
```

```
 2183  012066  052120  022456  000056
 2184
 2185  012074  044440  046114  043505  CODE06: .ASCIZ  ; ILLEGAL TRANS. INTERRUPT.%.;
 2186  012102  046101  052040  040522
 2187  012110  051516  020056  047111
 2188  012116  042524  051122  050125
 2189  012124  027124  027045     000
 2190
 2191  012131     040     000          SPACE:  .ASCIZ  ; ;
 2192  012133     045     000          CRLF:   .ASCIZ                  ;%;
 2193  012135     045  000056          DOT:    .ASCIZ  ;%.;
 2194  012140  000134                  SLASH:  .ASCIZ  ;\;
 2195                                          .EVEN
 2196
 2197
 2198  012142  000000                  MONFLG: 0
 2199  012144  000000                  MEMSIZ: 0
 2200  012146  000001                  UNITNO: 1
 2201  012150  000002                          2
 2202  012152  000004                          4
 2203  012154  000010                          10
 2204  012156  000020                          20
 2205  012160  000040                          40
 2206  012162  000100                          100
 2207  012164  000200                          200
 2208  012166  000400                          400
 2209  012170  001000                          1000
 2210  012172  002000                          2000
 2211  012174  004000                          4000
 2212  012176  010000                          10000
 2213  012200  020000                          20000
 2214  012202  040000                          40000
 2215  012204  100000                          100000
 2216
 2217                          ;DL11 ACTIVE DEVICE ADDRESSES LOADED BY MAPPER
 2218
 2219  012206  000000                  RCSR0:  0
 2220  012210  000000                  RBUF0:  0
 2221  012212  000000                  XCSR0:  0
 2222  012214  000000                  XBUF0:  0
 2223  012216  000000                  RVTR0:  0
 2224  012220  000000                  RLVL0:  0
 2225  012222  000000                  XVTR0:  0
 2226  012224  000000                  XLVL0:  0
 2227          012626                          .=.+256.                ;SAVE FOR POSSIBLE DL11 ADDRESSES
 2228
 2229                          ;ADDRESSES AND CONSTANTS
 2230
 2231
 2232  012626  000000                  HERE:   0
 2233  012630  000000                  INTRAN: 0                       ;SOFTWARE SW. FOR LEGAL TRANSMITTER INTERRUPTS
 2234          012672                          .=.+40
 2235  012672  000000                  HLDL0:  0
 2236          012734                          .=.+40
 2237  012734  000000                  SENDSW: 0
 2238          012776                          .=.+40
```

```
2239  012776  000000          BOOTSW: 0                       ;SET WHEN BOOTING PROGRAM
2240          013040                  .=.+40
2241  013040  000000          ERRCTR: 0
2242          013102                  .=.+40
2243  013102  000000          BCDCTR: 0
2244  013104  000000          BCDPTR: 0
2245  013106  000000          BCDBUF: 0
2246          013150                  .=.+40
2247  013150  000000          RCHAR:  0
2248  013152  000000          RSTAT:  0
2249  013154  000000          SYSSWH: 0
2250  013156  000000          TTYPTR: 0
2251  013160  000000          CNTR:   0
2252  013162  000000          TYPSV2: 0
2253  013164  000000          ACTIVE: 0
2254  013166  000000          RUBSWH: 0
2255  013170  000000          SCHAR:  0
2256  013172  000000          LINNO:  0
2257  013174  000000          ADDOFF: 0
2258  013176  000000          REGOFF: 0
2259  013200  000000          BUFOFF: 0
2260  013202  000000          CONSFL: 0
2261  013204  000000          SAVCHR: 0
2262  013206  000000          DEVADR: 0
2263  013210  000000          PRTFLG: 0
2264  013212  000000          BOOTP1: 0
2265  013214  000000          BOOTP2: 0
2266  013216  000000          BOOTAD: 0
2267  013220  000000          BOOTOF: 0                       ;CONTAINS  THE BOOT OFFSET NO.
2268          013262                  .=.+40
2269  013262  000000          BOOTLN: 0                       ;CONTAINS THE BOOT ADDR. LINE NO.
2270          013324                  .=.+40
2271  013324  000000          TEMP:   0                       ;TEMPORARY STORAGE
2272  013326  000000          KSTOR1: 0                       ;FERMANENT STORAGE
2273  013330  000000          KSTOR2: 0                       ;PERMANENT STORAGE
2274  013332  000000          KSTOR3: 0
2275  013334  000000          KSTOR4: 0
2276  013336  000000          RMODE:  0
2277  013340  000000          PRTCNT: 0
2278  013342  000000          ERRFLG: 0                       ;SOFTWARE SW.
2279  013344  000000          PRTSWH: 0                       ;SOFTWARE SW.
2280  013346  000000          TOPC:   0
2281  013350  000000          FROMPC: 0
2282  013352  000000          FMAP:   0                       ;SOFTWARE SW., SET IF MAPPING
2283  013354  000000          RECSWH: 0                       ;RECEIVER SOFTWARE SW, SET=RECEIVING
2284          013416                  .=.+40                  ;ALLOCATE FOR '16' RECEIVERS
2285                          ;READER DEVICE ADDRESSES
2286
2287  013416  000000          RCSR:   0
2288  013420  000000          RDBR:   0
2289
2290  013422  000000          TRNSWH: 0                       ;TRANSMITTER SOFTWARE SW, SET=TRANSMITTING
2291          013464                  .=.+40
2292  013464  000000          SAVR4:  0                       ;BUFFER AREA TO SAVE CONTENTS OF 'R4'
2293          013526                  .=.+40                  ;ALLOCATE '1' LOCATION FOR EACH UNIT.
2294  013526  000000          RECNTR: 0
```

```
2295                013570                          .=.+40
2296  013570        000000          XFERCT: 0
2297                013632                          .=.+40
2298  013632        000000          REC:    0
2299                013674                          .=.+40
2300  013674        000000          OR:     0
2301                013736                          .=.+40
2302  013736        000000          FRM:    0
2303                014000                          .=.+40
2304  014000        000000          PAR:    0
2305                014042                          .=.+40
2306  014042        000000          ST:     0
2307                014104                          .=.+40
2308  014104        000000          TRN:    0
2309                014146                          .=.+40
2310  014146        000000          ERRBUF: 0                       ;ERROR BUFFER STORAGE AREA.
2311                014770                          .=.+400.
2312  014770        000000          TTYBUF: 0
2313                015032                          .=.+40
2314  015032        000000          BUFFER: 0                       ;DATA BUFFER STORAGE AREA.
2315                000001                          .END
```

```
ACTIVE  013164            757    949*   1108   1271   1336*  1354*  1389*  2253#
ADDOFF  013174           1092*  2257#
BCDBIN  006072           1111   1478#
BCDBN0  006110           1481#  1488
BCDBN1  006112           1482#  1497
BCDBN2  006134           1486   1489#
BCDBN3  006160           1487   1499#  1504
BCDBUF  013106           1479   1505   2245#
BCDCTR  013102            898*   923*   951*   968*   983*  1172*  1190   1198*  1480*  1501*  2243#
BCDEND  006200           1483   1504#
BCDPTR  013104           1076   1077*  1479*  1499*  1500*  1505*  2244#
BINDEC= 104002            544#   783   1125   1147   1149   1151   1153   1155   1157   1159   1161   1163   1165
BOOT    004452            860   1189#
BOOTAD  013216           1234*  1237   1250*  1257*  2266#
BOOTLN  013262           1191   1238   2269#
BOOTOF  013220           1192   1239   2267#
BOOTP1  013212           1191*  1193*  1195*  2264#
BOOTP2  013214           1192*  1194*  1196*  2265#
BOOTSW  012776           1197*  1240   1256*  1379   2239#
BOOT1   004500           1193#  1201
BOOT2   004544           1199   1202#
BOOT3   004552           1204#  1208
BOOT4   004630           1203   1217#
BUFFER  015032           1016   1093   1337   1355   2314#
BUFOFF  013200           1090*  2259#
CNTR    013160           1122*  1125   1128*  2251#
CODE00  011666            793   2154#
CODE01  011723            794   2160#
CODE02  011745            795   2165#
CODE03  011767            796   2170#
CODE04  012010            797   2174#
CODE05  012037            798   2179#
CODE06  012074            799   2185#
CONC    003072            851    921#
CONC1   003102            924#   928
COND    003042            862    908#
CONH    003014            864    896#   901
CONH1   003040            899    902#
CONL    004134            871   1120#
CONM    004216            874   1140#
CONP    003224            876    963#
CONP1   003240            966#   972
CONP2   003244            966*   967#
CONP3   003270            969    973#
CONR    003140            866    940#
CONR1   003160            946#
CONR2   003206            945    951#
CONR3   003222            952    955#
CONS    003272            868    979#
CONSFL  013202            881    980*  1011*  2260#
CONSO   003342            993#  1009
CONS1   003302            981#   986
CONS2   003326            984    987#
CORSIZ  001354            591    595#
CRLF    012133            811    971   1112   1124   1146   2192#
DATA    002414            775    805#
```

```
DECPTR  006324          1519    1536#
DEC1    006266          1525#
DEVADR  013206           609     611*   612    1047*  1048*  1049*  1050*  1061   1063*  1064*  1065*  1102*  1206
                        1214    2262#
DOT     012135           748     886   1260    2193#
EMTOK   006462          1581    1583#
EMTSRV  006442           524    1577#
EMTTAB  006502          1585    1591#
EOP   = 000014           509#   1003   1012    1349   1385   1413
ERRBUF  014146           745     758    762     912   2310#
ERRCTR  013040          1295    1305   1313    1319   1331   1359*  2241#
ERRFLG  013342           760     772*   778*    780*   914*  1242*  1347*  1360*  2278#
ERRMES  002370           789*    790#
ERRTBL  002376           789     793#
ERTRAP  011046          20[illegible]    2058#
EXIT    002476          [illegible]2     820#
EXITKS  003002          [illegible]37    880    887#   987    1010   1051   1066   1219
EXTRAN  005550          1374    1376   1378    1380   1390   1392#
FINVEC  001652           646     662#
FMAP    013352           669*   2043   2053*   2282#
FORMIT  003730           896     940    965     979   1072#  1084   1141   1189
FORMON  003734           900     953    970     985   1073#  1174   1200
FOUNDV  001670           665#    686
FRAMER  005160          1303    1310#
FRM     013736          1156    1312*  2302#
FROMPC  013350          2042*   2065*  2067    2281#
GETLN   002760           839     841    881#
GETLN1  004050           608    1072   1102#   1205   1213
GETLN2  003520           883    1029#
HERE    012626           614*    620*   627     632    664    701   1142   2232#
HLDLO   012672           719     741    897*    944    946*   998   1164   1375   2235#
INTRAN  012630           717    1371   1373*   2233#
KEYSRV  002502           527     827#
KSTOR1  013326           679*    681    777*    783   2272#
KSTOR2  013330           776*    784   2273#
KSTOR3  013332          1446*   1459*  2274#
KSTOR4  013334          1190*   1233   2275#
LDADRS  001602           633     643#
LDNXTV  002050           702#    716
LDVECT  002006           666     694#  1569
LINNO   013172          1144*   1145*  1147    1166*  2256#
MAPNE   001522           615     623#
MAPVEC  010750           520    2040#
MASK    006056          1447*   1453   1458*   1467#
MEMSIZ  012144           596*    601    732    2199#
MES1    011222           635    2089#
MES11   011614          1204    2146#
MES13   011645          1212    2151#
MES2    011257           678    2095#
MES3    011312           782    2101#
MES4    011320          1568    2102#
MES5    011361          2059    2109#
MES6    011436          2064    2121#
MES7    011445          1121    2124#
MES8    011504          1143    2131#
MES9    011567           910    2142#
```

```
MFIAD   011403            607    2115#
MONFLG  012142            603     605*   2198#
MOVEIT  005770           1449#   1460
NOP   = 000240            507#
NXADRS  001612            645#    655
NXTCHR  005544           1386    1391#
OCTPRT  005726           1441#   1592
OCTSV1  006052           1442*   1461    1465#
OCTSV2  006054           1443*   1462    1466#   1512*   1531
OR      013674           1152    1304*   2300#
OVRLAY  010712            590    2027#
OVRLYA  010726           2030#   2035
OVRLYB  010746           2034    2036#
PAR     014000           1154    1318*   2304#
PARITY  005212           1311    1318#
PC    =%000007            500#    590*    608*    836*    843*    846*    879*    896*    900*    924*    940*    941*    953*
                          955*    965*    970*    979*    985*    989*   1035*   1060*   1072*   1083*   1097*   1111*   1113*
                         1141*   1174*   1189*   1200*   1205*   1213*   1275*   1363*   1392*   1417*   1423*   1425*   1429*
                         1487*   1502*   1504*   1506*   1526*   1530*   1604*   1618*   1632*   1645*   1658*   1672*   1686*
                         1699*   1712*   1726*   1739*   1753*   1766*   1780*   1793*   1807*   1820*   1834*   1847*   1861*
                         1874*   1888*   1901*   1915*   1928*   1942*   1955*   1969*   1982*   1996*   2009*   2023*
POP1SP= 005726            504#
POP2SP= 022626            505#    623    2041
PRINT = 104000            542#    543     606     607     634     677     748     782     790     811     886     910     967
                          971    1033    1055    1112    1121    1124    1143    1146    1204    1212    1260    1567    2058
                         2063
PRTAS0  002436            810#    815     819
PRTAS1  002450            808     814#
PRTCNT  013340            810*    817*    818    1405*   1418*   1419    1421*   2277#
PRTDOT  002772            885#    902     915     942     973    1023    1132    1176
PRTFLG  013210           2263#
PRTOCT= 104001            543#    544     680    1127    2061    2066
PRTSWH  013344           2279#
PSW     001200            533#    587*    668*    674*    729*    749*    963*   1107*   1120*   1140*   1400*   1441*   1511*
                         1555*
PUSH2S= 024646            506#
PWRFAL  006336            522    1545#
PWRUP   006372           1553    1555#
QMARK   002746            856     878#   1042
RBUF0   012210           1291    2220#
RCHAR   013150           1236*   1249    2247#
RCSR    013416           1202    1209*   1217*   1235    1253*   1255*   2287#
RCSR0   012206            599     643     697    2219#
RDBR    013420           1211*   1236    2288#
READER  004646           1215    1229#
READIT  004702           1237#   1252    1259
READ1   004744           1241    1247#
READ2   005002           1246    1248    1255#
READ3   005030           1254    1261#
REC     013632           1158    1294*   2298#
RECERR  005424           1298    1308    1316    1322    1334    1359#   1384
RECEXT  005442           1296    1306    1314    1320    1327    1332    1350    1358    1363#
RECNTR  013526           1148    1352*   2294#
RECR4A  005340           1341    1344#
RECSWH  013354            730     743    1324    1335*   1351*   2283#
RECVER  005064           1291#   1604    1618    1632    1645    1658    1672    1686    1699    1712    1726    1739    1753
```

```
R4      =%000004        497# 613* 621* 629* 698* 710* 712* 784* 785* 786* 787  789  830
                        887* 929* 966  981  995* 1002* 1003* 1004 1012* 1016* 1017* 1018 1076*
                       1078  1080 1088* 1093* 1094* 1095* 1096* 1232 1233* 1251* 1258* 1261* 1337*
                       1338* 1339* 1340* 1344* 1348  1349  1355* 1356* 1357  1385  1391  1469* 1478*
                       1482  1484  1518  1519* 1522  1524  1527  1532* 1549  1562* 1599  1603* 1605
                       1613  1617* 1619  1627  1631* 1633  1640  1644* 1646  1653  1657* 1659  1667
                       1671* 1673  1681  1685* 1687  1694  1698* 1700  1707  1711* 1713  1721  1725*
                       1727  1734  1738* 1740  1748  1752* 1754  1761  1765* 1767  1775  1779* 1781
                       1788  1792* 1794  1802  1806* 1808  1815  1819* 1821  1829  1833* 1835  1842
                       1846* 1848  1856  1860* 1862  1869  1873* 1875  1883  1887* 1889  1896  1900*
                       1902  1910  1914* 1916  1923  1927* 1929  1937  1941* 1943  1950  1954* 1956
                       1964  1968* 1970  1977  1981* 1983  1991  1995* 1997  2004  2008* 2010  2018
                       2022* 2024
R5      =%000005        498# 699* 700* 714  715  746* 762* 763  776  777  807  814  816
                        820  913* 1550 1561*
SAVCHR  013204         1291* 1300 1302 1310 1326 1328 1342 1344 2261#
SAVR4   013464          981* 995  1004* 1018* 1603 1605* 1617 1619* 1631 1633* 1644 1646* 1657
                       1659* 1671 1673* 1685 1687* 1698 1700* 1711 1713* 1725 1727* 1738 1740*
                       1752  1754* 1765 1767* 1779 1781* 1792 1794* 1806 1808* 1819 1821* 1833
                       1835* 1846 1848* 1860 1862* 1873 1875* 1887 1889* 1900 1902* 1914 1916*
                       1927  1929* 1941 1943* 1954 1956* 1968 1970* 1981 1983* 1995 1997* 2008
                       2010* 2022 2024* 2292#
SCHAR   013170          833* 844  996  1000 1002 1103* 1109 2255#
SENDBF  003400          999  1002#
SENDLN  003330          882  989#
SENDSW  012734          947* 982* 993  1013 1015* 1377 2237#
SERVCE  002152          703  729# 854
SLASH   012140         1033  1055 2194#
SP      =%000006        499# 588* 740* 827* 828* 829* 830* 887  888  889  890  929  930
                        931  932  1229* 1230* 1231* 1232* 1261 1262 1263 1264 1402 1403* 1404*
                       1433  1444 1445* 1469 1470 1471 1472 1513 1516* 1517* 1518* 1532 1533
                       1545* 1546* 1547* 1548* 1549* 1550* 1551* 1552 1559* 1560 1561 1562 1563
                       1564  1565 1566 1577* 1578* 1579* 1580 1583* 1584* 1585* 1586* 1587 1596*
                       1597* 1598* 1599* 1610* 1611* 1612* 1613* 1624* 1625* 1626* 1627* 1637* 1638*
                       1639* 1640* 1650* 1651* 1652* 1653* 1664* 1665* 1666* 1667* 1678* 1679* 1680*
                       1681* 1691* 1692* 1693* 1694* 1704* 1705* 1706* 1707* 1718* 1719* 1720* 1721*
                       1731* 1732* 1733* 1734* 1745* 1746* 1747* 1748* 1758* 1759* 1760* 1761* 1772*
                       1773* 1774* 1775* 1785* 1786* 1787* 1788* 1799* 1800* 1801* 1802* 1812* 1813*
                       1814* 1815* 1826* 1827* 1828* 1829* 1839* 1840* 1841* 1842* 1853* 1854* 1855*
                       1856* 1866* 1867* 1868* 1869* 1880* 1881* 1882* 1883* 1893* 1894* 1895* 1996*
                       1907* 1908* 1909* 1910* 1920* 1921* 1922* 1923* 1934* 1935* 1936* 1937* 1947*
                       1948* 1949* 1950* 1961* 1962* 1963* 1964* 1974* 1975* 1976* 1977* 1988* 1989*
                       1990* 1991* 2001* 2002* 2003* 2004* 2015* 2016* 2017* 2018* 2040 2042
                       2191#
SPACE   012131          761  772#
SRVERR  002272         1162  1330* 2306#
ST      014042          508# 588  740
STACK = 001100          530  587# 636  682  849  2069
START   001314          604  607#
START1  001432          610  612#
START2  001456          617# 628
START3  001504          538# 757* 1108* 1271*
SWR     001212          855  857* 877*  885*  1131* 1218* 2249#
SYSSWH  013154          997  1011#
TAGA    003442         1013# 1022
TAGB    003452          994  1006#
TAGC    003420
```

```
TAGD    003476          1014    1019#
TEMP    013324           664*    665     667*    701*    702     704*    1126*   1127    1148*   1149    1150*   1151    1152*
                        1153    1154*   1155    1156*   1157    1158*   1159    1160*   1161    1162*   1163    1164*   1165
                        1552*   1559    2271#
TITLE   011111           606    2074#
TKB     001204           535#    831
TKS     001202           534#    589*    747*    1106*
TOPC    013346          2040*   2045*   2046    2047*   2048    2049*   2050    2051*   2052    2060*   2062    2280#
TPB     001210           537#    809*    816*    1274*   1457*
TPS     001206           536#    805     1272    1455
TRANOK  005516          1382    1385#
TRN     014104          1160    2308#
TRNMIT  005444          1371#   1820    1834    1847    1861    1874    1888    1901    1915    1928    1942    1955    1969
                        1982    1996    2009    2023
TRNSWH  013422           948*   1292    1353*   1381    1387*   2290#
TSTERR  002240           757#    764     781     788     791     821
TSTVA   001766           676     683#
TTYBUF  014770          1104*   1105    1168    1478    2312#
TTYPTR  013156          1043*   1044*   1045*   1057*   1058    1059*   1105*   2250#
TYPECL  005656          1410    1416    1421#   1430
TYPEIT  005042           836     843     846     879     989    1035    1060    1083    1271#   1273    1417    1423    1425
                        1429    1526    1530
TYPERA  005600          1406#   1420    1426
TYPERB  005704          1412    1428#
TYPEXT  005716          1408    1414    1432#
TYPMES  005552          1400#   1591
TYPSV2  013162          1401*   1432    2252#
TYPT1   006252          1520#   1528
TYPT2   006256          1521#   1523
UNITNO  012146           949    1336    1354    1389    2200#
XBINDE  006214          1511#   1593
XBUFO   012214           950*   1000*   1249*   1357*   1391*   2222#
XCSRO   012212           662     698    2221#
XFERCT  013570          1150    1388*   2296#
XFERO0  007612           696    1912#
XFERO1  007656          1826#
XFERO2  007722          1839#
XFERO3  007766          1853#
XFERO4  010032          1866#
XFERO5  010076          1880#
XFERO6  010142          1893#
XFERO7  010206          1907#
XFERO8  010252          1920#
XFERO9  010316          1934#
XFER10  010362          1947#
XFER11  010426          1961#
XFER12  010472          1974#
XFER13  010536          1988#
XFER14  010602          2001#
XFER15  010646          2015#
XLVLO   012224           663    2226#
XVTRO   012222          2225#
.     = 015034           513#    518     519#    526#    529#    532#    594     602     622     806     848     853     859
                        1372    1448    1456    1558    2227#   2234#   2236#   2238#   2240#   2242#   2246#   2268#   2270#
                        2284#   2291#   2293#   2295#   2297#   2299#   2301#   2303#   2305#   2307#   2309#   2311#   2313#
```

```
ADD      624   654   684   685   711   712   713   714   715   925   926  1005  1006  1007  1017
        1019  1020  1050  1077  1085  1086  1087  1094  1167  1195  1196  1210  1242  1250  1257
        1338  1356  1360  1403  1445  1494  1495  1496  1500  1516  1524  1585  2032
ASL      786  1047  1048  1049  1491  1492  1493  1583
ASR     1063  1064  1065  1145
ASRB    1245  1362
BEQ      666   703   788   815   819   839   851   862   864   866   868   876   899   909   945
         994   997  1014  1030  1032  1037  1079  1130  1199  1208  1293  1303  1311  1327  1329
        1343  1346  1408  1410  1412  1414  1416  1483  2034  2044
BGE      841  1081
BGT     1420
BIC      670   683   785   832  1046  1062  1336  1389  1489  1515  1584
BICB    1453
BIS      649   651   653   669   671   709   710   747   845   949  1106  1354  1454  1525
BIT      645  1129  1302  1310
BITB    1455
BLE      626   952   969   984  1041  1173
BLOS     759
BLT     1039  1296  1306  1314  1320  1332
BMI      773  1248
BNE      602   604   610   628   633   646   676   720   733   744   761   775   808   835   848
         853   856   859   870   873   882   928   999  1009  1022  1054  1089  1110  1169  1171
        1203  1241  1252  1259  1325  1350  1372  1376  1378  1380  1382  1386  1460  1486  1528
        1558  1581
BPL      779   806  1273  1301  1456  1523
BR       594   622   636   655   686   716   764   781   791   812   821   837   880   901   902
         911   915   942   954   972   973   986   987  1084  1175  1201  1246  1254  1298  1308
        1316  1322  1334  1341  1358  1374  1384  1390  1426  1430  1448  1488  1497  2035
CLR      589   600   614   616   668   718   731   742   749   780   810   885   914   921   922
         923   946   947   950   963   964   990   991   992  1011  1015  1034  1073  1074  1075
        1095  1096  1102  1103  1104  1107  1120  1122  1131  1140  1216  1218  1234  1255  1256
        1339  1340  1351  1387  1400  1405  1421  1441  1480  1481  1511  1556  2053
CLRB    1045  1059  1297
CMP      601   625   627   719   732   743   758   787   818   834   838   840   927  1008  1021
        1029  1080  1109  1295  1305  1313  1319  1331  1419  1485  2033
CMPB     807   814   847   850   852   858   861   863   865   867   869   872   875   996  1036
        1038  1040  1328  1342  1349  1385  1409  1411  1413  1415
COM      908
DEC      667   704   772   778   877   898   951   968   983  1057  1088  1170  1172  1198  1251
        1258  1459
EMT      542
HALT     790   967  1554  1582  2068
INC      605   620   817   857   897   948   980   982  1044  1056  1128  1166  1197  1294  1304
        1312  1318  1330  1335  1347  1352  1353  1359  1373  1388  1418  1501  1521  1557
JMP      530   682   849   854   860   871   874   883   933  1010  1023  1042  1051  1066  1132
        1176  1219  1569  1587  1606  1620  1634  1647  1660  1674  1688  1701  1714  1728  1741
        1755  1768  1782  1795  1809  1822  1836  1849  1863  1876  1890  1903  1917  1930  1944
        1957  1971  1984  1998  2011  2025  2069
JSR      590   608   836   843   846   879   896   900   924   940   941   953   965   970   979
         985   989  1035  1060  1072  1083  1111  1141  1174  1189  1200  1205  1213  1417  1423
        1425  1429  1487  1504  1526  1530  1604  1618  1632  1645  1658  1672  1686  1699  1712
        1726  1739  1753  1766  1780  1793  1807  1820  1834  1847  1861  1874  1888  1901  1915
        1928  1942  1955  1969  1982  1996  2009  2023
MOV      587   588   591   592   596   597   598   599   611   612   613   615   621   629   630
         631   643   644   647   648   650   652   662   663   664   674   679   694   695   696
         697   698   699   701   705   706   707   708   717   729   730   740   741   745   746
```

```
                757   762   763   784   789   827   828   829   830   833   842   844   887   888   889
                890   912   913   929   930   931   932   966   981   995  1004  1016  1018  1061  1076
               1082  1090  1091  1092  1093  1105  1108  1123  1126  1142  1144  1148  1150  1152  1154
               1156  1158  1160  1162  1164  1190  1191  1192  1193  1194  1206  1209  1211  1214  1215
               1217  1229  1230  1231  1232  1233  1235  1236  1237  1238  1239  1253  1261  1262  1263
               1264  1271  1291  1337  1355  1401  1402  1404  1422  1424  1428  1432  1433  1442  1443
               1444  1446  1447  1458  1461  1462  1469  1470  1471  1472  1478  1479  1490  1499  1505
               1512  1513  1514  1517  1518  1519  1520  1529  1531  1532  1533  1545  1546  1547  1548
               1549  1550  1551  1552  1553  1555  1559  1560  1561  1562  1563  1564  1565  1566  1577
               1579  1586  1596  1597  1598  1599  1600  1601  1602  1603  1605  1610  1611  1612  1613
               1614  1615  1616  1617  1619  1624  1625  1626  1627  1628  1629  1630  1631  1633  1637
               1638  1639  1640  1641  1642  1643  1644  1646  1650  1651  1652  1653  1654  1655  1656
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               1682  1683  1684  1685  1687  1691  1692  1693  1694  1695  1696  1697  1698  1700  1704
               1705  1706  1707  1708  1709  1710  1711  1713  1718  1719  1720  1721  1722  1723  1724
               1725  1727  1731  1732  1733  1734  1735  1736  1737  1738  1740  1745  1746  1747  1748
               1749  1750  1751  1752  1754  1758  1759  1760  1761  1762  1763  1764  1765  1767  1772
               1773  1774  1775  1776  1777  1778  1779  1781  1785  1786  1787  1788  1789  1790  1791
               1792  1794  1799  1800  1801  1802  1803  1804  1805  1806  1808  1812  1813  1814  1815
               1816  1817  1818  1819  1821  1826  1827  1828  1829  1830  1831  1832  1833  1835  1839
               1840  1841  1842  1843  1844  1845  1846  1848  1853  1854  1855  1856  1857  1858  1859
               1860  1862  1866  1867  1868  1869  1870  1871  1872  1873  1875  1880  1881  1882  1883
               1884  1885  1886  1887  1889  1893  1894  1895  1896  1897  1898  1899  1900  1902  1907
               1908  1909  1910  1911  1912  1913  1914  1916  1920  1921  1922  1923  1924  1925  1926
               1927  1929  1934  1935  1936  1937  1938  1939  1940  1941  1943  1947  1948  1949  1950
               1951  1952  1953  1954  1956  1961  1962  1963  1964  1965  1966  1967  1968  1970  1974
               1975  1976  1977  1978  1979  1980  1981  1983  1988  1989  1990  1991  1992  1993  1994
               1995  1997  2001  2002  2003  2004  2005  2006  2007  2008  2010  2015  2016  2017  2018
               2019  2020  2021  2022  2024  2027  2028  2029  2030  2031  2040  2042  2046  2048  2050
               2052
MOVB            776   777   809   816   831   878  1000  1002  1003  1012  1043  1058  1243  1244  1249
               1274  1307  1315  1321  1333  1344  1348  1357  1361  1383  1391  1406  1452  1457  1484
NOP             618   619   672   673
ROL            1449  1450  1451
RTI             891  1265  1434  1463  1473  1534  1796  2054
RTS             955  1097  1113  1275  1363  1392  1502  1506  2036
SUB             595   700  1522  1578  2045  2047  2049  2051  2060  2065
TST             593   603   609   617   632   665   675   702   760   774   855   881   944   993   998
               1013  1031  1053  1078  1202  1207  1240  1247  1292  1300  1324  1345  1371  1375  1377
               1379  1381  1527  1580  2043
TSTB            805   820  1168  1272  1326  1407  1482
.ABS            484
.ASCII         2074  2081
.ASCIZ         2085  2089  2095  2101  2102  2109  2115  2121  2124  2131  2142  2146  2151  2154  2160
               2165  2170  2174  2179  2185  2191  2192  2193  2194
.BYTE          2071
.ENABL          485
.END           2315
.EVEN          2195
.REM              1
.REPT           514
.TITLE          483
```

```
 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DZVTEB,DZVTEB.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZVTEB.P11
 RUN-TIME: 7 15 3 SECONDS
 RUN-TIME RATIO: 55/27=2.0
 CORE USED:  9K  (18 PAGES)
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K05.

Spooler runtime 9 Seconds, 40 KCS, 248 disk reads, 3 disk writes, 61 pages

[illegible] Date 14-Oct-76 13:19:18 Monitor [illegible]

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[illegible]

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9000000011111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000001111111111222222222233312